Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Preliminary Environmental Information Report

Volume 1

Chapter 23 - Onshore Archaeology & Cultural Heritage

April 2021

China Resources
Better Life Together

Masdar
A MUBADALA COMPANY

equinor

Title**:**	
Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions Preliminary Environmental Information Report Chapter 23 Onshore Archaeology and Cultural Heritage	
Document no.: PB8164-RHD-ZZ-XX-RP-Z-0010	
Date:	Classification
29th April 2021	**Final**
Prepared by:	
Royal HaskoningDHV	
Approved by:	Date:
Jo Rodriguez, Equinor	29th April 2021

Table of Contents

List of Tables

Volume 3

Glossary of Acronyms

ADBA	Archaeological Desk Based Assessment
BDC	Broadland District Council
BGS	British Geological Survey
CIA	Cumulative Impact Assessment
DCO	Development Consent Order
DECC	Department of Energy and Climate Change
DEP	Dudgeon Offshore Wind Farm Extension Project
DMRB	Design Manual for Roads and Bridges
DOW	Dudgeon Offshore Wind Farm
EIA	Environmental Impact Assessment
EPP	Evidence Plan Process
ES	Environmental Statement
ETG	Expert Topic Group
GIS	Geographical Information System
HLC	Historic Landscape Characterisation
HVAC	High-Voltage Alternating Current
HVDC	High-Voltage Direct Current
km	Kilometre
LiDAR	Light Detection and Ranging
LPA	Local Planning Authority
LVIA	Landscape and Visual Impact Assessment
MHCLG	Ministry for Housing, Communities and Local Government
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MW	Megawatts
NCC HES	Norfolk County Council Historic Environment Service
NHER	Norfolk Historic Environment Record
NHLE	National Heritage List for England
NNDC	North Norfolk District Council
NMP	National Mapping Programme
NorCC	Norwich City Council
NPPF	National Planning Policy Framework

NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
OS	Ordnance Survey
OWF	Offshore Wind Farm
PEIR	Preliminary Environmental Information Report
PPG	Planning Practice Guidance
SEP	Sheringham Shoal Offshore Wind Farm Extension Project
SNC	South Norfolk Council
SoS	Secretary of State
SVIA	Seascape and Visual Impact Assessment
UK	United Kingdom
WSI	Written Scheme of Investigation
WTG	Wind Turbine Generator
ZTV	Zone of Theoretical Visibility

Glossary of Terms

The Applicant	Equinor New Energy Limited
DCO boundary	The area subject to the application for development consent, including all permanent and temporary works for DEP and SEP. The DCO boundary will be subject to updated impact assessment and further development of mitigation proposals to inform the ES.
Dudgeon Offshore Wind Farm Extension site	The Dudgeon Offshore Wind Farm Extension offshore wind farm boundary.
The Dudgeon Offshore Wind Farm Extension Project (DEP)	The Dudgeon Offshore Wind Farm Extension site as well as all onshore and offshore infrastructure.
Evidence Plan Process (EPP)	A voluntary consultation process with specialist stakeholders to agree the approach, and information to support, the EIA and HRA for certain topics.
Horizontal directional drilling (HDD) zones	The areas within the onshore cable corridor which would house HDD entry or exit points.
Infield cables	Cables which link the wind turbine generators to the offshore substation platforms.
Jointing bays	Underground structures constructed at regular intervals along the onshore cable corridor to join sections of cable and facilitate installation of the cables into the buried ducts.
Landfall	The point at the coastline at which the offshore export cables are brought onshore, connecting to the onshore cables at the transition joint bay above mean high water
PEIR boundary	The area subject to survey and preliminary impact assessment to inform the PEIR, including all permanent and temporary works for DEP and SEP. The PEIR boundary will be refined down to the final DCO boundary ahead of the application for development consent.
Offshore export cables	The cables which would bring electricity from the offshore substation platform(s) to the landfall. 220 – 230kV
Offshore substation platform	A fixed structure located within the wind farm area, containing electrical equipment to aggregate the power generated by the wind turbines and increase the voltage before transmitting the power to shore
Onshore cable corridor	The area between the landfall and the onshore substation sites, within which the onshore cable

	circuits will be installed along with other temporary works for construction.
Onshore export cables	The cables which would bring electricity from the landfall to the onshore substation. 220 – 230kV
Onshore substation sites	Parcels of land within onshore substation zones A and B, identified as the most suitable location for development of the onshore substation. Two sites have been identified for further assessment within the PEIR.
Onshore Substation Zone	Parcels of land within the wider onshore substation search area identified as suitable for development of the onshore substation. Two substation zones (A and B) have been identified as having the greatest potential to accommodate the onshore substation.
Study area	Area where potential impacts from the project could occur, as defined for each individual EIA topic.
Sheringham Shoal Offshore Wind Farm Extension site	Sheringham Shoal Offshore Wind Farm Extension lease area.
The Sheringham Shoal Offshore Wind Farm Extension Project (SEP)	The Sheringham Shoal Offshore Wind Farm Extension site as well as all onshore and offshore infrastructure.
Transition joint bay	Connects offshore and onshore export cables at the landfall. The transition joint bay will be located above mean high water

23 ONSHORE ARCHAEOLOGY AND CULTURAL HERITAGE

23.1 Introduction

1. This chapter of the Preliminary Environmental Information Report (PEIR) considers the potential impacts of the proposed Dudgeon Offshore Wind Farm Extension Project (DEP) and Sheringham Shoal Offshore Wind Farm Extension Project (SEP) on Onshore Archaeology and Cultural Heritage. The chapter provides an overview of the existing environment within the study areas, followed by an assessment of the potential impacts and associated mitigation for the construction, operation, and decommissioning phases of DEP and SEP.
2. This assessment has been undertaken with specific reference to the relevant legislation and guidance, of which the primary source are the National Policy Statements (NPS). Details of these and the methodology used for the Environmental Impact Assessment (EIA) and Cumulative Impact Assessment (CIA) are presented in **Section 23.4**.
3. The existing baseline conditions for the onshore archaeological and cultural heritage environment as outlined in this chapter (**Section 23.5**) provide an account of the known archaeological resource (including designated and non-designated heritage assets) and a summary of the potential for currently unrecorded sites and finds to exist within the study area and within the PEIR boundary.
4. The assessment should be read in conjunction with following linked chapters:
   - **Chapter 16: Offshore and Intertidal Archaeology and Heritage**;
   - **Chapter 20: Water Resources and Flood Risk**;
   - **Chapter 25: Noise and Vibration**;
   - **Chapter 26: Traffic and Transport**;
   - **Chapter 27: Seascape and Visual Impact Assessment**; and
   - **Chapter 28:Landscape and Visual Impact Assessment**.
5. Additional information to support the onshore archaeology and cultural heritage assessment includes:
   - Archaeological Desk Based Assessment (**Appendix 23.1**);
   - Aerial Photographic, LiDAR and Map Regression Analysis (**Appendix 23.2**);
   - Heritage Setting Assessment (**Appendix 23.3**); and
   - Priority Archaeological Geophysical Survey (**Appendix 23.4**).
6. This chapter has been prepared in consultation with Historic England and Norfolk County Council Historic Environment Service (NCC HES) (**Section 23.2**) and in accordance with legislation, policy and industry standards and guidance documents relevant to the onshore archaeological and cultural heritage (historic) environment (**Section 23.4**), with specific reference to the NPS, the National Planning Policy Framework (NPPF) and associated Planning Practice Guidance (PPG).

23.2 Consultation

7. Consultation with regard to onshore archaeology and cultural heritage has been undertaken in line with the general process described in **Chapter 6 EIA Methodology**. The key elements to date have included scoping and the ongoing Evidence Plan Process (EPP) via the Archaeology (onshore and offshore) Expert Topic Group (ETG). The feedback received has been considered in preparing the PEIR. **Table 23-1** provides a summary of how the consultation responses received to date have influenced the approach that has been taken.

8. This chapter will be updated following the consultation on the PEIR in order to produce the final assessment that will be submitted with the Development Consent Order (DCO) application. Full details of the consultation process will also be presented in the Consultation Report alongside the DCO application.

Table 23-1: Consultation responses.

Consultee	Date/ Document	Comment	Project Response
The Planning Inspectorate (The Secretary of State (SoS))	November 2019 / Scoping Opinion	Paragraph 681 of the Scoping Report explains that the onshore archaeological study area is the same as the onshore scoping area described in section 1.4 of the Scoping Report. The Inspectorate considers the defined areas to be relatively limited in terms of the archaeological assessment, particularly for potential consideration of indirect effects on setting. The Applicant should ensure that the study area around the onshore cable corridor and substation are sufficiently broad to give consideration to heritage assets that could be indirectly impacted.	The study areas considered in this assessment (**Section 23.3.1**) have been agreed in consultation with Historic England and NCC HES and are considered sufficiently broad for the purposes of considering heritage assets that could be indirectly impacted.
The Planning Inspectorate (SoS)	November 2019 / Scoping Opinion	Any likely significant effects associated with the potential for breakout of bentonite drilling fluid should be assessed in the ES.	Assessment of potential impacts from any breakout of bentonite will be reported in full in the ES.

Consultee	Date/ Document	Comment	Project Response
The Planning Inspectorate (SoS)	November 2019 / Scoping Opinion	Paragraph 697 of the Scoping Report states there are potential cumulative impacts from the original Dudgeon and Sheringham Shoal Offshore Wind Farm Extension Projects. The Inspectorate notes that these windfarms are operational and therefore considers that they should be considered in the environmental baseline, rather than the cumulative effects assessment.	The findings from these projects are considered as part of the baseline section (**Section 23.5**).
The Planning Inspectorate (SoS)	November 2019 / Scoping Opinion	Table 3-16 of the Scoping Report states that proposed baseline surveys will be undertaken on targeted areas of the application site and that any targeted trial trenching would be dependent on landowner access permissions being agreed. The Applicant should ensure that the baseline survey coverage is sufficient to inform the assessment of effects. The ES should explain and justify how the 'targeted areas' are selected. The Inspectorate recommends that areas critical for the delivery of the Proposed Development are included within the surveys e.g. the landfall site. The Inspectorate recommends that the Applicant seeks to agree the scope of surveys with relevant consultation bodies including Historic England and the relevant local planning authorities.	The scope of baseline surveys was agreed in consultation with Historic England and NCC HES and are presented in **Section 23.4.2**. The baseline surveys are ongoing. A summary of the results obtained to date (October 2020) are presented in **Section 23.5**. Full details of each baseline survey are presented in **Appendix 23.4** (Priority Archaeological Geophysical Survey Report).

Consultee	Date/ Document	Comment	Project Response
The Planning Inspectorate (SoS)	November 2019 / Scoping Opinion	The Inspectorate welcomes references to the preparation of an outline WSI (Written Scheme of Investigation) to be submitted as part of the ES to outline mitigation commitments. The Inspectorate recommends the Applicant prepare the WSI in conjunction with Historic England and the relevant local planning authorities and that agreements as to spatial and temporal coverage (as well as it's delivery through DCO requirements) will be sought as part of the EPP.	An Outline WSI will form an appendix to the ES and will be prepared in consultation with Historic England and NCC HES.
The Planning Inspectorate (SoS)	November 2019 / Scoping Opinion	Appropriate cross reference should be made to the Landscape and Visual Impact Assessment (LVIA) and Seascape and Visual Impact Assessment (SVIA) section of the ES particularly in terms of viewpoint selection within the LVIA which should incorporate views from cultural heritage assets.	Heritage specific viewpoints have been identified in collaboration with the LVIA and SVIA specialists and consulted upon with Historic England and NCC HES. The relation with LVIA and SVIA is presented in **Section 25.5**.
Historic England / NCC HES	January 2020 / ETG Evidence Plan Agreement Log	With respect to the proposed onshore substation, and potential impacts associated with changes to the setting of heritage assets, it was confirmed that LVIA and SVIA tool kits, including e.g. zones of theoretical visibility and photomontages, would be used to inform assessment.	The Setting Assessment work is ongoing with Steps 1 and 2 of the Historic England Guidance presented in **Appendix 23.3** and summarised in **Section 23.5**.

Consultee	Date/ Document	Comment	Project Response
Historic England / NCC HES	January 2020 / ETG Evidence Plan Agreement Log	It was agreed that if any Engineering-led Ground Investigation (GI) works are planned for the project, NCC HES and HE should review the methodology and provision for associated archaeological watching brief and/or geoarchaeological monitoring.	No Engineering-led GI works have been carried out to date. A commitment to include archaeological objectives in planned surveys post-consent will form part of the Outline WSI submitted with the final DCO application.
Historic England / NCC HES	January 2020 / ETG Evidence Plan Agreement Log	It was agreed that analysis of Lidar and aerial photographic data will primarily be undertaken within the 200m onshore cable corridor and will also include a suitable small buffer out with the PEIR boundary. Following this, locations for priority archaeological geophysical surveys would be agreed with NCC HES.	Full details of the Aerial Photographic, LiDAR and Map Regression Analysis are presented in **Appendix 23.2**, and the results of the Priority Archaeological Geophysical Survey presented in **Appendix 23.4**. A summary of the results from both baseline surveys is presented in **Section 23.5**.

Consultee	Date/ Document	Comment	Project Response
Historic England / NCC HES	January 2020 / ETG Evidence Plan Agreement Log	It was agreed that possible targeted archaeological trial trenching should also be considered in the areas identified as 'critical', or at particular pinch-points, for DEP and SEP. However, it was acknowledged that this is heavily dependent on land access in the pre-consent stage.	No targeted archaeological trial trenching has been carried out pre-application. A commitment to including archaeological trial trenching post-consent will form part of the Outline WSI submitted with the final DCO application.
Historic England / NCC HES	January 2020 / ETG Evidence Plan Agreement Log	Agreed that neither an offshore or onshore Evidence Plan Process specific archaeology and cultural heritage Method Statement document is required, as this would simply be repeating much of the Scoping Report and Scoping Opinion, as well as discussion as already documented within the minutes of the first and future ETG meetings. This is separate to the acknowledged requirement for survey-specific WSIs and/or Method Statements to be agreed prior to archaeological related site-based survey work and relevant engineering led activities.	Approach to assessment established through EPP and established industry practice for offshore renewables as set out in **Section 23.4**

23.3 Scope

23.3.1 Study Area

9. The study areas for onshore archaeology and cultural heritage incorporates the landfall from Mean High Water Springs (MHWS), PEIR boundary, and is defined as follows:

- Non-designated Heritage Assets study area: defined by a 500m boundary around (either side of) the PEIR boundary; and

- Designated Heritage Assets study area: defined by a 1km boundary around the PEIR boundary.

10. As the setting assessment is currently ongoing, potential setting impacts such as those arising from above ground infrastructure may be considered over a wider area and will tie-in with the LVIA and SVIA process and tools such as Zones of Theoretical Visibility (ZTVs) and photomontages where necessary. This will be further considered moving beyond PEIR into the final DCO application.

11. For the purposes of the Aerial Photographic, LiDAR and Map Regression Analysis a separate study area comprising a 100m buffer around the PEIR boundary was utilised.

23.3.2 Realistic Worst-Case Scenario

23.3.2.1 General Approach

12. The final design of the DEP and SEP will be confirmed through detailed engineering design studies that will be undertaken post-consent to enable the commencement of construction. In order to provide a precautionary but robust impact assessment at this stage of the development process, realistic worst-case scenarios have been defined in terms of the potential effects that may arise. This approach to EIA, referred to as the Rochdale Envelope, is common practice for developments of this nature, as set out in Planning Inspectorate Advice Note Nine (2018). The Rochdale Envelope for a project outlines the realistic worst-case scenario for each individual impact, so that it can be safely assumed that all lesser options will have less impact. Further details are provided in **Chapter 6 EIA Methodology**.

13. The realistic worst-case scenarios for the onshore archaeology and cultural heritage assessment are summarised in **Table 23-2**. These are based on DEP and SEP parameters described in **Chapter 5 Project Description**, which provides further details regarding specific activities and their durations.

14. In addition to the design parameters set out in **Table 23-2**, consideration is also given to how DEP and SEP will be built out as described in **Section 0** to **Section 23.3.2.4** below. This accounts for the fact that whilst DEP and SEP are the subject of one DCO application, it is possible that either one or both of DEP and SEP will be developed, and if both are developed, that construction may be undertaken either concurrently or sequentially.

15. By employing a worst-case scenario approach for each individual impact, this assessment presents the maximum possible effect upon the onshore archaeology and cultural heritage resource within the study areas and PEIR boundary. As such, impacts of greater adverse significance would not arise should any other project scenario than that assessed within this chapter be taken forward in the final project design. As such, any other combination of the project options under consideration other than that directly discussed in this chapter would result in effects of an equivalent or lesser significance upon heritage assets. This is supported by embedded mitigation strategies (see **Section 23.3.3**) that will ensure appropriate levels of protection for designated heritage assets when the project design is finalised.

Table 23-2: Realistic Worst-Case Scenarios.

Impact	Parameter DEP or SEP in isolation	DEP and SEP concurrently	DEP and SEP sequentially	Notes and Rationale
Construction				
Impacts relating to the landfall	<u>Temporary HDD works</u> • HDD temporary works compound area = 5,750m^2 • Transition joint bay size = 10 x 15m. • Total construction space required = 30,000m^2	<u>Temporary HDD works</u> • HDD temporary works compound area = 5,750m^2 • Transition joint bay size = 15 x 15m. • Total construction space required = 30,000m^2	<u>Temporary HDD works</u> • HDD temporary works compound area = 5,750m^2 for each project (overlapping) • Transition joint bay size = 10 x 15m for each project • Total construction space required for each project = 30,000m^2 (overlapping)	The HDD works should not require any prolonged periods of restrictions or closures to the beach for public access, although it is possible that some work activities will be required to be performed on the beach that may require short periods of restricted access.
	<u>Temporary access</u> • Route from the existing road system	<u>Temporary access</u> • Route from the existing road system	<u>Temporary access</u> • Route from the existing road system	
Impacts relating to the onshore cable corridor	<u>Temporary access</u> • Various from public highway (6m wide) to single tracks (3m wide). • Access haul road dimensions = 60km long by 6m wide.	<u>Temporary access</u> • Various from public highway (6m wide) to single tracks (3m wide). • Access haul road dimensions = 60km long by 6m wide.	<u>Temporary access</u> • Various from public highway (6m wide) to single tracks (3m wide). • Access haul road dimensions = 60km long by 6m wide.	The onshore cable duct will be installed in sections of up to 1km at a time, with a typical construction presence of up to four weeks along each 1km section.

