

Norfolk Boreas Offshore Wind Farm

Chapter 28

Onshore Archaeology and Cultural Heritage

Environmental Statement

Volume 1

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Glossary of Acronyms

AAA	Areas of Archaeological Activity
ADBA	Archaeological Desk Based Assessment
AHOB	Ancient Human Occupation of Britain (Project)
AIS	Air-Insulated Switchgear
BGS	British Geological Survey
BNG	British National Grid
CFB	Cromer Forest Bed
CIA	Cumulative Impact Assessment
CPRE	Campaign to Protect Rural England
DBEIS	Department for Business, Energy & Industrial Strategy
DCO	Development Consent Order
DECC	Department of Energy and Climate Change
DMRB	Design Manual for Roads and Bridges
EIA	Environmental Impact Assessment
EPP	Evidence Plan Process
ES	Environmental Statement
ETG	Expert Topic Group
GI	Ground Investigation
GIS	Geographic Information System
GPS	Global Positioning System
HDD	Horizontal Directional Drilling
HE	Historic England
HLC	Historic Landscape Character
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
IPC	Infrastructure Planning Commission
JCS	Joint Core Strategy
LIDAR	Light Detection and Ranging
LVIA	Landscape and Visual Impact Assessment
MA	Mobilisation Area
MHCLG	Ministry of Housing, Communities and Local Government
MHWS	Mean High Water Springs
N2RS	No To Relay Stations
NCC	Norfolk County Council
NCC HES	Norfolk County Council Historic Environment Service
NHER	Norfolk Historic Environment Record
NPPF	National Planning Policy Framework
NPS	National Policy Statements
NSIPs	Nationally Significant Infrastructure Projects
PAB	Pathways to Ancient Britain (Project)
PEIR	Preliminary Environmental Information Report
PLBCAA	Planning Listed Buildings and Conservation Areas Act
PPG	Planning Practice Guidance
RPG	Registered Park and Garden

SoS	Secretary of State
TC	Trenchless Crossing
VWPL	Vattenfall Wind Power Limited
WCS	Worst Case Scenario
WSI	Written Scheme of Investigation
ZTV	Zone of Theoretical Visibility

Glossary of Terminology

Cable logistics area	Existing hardstanding area to allow the storage of cable drums and associated materials and to accommodate a site office, welfare facilities and associated temporary infrastructure to support the cable pulling works.
Cable Pulling	Installation of cables within pre-installed ducts from jointing pits located along the onshore cable route.
Ducts	A duct is a length of underground piping, which is used to house electrical and communications cables.
Evidence Plan Process	A voluntary consultation process with specialist stakeholders to agree the approach to the EIA and information to support the HRA.
Heritage assets	Term used when referring to onshore archaeological receptors.
Jointing pit	Underground structures constructed at regular intervals along the onshore cable route to join sections of cable and facilitate installation of the cables into the buried ducts.
Landfall	Where the offshore cables come ashore at Happisburgh South.
Landfall compound	Compound at landfall within which HDD drilling would take place.
Landfall compound zone	Area within which the landfall compounds would be located.
Link boxes	Underground chambers or above ground cabinets next to the cable trench housing low voltage electrical earthing links.
Mobilisation area	Areas approx. 100 x 100m used as access points to the running track for duct installation. Required to store equipment and provide welfare facilities. Located adjacent to the onshore cable route, accessible from local highways network suitable for the delivery of heavy and oversized materials and equipment.
Mobilisation zone	Area within which a mobilisation area would be located.
National Grid new / replacement overhead line tower	New overhead line towers to be installed at the National Grid substation.
National Grid overhead line modifications	The works to be undertaken to complete the necessary modification to the existing 400kV overhead lines.
National Grid overhead line temporary works	Area within which the work will be undertaken to complete the necessary modification to the existing 400kV overhead lines.
National Grid substation extension	The permanent footprint of the National Grid substation extension.