Impact	Parameter DEP or SEP in isolation	DEP and SEP concurrently	DEP and SEP sequentially	Notes and Rationale
	Duration • 24 months in total	Duration • 24 months in total	Duration • 24 months in total	
	Material volumes • Width of top soil storage = 6m • Quantity of material excavated for cable trench = 180,000m^3 of which 36,000m^3 to be disposed of	Material volumes • Width of top soil storage = 6m • Quantity of material excavated for cable trench = 360,000m^3 of which 72,000m^3 to be disposed of	Material volumes • Width of top soil storage = 6m • Quantity of material excavated for cable trench = 360,000m^3 of which 72,000m^3 to be disposed of	
	Construction corridor • Total width = 45m • Jointing bays = 120 (approximately every 500m) buried below ground • Jointing bay dimensions = 12m long by 4m wide by 2m deep within the working corridor • One trench, 1m wide by 1.75m deep. • Minimum cable burial depth at 1.2m	Construction corridor • Total width = 60m • Approximately 120 jointing bays (one every 500m) buried below ground • Jointing bay dimensions = 12m long by 4m wide by 2m deep within the working corridor. • Two trenches, each 1m wide by 1.75m deep. • Minimum cable burial depth at 1.2m	Construction corridor • Total width = 60m • Approximately 240 jointing bays (one every 500m) buried below ground along each cable trench • Jointing bay dimensions of 12m long by 4m wide by 2m deep within the working corridor. • Two trenches, each 1m wide by 1.75m deep. • Minimum cable burial depth at 1.2m	

Impact	Parameter DEP or SEP in isolation	DEP and SEP concurrently	DEP and SEP sequentially	Notes and Rationale
	Construction compounds • Up to 2 main compounds of 60,000m^2 each • 8 secondary compounds of 2,500m^2 each • HDD compounds = 1,500m^2 - 4,500m^2	Construction compounds • Up to 2 main compounds of 60,000m^2 each • 8 secondary compounds of 2,500m^2 each • HDD compounds = 1,500m^2 - 4,500m^2	Construction compounds • Up to 2 main compounds for each project of 60,000m^2 each • 8 secondary compounds for each project of 2,500m^2 each • HDD compounds = 1,500m^2 - 4,500m^2	
Impacts relating to the onshore substation	Substation footprint • Permanent area = 3.25ha. • Temporary construction area = 1ha • Total construction area = 4.25ha	Substation footprint • Permanent area = 6.0ha • Additional construction area = 1ha • Total construction area = 7.0ha.	Substation footprint • Permanent area = 6.25ha • Additional construction area = 1ha • Total construction area = 7.25ha.	
Operation				
Impacts relating to offshore infrastructure	Offshore Wind Turbines • Maximum number of wind turbines: 32 (DEP) / 24 (SEP) • Maximum blade tip height above LAT: 330m	Offshore Wind Turbines • Maximum number of wind turbines: 56 • Maximum blade tip height above LAT: 330m	Offshore Wind Turbines • Maximum number of wind turbines: 56 • Maximum blade tip height above LAT: 330m	The maximum height and massing of the permanent onshore and offshore infrastructure represents the worst case under each scenario and is the basis for this assessment

Impact	Parameter DEP or SEP in isolation	DEP and SEP concurrently	DEP and SEP sequentially	Notes and Rationale
Impacts relating to the onshore cable route	Link boxes • Below ground = 120 (up to 2m x 2m x 1.5m) plus an above ground marker post at each location • Above ground = 120 (up to 1.5m x 1m x 1.5m)	Link boxes • Below ground = 120 (up to 2m x 2m x 1.5m) plus an above ground marker post at each location • Above ground = 120 (up to 1.5m x 1m x 1.5m)	Link boxes • Below ground = 120 for each project (up to 2m x 2m x 1.5m) plus an above ground marker post at each location • Above ground = 120 for each project (up to 1.5m x 1m x 1.5m)	Link boxes are expected to be below ground. Alternatively link boxes may be above ground in cabinets.
Impacts relating to the onshore substation	Substation footprint • Operational area = 3.25ha	Substation footprint • Operational area = 6.0ha	Substation footprint • Operational area = 6.25ha	
	Substation buildings • Max building height = 15m • Maximum height up to 30m tall lightning rods	Substation buildings • Max building height = 15m • Maximum height up to 30m tall lightning rods	Substation buildings • Max building height = 15m • Maximum height up to 30m tall lightning rods	
	Duration • 36 months in total	Duration • 36 months in total	Duration • 36 months in total for each project	
Decommissioning				
No final decision has yet been made regarding the final decommissioning policy for the onshore project infrastructure including landfall, onshore cable route and onshore substation. It is also recognised that legislation and industry best practice change over time. However, it is likely that the onshore project equipment, including the cable, will be removed, reused or recycled where possible and the transition bays and cable ducts being left in place. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and will be agreed with the regulator. It is anticipated that for the purposes of a worst case scenario, the impacts will be no greater than those identified for the construction phase.				

Impact	Parameter DEP or SEP in isolation	DEP and SEP concurrently	DEP and SEP sequentially	Notes and Rationale
Assuming that provision is made for methods of removal which minimise further impact to the wider area, it is reasonable to assume that any potential damage upon designated and non-designated heritage assets would have already occurred as part of construction activities. However, it is noted that the demolition of buildings and infrastructure can have an impact greater than that of construction e.g. if grubbing out of foundations or remediation of contaminants is required. As such, the worst-case scenario with regard to decommissioning cannot be ascertained until the decommissioning plan is finalised. Changes to setting may be present as a result of visual and audible impacts associated with decommissioning activities. Changes to the setting of heritage assets are considered to be temporary in duration, occurring in association with the decommissioning phase. As such, the worst-case scenario as outlined for the construction phase in relation to temporary changes to the setting of heritage assets is unlikely to be exceeded as a result of decommissioning activities.				

23.3.2.2 Construction Scenarios

16. The following principles set out the framework for how DEP and SEP may be constructed:
    - DEP and SEP may be constructed at the same time, or at different times;
    - If built at the same time both DEP and SEP could be constructed in four years;
    - If built at different times, either Project could be built first;
    - If built at different times each Project would require a four-year period of construction;
    - If built at different times, the duration of the gap between the end of construction of the first Project, and the start of construction of the second Project may vary from overlapping, to up to 4 years;
    - Assuming a maximum construction period per project of four years, and taking the above into account, the maximum construction period over which the construction of both DEP and SEP could take place is 12 years.
17. In order to determine which construction scenario presents the realistic worst case for each receptor and impact, the assessment considers both maximum duration effects and maximum peak effects, in addition to each Project being developed in isolation, drawing out any differences between DEP and SEP.
18. The three construction scenarios considered by the onshore archaeology and cultural heritage assessment are therefore:
    - Build DEP or build SEP in isolation;
    - Build DEP and SEP concurrently – reflecting the maximum peak effects; and
    - Build one project followed by the other with a gap of up to 4 years (sequential) – reflecting the maximum duration of effects.
19. Any differences between DEP and SEP, or differences that could result from the manner in which the first and the second DEP and SEP are built (concurrent or sequential and the length of any gap) are identified and discussed where relevant in the impact assessment section of this chapter (**Section 23.6**). For each potential impact only the worst-case construction scenario for DEP and SEP is presented, i.e. either concurrent or sequential. The justification for what constitutes the worst-case is provided, where necessary, in **Section 23.6**.

23.3.2.3 Operation Scenarios

20. Operation scenarios are described in detail in **Chapter 5 Project Description**. The assessment considers the following three scenarios:
    - Only DEP in operation;
    - Only SEP in operation; and
    - The DEP and SEP operating at the same time, with a gap of up to 3 years between each project commencing operation.
21. The operational lifetime of each project is expected to be 35 years.

23.3.2.4 Decommissioning Scenarios

22. Decommissioning scenarios are described in detail in **Chapter 5 Project Description**. Decommissioning arrangements will be agreed through the submission of a Decommissioning Plan prior to construction, however for the purpose of this assessment it is assumed that decommissioning of DEP and SEP could be conducted separately, or at the same time.

23.3.3 Summary of Mitigation Embedded in the Design

23. This section outlines the embedded mitigation relevant to the onshore archaeology and cultural heritage assessment, which has been incorporated into the design of DEP and SEP (**Table 23-3**). Where other mitigation measures are proposed, these are detailed in the impact assessment (**Section 23.6**).

Table 23-3: Embedded Mitigation Measures

Parameter	Mitigation Measures Embedded into the Design of DEP and SEP
Direct, physical impacts to designated heritage assets	Route refinement process undertaken to avoid all designated heritage assets.

23.4 Impact Assessment Methodology

23.4.1 Policy, Legislation and Guidance

23.4.1.1 National Policy Statements

24. The assessment of potential impacts upon onshore archaeology and cultural heritage has been made with specific reference to the relevant National Policy Statements (NPS). These are the principal decision-making documents for Nationally Significant Infrastructure Projects (NSIPs). Those relevant to the Project are:

- Overarching NPS for Energy (EN-1) (Department of Energy and Climate Change (DECC) 2011a);
- NPS for Renewable Energy Infrastructure (EN-3) (DECC 2011b); and
- NPS for Electricity Networks Infrastructure (EN-5) (DECC 2011c).

25. The specific assessment requirements for onshore archaeology and cultural heritage, as detailed in the NPS, are summarised in **Table 23-4** together with an indication of the section of the PEIR chapter where each is addressed.

Table 23-4: NPS Assessment Requirements.

NPS Requirement	NPS Reference	Section Reference
En-1 NPS for Energy (EN-1)		
'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.'	Paragraph 5.8.8	The significance and value of the heritage assets considered in this chapter have been detailed in **Section 23.5**. An initial setting assessment has been undertaken (**Appendix 23.3**), the results of which have informed **Section 23.5**. The setting assessment is ongoing and will be submitted in full as part of the final DCO application. Issues relating to the setting of offshore and intertidal heritage assets have been considered as part of **Chapter 15** Offshore and Intertidal Archaeology and Cultural Heritage.
"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."	Paragraph 5.8.9	**Section 23.5** of this chapter has been informed by an Archaeological Desk Based Assessment (ADBA) (**Appendix 23.1**), an Aerial Photographic, LiDAR and Map Regression Analysis (**Appendix 23.2**), an initial Setting Assessment (**Appendix 23.3**) and a Priority Archaeological Geophysical Survey (**Appendix 23.4**).

NPS Requirement	NPS Reference	Section Reference
'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.'	Paragraph 5.8.10	This chapter provides an account of the potential impacts of DEP and SEP upon heritage assets and their significance (**Section 23.6**).
EN-3 NPS for Renewable Energy Infrastructure		
'Consultation with the relevant statutory consultees should be undertaken by the applicants at an early stage of the development.'	Paragraph 2.6.140	Consultation has been undertaken with relevant statutory consultees, as outlined in **Section 23.2** Consultation will be on going throughout the development process.
'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 windfarm design.'	Paragraph 2.6.141	The assessment has been undertaken in accordance with section 5.8 of EN-1, as detailed above. The Priority Archaeological Geophysical Survey has informed this assessment (**Section 23.5** and **Appendix 23.4**). Geotechnical surveys have not been progressed pre-consent.

23.4.1.2 Other

26. This assessment has also been undertaken in a manner consistent with the NPPF, a revised version of which was published by the Ministry of Housing, Communities and Local Government (MHCLG) in June 2019, replacing the original policy from March 2012. Provision for the historic environment is principally given in section 16: Conserving and enhancing the historic environment of the NPPF, which directs local authorities to set out "*a positive strategy for the conservation and enjoyment of the historic environment, including heritage assets most at risk through neglect, decay or other threats*". Local planning authorities should recognise that heritage assets are "*an irreplaceable resource and should be conserved in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life of existing and future generations*" (MHCLG, 2019).

27. The aim of NPPF section 16 is to ensure that Regional Planning Bodies and local authorities, developers and owners of heritage assets adopt a consistent and holistic approach to their conservation and to reduce complexity in planning policy relating to proposals that affect them.

28. To summarise, UK government guidance provides a framework which:

- Recognises that heritage assets are an irreplaceable resource;
- Requires applicants to provide a level of detail that is proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance;
- Takes into account the desirability of sustaining and enhancing the significance of heritage assets, including any contribution made by their setting, and putting them to viable uses consistent with their conservation;
- Places weight on the conservation of designated heritage assets (which include world heritage sites, scheduled monuments, listed buildings, protected wreck sites, registered parks and gardens, registered battlefields or conservation areas), with any anticipated substantial harm weighed against the public benefits of the proposal;
- Requires applicants to include a consideration of the effect of an application on the significance of non-designated heritage assets, giving regard to the scale of any harm or loss and the significance of the heritage asset;
- Regard proposals that preserve those elements of the setting that make a positive contribution to the asset (or which better reveal its significance) favourably; and
- Requires developers to record and advance understanding of the significance of any heritage assets to be lost (wholly or in part) in a manner proportionate to their importance and impact, and to make this evidence (and any archive generated) publicly accessible.

29. The NPPF's associated PPG 'Conserving and enhancing the historic environment' (DCLG, 2014) includes further information and guidance on how national planning policy is to be interpreted and applied locally. Although the PPG is an important and relevant consideration with respect to this project, EN-1 (the Overarching NPS for Energy) is the key decision-making document.

30. In addition to the above, works affecting Listed Buildings and Conservation Areas are subject to the Planning (Listed Buildings and Conservation Areas) Act 1990, while those affecting Scheduled Monuments and Archaeological Areas of Importance must consider the Ancient Monuments and Archaeological Areas Act 1979 (as amended). Additionally, certain hedgerows may be deemed to be historically important under the criteria set out in the Hedgerow Regulations 1997, as amended by The Hedgerows (England) (Amendment) Regulations 2002.

31. In the context of listed buildings, regulation 3 of the Infrastructure Planning (Decisions) Regulations 2010 (the 'Decisions Regulations') sets out that it is necessary for the Secretary of State (SoS) to "have regard to the desirability of preserving the listed building or its setting or any features of special architectural or historic interest which it possesses". This language differs from the duty in section 66 of the Planning (Listed Buildings and Conservation Areas) Act 1990 ("PLBCAA") for a decision maker to have "special regard" and indicates that Parliament intends that a particular approach be taken in the case of NSIPs. The Decisions Regulations have been taken into account in the preparation of this chapter.

32. This chapter also takes into account regional and local guidance relevant to the study area and the project.

33. The regional policy relevant to the study area comprises the Planning Guidance Note 6: Regional Planning Guidance for East Anglia to 2016 (Department of the Environment, Transport and the Regions, 2000), which includes:

- Policy 37: General management principles for conserving and enhancing the natural, built and historic environment;
    - To conserve and enhance the important aspects of East Anglia's natural, built and historic environment;
- Policy 38: Protection of designated areas;
    - Priority should be given to protecting and enhancing areas designated at international or national level for their intrinsic importance in terms of nature conservation or landscape quality;
- Policy 40: Conservation of East Anglia's built and historic environment;
    - Development plans should contain policies to protect the built and historic heritage and manage change in a way that respects local character and distinctiveness, by conserving and maintaining historic and archaeological resources, and by ensuring that new development respects and enhances local character.

34. Local policies relevant to the study area comprise:

- North Norfolk: Local Development Framework - Core Strategy (North Norfolk District Council 2008, Updated 2012);
- Greater Norwich Development Partnership (2012) – Joint Core Strategy (JCS) for Broadland, Norwich and South Norfolk (adopted March 2011, amendments adopted January 2014);
- The Broadland Development Management Development Plan Document (Broadland District Council, 2015); and
- Breckland District Council Local Plan Document (Breckland District Council, 2019).

35. The local development plan documents listed above each include policies which state that development proposals must ensure the protection, conservation, management and enhancement of the historic environment. Further details can be found in **Appendix 23.1**.

36. In demonstrating adherence to industry good practice, this chapter has also been compiled with respect to available archaeological and cultural heritage guidance for onshore development including:

- The Historic Environment in Local Plans: Historic Environment Good Practice Advice in Planning Note 1 (Historic England 2015a);
- Managing Significance in Decision-Taking in the Historic Environment: Historic Environment Good Practice Advice in Planning Note 2 (Historic England 2015b);
- The Setting of Heritage Assets: Historic Environment Good Practice Advice in Planning Note 3 (Historic England 2017a);
- Chartered Institute for Archaeologists' Standard and Guidance for Historic Environment Desk-Based Assessments (updated 2017b) and Code of Conduct (2014); and
- Conservation Principles: For the Sustainable Management of the Historic Environment (Consultation Draft 10th November 2017, Historic England 2017c).

37. Further detail is provided in **Chapter 3 Policy and Legislative Context**.

23.4.2 Data and Information Sources

23.4.2.1 Site specific surveys

38. In order to provide site specific and up to date information on which to base the impact assessment, a historic environment walkover survey and priority archaeological geophysical survey was conducted.

39. The historic environment walkover survey was undertaken to confirm the presence/absence of heritage assets identified on the Norfolk Historic Environment Record (NHER) and through desk-based review of aerial imagery and historic maps, to assess their preservation, extent and setting, and to identify any previously unrecorded heritage assets. A total of 67 locations containing known heritage assets were visited between 5th-8th October 2020, the results from which are presented within **Appendix 23.1**.

40. The aims of the historic environment walkover survey 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) to be present within the PEIR boundary;
- assess the potential impact from other modern developments within the study areas which may have reduced the significance/preservation of known heritage assets; and
- undertake initial setting assessment site visits of and in the vicinity of identified designated heritage assets.

41. The aim of the priority archaeological geophysical survey was to locate, record and characterise any surviving sub-surface archaeological remains that would enhance current understanding of the archaeological resource at targeted locations within the PEIR boundary.

42. A total of 37 areas, covering approximately 585ha, were identified as requiring a priority archaeological geophysical survey. These areas were targeted based on known locations of recorded heritage assets relating to buried archaeology within the NHER and as identified from aerial photographic data.