National Grid temporary works area	Area within which the work will be undertaken to complete the necessary modification to the existing 400kV overhead lines.
Necton National Grid substation	The grid connection location for Norfolk Boreas and Norfolk Vanguard.
Onshore 400kV cable route	Buried high-voltage cables linking the onshore project substation to the Necton National Grid substation.
Onshore cable route	The up to 35m working width within a 45m wide corridor which will contain the buried export cables as well as the temporary running track, topsoil storage and excavated material during construction.
Onshore cables	The cables which take power and communications from landfall to the onshore project substation.
Onshore infrastructure	The combined name for all onshore infrastructure associated with the project from landfall to grid connection.
Onshore project area	The area of the onshore infrastructure (landfall, onshore cable route, accesses, trenchless crossing zones and mobilisation areas; onshore project substation and extension to the Necton National Grid substation and overhead line modifications).
Onshore project substation	A compound containing electrical equipment to enable connection to the National Grid. The substation will convert the exported power from HVDC to HVAC, to 400kV (grid voltage). This also contains equipment to help maintain stable grid voltage.
Onshore project substation temporary construction compound	Land adjacent to the onshore project substation which would be temporarily required during construction of the onshore project substation.
Overhead Line	An existing 400kV power line suspended by towers.
Running track	The track along the onshore cable route which the construction traffic would use to access workfronts.
The Applicant	Norfolk Boreas Limited.
The project	Norfolk Boreas Wind Farm including the onshore and offshore infrastructure.
Transition pit	Underground structures that house the joints between the offshore export cables and the onshore cables.
Trenchless crossing compound	Pairs of compounds at each trenchless crossing zone to allow boring to take place from either side of the crossing.
Trenchless crossing zone	Areas within the onshore cable route which will house trenchless crossing entry and exit points.
Workfront	A length of onshore cable route within which duct installation works will occur, approximately 150m.

28 ONSHORE ARCHAEOLOGY AND CULTURAL HERITAGE

28.1 Introduction

1. This chapter of the Environmental Statement (ES) summarises the existing baseline conditions for the onshore archaeological and cultural heritage environment (the historic environment) within the onshore project area of Norfolk Boreas ('the project') (section 28.6). It also assesses the potential impacts to the onshore historic environment from the project and describes the embedded and additional mitigation measures proposed (section 28.7).
2. Vattenfall Wind Power Limited (VWPL) (the parent company of Norfolk Boreas Limited) is also developing Norfolk Vanguard, a 'sister project' to Norfolk Boreas. In order to minimise impacts associated with onshore construction works for the two projects, Norfolk Vanguard Limited are seeking to obtain consent to undertake enabling works for both projects at the same time. However, Norfolk Boreas needs to consider the possibility that Norfolk Vanguard may not proceed to construction.
3. The Environmental Impact Assessment (EIA) will therefore be undertaken using the following two alternative scenarios (further details are presented in Chapter 5 Project Description) and an assessment of potential impacts has been undertaken for each scenario:
 - **Scenario 1** – Norfolk Vanguard proceeds to construction and installs ducts and other shared enabling works for Norfolk Boreas.
 - **Scenario 2** – Norfolk Vanguard does not proceed to construction and Norfolk Boreas proceeds alone. Norfolk Boreas undertakes all works required as an independent project.
4. Given the spatial overlap and timeframe between the project and Norfolk Vanguard , the results of the staged programme of assessment and survey undertaken for Norfolk Vanguard are considered to be valid for use for the Norfolk Boreas project, as agreed with Norfolk County Council (NCC) Historic Environment Service (HES) and Historic England (HE) (see section 28.2.2).
5. Baseline conditions, comprising an account of the known archaeological and cultural heritage resource (including designated and non-designated heritage assets) and a summary of the potential for currently unrecorded sites (assets) and finds to exist within the onshore project area, have been established based on the results of the following data assessment, survey and evaluation work elements prepared for Norfolk Vanguard:
 - Archaeological Desk Based Assessment (ADBA - Appendix 28.1) prepared in compliance with the Written Scheme of Investigation (WSI): ADBA (Terrestrial

- Archaeology) (Document reference: PB4476.003.039 - Royal HaskoningDHV, 2017a), and agreed in advance with NCC, HES and HE;
- Aerial photographic and Light Detection and Ranging (LiDAR) data assessment work (Appendix 28.1, Annex 28.1.3);
 - A priority programme of archaeological geophysical survey (Appendix 28.2), undertaken in compliance with the WSI: Priority Archaeological Geophysical Survey (Terrestrial Archaeology) (document reference: PB4476.003.046 - Royal HaskoningDHV, 2017b), and agreed in advance with NCC HES and HE; and
 - Geoarchaeological monitoring of Ground Investigation (GI) Works (Appendix 28.3) undertaken in compliance with the WSI for Geoarchaeological Watching Brief (document reference: 108481.01 - Wessex Archaeology, 2017), and agreed in advance with NCC HES and HE.
6. The features identified in the aerial photographic and LiDAR data assessment formed the basis of the priority programme of archaeological geophysical survey. Those features mapped as either intersecting or located wholly within a 200m wide corridor were targeted. Records held by the Norfolk Historic Environment Record (NHER) with no corresponding aerial photographic / LiDAR feature were also reviewed within this corridor, with those considered to warrant and benefit from survey (in order to understand the potential risks) also targeted as part of the priority programme of archaeological geophysical survey.
7. Those features identified as potentially being present as sub-surface archaeological remains within the onshore project area have not been ground truthed through intrusive (e.g. trial trenching) evaluation approaches. It has been discussed and agreed with NCC HES and HE that this will be conducted in the post-consent stages of the project if a DCO is granted. This may be undertaken as part of Norfolk Vanguard under Scenario 1 or as part of Norfolk Boreas under Scenario 2. Assessment, survey and reporting at this stage with respect to below ground archaeological remains is based on archaeological potential as indicated by the results of non-intrusive survey and evaluation techniques only.
8. Although identified as a priority area for geophysical survey, the substation area was not subject to geophysical survey prior to the submission of the Preliminary Environmental Information Report (PEIR) due to access restrictions. Survey data within this area has since been acquired (between the 14th and 31st January 2019) and archaeologically assessed (see Appendix 28.8), the results of which inform this assessment. The survey was undertaken in compliance with the WSI: Priority Archaeological Geophysical Survey (Terrestrial Archaeology) (document reference: PB4476.003.046 - Royal HaskoningDHV, 2017b), as agreed in advance with NCC HES and HE.

9. Further cultural heritage considerations have also been informed by a detailed heritage settings assessment undertaken as part of Norfolk Vanguard, based on the results of a staged programme of assessment comprising desk-based review, site visits and the incorporation and use of Landscape and Visual Impact Assessment (LVIA) tool-kits (e.g. Zones of Theoretical Visibility (ZTV) and photomontages), with respect to heritage setting. An initial settings assessment was undertaken as part of the ADBA (Appendix 28.1) and has since been developed further (Appendix 28.4). Setting considerations specific to Norfolk Boreas are discussed in this chapter, where relevant (sections 28.6 and 28.7). The approach to heritage settings assessment has been agreed with HE and NCC HES as part of the pre-application consultation process for the Norfolk Vanguard and Norfolk Boreas projects (see section 28.3).
10. Archaeology and cultural heritage considerations below Mean High Water Springs (MHWS) are assessed separately within Chapter 17 Offshore and Intertidal Archaeology and Cultural Heritage. Although reported on separately, correlation between the assessment methodology utilised in the onshore and offshore and intertidal archaeological and cultural heritage chapters has been ensured, where relevant, in order to produce an integrated and coherent account of the historic environment and the degree to which the project may interact with the archaeological and cultural heritage resource as a whole.
11. Inter-relationships have been identified between the following topics (section 28.9). This chapter provides cross references where relevant and should therefore be read in conjunction with these. The relevant chapters are:
 - Chapter 17 Offshore and Intertidal Archaeology and Cultural Heritage;
 - Chapter 25 Noise and Vibration; and
 - Chapter 29 Landscape and Visual Impact Assessment.
12. This chapter has been prepared in regular consultation with HE and NCC HES (section 28.3) and in accordance with legislation, policy and industry standards and guidance documents relevant to onshore archaeology and cultural heritage (section 28.2), with specific reference to the relevant National Policy Statements (NPS), the National Planning Policy Framework (NPPF) and associated Planning Practice Guidance (PPG).