43. The priority archaeological geophysical survey is ongoing and is anticipated to be completed in early 2021. At the time of writing (April 2021), 23 survey areas were complete or partially complete (due to crop constraints), covering approximately 310ha. Details of the results for the survey areas completed thus far are provided in **Appendix 23.4**, and (where available) have been incorporated into **Section 23.4**. The outstanding survey results will be incorporated into the final DCO application.

23.4.2.2 Other available sources

44. Other sources that have been used to inform the assessment are listed in **Table 23-5**.

Table 23-5: Other available data and information sources.

Data set	Spatial coverage	Year	Notes
National Heritage List for England (NHLE)	England	Accessed May – August 2020	Official, up to date, register of all nationally protected historic buildings and sites in England - listed buildings, scheduled monuments, registered parks and gardens, and battlefields.
Norfolk Historic Environment Record (NHER)	Norfolk County	13/02/2020	HERs are information services that provide access to comprehensive and dynamic resources relating to the archaeology and historic built environment of a defined geographic area. HERs contain details on local archaeological sites and finds, historic buildings and historic landscapes and are regularly updated.
Conservation Areas	Norfolk County	Accessed May – August 2020	North Norfolk District Council (NNDC), Broadland District Council (BDC) and Breckland District Council hold information on Conservation Areas including locally listed buildings.

Data set	Spatial coverage	Year	Notes
Relevant Regional, Local and Period Archaeological Studies and Journals	UK	Accessed May – August 2020	Historic and archaeological data consulted to inform the wider baseline context. The studies / journals consulted do not constitute an exhaustive account of all historical / archaeological data identified within the study area.
The Archaeology Data Service	UK	Accessed May – August 2020	A non-exhaustive directory of archaeological research consulted to inform the wider baseline context and previous archaeological investigations in the study area.
Cartographic sources (the NHER, Norfolk Record Office, NCC's Historic Map Explorer and Envirocheck Report)	Norfolk County	Accessed (online / digital supplies) May – August 2020. Note: NHER and Norfolk Record Office currently closed due to Coronavirus.	Historic mapping for the study area including 19th century Enclosure and Tithe maps, and 1st, 2nd and later edition Ordnance Survey maps. Some cartographic data is fragmentary for the study area. This chapter integrates the results of the Map Regression analysis undertaken by Air Photo Services. The full report is included as **Appendix 23.2**.
Aerial Photographic Data (Historic England Archive and the NHER, and ortho-rectified mosaics of vertical aerial photographs at Google Earth)	Norfolk County	Accessed (online / digital supplies) May – August 2020. Note: Historic England Archive and NHER currently closed due to Coronavirus	Aerial photographic data for the study area. This chapter integrates the results of the Aerial Photographic assessment undertaken by Air Photo Services. The full report is included as **Appendix 23.2**.

Data set	Spatial coverage	Year	Notes
Light Detection and Ranging (LiDAR) survey data	Norfolk County	Accessed May – August 2020	Available LiDAR data for the study area. This chapter integrates the results of the LiDAR assessment undertaken by Air Photo Services. The full report is included as **Appendix 23.2**.
British Geological Survey (BGS) data (surface geology)	UK	Accessed August 2020	Historic borehole logs and wider geological background for the study area.
Zone of Theoretical Visibility (ZTV)	Study Area	Accessed August 2020	ZTVs for the permanent above ground infrastructure required by DEP and SEP to inform the setting assessments – details of the ZTVs are provided in **Chapter 28 Landscape and Visual Impact**.

23.4.3 Impact Assessment Methodology

45. **Chapter 6 EIA Methodology** provides a summary of the general impact assessment methodology applied to DEP and SEP. The following sections confirm the methodology used to assess the potential impacts on onshore archaeology and cultural heritage.

46. In the absence of an industry standard methodology for heritage impact assessment within the framework of EIA, the impact assessment methodology adopted takes account of overarching principles presented in the following policy and guidance:

- NPPF (MHCLG 2019);
- The Setting of Heritage Assets: Historic Environment Good Practice Advice in Planning Note 3 (Historic England, 2017a); and
- Conservation Principles: For the Sustainable Management of the Historic Environment (Consultation Draft 10th November 2017, Historic England 2017c).

23.4.3.1 Definitions

47. The impact assessment methodology adopted for onshore archaeology and cultural heritage has, as far as possible, identified and defined those heritage assets, and their settings, likely to be impacted by the proposed scheme and assess the level of any resulting benefit, harm or loss to their significance. The assessment is not limited to direct (physical) impacts, but also assesses possible indirect (physical) impacts upon heritage assets which may arise as a result of vibration from groundworks / construction traffic affecting the fabric of a heritage asset or changes in ground conditions resulting in an effect on preservation conditions beyond the DEP and SEP parameters. Impacts associated with a change to the setting of heritage assets which may affect their significance, whether visually, or in the form of noise, dust and vibration, as well as spatial associations and a consideration of historic relationships between places.

48. More specifically, the impact assessment presents:

- The perceived heritage importance of identified assets;
- A consideration of heritage significance, and where relevant the contribution that setting makes to the heritage significance of the assets identified as being affected, both designated and non-designated;
- The anticipated magnitude of impact (change to heritage significance) upon those assets identified; and
- The significance of effect (in EIA terms) of any identified impacts upon those assets identified.

49. The impact assessment methodology adopted differs from some of the more standard approaches and terminology used and applied more generally within the PEIR for other technical disciplines. The standardised and tailored EIA matrices provide a useful guidance framework for the expert judgement by suitably experienced and qualified heritage practitioners based on the heritage specific legislation, policy and guidance documents available, and using the fundamental concepts from the NPS and NPPF of benefit, harm and loss.

23.4.3.2 Heritage Significance and Heritage Importance

50. Heritage significance is the sum of the heritage values or interests that we, as a society, recognise in a heritage asset and seek to protect or enhance for future generations (NPPF 2019, Annex 2). A statement of heritage significance should explain why we value a heritage asset. Understanding the heritage significance of an asset should not be confused with a description of that asset which does not articulate ‘what matters and why’.

51. Heritage significance does not have a scale associated with it and it is therefore not appropriate to refer to ‘high’ or ‘low’ heritage significance. This scaling is addressed through the separate consideration of a heritage asset’s importance. Heritage significance is not directly related to designation status nor is it defined in law. However, the reasons for designation may articulate aspects of heritage significance.

52. The importance of a heritage asset is a measure of the degree to which we seek to protect and preserve the heritage significance of that asset through, for example, legislation and planning policy. Determining the importance of an asset is a key decision in impact assessment as it will affect judgements regarding the relative weight to be given to protecting different assets during the design of a proposal, as well as conclusions regarding the significance of effect (in EIA terms) once combined with assessed magnitude of impacts on heritage significance.

53. Importance is scaled (unlike heritage significance) and requires the assessor to make a judgement regarding the merits of different heritage assets. It is therefore appropriate to refer to 'high' or 'low' importance for example. The statutory designation of heritage assets provides examples of how assets can be assigned a level of importance against explicit criteria. Some designated assets are judged to be of national importance, for example Scheduled Monuments; and World Heritage Sites are, again by definition, sites of international importance.

23.4.3.3 Sensitivity (Heritage Importance)

54. The sensitivity of a receptor (in EIA) is a function of its capacity to accommodate change and reflects its ability to recover if it is affected. However, while impacts to a heritage asset's setting or character can be temporary, impacts which result in damage or destruction of the assets themselves, or their relationship with their wider environment and context, are permanent. Once destroyed an asset cannot recover. On this basis, the assessment of the significance of any identified impact is largely a product of the heritage importance of an asset (rather than its sensitivity) and the perceived magnitude of the effect on it, assessed and qualified by professional judgement.

55. An assessment of impacts and associated effects on an asset involves an understanding of the heritage significance of the asset and, in the case of an impact associated with a change in the setting of that asset, the contribution that the setting makes to the heritage significance of the asset. Policy sets out that the level of detail should be proportionate to the importance of the heritage asset and no more than is sufficient to understand the potential impact of the proposed project on their significance (NPPF paragraph 189, 2019).

56. The initial indicative criteria for determining the heritage importance of any relevant heritage assets are described in **Table 23-6**.

57. The categories and definitions of heritage importance do not necessarily reflect a definitive level of importance of an asset. They are intended to provide a provisional guide to the assessment of perceived heritage importance, which is to be based upon professional judgement incorporating the evidential, archaeological, historical, aesthetic, architectural and communal heritage values of the asset or assets.

58. Establishing heritage importance (or likely heritage importance) of an asset or group of assets, and the related significance of effect by considering the perceived magnitude of impact on the asset or assets, assists in the development of appropriate evaluation and mitigation approaches. It is important to note that the heritage importance and heritage significance of an asset can be amended or revised as more information comes to light.

59. **Table 23-6** includes heritage assets of uncertain heritage importance i.e. where the importance, existence and / or level of survival of an asset has not been ascertained (or fully understood) from available evidence. Although **Table 23-6** provides a definition for assets of an uncertain heritage importance, where uncertainty occurs, the precautionary approach is to assign the highest likely level of importance. This precautionary approach represents good practice in archaeological impact assessment and reduces the potential for impacts to be under-estimated.

Table 23-6 Indicative Criteria for Determining Heritage Importance

Sensitivity	Definition
High (perceived International / National Importance)	• World Heritage Sites • Scheduled Monuments • Grade I and II* Listed Buildings or structures • Designated historic landscapes of outstanding interest • Conservation Areas containing buildings or structures with high heritage importance, or high concentrations of listed buildings • Assets of acknowledged international / national importance • Assets that can contribute significantly to acknowledged international / national research objectives
Medium (perceived Regional Importance)	• Grade II Listed Buildings or structures • Designated special historic landscapes • Other types and character of Conservation Areas • Assets that contribute to regional research objectives • Assets with regional value, educational interest or cultural appreciation
Low (perceived Local importance)	• 'Locally Listed' buildings or structures • Assets that contribute to local research objectives • Assets with local value, educational interest or cultural appreciation • Assets compromised by poor preservation and / or poor contextual associations
Negligible	• Assets with no significant value or archaeological / historical interest

Sensitivity	Definition
Uncertain/ Unknown	• The importance / existence / level of survival of the asset has not been ascertained (or fully ascertained / understood) from available evidence

23.4.3.4 Magnitude

60. Magnitude can be broadly defined as the degree to which heritage significance positively or negatively changed.

61. Direct physical impacts, indirect physical impacts and impacts from a change in setting on the significance of heritage assets are considered relevant. Impacts may be adverse or beneficial. Depending on the nature of the impact and the duration of development, impacts can also be temporary and / or reversible or permanent and / or irreversible.

62. The finite nature of archaeological remains means that physical impacts are almost always adverse, permanent and irreversible; the 'fabric' of the asset and, hence, its potential to inform our historical understanding, will be removed. By contrast, impacts resulting from the change in the setting of heritage assets will depend upon the longevity of construction and operation of DEP and SEP and the sensitivity with which the landscape is re-instated subsequent to decommissioning / demolition, if applicable.

63. The magnitude of beneficial impact with respect to onshore archaeology and cultural heritage directly relates to the level of public value associated with an individual impact. Benefits may correspond directly to DEP and SEP itself where a project will enhance the historic environment (e.g. through measures which will improve the setting of a heritage asset or public access to it).

64. Alternatively, benefits may occur on the basis of data gathering exercises undertaken for the purpose of a project which will enhance public understanding by adding to the archaeological record (e.g. through the accumulation of publicly available information and data). The measure of beneficial impact (high / medium / low) is, therefore, necessarily situational and specific to a given site, area or subject. One such example of a positive magnitude of impact could be relevant to, for example, new survey data being acquired, which will ultimately be made publicly accessible through the NHER as part of DEP and SEP.

65. The indicative criteria used for assessing the magnitude of impact with regard to archaeology and cultural heritage are presented in **Table 23-7**.

Table 23-7 Indicative Criteria for Assessing Magnitude of Impact

Magnitude	Definition
High Adverse	Key elements of the asset's fabric and/or setting are lost or fundamentally altered, such that the asset's heritage significance is lost or severely compromised.

Magnitude	Definition
Medium Adverse	Elements of the asset's fabric and/or setting which contribute to its significance are affected, but to a more limited extent, resulting in an appreciable but partial loss of the asset's heritage significance.
Low Adverse	Elements of the asset's fabric and/or setting which contribute to its heritage significance are affected, resulting in a slight loss of heritage significance.
Negligible	The asset's fabric and/or setting is changed in ways which do not materially affect its heritage significance.
Low Beneficial	Elements of the asset's physical fabric which would otherwise be lost, leading to a slight loss of cultural significance, are preserved *in situ*; or Elements of the asset's setting are improved, slightly enhancing its cultural significance; or Research and recording leads to a slight enhancement to the archaeological or historical interest of the asset. This only applies in situations where the asset would not be otherwise harmed i.e. it is not recording in advance of loss.
Medium Beneficial	Elements of the asset's physical fabric which would otherwise be lost, leading to an appreciable but partial loss of cultural significance, are preserved *in situ*; or Elements of the asset's setting are considerably improved, appreciably enhancing its cultural significance; or Research and recording leads to a considerable enhancement to the archaeological or historical interest of the asset. This only applies in situations where the asset would not be otherwise harmed i.e. it is not recording in advance of loss.
High Beneficial	Elements of the asset's physical fabric which would otherwise be lost, severely compromising its cultural significance, are preserved *in situ*; or Elements of the asset's setting, which were previously lost or unintelligible, are restored, greatly enhancing its cultural significance.
No impact	No change to the assets fabric or setting which affects its heritage significance.

66. It is important that there is a narrative behind the assessment for example as a modifier (qualifier) for the heritage importance assigned to an asset, or the perceived magnitude of impact on the asset, as well as the subsequent anticipated significance of effect (**Section 23.4.3.5**).

23.4.3.5 Impact Significance

67. Following the identification of the heritage importance of the asset, and the magnitude of the potential impact upon heritage significance, it is possible to determine the significance of the effect in EIA terms using the matrix presented in **Table 23-8**.

68. The significance of effect is qualitative and reliant on professional experience, interpretation and judgement. The matrix should therefore be viewed as a framework to aid understanding of how a judgement has been reached, rather than as a prescriptive, formulaic tool.

Table 23-8 Impact significance matrix

		Negative Magnitude				Beneficial Magnitude			
		High	**Medium**	**Low**	**Negligible**	**Negligible**	**Low**	**Medium**	**High**
Sensitivity	**High**	*Major*	*Major*	*Moderate*	*Minor*	*Minor*	*Moderate*	*Major*	*Major*
	Medium	*Major*	*Moderate*	*Minor*	*Minor*	*Minor*	*Minor*	*Moderate*	*Major*
	Low	*Moderate*	*Minor*	*Minor*	*Negligible*	*Negligible*	*Minor*	*Minor*	*Moderate*
	Negligible	*Minor*	*Negligible*	*Negligible*	*Negligible*	*Negligible*	*Negligible*	*Negligible*	*Minor*

69. As with the definitions of magnitude and heritage importance, the matrix used is clearly defined by the expert assessor within the context of that assessment. The impact significance categories are defined as shown in **Table 23-9**.

70. Following initial assessment, if the impact does not require additional mitigation (or none is possible) the residual impact will remain the same. If, however, additional mitigation is proposed there will be an assessment of the post-mitigation residual impact.

Table 23-9 Definition of impact significance

Significance	Definition
Major	Change in heritage significance, both adverse or beneficial, which are likely to be important considerations at a national or regional level because they contribute to achieving national or regional objectives. Effective/acceptable mitigation options may still be possible, to offset and / or reduce residual impacts to satisfactory levels.
Moderate	Change in heritage significance, both adverse or beneficial, which are likely to be important considerations at a local level. Effective / acceptable mitigation options may still be possible, to offset and / or reduce residual impacts to satisfactory levels.
Minor	Change in heritage significance, both adverse or beneficial, which may be raised as local issues but are unlikely to be material considerations in the decision-making process. Industry standard mitigation measures may still apply.
Negligible	No material change to heritage significance.

Significance	Definition
No change	No impact, therefore, no change to heritage significance.

71. For the purposes of the EIA, 'major' and 'moderate' adverse impacts are deemed to be significant (in EIA terms), and as such may require mitigation. Whilst minor impacts are not significant in their own right, it is important to distinguish these from other non-significant (negligible) impacts as they may contribute to significant impacts cumulatively or through interactions, for example between heritage assets or elements of the historic environment (or historic landscape).

72. Where uncertainty occurs, a precautionary approach will be taken to ensure that impacts are not under assessed. Where the extent of harm is uncertain, either because an asset is not fully understood (i.e. if further investigation is required to establish the significance of an asset) or the magnitude of the impact is unclear (i.e. because the design is not yet finalised) the precautionary approach is to assume the potential for major (substantial) harm.

73. Embedded mitigation (**Table 23-3**) (for example where potential impacts may be avoided through design, and hence heritage assets are therefore preserved in situ, where possible) are referred to and included in the initial assessment of impacts as part of this chapter. If the impact does not require mitigation (or none is possible) the residual impact will remain the same. If, however, additional mitigation is required then there will be an assessment of the post-mitigation residual impact.

23.4.4 Historic Landscape Character

74. The approach to the assessment of HLC differs to that outlined above for heritage assets. The historic character of the landscape is described in terms of ability to accommodate change. For this reason, an approach is required which recognises the dynamic nature of the landscape and how all aspects of the landscape, no matter how modern or fragmentary, are treated as part of historic landscape character. It is not meaningful, therefore, to assign a level of heritage importance to these aspects of landscape character. Individual elements which contribute towards the HLC of an area (e.g. hedgerows, field boundaries) may, however, be assigned a heritage importance based on the criteria outlined in **Table 23-6** (where relevant).

75. As the HLC is described in terms of ability to accommodate change, it is also not meaningful to assign a measure of magnitude in order to understand the nature of the potential changes. Rather, this change is expressed as a narrative description of the landscape character and how it might be affected by DEP and SEP.