28.2 Legislation, Guidance and Policy

28.2.1 Legislation

13. The NPSs (the principal decision making documents for Nationally Significant Infrastructure Projects (NSIPs)), of relevance 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).
14. Table 28.1 sets out how specific NPS policies relevant to onshore archaeology and cultural heritage are addressed within this chapter.
15. Further detail on legislation and policy in relation to the wider project is provided in Chapter 3 Policy and Legislative Context.

Table 28.1 NPS assessment requirements for the historic environment

NPS requirement	NPS reference	ES reference
EN-1 Overarching NPS for Energy		
<p>‘As part of the Environmental Statement (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.’</p>	Section 5.8.8	<p>The significance of the archaeological receptors (heritage assets) considered in this ES chapter has been detailed in sections 28.4 and 28.6. This chapter has also been informed by a detailed heritage settings assessment, based on the results of a staged programme of assessment comprising desk-based review, site visits and the incorporation and use of LVIA tool-kits (e.g. ZTVs and photomontages), with respect to heritage setting. An initial settings assessment was undertaken as part of the ADBA (Appendix 28.1) and was developed further, the results of which are discussed in this chapter (see section 28.6, 28.7 and Appendix 28.4).</p>
<p>‘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.</p> <p>Where proposed development will affect the setting of a heritage asset, representative visualisations may be necessary to explain the impact.’</p>	Section 5.8.9	<p>This ES chapter has been informed by the following assessment, survey and ‘evaluation’ works, the results of which have helped identify the presence / absence of archaeological receptors (heritage assets) within the project area:</p> <ul style="list-style-type: none"> • ADBA (Appendix 28.1); • Aerial photographic and LiDAR data assessment (Appendix 28.1, Annex 28.1.3); • Priority programme of archaeological geophysical survey (Appendix 28.2); • Geoarchaeological monitoring of GI works (Appendix 28.3); and • Norfolk Boreas Offshore Wind Farm, Onshore Substation, Necton: geophysical survey (Appendix 28.8). <p>Archaeological information has informed the iterative design process (as detailed within Chapter 4 Site Selection and Assessment of Alternatives), see section 28.7.</p> <p>As noted above, this chapter has also been informed by a detailed heritage settings assessment, based on the results of a staged programme of assessment comprising desk-based review, site visits and the</p>

NPS requirement	NPS reference	ES reference
		incorporation and use of LVIA tool-kits to further assess any potential impact upon setting (see sections 28.6, 28.7 and Appendix 28.4).
<p>'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.'</p>	Section 5.8.10	<p>This ES chapter provides an account of the potential impact of the project upon heritage assets and their significance (section 28.7). The assessment as presented includes provision for the possibility that the Norfolk Vanguard project may not proceed to construction by including the consideration of two alternative scenarios within the context of the EIA (see section 28.1).</p> <p>This ES chapter has been informed by an ADBA (see Appendix 28.1) and staged programme of survey and 'evaluation' works (e.g. aerial photographic / LiDAR data assessment, priority geophysical survey and geoarchaeological monitoring of GI works) and a heritage settings assessment (Appendices 28.1, 28.2, 28.3, 28.4 and 28.8).</p>
<p>'In considering applications, the Infrastructure Planning Commission (IPC) [now the Planning Inspectorate and the Secretary of State] should seek to identify and assess the particular significance of any heritage asset that may be affected by the proposed development, including by development affecting the setting of a heritage asset, taking account of:</p> <ul style="list-style-type: none"> • Evidence provided with the application; • Any designation records; • The Historic Environment Record, and similar sources of information; • The heritage assets themselves; • The outcome of consultations with interested parties; and • Where appropriate and when the need to understand the significance of the heritage asset demands it, expert advice' 	Section 5.8.11	<p>This ES chapter assesses the potential for impacts to occur upon the onshore archaeology and cultural heritage resource as a result of the project. Impacts of a direct (e.g. physical) and indirect (e.g. non-physical) nature are considered within the context of the project in a manner that is proportionate to those assets present (and their perceived heritage significance), as agreed in consultation with HE and NCC HES. This approach is outlined in section 28.4 with the heritage assets set out in the baseline conditions section in section 28.6 and assessment detailed in sections 28.7 and 28.8.</p>