76. With regard to HLC, in terms of assessing impact, it is the alteration arising as a result of DEP and SEP to the baseline HLC as assessed in this chapter (see **Section 23.5** and **Appendix 23.1**) that is the key focus. In the absence of attributing heritage importance, impact upon HLC cannot be assessed using the significance matrix presented in **Table 23-8**, but is rather expressed in terms of the ability of the HLC to accommodate any change arising as a result of a project. In this respect, while damage to, or destruction of, a heritage asset is considered permanent and irreversible, impacts to HLC are dynamic, and may be temporary and reversible. Certain elements / features that may be considered to contribute to the HLC of an area (e.g. hedgerows, field / parish boundaries) may nonetheless be considered in relation to the process outlined above, as and where relevant.

23.4.5 Cumulative Impact Assessment Methodology

77. The cumulative impact assessment (CIA) considers other plans, projects and activities that may impact cumulatively with DEP and SEP. As part of this process, the assessment considers which of the residual impacts assessed for DEP and/or SEP on their own have the potential to contribute to a cumulative impact, the data and information available to inform the cumulative assessment and the resulting confidence in any assessment that is undertaken. **Chapter 6 EIA Methodology** provides further details of the general framework and approach to the CIA.

78. For onshore archaeology and cultural heritage, cumulative impacts may occur where 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. In combination effects of a development's construction and/or operation phases could result in a cumulative impact through a change in heritage setting to both designated and non-designated heritage assets.

79. Cumulative impacts are considered in **Section 23.7**.

23.4.6 Transboundary Impact Assessment Methodology

80. No transboundary impacts are anticipated as a result of the project with respect to onshore archaeology and cultural heritage.

23.4.7 Assumptions and Limitations

81. Data used to compile this PEIR chapter primarily consist of secondary information derived from a variety of sources. The assumption is made that the secondary data, as well as those derived from other secondary sources, are reasonably accurate.

82. The records held by the sources used in this assessment are not a record of all surviving heritage assets, rather a record of the discovery of a range of archaeological and historical components of the historic environment for the study area. The information held within these sources is not complete and does not preclude the subsequent discovery of further elements of the historic environment that are, at present, unknown.

83. At this stage, the aerial photographic, LiDAR and map regression analysis, priority archaeological geophysical survey and heritage setting assessment are ongoing and are reported only in part in this chapter. The full details of the findings from these ongoing surveys and assessments will be presented within the ES chapter submitted as part of the final DCO application.

84. The DCO application will also include a commitment from the Applicant to undertake a number of additional programmes of survey and evaluation post-consent (**Section 23.6**), such as archaeological evaluation, with the aim to mitigate any impacts foreseen upon the known archaeology in the areas with the most risk of encountering archaeological remains. Although the results of these post-consent surveys will not feed directly into the DCO application with respect to the historic environment baseline, they will directly inform the implementation of the mitigation strategy to ensure that impacts upon the onshore historic environment arising from DEP and SEP are fully identified, mitigated and therefore reduced/off-set (where applicable) to non-significant levels.

23.5 Existing Environment

23.5.1 Introduction

85. The following section provides a summary of the known and potential onshore archaeological and cultural heritage resource within the defined study areas.

86. The baseline environment as presented below has been, to date, informed by the baseline data and information gathering exercise and assessment undertaken as part of the ADBA (**Appendix 23.1**), the Aerial Photographic, LiDAR and Map Regression Analysis (**Appendix 23.2**) and site visits to inform an initial heritage setting assessment study (**Appendix 23.3**), as well as the initial results from the Priority Archaeological Geophysical Survey (**Appendix 23.4**).

87. The archaeological periods referred to in this chapter are broadly defined by the following date ranges:

- Palaeolithic: 960,000 BP – 8,500 BC;
- Mesolithic: 8,500 – 4,000 BC;
- Neolithic: 4,000 – 2,200 BC;
- Bronze Age: 2,200 – 700 BC;
- Iron Age: 700 BC – AD 43;
- Romano-British: AD 43 – 410;
- Early medieval (Saxon): AD 410 – 1066;
- Medieval: AD 1066 – 1499;
- Post-medieval: AD 1500 – 1799;
- 19th Century: AD 1800 – 1899; and
- Modern: AD 1900 – present day.

23.5.2 Designated Heritage Assets

88. There are 272 designated heritage assets within the 1km study area, comprising:

- Seven Scheduled Monuments;

- Five Registered Parks and Gardens;
- 248 Listed Buildings; and
- 11 Conservation Areas.

89. Details of the designated assets are presented in a gazetteer (**Appendix 23.1**; **Annex 23.1.1**).

90. At present, a total of 6 designated heritage assets are located within the PEIR boundary; this includes one Scheduled Monument, one RPG and four Conservation Areas. It should be noted that the PEIR boundary is based on an approximately 200m wide corridor, which will be refined down to a 45-60m wide corridor for the DCO application.

23.5.2.1 Heritage Setting Assessment

91. Designated heritage assets have been considered as part of an ongoing heritage setting assessment, the initial results of which are presented in **Appendix 23.3** and incorporated into the impact assessment presented in this chapter, thus enabling potential impacts associated with changes in setting from DEP and SEP to be more fully understood.

92. The heritage setting assessment initially focussed on all designated heritage assets which are regarded as heritage assets with a high heritage importance, in line with criteria outlined in **Table 23-6**. Throughout the assessment, more detailed attention was given to those assets in the immediate vicinity of the proposed above ground infrastructure and / or to those assets of significant height or those situated on particularly high ground, as this increases the chances of long-range views (visual links) from such assets towards the proposed above ground infrastructure options.

93. Full details of the setting assessment work undertaken to date in relation to designated heritage assets can be found within **Appendix 23.3**.

94. Non-designated assets have, at present, not been subject to setting considerations; this will be undertaken following refinement of the PEIR boundary with particular reference to those assets with perceived intervisibility with above ground infrastructure.

95. Initial site visits (October 2020) were targeted and focused predominantly at, and in the vicinity of, the two onshore substation options.

96. The assets identified are presented in **Appendix 23.3**, and are considered to have a setting that, to a greater or lesser extent, contributes to their heritage significance. To inform the final assessment, these assets will be visited or re-visited (as required) and assessed in order to consider further or rule out any ongoing setting concerns / implications, and any relevant mitigation that may be required / achievable.

97. As the setting assessment work is ongoing, no formal final impact assessment and conclusions have been conducted or drawn for individual heritage assets currently under consideration. The setting assessment will be reported in full in the final DCO application. Appropriate LVIA and SVIA cross referencing will be made at that stage, and LVIA and SVIA tools (e.g. select photomontages from specific heritage viewpoints) will be utilised, where appropriate, for finalised heritage setting assessment purposes.

98. Step 1 of the settings assessment in accordance with Historic England's advice note has been completed and the results presented in **Appendix 23.3**. work on further stages of assessment is ongoing and will be reported in full in the ES Chapter in support of the DCO application. The next steps leading towards the final DCO application will be to utilise available LVIA and SVIA tools such as ZTVs and photomontages, particularly in relation to the onshore substation and offshore infrastructure, and to undertake further site visits.

99. At the time of writing this document, collaborative workshops have been undertaken with the LVIA and SVIA consultants with the interest to refine specific heritage viewpoints to capture the photomontages in order inform the settings assessment.

100. Details of these viewpoints were sent to Historic England for consultation, review and subsequent guidance, although at the time of writing this document, a formal response has yet to be received.

101. Ongoing photographic survey of the Heritage Viewpoints will be undertaken photomontages generated to inform the forthcoming settings assessment in the ES chapter.

23.5.2.2 Heritage Importance

102. Based on the criteria shown in **Table 23-6**, the designated heritage assets outlined in **Section 23.5.2.1** (and **Appendix 23.3**) are considered to be assets of medium or high heritage importance with perceived regional or national importance.

23.5.3 Non-designated Heritage Assets

23.5.3.1 Summary of Non-designated Heritage Assets within the Study Area

103. There are 1,350 non-designated heritage assets within the 500m study area (**Appendix 23.1**, **Annex 23.1.2** and **Annex 23.1.3**), of which 393 fall within the PEIR boundary. This comprises 344 previously recorded non-designated heritage assets and 49 previously unrecorded potential non-designated heritage assets (as indicated by Aerial Photographs, LiDAR and historic mapping data).

104. Non-designated heritage assets potentially subject to direct physical impacts are confined to the DCO boundary and may comprise potential subsurface archaeological remains and above ground heritage assets (e.g. earthworks or structures).

105. Non-designated heritage assets which may be subject to indirect physical or non-physical impacts (associated with change in setting) as a result of DEP and SEP may be either within or beyond the parameters of the DCO boundary.

23.5.3.2 Sub-surface Archaeological Remains

106. Heritage assets within the PEIR boundary that are considered to potentially represent surviving below ground archaeological remains have not yet been fully evaluated through intrusive (e.g. trial trenching) evaluation approaches.

107. Features indicative of below ground archaeological remains, as indicated by data available and archaeologically assessed as part of the ADBA (see **Appendix 23.1**), variously include cropmarks, soil / parch marks, depressions and ditches.

108. Sub-surface archaeological remains may also be indicated by features identified in aerial photographs or historic map data as former buildings, structures or sites, which may no longer be extant as above ground remains but for which below ground remains may still be present (see **Appendix 23.2**).

109. A programme of priority archaeological geophysical survey (detailed magnetometry) has also been undertaken at targeted locations and further helps inform an understanding of the subsurface archaeological potential of the PEIR boundary (see **Appendix 23.4**). The types of buried archaeological remains identified range from extensive areas of settlement and enclosure to single clearly defined features.

110. A summary of the below ground archaeological remains identified within the PEIR boundary from the desk-based and non-intrusive evaluation surveys are presented in **Table 23-10**. The relevant figures to the identified below ground archaeological remains are available to view in **Appendix 23.1**, **Appendix 23.2**, and **Appendix 23.4**.

Table 23-10 Summary of Buried Archaeological Remains Identified to date

DEP/SEP ID	NHER PrefRef	APS ID	Geophysical Survey Area	Summary of Findings	Perceived Heritage Importance
Onshore Substation Zones					
723	52076	APS_004	PA1	Cropmarks of ditches, intersects Roman pits and possible field system south of Mangreen Farm. No coherent pattern of anomalies but cluster of anomalies in the south-west corner. Also, other linear and discrete anomalies, particularly in the western half of the field which may have archaeological potential.	Medium
1573, 1182	52079, 52080	APS_006	N/A	Cropmarks of fragmentary ditches of unknown date and post-medieval field boundaries.	Low
589, 590, 1611, 727, 931, 1063, 936, 1514	54877, 57922, 52071, 55197, 52069, 9750, 9717, 52070	APS_012 & APS_014 to 016	PA2	Site of medieval village of Gowthorpe, and cropmarks of ring ditches and sub-rectangular enclosures. Linear settlement clearly identified along the western edge of the survey area, which comprises a series of sub-rectangular enclosures with divisions and multiple discrete anomalies. Low magnitude linear	Medium - High

DEP/SEP ID	NHER PrefRef	APS ID	Geophysical Survey Area	Summary of Findings	Perceived Heritage Importance
				anomalies suggest a field system extending to the east of the settlement.	
1133, 436, 931, 1183	52066, 9752, 52069, 52084	APS_007 & APS_009 to 010	PA3	Post-medieval brickworks, and ring ditch, trackway and field boundaries. Sub-square enclosure with small square enclosure appended to the south-eastern corner which probably locates the brickworks. Several high magnitude anomalies within both enclosures and further to the east which may be of archaeological potential. Also, possible linear anomalies in the survey area.	Medium - High
Onshore Cable Corridor					
574	22652	APS_025	N/A	Extraction site of unknown date and multi-period finds.	Low
TBC	N/A	APS_031	N/A	Extraction site of unknown date.	Low
785, 1148, 438, 840, 978, 878, 879	28710, 54616, 28163, 28164, 28165, 28157, 28158	APS_022 & APS_028	PA4	Former WWII military site / accommodation. Area of magnetic disturbance locates accommodation building. Linear anomalies to south and east of the	Low - Medium

DEP/SEP ID	NHER PrefRef	APS ID	Geophysical Survey Area	Summary of Findings	Perceived Heritage Importance
				building locate likely services associated with the building.	
1155	59846	APS_034 to 035 & APS_037	PA5	Cropmarks over Roman road between Caistor St Edmund and Crownthorpe. Former boundaries of unknown date are identified in all three fields in the PA. No clear response from the road. Clusters of discrete anomalies located at the southern end of the survey area which may be small quarry pits from which material was excavated for use in the road's construction.	Medium - High
688, 281, 436, 1577, 385, 1046, 400, 431	22038, 18294, 19752, 53602, 19744, 53603, 15277, 19751	APS_041 to 042	PA6	Cropmarks of rectilinear enclosure, ditches and large infilled pits. Large rectilinear enclosure identified to the west of the survey area. Linear anomalies within the main enclosure indicate partition/sub-division. Other smaller enclosures extend to the east of the main enclosure.	Low - Medium

DEP/SEP ID	NHER PrefRef	APS ID	Geophysical Survey Area	Summary of Findings	Perceived Heritage Importance
TBC	N/A	APS_044 & APS_045	N/A	Post-medieval field system and possible trackway and additional parallel ditch of unknown date.	Low
1548, 530	15763, 53488	APS_048	PA7	Multi-period cropmarks; former field boundaries, enclosures and possible settlement. Unsurveyable – planted with Christmas trees.	Medium - High
TBC	N/A	APS_050	PA8	Probable ditched enclosures forming focus of prehistoric settlement. Unsurveyed at the time of writing – under mature maize crop.	Medium - High
TBC	N/A	APS_052 & APS_053	N/A	Cropmarks of an enclosure of unknown date and possible extraction site.	Low
1580, 538, 410, 1581	53682, 12809, 20008, 53683	APS_056, APS_058 to 059 & APS_062	PA9	Cropmarks of a Bronze Age barrow cemetery with at least four barrows, an undated rectangular enclosure and ditches. At least three and possibly four barrows clearly identified within the survey area. Part of area	High

DEP/SEP ID	NHER PrefRef	APS ID	Geophysical Survey Area	Summary of Findings	Perceived Heritage Importance
				unsurveyable at time of writing – under crop of potatoes.	
390, 725, 401, 664, 563, 874, 396	19755, 53628, 15898, 12808, 53679, 25701, 20011	APS_060 & APS_061	PA10	Cropmarks of a possible ring ditch of Bronze Age date and enclosures of Roman date. Linear anomalies possibly forming part of field system/enclosures. At time of writing, awaiting data from A47 scheme for northern part of survey area.	High
874, 725	25701, 53628	APS_060	PA11	Northern extent of cropmarks of Roman date. At time of writing, access denied.	Medium
884	28552	APS_063	PA12	Extant platforms and ditched enclosures relating to former medieval tofts. Anomalies possibly indicative of the medieval tofts visible to the western side of the field. North-eastern section of survey data characterised by responses due to deposition of alluvium adjacent to a stream course.	Medium

DEP/SEP ID	NHER PrefRef	APS ID	Geophysical Survey Area	Summary of Findings	Perceived Heritage Importance
783, 406	28684, 53627	APS_064	PA13	Cropmarks of enclosures and ditches of probable Roman date, possible temporary camp or domestic site. Possible large sub-square enclosure in south-eastern corner of area. At time of writing, awaiting data from A47 scheme for remaining survey area.	Medium - High
1339, 1453, 1314	34084, 53631, 50618	APS_067, APS_073 & APS_077	N/A	Site of WWI and WWII military training site, WWII weapons pit and searchlight battery.	Low to Medium
1579, 1110, 639	53678, 44183, 23773	APS_071 & APS_072	PA14	Cropmarks of probable Bronze Age barrow and undated fragmentary field boundaries and trackways. At time of writing, access denied.	High
609, 1314	50615, 50618	APS_077 & APS_079	PA15	Cropmarks of possible enclosures and associated field boundaries of possible Iron Age to Roman date. Possible rectangular enclosure at western end of survey area.	Medium - High

DEP/SEP ID	NHER PrefRef	APS ID	Geophysical Survey Area	Summary of Findings	Perceived Heritage Importance
608, 1002	50610, 50614	APS_082 & APS_085	N/A	Cropmarks of possible Iron Age to Roman date enclosures and probable former field boundaries.	Medium - High
567, 591, 1122	54357, 50607, 50608	APS_089 to 090 & APS_092	PA16	Cropmarks of ditches, former field boundaries, trackways and small square enclosure. Unsurveyed at the time of writing – under crop of carrots.	Medium - High
1565	50673	APS_095	PA17	Cropmarks of field boundaries of unknown date. Unsurveyed at the time of writing – under crop of sugar beet.	Low
988, 442, 925, 558, 930	35933, 29962, 7741, 50655, 50676	APS_096 to 097	PA18	Cropmarks of ring ditch and oval enclosure of possible Bronze Age date, and medieval building platforms. Part surveyed at time of writing – possible enclosures visible in data.	High
545, 557, 1203, 556	21719, 50649, 50648, 50647	APS_103, APS_107 to 108	PA19	Cropmarks of a possible Bronze Age round barrow cemetery. Two rectangular enclosures with large discrete anomalies within.	High

DEP/SEP ID	NHER PrefRef	APS ID	Geophysical Survey Area	Summary of Findings	Perceived Heritage Importance
1586, 526, 559, 845	54355, 34326, 50657, 50677	APS_104, APS_106 & APS_109	PA20	Medieval enclosures and field boundaries, and cropmarks of fragmentary ditches, former field boundaries and a possible ring ditch. Linear anomalies indicative of ditches forming fields and enclosures are identified in southern and central fields. Linear trends in northern field are more likely to be agricultural in origin.	Medium - High
1585, 1023, 726, 354	54354, 54353, 53700, 22887	APS_110 & APS_111	PA21	Undated ditches and a former road/trackway and field boundaries of medieval to post-medieval date. No anomalies of obvious archaeological interest.	Low
861, 1584, 726	51115, 53699, 53700	APS_112 & APS_113	PA22	Cropmarks of fragmentary ditches and soilmarks of buried walls of uncertain date. Fragmentary linear anomalies of uncertain origin. Possible round barrow on north-eastern edge of survey area.	Low
TBC	N/A	APS_114	N/A	Cropmarks of possible ditches and a possible ring ditch.	Medium – High

DEP/SEP ID	NHER PrefRef	APS ID	Geophysical Survey Area	Summary of Findings	Perceived Heritage Importance
TBC	N/A	APS_118	N/A	Cropmarks of undated ditches and a possible ring ditch.	Medium - High
TBC	N/A	APS_119 & APS_121	N/A	Cropmarks of a trackway and circular feature possibly associated with the former military airfield (Swannington WWII Airfield – NHER 7465).	Low - Medium
660	58227	APS_124	N/A	A complex of likely multi-phased rectilinear ditched enclosures and pits, with an outlying D-shaped ditched enclosure to the immediate east of the PEIR boundary.	Medium - High
TBC	N/A	APS_127	PA23	Cropmarks of ditches and possible enclosures. Southern end of 'ladder' settlement extending north/south and continuing into and through PA24 and PA25, approximately 1km in length and at least 200m wide. Comprises a series of rectangular enclosures. Numerous discrete anomalies within the enclosures suggests settlement activity.	Medium - High

DEP/SEP ID	NHER PrefRef	APS ID	Geophysical Survey Area	Summary of Findings	Perceived Heritage Importance
687, 360, 491, 524	21849, 58762, 7343, 29841	APS_128	PA24	Cropmarks of enclosures, boundaries and pits. NCC HER records a probable Roman fort. Central part of 'ladder' settlement extending north into PA25 and south into PA23, approximately 1km in length and at least 200m wide. Comprises a series of rectangular enclosures. Numerous discrete anomalies within the enclosures suggests settlement activity.	Medium - High
425, 1519, 469, 568, 467	7353, 22903, 21154, 7346, 20475	APS_129	PA25	Straight sided enclosures, one visible terminal defined entrance, ditches and pits. Northern end of 'ladder' settlement extending south into PA24 and PA23, approximately 1km in length and at least 200m wide. Comprises a series of rectangular enclosures. Numerous discrete anomalies within the enclosures suggests settlement activity.	Medium - High
TBC	N/A	APS_130	N/A	A possible ditched enclosure and several areas of hand dug extraction pits.	Medium

DEP/SEP ID	NHER PrefRef	APS ID	Geophysical Survey Area	Summary of Findings	Perceived Heritage Importance
TBC	N/A	APS_132	N/A	Cropmarks of pits and ditches	Medium
1526	36408	N/A	N/A	Cropmarks of undated enclosures.	Medium
TBC	N/A	APS_133 & APS_134	PA26	Cropmarks of ditched boundaries and possible trackways. Linear trends are probably of recent agricultural origin. A possible round barrow is identified in the north-western corner of the survey area.	Medium – High
483, 583, 968	35935, 37629, 7350	APS_135 & APS_136	PA27	An ovoid single ditched enclosure, possibly Neolithic, and linear and curvilinear ditches. Unsurveyed at the time of writing – under crop of sugar beet.	Medium - High
TBC	N/A	APS_137	N/A	Buried ditches of unknown date and origin.	Low - Medium
1521, 1555	29568, 36406	N/A	N/A	Rectangular enclosure and linear features.	Medium
607	12987	APS_139	N/A	Rectilinear enclosure and Iron Age chariot fitting, and cropmarks of ditches of a possible former field system.	Medium

DEP/SEP ID	NHER PrefRef	APS ID	Geophysical Survey Area	Summary of Findings	Perceived Heritage Importance
316, 331, 599	51455, 63420, 11339	APS_141	PA28	Settlement enclosures with a central trackway and outlying enclosures and boundaries. Unsurveyed at the time of writing – under crop of potatoes.	Medium - High
299, 777	28024, 28026	APS_142	PA29	Cropmarks of enclosures and former field system. Possible single large square enclosure straddling the boundary between the northern and southern fields. Other fragmentary linear anomalies possibly locate parts of an associated field system.	Medium
TBC	N/A	APS_144 & APS_145	N/A	Continuation of a former ditched field system with an integral trackway.	Low - Medium
1557, 898	36779, 39704	APS_146 & APS_047	PA30	Single ditched ovoid enclosure and fragmentary ditches, possible prehistoric site. No obvious anomalies of archaeological potential.	Medium
TBC	N/A	APS_148	N/A	Cropmarks of pits and possible buried ditches of unknown date.	Low - Medium

DEP/SEP ID	NHER PrefRef	APS ID	Geophysical Survey Area	Summary of Findings	Perceived Heritage Importance
TBC	N/A	APS_149	N/A	Cropmarks of pits and ditches	Low - Medium
TBC	N/A	APS_150	N/A	Cropmarks of buried ditches and a possible ditched trackway.	Low - Medium
TBC	N/A	APS_152	N/A	NMP records a ring ditch and enclosures.	Medium - High
TBC	N/A	APS_154	N/A	Two circular soil marks which may the site of former mounds, possibly Bronze Age round barrows	Medium - High
1553, 474, 453, 1529	27993, 22883, 53757, 51434	APS_164, APS_166, APS_167 & APS_169	PA32	Cropmarks of elongated mortuary enclosure, ring ditch, linear ditches and possible mounds. No clear linear anomalies although several discrete anomalies of uncertain origin have been identified.	Medium - High
548, 328, 919	32047, 51432, 62305	APS_189 & APS_192	PA33	Cropmarks of a possible ditched settlement enclosure and possible oval or round barrow. Access denied at time of writing.	Medium - High
549, 328, 919	32048, 51432, 62305	APS_192, APS_199 & part of APS_206	PA34	Probable Bronze Age round barrow, and part of medieval moated complex. Access denied at time of writing.	High

DEP/SEP ID	NHER PrefRef	APS ID	Geophysical Survey Area	Summary of Findings	Perceived Heritage Importance
803, 325	51430, 63388	APS_206 & APS_210	PA35	Medieval moated complex with enclosures, fishponds, old road and field system. Adjacent to Scheduled moated site – NHLE 1013097. Access denied at time of writing.	High
Landfall					
1302, 712, 1301, 626	11335, 39345, 51724, 56090	APS_244	PA36	Site of Weybourne Camp (NHER MNF11335). Access denied at time of writing.	Low - Medium
675, 1317, 1379, 1376, 482, 1311, 1377, 1378	41015, 32518, 38623, 38565, 33103, 17818, 38566, 38568	APS_238, PAS_243 to APS_244 and APS_247 to APS_249	PA37	WWI and WWII slit trenches and associated coastal defences. Multi-period findspots. Access denied at time of writing.	Low - Medium

111. Those archaeological sites / features / assets / anomalies (based on the data presented in **Appendices 23.1, 23.2** and **23.4**) considered to be potentially vulnerable to direct physical impact as a result of DEP and SEP (i.e. those within the eventual DCO boundary) are directly addressed within the impact assessment and discussed, where relevant, in **Section 23.6**.

23.5.3.3 Archaeological Potential of the PEIR boundary

112. The overall archaeological potential of the PEIR boundary, as assessed in the ADBA (**Appendix 23.1**) prior to the assessment of the geophysical survey data, is considered to be high, with the following key distinctions drawn out based on information available to date:

- Moderate to high likelihood of Bronze Age burial sites;
- Moderate to high likelihood of late prehistoric (Iron Age) and Romano-British remains in the form of possible settlements and associated field systems;
- High likelihood of evidence of medieval and post-medieval agricultural land use; and
- Moderate likelihood of surviving evidence of WWII coastal defences and military training activity.

113. The prehistoric and Roman sites are likely to be readily identified through geophysical survey and would most likely be of local to potentially regional importance. Note that the geophysical survey undertaken to date has already provided enhanced information on this. Medieval and post-medieval features are also likely to be readily identified through geophysical survey, with remains unlikely to be of more than local importance (the geophysical survey undertaken to date has provided enhanced information on this).

114. The archaeological potential of the PEIR boundary is based on an assessment of data obtained through an assessment of baseline data gathering and survey campaigns to inform the assessment. Post-consent investigations (see **Sections 23.3.3** and **23.4.2**) will feed into the establishment of appropriate, proportionate and robust mitigation approaches.

23.5.3.4 Above Ground Archaeological Remains and Heritage Assets

115. Features considered to represent above ground heritage assets within the PEIR boundary are summarised **Table 23-11**.

Table 23-11: Possible above Ground Heritage Assets within the PEIR boundary

DEP/SEP ID	NHER PrefRef	APS ID	Description	Perceived Heritage Importance
884	28552	APS_063	Extant platforms and ditched enclosures relating to former medieval tofts.	Medium
1324	24265		World War Two pillbox	Low
1336	32516		World War Two pillbox	Low

DEP/SEP ID	NHER PrefRef	APS ID	Description	Perceived Heritage Importance
1323	24264		World War Two pillbox	Low
1333	32501		World War Two pillbox	Low

116. The heritage assets summarised in **Table 23-11** represent only those within the PEIR boundary considered to represent above ground remains as indicated by descriptive information held by the NHER and assessed as a result of the aerial photographic, LiDAR and historic map analysis. Access restrictions, thick vegetation and unharvested crops variously prevented access to some areas during the walkover survey. As such, the potential for heritage assets to survive as above ground remains in addition to those summarised in **Table 23-11** cannot be discounted.

117. It is also acknowledged that examples of above ground historic earthworks are a rare resource within Norfolk as a result of agricultural activity and as such are considered valuable where they do survive as above ground features.

23.5.3.5 Heritage Setting Assessment

118. As outlined in **Section 23.5.2.1**, the heritage settings assessment initially focussed on designated heritage assets in the vicinity of the permanent above ground infrastructure (i.e. the onshore substation and offshore wind turbines). However, as the settings assessment progresses, select non-designated heritage assets which may be subject to an impact to their heritage significance through a change to their setting will also form part of this consideration.

119. This assessment is ongoing and will be developed as the EIA progresses in order to establish which heritage assets require consideration and assessment.

23.5.3.6 Heritage Importance

120. The non-designated heritage assets within the PEIR boundary (identified to date as part of this assessment) are examples of locally common features representing post-medieval agriculture, and modern military activity. Based on information available to date, these assets may contain evidence that would contribute to understanding the archaeological resource of the local area. They are therefore anticipated to be of low heritage importance. The previously recorded non-designated heritage assets also, however, include possible prehistoric and / or Roman features represented by cropmarks. Given the uncertainty regarding the origin of potential sub-surface archaeological remains of this nature (based on available data), this chapter has been prepared in line with the precautionary principle whereby the highest likely level of importance may be assigned and assessed within **Section 23.6**, as necessary. This precautionary approach represents good practice in archaeological impact assessment and reduces the potential for impacts to be under-estimated.

121. For the previously unrecorded non-designated heritage assets, identified as a result of the analysis of aerial photography, LiDAR data and historic mapping (**Appendix 23.2**) and the priority archaeological geophysical survey (**Appendix 23.4**), it has not yet been possible to determine the precise nature, extent or date of these features. It may also be the case that some (or many) of the features prove to be non-archaeological. Given this uncertainty, these potential heritage assets have also been assigned a precautionary heritage importance, where appropriate, depending on the nature of the asset in question, against which potential impacts have been assessed in **Section 23.6**.

23.5.3.7 Historic Landscape Character

122. The study area is predominantly characterised by 20th century enclosure and boundary loss, with an even distribution of land enclosed during the 18th to 19th centuries, mostly as a result of parliamentary planned enclosure.

123. These predominant HLC types are anticipated to be able to accommodate a temporary level of change to HLC during construction with fields/areas being returned to their pre-construction condition and character post-construction, as part of a sensitive programme of backfilling and reinstatement / landscaping. Certain hedgerows and field boundaries (e.g. parish boundaries) may require recording prior to/during the construction process and enhanced provisions during backfilling and reinstatement.

23.5.4 Ongoing and forthcoming programmes of assessment and survey

124. In order to further inform the onshore archaeological and cultural heritage baseline environment, the following programmes of assessment and survey are anticipated to inform the archaeological mitigation strategy, albeit that evaluation of a more intrusive nature will be undertaken within the post-consent stage(s) of DEP and SEP and will therefore not directly inform the final DCO application.

23.5.4.1 Below ground archaeology

125. The assessment of aerial photographs, LiDAR data and historic mapping will be progressed further once the relevant archives are open for in-person visits. The findings from which will form an addendum to **Appendix 23.2** and inform the final DCO application.

126. The priority archaeological geophysical survey will continue once access and/or crops have been harvested. The results from which will also inform the final DCO application.

127. The information gained from these non-intrusive evaluation surveys will inform a programme of intrusive evaluation investigations (e.g. trial trenching) which are proposed to be undertaken post-consent. The primary purpose of intrusive programmes of evaluation will be to ground-truth and further identify areas of archaeological interest, in order to confirm the exact locations of any buried archaeological features which may be extant within the DCO boundary, as indicated by the previous non-intrusive survey methods discussed above.

128. The information attained from these investigations will inform decisions regarding the archaeological mitigation strategy for DEP and SEP so that the historic environment resource can be safeguarded in a manner that is efficient, appropriate and proportionate to the significance of the archaeological remains present. Post-consent survey commitments in this regard will be detailed in a project-specific Outline WSI prepared in agreement with the relevant regulators and submitted as part of the DCO application.

23.5.4.2 The setting of heritage assets

129. The setting assessment undertaken to date and presented in this chapter addresses Step 1 of Historic England's guidance on the *Setting of Heritage Assets: Historic Environment Good Practice Advice in Planning Note 3* (Historic England, 2017a), which identifies the heritage assets affected and their settings. A number of heritage assets have also been subject to a preliminary assessment with respect to Step 2 of the approach, which assesses whether, how and to what degree setting makes a positive contribution to the significance of the heritage assets in question (**Appendix 23.3**). This work is ongoing.

130. It is anticipated that a number of additional site visits will take place prior to the submission of the DCO application to further inform the additional stages of the heritage setting assessment. The site visits and assessment undertaken to date were devised with the purpose of facilitating a sufficiently early understanding of the designated heritage assets to enable any potential changes in setting from the proposed above ground infrastructure to be adequately identified in this chapter. This approach has also facilitated the identification of heritage assets considered to require further heritage setting considerations specific to the PEIR boundary.

131. Additional site visits are intended to supplement and build upon this assessment further within the final DCO application, in conjunction with available LVIA and SVIA tool-kits. It is anticipated that these additional survey and assessment measures will enable the significance of effect of any indirect non-physical impact upon the setting of heritage assets arising from DEP and SEP to be further determined, thereby informing decisions regarding appropriate mitigation measures which seek to reduce (or offset) any identified impacts to a non-significant level.

23.5.5 Climate Change and Natural Trends

132. The historic environment is vulnerable to the effects of climate change. Changes to environmental conditions have the potential to alter the range of flora and fauna within the environment, thereby potentially changing the inherent character of historic and designed landscapes and affecting historic building materials (e.g. fungal / plant growth and insect infestation due to the effects of global warming). Extremes in temperature and cycles of wetting and drying as a result of climate change can also damage historic buildings, landscapes and buried archaeological remains, variously as a result of soil saturation and shrinkage and changes to soil chemistry. Waterlogged archaeological and palaeoenvironmental remains are particularly vulnerable in this regard, with the desiccation of soils and lowered groundwater levels potentially increasing the risk of decay to such remains, if and where present. These damaging cycles create stressful environments for buried archaeology, with preservation in situ becoming increasingly difficult. Given that heritage assets, and the contexts in which they survive vary, it follows that multiple factors may affect their survival, stabilisation or decay. On this basis, broad-scale strategies to safeguard the historic environment from the effects of climate change are therefore difficult to determine, with no one single solution available.

133. Elements of climate change considered to be a particular relevance to the DCO boundary include those associated with sea level changes and erosion, which have the potential to damage and de-stabilise coastal heritage assets. To the west of the landfall, the North Norfolk Heritage Coast (from Old Hunstanton to Weybourne) is described as a very dynamic coastline subject to continuous change, both erosion and accretion varying over time and in rate along the coast. However, the soft cliffs from Weybourne to Bacton, which characterise the landfall study area, are being affected by sea level rise causing increased erosion and increasing difficulty in maintaining sea defences. In particular, increased frequency and severity of storms, coupled with sea level rise, will likely impact coastal heritage assets and in the medium to long term, sea level rise is likely to drive a very significant change. The sub-surface archaeology which is exposed, investigated and recorded to professional standards may, however, be considered a public benefit in terms of understanding of and building upon the archaeological record, and certainly preferable to assets and remains being lost altogether.

23.6 Potential Impacts

134. This section outlines potential impacts as a result of DEP and SEP, their likely magnitude and the resulting significance of any effects when compared against the heritage importance of assets assessed, using the assessment methodology described in **Section 23.4** and **Chapter 6 EIA Methodology**.

135. A range of potential impacts may occur to onshore archaeology and cultural heritage assets as a result of changes during the construction, operation and decommissioning of DEP and SEP. DEP and SEP have the potential to impact upon the historic environment resource in a number of ways, through direct (physical) changes, indirect (physical) changes, and indirect (non-physical) changes to the setting of heritage assets. Some impacts and changes will be temporary and others permanent, some confined to the construction stages and others more permanent during operation and the lifespan of DEP and SEP, and subsequent decommissioning. A summary of all potential impacts identified for onshore archaeology and cultural heritage is provided in **Section 23.12**, **Table 23-16**.

136. Direct (physical) impacts, as stated in the NPS EN-3 (DECC 2011b: 49), encompass direct effects from the physical siting of the DCO boundary. Potential direct impacts thus comprise both direct damage to archaeological deposits and material and the disturbance or destruction of relationships between deposits and material and their wider surroundings. This may include buried archaeological remains. Consequently, all aspects of DEP and SEP which involve intrusive groundworks have the potential to affect heritage assets with archaeological interest (e.g. buried archaeological remains) through direct physical change.

137. DEP and SEP also have the potential to interact with local hydrological processes which in turn may result in impacts of an in-direct (physical) nature occurring upon buried archaeological deposits through either desiccation or waterlogging.

138. Indirect (non-physical) impacts on the historic environment, as stated in NPS EN3 (DECC 2011b: 67), include heritage assets being affected by change in their setting. Indirect (non-physical) impacts upon significance as a result of change in the setting of heritage assets have the potential to occur throughout the lifetime of DEP and SEP, thus encompassing all phases, from construction, into operation and subsequent decommissioning. Indirect non-physical impacts upon the setting of heritage assets are most relevant as a result of the presence of above ground infrastructure for the DEP and SEP during the operational phase, effects of which may be long-term or ‘permanent’ in nature. Indirect non-physical impacts upon the setting of heritage assets may also arise as a result of construction and decommissioning works, although effects will be, by comparison, shorter in duration and of a temporary nature.