NPS requirement	NPS reference	ES reference
<p>'In considering the impact of a proposed development on any heritage assets, the IPC [now the Planning Inspectorate and the Secretary of State] should take into account the particular nature of the significance of the heritage assets and the value that they hold for this and future generations. This understanding should be used to avoid or minimise conflict between conservation of that significance and proposals for development.'</p>	<p>Section 5.8.12</p>	<p>Heritage significance is assigned broadly in line with the methodology set out in section 28.4, based on available data. With regards to potential below ground remains, this data is predominantly non-intrusive in nature and as such, heritage significance is based on professional judgement and experience, rather than any fully substantiated and established levels of heritage significance, as part of intrusive ground truthing for instance. Because of this, a precautionary approach has been adopted which will be further substantiated post-consent following an initial informative stage of mitigation work (e.g. further geophysical survey and archaeological trial trenching).</p>
<p>'The IPC [now the Planning Inspectorate and the Secretary of State] should take into account the desirability of sustaining and, where appropriate, enhancing the significance of heritage assets, the contribution of their settings and the positive contribution they can make to sustainable communities and economic vitality... This can be by virtue of:</p> <ul style="list-style-type: none"> • heritage assets having an influence on the character of the environment and an area's sense of place; • heritage assets having a potential to be a catalyst for regeneration in an area, particularly through leisure, tourism and economic development; • heritage assets being a stimulus to inspire new development of imaginative and high quality design; • the re-use of existing fabric, minimising waste; and • the mixed and flexible patterns of land use in historic areas that are likely to be, and remain, sustainable. <p>...The IPC [now the Planning Inspectorate and the Secretary of State] should take into account the desirability of new</p>	<p>Section 5.8.13</p>	<p>In order to assess the positive contributions of the project in the context of onshore archaeology and cultural heritage, the magnitude of positive effect has also been considered in this chapter. The magnitude of positive effect directly relates to the level of public value associated with an individual beneficial impact and may correspond directly to the project itself (e.g. by means of route refinement / micro-siting which seek to avoid heritage assets) or where a project will enhance the historic environment and / or public understanding (e.g. by adding to the archaeological record). This is discussed in section 28.4 and assessed in section 28.7.</p> <p>Opportunities to minimise harm to the onshore historic environment have been fully considered as part of the Norfolk Boreas and associated Norfolk Vanguard projects and feedback from community and stakeholder consultation taken on-board. This has been directly reflected in the commitment made by Vattenfall to utilise High Voltage Direct Current (HVDC) technology, meaning that the required cable route for the two projects combined has been narrowed from 100 metres wide to 45 metres wide (the onshore cable route). There is also no longer a need for a Cable Relay Station (CRS) following the decision to use HVDC technology. The HVDC onshore project substation has been subject to sensitive siting considerations, and mitigation planting and acoustic</p>