139. The impact assessment as presented in this chapter assumes that activities associated with construction may theoretically occur anywhere within the PEIR boundary.

140. As outlined in **Section 23.5.4**, further data will be acquired and assessed to inform and build upon the known onshore archaeological and cultural heritage baseline environment of the study areas, and specifically DEP and SEP. The results of additional assessment will enable a more detailed impact assessment to be undertaken as part of the forthcoming final DCO application. Prior to the completion of these programmes of assessment and survey, at this stage of enquiry, it has been considered necessary for the impact assessment presented in this PEIR chapter to be undertaken in a more high-level manner.

141. As such heritage assets will not be considered as single, individual receptors as part of an asset-by-asset approach. Instead, for the purposes of this PEIR, heritage assets have been grouped. The following broad groups will apply and be taken forward into the impact assessment:

- Below ground archaeology:
  - Areas of possible archaeological interest (including non-designated buried archaeological heritage assets) (ranging between anticipated low and high, as a worst case, significance); and
  - Unknown potential buried archaeological remains (precautionary high heritage significance until evidenced otherwise).
- Above ground archaeology/built heritage assets:
  - Designated heritage assets (high heritage significance);
  - Areas of possible archaeological / cultural heritage interest (including non-designated above ground archaeology and cultural heritage assets, e.g. earthworks and standing structures) (ranging between anticipated low and medium, as a worst case, heritage significance).

23.6.1 Potential Impacts during Construction

23.6.1.1 Impact 1: Direct Physical Impact on (permanent change to) Designated Heritage Assets

142. Impacts resulting in potential effects as part of the construction work are those associated with intrusive groundworks, including:

- The removal of topsoil anywhere across the DCO boundary;
- Open cut trenching as part of the onshore cable installation works;
- The excavation of jointing bays and link boxes along the onshore cable route;
- Groundworks associated with the onshore cable route easement and associated access trackways;
- Vibration from HDD drilling and other intrusive groundworks; and
- Accidental damage from plant movement and other construction traffic.

143. Any direct (physical) impact to designated heritage assets (and their 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 would likely 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.

23.6.1.1.1 Magnitude of effect – DEP or SEP in Isolation

144. Any direct physical impacts on the significance of designated heritage assets is considered to be of high magnitude. However, the extent of any impact will often depend on the presence, nature and depth of any such remains, in association with the depth of construction-related groundworks, as well as the specific elements, aspects or areas of the asset subject to impact (including the level to which these may or may not contribute to heritage significance). As such, a reduced magnitude of impact may be relevant where the anticipated interaction between the proposed groundworks and the designated heritage asset is considered to be unlikely or limited in terms of impact upon the asset's heritage significance. The magnitude of direct physical impacts on designated heritage assets during the construction phase could therefore range from negligible to high.

145. There are currently 33 designated heritage assets located within the PEIR boundary which are considered to have a medium to high heritage importance.

23.6.1.1.2 Impact Significance – DEP or SEP in Isolation

146. In the absence of mitigation, all direct impacts to designated heritage assets assigned a heritage importance of medium and above could result in an impact of major adverse significance.

23.6.1.1.3 Mitigation – DEP or SEP in Isolation

147. The preferred and optimum mitigation measure is preservation *in situ*, wherever possible. By avoiding designated heritage assets in their entirety (as indicated by existing and available data), the magnitude of impact may be reduced depending on the extent of the asset in question (with reference to change or impact upon heritage significance) and the degree to which preservation *in situ* has been applied.

148. Avoidance, micro-siting and route refinement will continue as the design of DEP and SEP is progressed prior to the final DCO application. This strategy ensures that ongoing baseline data will input directly into the iterative design process so that designated heritage assets are avoided, wherever possible within the confines of engineering and other environmental constraints. The DCO boundary refinement process is ongoing, and it is expected that all designated heritage assets would be avoided in accordance with the embedded mitigation outlined in **Table 23-3**.

23.6.1.1.4 Residual Impact – DEP or SEP in Isolation

149. Following further route refinement and micro-siting it is anticipated that all designated heritage assets would be avoided and the residual impact magnitude and impact significance will be reduced to levels considered **non-significant** in EIA terms.

23.6.1.1.5 DEP and SEP Together

150. The worst-case scenario for direct physical impacts on designated heritage assets is based upon the general assumption that the greatest potential footprint for DEP and SEP represents the greatest potential for direct physical impacts (e.g. damage / destruction). The combined footprint of both DEP and SEP, therefore, represents a greater potential for direct impacts than if, for example, only DEP or SEP was to be built in isolation. However, the magnitude of effect and impact significance would be the same if DEP or SEP were constructed in isolation.

151. As detailed above, the DCO boundary refinement process is ongoing and will be the same for the construction of both DEP and SEP, as for either project built in isolation. Therefore, with the application of embedded mitigation it is anticipated that such effects will be reduced or offset to levels considered **non-significant** in EIA terms.

23.6.1.2 Impact 2: Direct Physical Impact on (permanent change to) Non-designated Heritage Assets (including Buried Archaeological Remains, Historic Earthworks and Structures)

152. Impacts resulting in potential effects as part of the construction work are those associated with intrusive groundworks, including:

- The removal of topsoil anywhere across DEP and SEP;
- The excavation of transition pits at the landfall;
- The application of HDD at the landfall;
- Open cut trenching as part of the onshore cable installation works;
- The excavation of jointing bays and link boxes along the onshore cable corridor;
- Groundworks associated with the onshore cable corridor easement and associated access trackways; and
- Groundworks associated with the onshore substation.

153. Any adverse impacts (and associated effects) upon sub-surface archaeological remains and above ground heritage assets due to construction-related works would likely be permanent and irreversible in nature. Once archaeological deposits and material, and the relationships between deposits, material and their wider surroundings have been damaged or disturbed, it is not possible to reinstate or reverse those changes. As such, direct physical impacts to an asset's fabric (where elements lost contribute to heritage significance) can represent a total loss of an asset's heritage significance, or parts of it, and the character, composition or attributes of the asset may be fundamentally changed or lost from the site altogether.

154. A staged programme of assessment has commenced with a view to building upon an understanding of potential archaeological remains and their likely heritage significance in the study areas and more specifically within the PEIR boundary. This approach, to date, has identified a number of areas of possible archaeological interest, which have been assigned initial predicted heritage significance levels between low and high. Those considered to be most vulnerable with regard to the various elements of construction are highlighted below. However, it should be borne in mind that the assessments and surveys being progressed (**Section 23.5.4**) will further inform the nature and extent of any features present and have the potential to alter the perceived heritage significance of assets encountered.

155. It should also be emphasised that the potential for buried archaeological remains and above ground heritage assets not currently represented by the APS or NHER data to be impacted as a result of construction works should not be discounted. In the absence of further data regarding the 'potential' archaeological resource, such assets must be considered as potentially having a high perceived heritage significance.

156. Extant earthworks and field boundaries are an integral part of the HLC. Any loss of such features arising as a result of construction-related activities therefore has the potential to impact upon the HLC of DCO boundary and wider surrounds. This change to the HLC arising from the potential loss of above ground features is also discussed below.

Landfall location

157. Construction activities within the landfall location that have the potential to directly (physically) impact buried archaeological remains, and above ground heritage assets, are those associated with HDD works, cable trenching, installation of the landfall HDD compound, and groundworks associated with transition bay installation.

158. Data available and assessed to date (as part of this assessment) within the landfall location indicates a predominance of features associated with the coastal defence network of the two World Wars (particularly those of the WWII) and military training areas (see **Section 23.5.3.2**, **Table 23-10**). It is possible that sub-surface remains relating to these features exist within the landfall location. Below ground features associated with the two World Wars are likely to be of low to medium heritage importance.

159. Four WWII pillboxes, which are recorded as above ground heritage assets, have been identified within the landfall location (see **Table 23-11**). Based on information available to date, these heritage assets are assigned a low heritage importance.

160. The landfall location also contains numerous records of multi-period findspots which could potentially indicate the presence of buried archaeological remains of earlier date (DEP/SEP IDs **310**, **311**, **626**, **712**, **787**, **1125** and **675**). Due to the uncertainty of the heritage significance of these findspots in the absence of further assessment and survey, these assets are assigned a precautionary medium heritage importance.

161. With regard to the HLC (see **Appendix 23.1**), the areas mapped as commons, wastes, heaths and 20th century agriculture at the landfall location will experience a temporary level of change to HLC during construction.

Onshore Cable Corridor

162. Construction activities in the DCO boundary that have the potential to directly (physically) impact buried archaeological remains and above ground heritage assets are those associated with cable trenching, potential trenchless techniques at crossing points and groundworks associated with compound footprints, jointing bay and link box installation and the cable easement.

163. Data available and assessed to date within the onshore cable corridor element of the PEIR boundary indicates the potential presence of sub-surface archaeological remains of varying type. Due to the extent of the onshore cable corridor, the large number of possible areas of archaeological interest currently identified and the inability to accurately ascertain the presence / absence, nature and extent of the potential buried remains within it, it is not possible at this stage of enquiry to identify each and every heritage asset representative of below ground archaeology that may be impacted by construction works associated with DCO boundary.

164. Areas of notable features within the PEIR boundary are presented in **Section 23.5.3.2**, **Table 23-10**. These areas have been variously assigned a low to high perceived heritage significance based on information available to date.

165. In addition to areas of potential buried archaeological remains, two areas representative of above ground archaeological remains have been identified within the PEIR boundary (see **Table 23-11**). Based on information available to date, these heritage assets are assigned a low to medium heritage importance.

166. The predominant HLC types of 18th to 19th century enclosure and 20th century agriculture within the majority of the PEIR boundary will experience a temporary level of change to HLC during construction, as will the more discrete HLC types represented variously across PEIR boundary (pre-18th century enclosure, woodland, inland managed wetland, parks, gardens, recreation water features, mineral and marginal).

Onshore Substation

167. Construction activities at the onshore substation that have the potential to directly (physically) impact buried archaeological remains are those associated with groundworks and landscape planting . There are currently two substation sites under consideration.

168. Data available and assessed to date for Site 1 includes cropmarks of fragmentary ditches of unknown date and post-medieval field boundaries. This area has been assigned a low perceived heritage significance based on information available to date.

169. Data available and assessed to date for site 2 identifies a linear settlement along its western edge, which comprises a series of sub-rectangular enclosures with divisions and multiple discrete features. This could represent the site of medieval village of Gowthorpe or are associated with the cropmarks of sub-rectangular enclosures of probable Roman date. Evidence for an associated field system extends to the east of the settlement. This area has been assigned a medium to high perceived heritage significance based on information available to date.

23.6.1.2.1 Magnitude of effect – DEP or SEP in Isolation

170. Any direct physical impacts on the significance of buried archaeological remains and above ground heritage assets are often considered to be of high magnitude. However, the extent of any impact will often depend on the presence, nature and depth of any such remains, in association with the depth of construction-related groundworks, as well as the specific elements, aspects or areas of the asset subject to impact (including the level to which these may or may not contribute to heritage significance). As such, a reduced magnitude of effect may be relevant where the anticipated interaction between the proposed groundworks and the potential sub-surface archaeological remains (as indicated by available data) is considered to be unlikely or limited in terms of impact upon the asset's heritage significance. The magnitude of direct physical impacts on buried archaeological remains during the construction phase could therefore range from negligible to high.

Landfall location

171. Direct physical impacts to potential below ground archaeological remains as part of construction works at the landfall could represent up to a medium magnitude of effect.

172. Direct physical impacts to above ground heritage assets as part of construction works within the landfall location have the potential to result in a high magnitude of effect.

Onshore Cable Corridor

173. It could be possible that direct physical impacts to potential below ground archaeological remains as part of construction works within the onshore cable corridor could result in a high magnitude of effect.

174. Direct physical impacts to above ground archaeological remains as part of construction works within the DCO boundary have the potential to result in effects of high magnitude.

Onshore Substation

175. It could be possible that direct physical impacts to potential below ground archaeological remains as part of construction works within the onshore substation sites could result in a high magnitude of effect.

23.6.1.2.2 Impact Significance – DEP or SEP in Isolation

Landfall location

176. Construction works within the landfall location therefore have the potential to result in impacts of moderate adverse significance to potential below ground archaeological remains (in certain instances (prior to site specific mitigation), based upon the realistic worst case), and the potential to result in impacts of a moderate adverse significance to extant above-ground assets, based upon a realistic worst-case scenario.

Onshore Cable Corridor

177. In the absence of mitigation, direct impacts to areas of possible archaeological interest assigned a heritage significance of medium and above could result in an impact of major adverse significance, based upon a realistic worst-case scenario. In the absence of mitigation, direct impacts to areas of possible archaeological interest assigned a low heritage significance could result in an impact of moderate adverse significance, based upon a realistic worst-case scenario.

178. Construction works within the DCO boundary have the potential to result in impacts of a major adverse significance on identified earthworks assigned a medium heritage importance and impacts of a moderate adverse significance to those assets assigned a low heritage importance, based on the realistic worst-case scenario.

179. The PEIR boundary also crosses 34 parish boundaries. Any hedgerows associated with these boundaries are classed as “Important Hedgerows” and are therefore considered to be heritage assets of medium heritage importance (as a likely highest level of heritage importance). Prior to mitigation, groundworks have the potential to result in a low magnitude of effect upon any such hedgerows (where present, given the limited interaction between the boundaries and the onshore cable corridor), resulting in an impact of minor adverse significance, as a likely worst-case scenario.

Onshore Substation

180. In the absence of mitigation, all direct impacts within Site 2 where areas of possible archaeological interest have been assigned a heritage significance of medium to high could result in an impact of major adverse significance, based upon a realistic worst-case scenario. In the absence of mitigation, all direct impacts within Site 1 where areas of possible archaeological interest have been assigned a low heritage significance could result in an impact of moderate adverse significance, based upon a realistic worst-case scenario.

181. No above ground archaeological remains or heritage assets are currently recorded or identified within either onshore substation site based on data available to date. As such, impacts arising from construction works within the onshore substation sites upon above ground archaeological remains are negligible.

182. The onshore substation will represent a permanent / long-term change to the HLC which is mapped as 18th to 19th century enclosure and 20th century agriculture.

183. Site 2 includes two parish boundaries and any hedgerows associated with these boundaries would be classed as “Important Hedgerows” and are therefore considered to be heritage assets of medium heritage importance (as a likely highest level of heritage importance). Prior to mitigation, groundworks have the potential to result in a medium magnitude of effect upon any such hedgerows (where present), resulting in an impact of moderate adverse significance, as a likely worst-case scenario.

23.6.1.2.3 Mitigation – DEP or SEP in Isolation

184. Avoidance, micro-siting and route refinement will continue as the design of the proposed DEP and SEP is progressed prior to the final DCO application. This strategy ensures that ongoing baseline assessment and survey data will input directly into the iterative design process so that potential sub-surface archaeological remains (in particular suspected features of likely medium or high heritage importance or concentrated areas of known complex archaeological features) and above ground heritage assets have been avoided, wherever possible within the confines of engineering and other environmental constraints.

185. DEP and SEP have committed to undertake additional programmes of post-consent survey and evaluation (to be referred to as post-consent initial informative stages of mitigation work and as discussed in **Table 23-3**) which, of relevance to sub-surface archaeological remains, may include any outstanding geophysical survey, a scheme wide programme of trial trenching, targeted field walking and metal detecting. This strategy will be outlined as part of a project-specific Outline WSI, submitted with the final DCO application. The initial informative stages of mitigation work may indicate the presence of previously unknown buried archaeology (and further verify previously known / anticipated buried remains as indicated by the previous non-intrusive survey methods), enabling the resource to be appropriately addressed by means of mitigating any impacts in a manner that is proportionate to the significance of the remains present.

186. Additional mitigation beyond the initial informative stages is envisaged to comprise a combination of the following recognised standard approaches:

- Further advance and enacting of preservation *in situ* options and requirements (e.g. avoidance / micro-siting / HDD etc., where possible);
- Set-piece (open-area) Excavation: including subsequent post-excavation assessment, and analysis, publication and archiving;
- Strip, Map and Record (or Sample) Excavation: including subsequent post-excavation assessment, and analysis, publication and archiving;
- Watching Brief (targeted and general archaeological monitoring and recording): including subsequent post-excavation assessment, and analysis, publication and archiving (where appropriate);

- Earthwork Condition Surveys: including subsequent reporting and archiving (followed by backfilling and reinstatement, where required on a case-by-case basis); and
- Built Heritage / Historic Building Surveys and Recording: including subsequent reporting and archiving (followed by conservation and/or restoration, where required on a case-by-case basis).

187. Impact to the HLC (including hedgerows and parish boundaries) will be minimised by returning field boundaries / areas / hedgerows to their pre-construction condition and character post-construction, as part of a sensitive programme of backfilling and reinstatement / landscaping. Certain hedgerows and field boundaries (e.g. parish boundaries) may require recording prior to the construction process and enhanced provisions made during backfilling and reinstatement.

188. The site specific measures adopted by DEP and SEP will be determined post-consent as DEP and SEP progress in a specific and bespoke manner, tailored on a case-by-case / area-by-area basis (as required) accordingly and in response to the combination of onshore archaeological and cultural heritage assessment. Opportunities to optimise the programme, including expedient commencement of archaeological work in the immediate post-consent stages will also be sought in ongoing discussion and agreement with NCC HES and Historic England.

189. The preferred and optimum mitigation measure is preservation *in situ*, wherever possible. By avoiding sub-surface archaeological remains (sites / features), either largely or in their entirety (as indicated by existing and available data), the magnitude of impact may be reduced depending on the extent of the site / feature in question (with reference to change or impact upon heritage significance) and the degree to which preservation *in situ* has been applied. Where avoidance is not possible, significant impacts upon sub-surface archaeological remains may potentially to a degree be off-set by the application of appropriate alternative mitigation measures which serve to preserve archaeological remains, where present, by record (e.g. following intrusive evaluation and subsequent excavation, where required). Although preservation by record cannot be considered to reduce the magnitude of impact (and associated significance of effect) per se, given the physical loss of a given site / feature, the acquisition of a robust archaeological record of a site / feature may be considered to adequately compensate identified, recognised and acceptable harm to a heritage asset in line with industry standard good practice mitigation measures and compatible with the definitions outlined in **Section 23.4.3**.

23.6.1.2.4 Residual Impact – DEP or SEP in Isolation

190. With the application of mitigation, it is anticipated that the residual magnitude and significance will be reduced or offset to levels considered non-significant in EIA terms (i.e. anticipated to be no worse than a **minor adverse** significance for Impact 2).

23.6.1.2.5 DEP and SEP Together

191. The worst-case scenario for direct physical impacts on non-designated heritage assets will be based upon the general assumption that the greatest potential footprint for DEP and SEP represents the greatest potential for direct physical impacts (e.g. damage / destruction) to surviving buried archaeological remains and above ground heritage assets. The combined footprint of both DEP and SEP, therefore, represents a greater potential for direct impacts than if, for example, only DEP or SEP was to be built in isolation. However, whilst there is a greater potential for direct impacts, the increased footprint of DEP and SEP together would not lead to an increase to the magnitude of effect for any of the heritage assets or potential heritage assets discussed above. Similarly, the significance of the impacts will remain the same if DEP or SEP were constructed in isolation or together.

192. The application of mitigation (as detailed above) will be the same for the construction of both DEP and SEP, as for either project built in isolation. Therefore, with the application of mitigation it is anticipated that impacts will be reduced or offset to levels considered non-significant in EIA terms (i.e. anticipated to be no worse than a **minor adverse s**ignificance for Impact 2).

23.6.1.3 Impacts 3 and 4: Indirect Physical Impact on (permanent change to) Designated and Non-designated Heritage Assets

23.6.1.3.1 DEP or SEP in Isolation

193. Potential indirect impact to designated and non-designated heritage assets from changes to ground conditions is assessed with reference to **Section 20.6** (Potential Impact during Construction) of **Chapter 20 Water Resources and Flood Risk**.

194. There are potential impacts as a result of changes to ground conditions affecting buried archaeological deposits. Potential direct impacts thus comprise both direct damage to archaeological deposits and material and the disturbance or destruction of relationships between deposits and material and their wider surroundings. This may include buried archaeological remains, or geoarchaeological/ palaeoenvironmental remains. Consequently, all aspects of the project which involve intrusive groundworks have the potential to directly impact heritage assets.

195. The geology of DEP and SEP are largely chalky till, chalky drift and glacio-fluvial drift, providing a favourable environment for settlement from prehistoric times to the present day and give rise to free draining soils.

196. Construction activities undertaken as part of the project have the potential to effect below ground heritage assets over a wider area than that of the footprint of DEP and SEP, for example, through hydrological changes that may cause desiccation and drying out of wetland deposits and associated preserved waterlogged archaeological or geoarchaeological remains.

197. Impacts resulting in potential effects as part of construction works are those associated with intrusive groundworks. Of particular interest in relation to the below ground archaeological remains are those works requiring trenchless techniques (e.g. HDD), taking place within the landfall and at crossing locations where the onshore cable route intersects, for example, major transport routes or waterways. Also, the excavation of transition pits at the landfall and jointing pits along the cable route which have the potential to impact deposits of a slightly deeper nature than other groundworks undertaken as part of construction works.

198. No Engineering-led GI works have been carried out to date. A commitment to include archaeological objectives in planned surveys post-consent will form part of the Outline WSI submitted with the final DCO application.

199. The potential for the project to encounter currently unrecorded archaeological or geoarchaeological/ palaeoenvironmental remains will be mitigated by means of implementing additional mitigation measures and commitments (set out in a project-specific Outline WSI submitted with the final DCO application), which will include reference to a project-wide approach to geoarchaeological assessment/ palaeoenvironmental survey, which will be established in the post-consent stages.

200. Indirect impacts to designated heritage assets are not anticipated to occur as these receptors will be avoided.

201. Potential indirect impact to designated and non-designated heritage assets as a result of vibration from groundworks/construction traffic affecting the fabric of a heritage asset is assessed with reference to **Section 28.6** (Potential Impact during Construction) of **Chapter 26 Traffic and Transport**, and **Section 25.6** (Potential Impact During Construction) of **Chapter 25 Noise and Vibration**. The assessment considers the peak construction traffic against the 2025 baseline. This is considered the worst-case year for assessment purposes as it represents the earliest realistic year for peak construction traffic. Later years would have higher baseline traffic flows and therefore the introduction of DEP and SEP construction traffic would represent a lesser impact magnitude.

202. Potential for vibration from groundworks / construction traffic affecting the fabric of a heritage asset would likely occur through the presence of machinery, traffic and general activities taking place within the onshore areas. The sight, noise and smell as well as any dust and vibration created during the construction, operation and decommissioning phase could have an indirect (non-physical) impact upon heritage assets and their settings. The operation of the HDD and ancillary equipment would produce the greatest vibration impacts along the onshore cable corridor. The vibration effects from onshore cable corridor construction activities would be no greater than negligible magnitude; representing an impact of no greater than minor adverse significance at medium sensitivity receptors. No further mitigation measures are proposed.

23.6.1.3.2 DEP and SEP Together

203. Impacts on potential below ground archaeological or geoarchaeological / palaeoenvironmental remains as part of construction works under DEP or SEP in isolation are those associated with intrusive groundworks associated with the excavation of transition pits, the HDD at the landfall and the excavation of jointing pits along the onshore cable corridor.

204. The potential for the project to encounter currently unrecorded archaeological or geoarchaeological/ palaeoenvironmental remains will be mitigated by means of implementing additional mitigation measures and commitments (set out in a project-specific Outline WSI submitted with the final DCO application), which will include reference to a project-wide approach to geoarchaeological assessment/ palaeoenvironmental survey, which will be established in the post-consent stages.

23.6.1.4 Impacts 5 and 6: Temporary Change to the Setting of Heritage Assets (both Designated and Non-Designated) which could affect their Heritage Significance

205. Activities undertaken as part of construction works for DEP and SEP have the potential to impact designated and non-designated heritage assets through a temporary change in their setting which may affect their heritage significance. Temporary changes in the setting of heritage assets, should they occur, may do so through the presence of machinery, construction traffic and general construction activities taking place within the DCO boundary. The sight, sound, any dust created, and even smell, during the construction phase has the potential to temporarily change the setting of heritage assets and their associated heritage significance.

206. The heritage setting assessment is ongoing and will be informed by LVIA and SVIA toolkits and further site visits to understand how DEP and SEP would potentially change the setting of each asset and whether these changes would impact on the significance of the asset. Any changes in setting due to construction activities would be temporary and of sufficiently short duration that they would not give rise to material harm.

207. The full findings of the heritage setting assessment will be presented in the ES, accompanying the final DCO application.

23.6.2 Potential Impacts during Operation

208. During operation, it is expected that there will be no further requirement for land to be disturbed or excavated, except in the event that onshore cables require repair or maintenance. However, these activities would not extend beyond the construction footprint, and would be relatively rare and localised in occurrence. As such, direct and indirect physical impacts to both designated and non-designated heritage assets during operation have been scoped out of further assessment.

209. The presence of above ground, and offshore, infrastructure could, however, have an impact on heritage significance as a result of change in the setting of heritage assets due to the presence of new above ground onshore infrastructure associated with DEP and SEP being introduced to and present within the landscape.

23.6.2.1 Impacts 1 and 2: Permanent Change to the Setting of Heritage Assets (both Designated and Non-Designated) which could affect their Heritage Significance

210. The presence of above ground infrastructure could have an ongoing impact on the setting of heritage assets for the duration of the operation phase as a result of the onshore substation within the landscape and their day to day use.

211. A settings assessment following Historic England guidance has commenced and is ongoing and will be reported in full in support of the DCO application. The next steps leading towards the final DCO application will be to utilise available LVIA and SVIA tools such as ZTVs and photomontages, particularly in relation to the onshore substation and offshore infrastructure, and to undertake further site visits.

212. At the time of writing this document, collaborative workshops have been undertaken with the LVIA and SVIA consultants with the interest to refine specific heritage viewpoints to capture the photomontages in order inform the settings assessment.

213. Details of these viewpoints were sent to Historic England for consultation, review and subsequent guidance, although at the time of writing this document, a formal response has yet to be received.

214. Ongoing photographic survey of the Heritage Viewpoints will be undertaken photomontages generated to inform the forthcoming settings assessment in the ES chapter.

215. In the absence of additional data (e.g. attained from site visits and the incorporation of LVIA and SVIA analysis tools), the impact significance of permanent above ground infrastructure cannot be ascertained at this stage of enquiry.

216. The following designated assets may be subject to a change in setting affecting their heritage significance as a result of the presence of the onshore substation and have been identified as requiring further assessment:

- Venta Icenorum (**5**);
- Gowthorpe Manor House (**46**) and associated Listed Buildings (DEP/SEP IDs **45**, **112**, **153** and **155**);
- Mangreen Hall (**44**) and associated Listed Buildings (DEP/SEP IDs **152**, **154** and **114**);
- Keswick Hall (NHLE 1306331);
- Church of All Saints (NHLE 1050544) and the remains of Church of All Saints immediately to the east (NHLE 1050545), Keswick;
- Church of All Saints (NHLE 1050644), Shotesham;
- Church of St Edmund (NHLE 1373145);
- Church of St Mary Magdalen (NHLE 1172267);
- Church of the Holy Cross (NHLE 1050437);
- Church of St Peter (NHLE 1169726);
- Church of the Holy Cross (NHLE 1050437);
- Paddock Farmhouse (NHLE 1050702); and
- Intwood Hall (**9**), including Church of All Saints (NHLE 1373136).

217. The landfall location and the onshore cable corridor requires no significant above ground infrastructure. The transition joint bay at the landfall location will be buried below ground. Link boxes will be required along the cable route at a frequency of one every 500m and would either be buried or above ground level but of a scale that would not result in any significant visibility. As a result, changes to the setting of heritage assets with regard to these elements of DEP and SEP are **negligible** for all scenarios.

23.6.3 Potential Impacts during Decommissioning

218. No decision has been made regarding the final decommissioning policy for DEP and SEP as it is recognised that industry best practice, rules and legislation change over time. The detailed decommissioning activities and methodology would be determined later within DEP and SEP lifetime so as to be in line with latest and current guidance, policy and legislation at that point. At that juncture, the decommissioning methodology would be agreed with the relevant authorities and statutory consultees. Onshore, decommissioning is likely to include removal or reuse of the onshore substation with the cables and jointing bays left *in situ* or removed.

219. Assuming that provision is made for methods of removal which minimise further impact to the wider area, it is reasonable to assume that any potential damage upon designated and non-designated heritage assets would have already occurred as part of construction activities. However, it is noted that the demolition of buildings and infrastructure can have an impact greater than that of construction e.g. if grubbing out of foundations or remediation of contaminants is required. As such, the worst-case scenario with regard to decommissioning cannot be ascertained until the decommissioning plan is finalised.

220. Changes to setting may be present as a result of visual and audible impacts associated with decommissioning activities. Any changes to the setting of heritage assets are considered to be temporary in duration, occurring in association with the decommissioning phase. As such, the worst-case scenario as outlined for the construction phase in relation to temporary changes to the setting of heritage assets is unlikely to be exceeded as a result of decommissioning activities.

23.7 Cumulative Impacts

23.7.1 Identification of Potential Cumulative Impacts

221. The first step in the cumulative assessment is the identification of which residual impacts assessed for DEP and/or SEP on their own have the potential for a cumulative impact with other plans, projects and activities (described as ‘impact screening’). This information is set out in **Table 23-12** below, together with a consideration of the confidence in the data that is available to inform a detailed assessment and the associated rationale. Only potential impacts assessed in **Section 23.6** as negligible or above are included in the CIA (i.e. those assessed as ‘no impact’ are not taken forward as there is no potential for them to contribute to a cumulative impact).

222. **Table 23-12** concludes that in relation to onshore archaeology and cultural heritage, potential cumulative impacts are likely to arise where the construction phase for two or more projects overlap or where the extent of the archaeological resource intersects two or more projects, or where intervisibility is shared between a heritage asset and two or more developments, should construction and operation run simultaneously.

Table 23-12 Potential Cumulative Impacts (impact screening)

Impact	Potential for Cumulative Impact	Rationale
Construction		
Impact 1: Direct Physical Impact on (permanent change to) Designated Heritage Assets	Yes	Cumulative direct impacts arising from two or more projects are possible in an area of over-lap or those with an extent which intersects two or more proposed project boundaries (where groundworks are anticipated). Impacts may also occur which affect the nature of the heritage resource on a wider scale.
Impact 2: Direct Physical Impact on (permanent change to) Non-designated Heritage Assets	Yes	Cumulative direct impacts arising from two or more projects are possible given the level of uncertainty regarding the nature and extent of the potential archaeological resource. Impacts may occur to individual archaeological features (buried or above ground) in an area of over-lap or those with an extent which intersects two or more proposed project boundaries (where groundworks are anticipated). Impacts may occur which affect the nature of the archaeological resource on a wider scale. Such impacts also have the potential to affect the HLC of the study area (e.g. loss of earthworks as a result of one project could affect the HLC as summarised for the purposes of another project).
Impacts 3 and 4: Indirect Physical Impact on (permanent change to) Designated and Non-designated Heritage Assets	Yes	Cumulative direct impacts arising from two or more projects are possible in an area of over-lap or those with an extent which intersects two or more proposed project boundaries (where groundworks are anticipated).
Impact 5 and 6: Temporary change	Yes	Cumulative changes in setting arising from two or more projects are possible, particularly in the

Impact	Potential for Cumulative Impact	Rationale
in the Setting of Heritage Assets (both designated and non-designated) which may affect their Heritage Significance		event that the construction of two or more projects is concurrent and within sight of an individual heritage asset, although additional factors affecting setting may also occur.
Operation		
Impacts 1 and 2: Permanent change in the Setting of Heritage Assets (both designated and non-designated) which may affect their Heritage Significance	Yes	Cumulative changes in heritage setting arising from two or more projects are possible, particularly in the event that the infrastructure of two or more projects occurs within sight of an individual heritage asset, although additional factors affecting setting may also occur.
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. As such, cumulative impacts during the decommissioning stage are assumed to be the same as those identified during the construction stage.		

23.7.2 Other Plans, Projects and Activities

223. The second step in the cumulative assessment is the identification of the other plans, projects and activities that may result in cumulative impacts for inclusion in the CIA (described as 'project screening'). This information is set out in **Table 23-13** below, together with a consideration of the relevant details of each, including current status (e.g. under construction), planned construction period, closest distance to DEP and SEP, status of available data and rationale for including or excluding from the assessment.

224. The project screening has been informed by the development of a CIA Project List which forms an exhaustive list of plans, projects and activities in a very large study area relevant to DEP and SEP. The list has been appraised, based on the confidence in being able to undertake an assessment from the information and data available, enabling individual plans, projects and activities to be screened in or out.

225. Those projects located more than 1km from the onshore cable corridor and more than 5km from the onshore substation are not included in **Table 23-13**.

Table 23-13: Summary of projects considered for the CIA in relation to Onshore archaeology and cultural heritage (project screening)

Project	Status	Construction Period	Closest Distance from the Onshore Cable Corridor or Substation (km)	Included in the CIA (Y/N)	Rationale
Norfolk Vanguard Offshore Wind Farm	DCO Consented[1]	2021-2025	0km – DEP and SEP onshore cable corridor crosses the Norfolk Vanguard onshore cable corridor. 30km between onshore substation Site 1 and Site 2	Y	The Norfolk Vanguard onshore cable corridor crosses the DEP and SEP PEIR boundary and may result in impacts of a direct and / or indirect nature upon non-designated heritage assets. There is also the possibility of cumulative impacts on heritage setting should the construction periods overlap.
Hornsea Project Three Offshore Wind Farm	Undergoing examination	2021-2025 (single phase) 2021-2031 (two phase)	0km – DEP and SEP onshore cable corridor crosses the proposed Hornsea Three onshore cable corridor.	Y	The Hornsea Three onshore cable corridor crosses the DEP and SEP PEIR boundary and may result in impacts of a direct and / or indirect nature upon non-designated heritage assets. There is also the possibility of cumulative impacts on heritage setting

[1] Following completion of this CIA, the ruling of a Judicial Review brought against the Secretary of State for Business Energy and Industrial Strategy's (BEIS) decision to award a DCO for NV has been handed down. The decision to grant the order has been submitted to the Secretary of State for redetermination. BEIS will be considering its options, namely appeal or redetermination. Until such time as this process reached a conclusion it has been decided to maintain the NV/ NB cumulative assessment for stakeholder review.

Project	Status	Construction Period	Closest Distance from the Onshore Cable Corridor or Substation (km)	Included in the CIA (Y/N)	Rationale
			1.4km from onshore substation Site 1 and 0.95km from onshore substation Site 2		should the construction periods overlap and also during operation due to the location of the substation.
Norfolk Boreas Offshore Wind Farm	DCO Examination	2021-2026	0km – DEP and SEP onshore cable corridor crosses the Norfolk Boreas onshore cable corridor. 30km between onshore substation Site 1 and Site 2	Y	The proposed Norfolk Boreas onshore cable corridor rosses the DEP and SEP PEIR boundary and may result in impacts of a direct and / or indirect nature upon non-designated heritage assets. There is also the possibility of cumulative impacts on heritage setting should the construction periods overlap.
A47 North Tuddenham to Easton	Pre-application DCO	2021-2024	0km – A47 crosses the onshore cable corridor of DEP and SEP.	Y	The proposed road scheme overlaps with the DEP and SEP PEIR boundary and may result in impacts of a direct and / or indirect nature upon non-designated heritage assets. There is also the possibility of cumulative

Project	Status	Construction Period	Closest Distance from the Onshore Cable Corridor or Substation (km)	Included in the CIA (Y/N)	Rationale
					impacts on heritage setting should the construction periods overlap.

23.7.3 Assessment of Cumulative Impacts

226. Having established the residual impacts from DEP and/or SEP with the potential for a cumulative impact, along with the other relevant plans, projects and activities, the following sections provide an assessment of the level of impact that may arise.

23.7.3.1 Cumulative Impact 1: Direct Physical Impact on (permanent change to) Non-designated Heritage Assets arising as a result of construction works

227. Due to the geographical overlap between the PEIR boundary and the projects listed in **Table 23-13**, there is the potential for direct cumulative impacts upon above ground and buried archaeological remains.

228. Impacts resulting in these potential effects as part of construction work are those associated with intrusive groundworks associated with the various projects, should they occur. The extent of any impact will depend on the presence and nature of any such remains. Any adverse effects may be permanent and irreversible in nature and have the potential to affect individual heritage assets, as well as the nature of the known archaeological resource as a whole. In the absence of mitigation, direct cumulative impact on buried and above ground archaeological remains would be considered to be high, resulting in a significance of effect ranging between moderate to major adverse, as a worst-case scenario.

229. However, these other named projects all require formal planning permission and are therefore anticipated to adopt mitigation strategies which will seek to avoid, reduce or offset the effects of direct impacts upon buried and above ground archaeological remains. The findings of the impact assessments for these other named projects, and mitigation strategies proposed for DEP and SEP detailed in **Table 23-13** will be considered in detail following refinement of the PEIR boudnary and will be reported in full in the ES as part of the full DCO application.

23.7.3.2 Cumulative Impact 2: Temporary and Permanent Change to the Setting of Designated and Non-designated Heritage Assets arising as a result of construction and operational works

230. A setting assessment following Historic England guidance has commenced (**Appendix 23.3**). The next steps will be to utilise LVIA and SVIA tools such as ZTVs and photomontages, particularly in relation to the onshore substation and offshore infrastructure.

231. At this stage, the cumulative impact considerations with respect to the setting of heritage assets is expected to be limited to the potential intervisibility of DEP and SEP onshore substation with the Hornsea Project Three onshore substation and any potential to cumulatively effect the setting of heritage assets in proximity to these. This will be assessed in full and reported within the ES as part of the full DCO application.

23.8 Transboundary Impacts

232. There are no transboundary impacts with regard to onshore archaeology and cultural heritage as the onshore project area would not be sited in proximity to any international boundaries. Transboundary impacts are therefore scoped out of this assessment and are not considered further.

23.9 Inter-relationships

233. Inter-relationships exist between onshore archaeology and cultural heritage and the assessments undertaken for Offshore and Intertidal Archaeology, Water Resources and Flood Risk, Noise and Vibration, Traffic and Transport, and Seascape, Landscape and Visual Impact Assessment (see **Table 23-14**). Upon their completion, information from these chapters will be used to help establish any further potential impacts on the onshore archaeology and cultural heritage and inform the impact assessment presented in the final DCO application.

Table 23-14: Onshore archaeology and cultural heritage inter-relationships

Topic and description	Related chapter	Where addressed in this chapter	Rationale
Construction			
The WWII coastal defences and associated buried remains, and a change to the setting of heritage assets.	Chapter 15: Offshore and Intertidal Archaeology and Heritage	**Sections 23.6.1.2** and **23.6.1.4**	Potential impacts on nearshore, intertidal and coastal archaeology and cultural heritage.
Indirect (physical) impacts on designated and non-designated heritage assets.	Chapter 20: Water Resources and Flood Risk	**Section 23.6.1.3**	Potential impacts as a result of changes to ground conditions affecting buried archaeological deposits.
A change to the setting of heritage assets.	Chapter 25: Noise and Vibration	**Section 23.6.1.4**	Potential impacts related to noise and vibration could impact on the setting of heritage assets.
Indirect (physical) impacts on designated and non-designated heritage assets.	Chapter 26: Traffic and Transport	**Section 23.6.1.3**	Potential for vibration from groundworks / construction traffic affecting the fabric of a heritage asset.
A change to the setting of heritage assets.	Chapter 27: Seascape and Visual Impact Assessment	**Section 23.6.1.4**	There could be potential impacts with respect to visual receptors along the coast which could also represent potential impacts to the setting of heritage assets.

Topic and description	Related chapter	Where addressed in this chapter	Rationale
A change to the setting of heritage assets.	Chapter 28: Landscape and Visual Impact Assessment	**Section 23.6.1.4**	There could be potential impacts with respect to landscape and visual receptors which could also represent potential impacts to the setting of heritage assets.
Operation			
A change to the setting of heritage assets.	Chapter 25: Noise and Vibration	**Section 23.6.2.1**	Potential impacts related to noise and vibration could impact on the setting of heritage assets.
A change to the setting of heritage assets.	Chapter 27: Seascape and Visual Impact Assessment	**Section 23.6.2.1**	There could be potential impacts with respect to visual receptors along the coast which could also represent potential impacts to the setting of heritage assets.
A change to the setting of heritage assets.	Chapter 28: Landscape and Visual Impact Assessment	**Section 23.6.2.1**	There could be potential impacts with respect to landscape and visual receptors which could also represent potential impacts to the setting of heritage assets.
Decommissioning			
Impacts associated with the decommissioning phase would be no greater than those identified for the construction phase.			

23.10 Interactions

234. The impacts identified and assessed in this chapter have the potential to interact with each other. The areas of potential interaction between impacts are presented in **Table 23-15**. This provides a screening tool for which impacts have the potential to interact. **Table 23-16** provides an assessment for each receptor (or receptor group) as related to these impacts.

235. Within **Table 23-16** the impacts are assessed relative to each development phase (Phase assessment, i.e. construction, operation or decommissioning) to see if (for example) multiple construction impacts affecting the same receptor could increase the level of impact upon that receptor. Following this, a lifetime assessment is undertaken which considers the potential for impacts to affect receptors across all development phases.

236. The significance of each individual impact is determined by the sensitivity of the receptor and the magnitude of effect; the sensitivity is constant whereas the magnitude may differ. Therefore, when considering the potential for impacts to be additive it is the magnitude of effect which is important – the magnitudes of the different effects are combined upon the same sensitivity receptor.

Table 23-15: Interaction between impacts - screening

Potential Interaction between Impacts						
Construction						
	Impact 1: Direct Physical Impact on Designated Heritage Assets	Impact 2: Direct Impact on Non-designated Heritage Assets	Impact 3: Indirect Physical Impact Designated Heritage Assets	Impact 4: Indirect Physical Impact Non-designated Heritage Assets	Impact 5: Temporary Change to the Setting of Designated Heritage Assets	Impact 6: Temporary Change to the Setting of Non-designated Heritage Assets
Impact 1: Direct Physical Impact on Designated Heritage Assets	-	No	No	No	Yes	No
Impact 2: Direct Impact on Non-designated Heritage Assets	No	-	No	No	No	Yes
Impact 3: Indirect Physical Impact Designated Heritage Assets	No	No	-	No	No	No

Potential Interaction between Impacts						
Impact 4: Indirect Physical Impact Non-designated Heritage Assets	No	No	No		No	No
Impact 5: Temporary Change to the Setting of Designated Heritage Assets	Yes	No	No	No		No
Impact 6: Temporary Change to the Setting of Non-designated Heritage Assets	No	Yes	No	No	No	
Operation						
	Impact 1: Permanent Change to the Setting of Designated Heritage Assets			Impact 2: Permanent Change to the Setting of Non-designated Heritage Assets		

Potential Interaction between Impacts		
Impact 1: Permanent Change to the Setting of Designated Heritage Assets	-	No
Impact 2: Permanent Change to the Setting of Non-designated Heritage Assets	No	-
Decommissioning		
It is anticipated that the decommissioning impacts will be similar in nature to those of construction.		

Table 23-16: Interaction between impacts – phase and lifetime assessment

	Highest significance level				
Receptor	Construction	Operation	Decommissioning	Phase assessment	Lifetime assessment
Designated Heritage Assets	Minor adverse	Minor adverse	Minor adverse	**No greater than individually assessed impact** Mitigation (avoidance, micro-siting and route refinement) will minimise or remove the potential for direct physical and indirect physical impacts on designated heritage assets during construction. There will be no direct or indirect physical disturbance during operation. Setting is not relevant to the construction and decommissioning phases. It is therefore considered that there will therefore be no pathway for interaction to exacerbate the potential impacts associated with these activities during or between any of the project phases.	**No greater than individually assessed impact** Infrastructure is only installed during construction, therefore there is no greater footprint taken as part of the operational or decommissioning phases. Setting is not relevant to the construction and decommissioning phases. It is therefore considered that over the project lifetime these impacts would not combine to increase the significance level of any impacts identified in this assessment.

	Highest significance level				
Non-designated Heritage Assets	Minor adverse	Minor adverse	Minor adverse	**No greater than individually assessed impact** Mitigation will minimise or offset the potential for direct physical and indirect physical impacts on non-designated heritage assets during construction. There will be no direct or indirect physical disturbance during operation. Setting is not relevant to the construction and decommissioning phases. It is therefore considered that there will therefore be no pathway for interaction to exacerbate the potential impacts associated with these activities during or between any of the project phases.	**No greater than individually assessed impact** Infrastructure is only installed during construction, therefore there is no greater footprint taken as part of the operational or decommissioning phases. Setting is not relevant to the construction and decommissioning phases. It is therefore considered that over the project lifetime these impacts would not combine to increase the significance level of any impacts identified in this assessment.

23.11 Potential Monitoring Requirements

237. Monitoring requirements for onshore archaeology will be described in the Outline WSI submitted alongside the DCO application and further developed and agreed with stakeholders prior to construction taking account of the final detailed design of DEP and SEP.

238. 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 NCC HES and Historic England.

23.12 Assessment Summary

239. This chapter provides a characterisation of the existing environment for onshore archaeology and cultural heritage based on both existing and site-specific survey data, which has established that there will be some minor adverse residual impacts on heritage assets during construction, operation and decommissioning phases of DEP and SEP.

240. A summary of the findings of this chapter for onshore archaeology and cultural heritage is presented in **Table 23-16**.

241. In accordance with the assessment methodology presented in **Section 23.4**, this table should also be used in conjunction with the additional narrative explanations provided in **Section 23.6**.

242. The impact assessment as presented in this chapter assumes that activities associated with construction may theoretically occur anywhere within the PEIR boundary.

243. With respect to direct physical impacts (i.e. buried and above ground archaeological remains) further refinement of the PEIR boundary (typically a 200m wide corridor) down to the DCO application boundary (typically a 45-60m wide corridor) will seek to avoid known heritage assets, where possible within the confines of other environmental and engineering constraints. In addition, with the implementation and completion of post-consent mitigation (initial informative stages of mitigation work and additional mitigation measures), it is not anticipated that there will be residual impacts on the heritage significance of heritage assets with archaeological interest greater than minor adverse.

244. Heritage setting assessment work is ongoing, and final impact assessment and summaries / conclusions have not yet been conducted or drawn for individual heritage assets that are currently under consideration in this PEIR. The settings assessment will be progressed and reported in full in the final DCO application.

245. Likewise, the potential for cumulative impacts to occur to potential onshore archaeological and cultural heritage assets will be assessed following refinement of the PEIR boundary and reported in full in the final DCO application.

Table 23-16: Summary of potential impacts on onshore archaeology and cultural heritage topic

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
Construction						
Impact 1: Direct Physical Impact on Designated Heritage Assets	Known Designated Heritage Assets	Medium - High	High	Major Adverse	Avoidance, micro-siting and route refinement	Predicted to be non-significant in EIA terms following the application of mitigation (avoidance measures)
Impact 2: Direct Physical Impact on Non-designated Heritage Assets	Known and potential buried archaeological remains and above ground heritage assets	Low - High	High	Moderate - Major Adverse	Further programmes of survey and evaluation to inform a mitigation strategy for either preservation *in situ*, archaeological excavation or watching brief.	[TBC] once evaluation and mitigation strategies are finalised. Following the application of appropriate and proportionate evaluation and mitigation approaches, to be agreed in consultation with NCC HES and Historic England, the residual impact is anticipated to be reduced (or offset) to an

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
						impact significance level considered non-significant in EIA terms.
Impact 3: Indirect Physical Impact on Designated Heritage Assets	Known Designated Heritage Assets	Medium - High	TBC	TBC	TBC	TBC
Impact 4: Indirect Physical Impact on Non-designated Heritage Assets	Known palaeoenvironmental and geoarchaeological deposits	Low - High	TBC	TBC	TBC	TBC
Impact 5: Temporary Change to the Setting of Designated	Known designated heritage assets	Medium - High	TBC	TBC	Next steps moving from PEIR to final DCO application include further site visits and/or	[TBC] once any required mitigation strategies are finalised. The residual impact is anticipated to be 'reduce-able' in the

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
Heritage Assets					revisits in respect of the proposed boundary and specific associated infrastructure (e.g. onshore project substation locations). As well as the application of LVIA and SVIA tools.	majority of cases to a level considered non-significant in EIA terms following the application of appropriate and proportionate mitigation approaches, to be agreed in ongoing consultation with NCC HES and Historic England.
Impact 6: Temporary Change to the Setting of Non-designated Heritage Assets	Known non-designated above ground heritage assets	Low - High	TBC	TBC	Next steps moving from PEIR to final DCO application include further site visits and/or revisits in respect of the proposed boundary and specific associated infrastructure (e.g. onshore project substation	[TBC] once any required mitigation strategies are finalised. The residual impact is anticipated to be 'reduce-able' in the majority of cases to a level considered non-significant in EIA terms following the application of appropriate and proportionate mitigation approaches, to be agreed in ongoing

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
					locations). As well as the application of LVIA and SVIA tools.	consultation with NCC HES and Historic England.
Operation						
Impact 1: Permanent Change	Known designated heritage assets	Medium - High	TBC	TBC	Next steps moving from PEIR to final DCO application include further site visits and/or revisits in respect of the proposed boundary and specific associated infrastructure (e.g. onshore project substation locations). As well as the application of LVIA and SVIA tools.	[TBC] once any required mitigation strategies are finalised. The residual impact is anticipated to be 'reduce-able' in the majority of cases to a level considered non-significant in EIA terms following the application of appropriate and proportionate mitigation approaches, to be agreed in ongoing consultation with NCC HES and Historic England.

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
Impact 2: Permanent Change	Known non-designated above ground heritage assets	Low - High	TBC	TBC	Next steps moving from PEIR to final DCO application include further site visits and/or revisits in respect of the proposed boundary and specific associated infrastructure (e.g. onshore project substation locations). As well as the application of LVIA and SVIA tools.	[TBC] once any required mitigation strategies are finalised. The residual impact is anticipated to be 'reduce-able' in the majority of cases to a level considered non-significant in EIA terms following the application of appropriate and proportionate mitigation approaches, to be agreed in ongoing consultation with NCC HES and Historic England.
Decommissioning						

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
No decision has been made regarding the final decommissioning policy, as it is recognised that industry best practice, rules and legislation change over time. The decommissioning methodology would need to be finalised nearer to the end of the lifetime of the project so as to be in line with latest and current guidance, policy and legislation at that point. Any such methodology would be agreed with the relevant authorities and statutory consultees. It is anticipated that the decommissioning impacts could be similar in nature to those of construction, depending on the extent and depths to which any further intrusive sub-surface decommissioning groundworks may occur.						

23.13 References

Breckland Council. (2019). *Breckland Local Plan*. Available at: https://www.breckland.gov.uk/article/2951/Adopted-Local-Plan. [Assessed: 09/09/2020].

Broadland District Council. (2015). *Development Management DPD (2015)*. Available at: https://www.broadland.gov.uk/downloads/download/161/development_management_dpd. [Assessed: 09/09/2020].

Chartered Institute for Archaeologists. (2019). *Code of Conduct*. Available at: https://www.archaeologists.net/sites/default/files/CodesofConduct.pdf. [Assessed: 09/07/2020].

Chartered Institute for Archaeologists. (2017). *Standard and Guidance for Historic Environment Desk-Based Assessments*. Available at: https://www.archaeologists.net/sites/default/files/CIfAS&GDBA_2.pdf. [Accessed: 09/07/2020].

Department of Energy and Climate Change. (2011a). *National Policy Statement for Renewable Energy Infrastructure* (EN-3). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/37048/1940-nps-renewable-energy-en3.pdf. [Accessed: 09/07/2020].

Department of Energy and Climate Change. (2011b). *Overarching National Policy Statement for Energy* (EN-1). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf. [Accessed: 09/07/2020].

Greater Norwich Development Partnership, 2011, amended 2014. Joint Core Strategy for Broadland, Norwich and South Norfolk. Greater Norwich Development Partnership.

Historic England. (2017a). *The Setting of Heritage Assets. Historic Environment Good Practice Advice in Planning Note 3* (Second Edition). Available at: https://historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/heag180-gpa3-setting-heritage-assets/. [Accessed: 09/07/2020].

Historic England. (2017b). *Conservation Principles, For the Sustainable Management of the Historic Environment (Consultation draft, 10th November 2017)*. Available at: https://historicengland.org.uk/content/docs/guidance/conservation-principles-consultation-draft-pdf/. [Accessed: 09/07/2020].

Historic England, (2015a). *The Historic Environment in Local Plans. Historic Environment Good Practice Advice in Planning: 1*. Available at: https://historicengland.org.uk/images-books/publications/gpa1-historic-environment-local-plans/gpa1/. [Accessed: 09/07/2020].

Historic England, (2015b). *Making Significance in Decision-Taking in the Historic Environment. Historic Environment Good Practice Advice in Planning: 2*. Available at: https://historicengland.org.uk/images-books/publications/gpa2-managing-significance-in-decision-taking/gpa2/. [Accessed: 09/07/2020].

Ministry of Housing Communities and Local Government. (2019). *National Planning Policy Framework.* Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/810197/NPPF_Feb_2019_revised.pdf. [Accessed: 09/07/2020].

Ministry of Housing Communities and Local Government. (2019b). *Planning Practice Guidance (PPG): Historic Environment (July 2019)*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/810197/NPPF_Feb_2019_revised.pdf. [Accessed: 09/07/2020].

North Norfolk District Council (2008, updated 2012). *North Norfolk Local Development Framework – Core Strategy*. Available at: https://www.north-norfolk.gov.uk/media/1370/3-_core_strategy_-incorporating_development_control_policies-_adopted_2008_-updated_2012.pdf#page=2. [Accessed: 09/09/2020].

PINS. (2018). *Planning Inspectorate Advice Note Nine: Rochdale Envelope*.