NPS requirement	NPS reference	ES reference
<p>development making a positive contribution to the character and local distinctiveness of the historic environment. The consideration of design should include scale, height, massing, alignment, materials and use. The IPC [now the Planning Inspectorate and the Secretary of State] should have regard to any relevant local authority development plans or local impact report on the proposed development in respect of the factors set out [above]’.</p>		<p>enclosures will be adopted to reduce any landscape and visual and noise concerns.</p> <p>Archaeological information has informed the iterative Design process (as detailed through Chapter 4 Site Selection and Assessment of Alternatives), see section 28.7.</p>
<p>‘There should be a presumption in favour of the conservation of designated heritage assets and the more significant the designated heritage asset, the greater the presumption in favour of its conservation should be. Once lost heritage assets cannot be replaced and their loss has a cultural, environmental, economic and social impact. Significance can be harmed or lost through alteration or destruction of the heritage asset or development within its setting. Loss affecting any designated heritage asset should require clear and convincing justification. Substantial harm to or loss of a grade II listed building, park or garden should be exceptional. Substantial harm to or loss of designated assets of the highest significance, including Scheduled Monuments; registered battlefields; grade I and II* listed buildings; grade I and II* registered parks and gardens; and World Heritage Sites, should be wholly exceptional.’</p>	<p>Section 5.8.14</p>	<p>The onshore project area and onshore works will avoid physical impacts upon known (e.g. previously listed / scheduled) designated heritage assets and as such, no direct physical impacts are anticipated to occur to designated heritage assets (section 28.6.2).</p> <p>This is with the exception of the Blickling Conservation Area (356) through which duct installation works will take place under Scenario 2, as previously discussed with NCC HES and HE. Although the occurrence of such works constitutes a direct physical impact on the landscape character of the Conservation Area (see section 28.6.2.1), the landscape elements of the Conservation Area subject to impact are considered to have been largely subject to certain levels of alteration and ‘recent’ change already, as part of agricultural use. Sensitive backfilling and reinstatement will be undertaken following construction and field boundaries and hedgerows returned to their pre-construction condition (this commitment is included within the project-specific Outline WSI – document reference 8.5). The impact assessment as presented in this chapter highlights that this impact will therefore be temporary in nature and confined to the construction period and is not considered to constitute harm to the significance of the Conservation Area following the completion of construction works (section 28.7).</p>
<p>‘Any harmful impact on the significance of a designated heritage asset should be weighed against the public benefit of development, recognising that the greater the harm to</p>	<p>Section 5.8.15</p>	<p>The onshore project area and onshore works will avoid physical impacts upon known (e.g. previously listed / scheduled) designated heritage assets. As such, no direct physical impacts are anticipated to occur to</p>

NPS requirement	NPS reference	ES reference
<p>the significance of the heritage asset the greater the justification will be needed for any loss. Where the application will lead to substantial harm to or total loss of significance of a designated heritage asset the IPC [now the Planning Inspectorate and the Secretary of State] should refuse consent unless it can be demonstrated that the substantial harm to or loss of significance is necessary in order to deliver substantial public benefits that outweigh that loss or harm.'</p>		<p>designated heritage assets (section 28.6.2). As above, this is with the exception of duct installation works through the Blickling Conservation Area (356) (see discussion in relation to NPS reference section 5.8.14 above).</p> <p>Designated heritage assets have also been considered as part of a heritage settings assessment (Appendix 28.4) to ensure that indirect (non-physical) impacts arising as a result of the project are fully considered. This assessment has been undertaken in line with guidance outlined in The Setting of Heritage Assets: Historic Environment Good Practice Advice in Planning Note 3 (Second Edition) (Historic England, 2017) (see sections 28.6, 28.7 and Appendix 28.4).</p>
<p>'Not all elements of a World Heritage Site or Conservation Area will necessarily contribute to its significance. The policies set out in paragraphs 5.8.11 to 5.8.15 above apply to those elements that do contribute to the significance. When considering proposals the IPC [now the Planning Inspectorate and the Secretary of State] should take into account the relative significance of the element affected and its contribution to the significance of the World Heritage Site or Conservation Area as a whole.'</p>	<p>Section 5.8.16</p>	<p>There are no World Heritage Sites within the study areas considered within this ES chapter.</p> <p>Duct installation works through the Blickling Conservation Area will directly impact landscape elements of the Conservation Area. The areas of Blickling Conservation Area associated with the onshore project area and onshore works are predominantly owned by the National Trust (Figure 28.1a – Map 4 of 9), and subject to tenant farming. The landscape elements subject to impact are therefore considered to have been largely subject to certain levels of alteration and 'recent' change already, as part of agricultural use. Sensitive backfilling and reinstatement will be undertaken following construction and field boundaries and hedgerows returned to their pre-construction condition (this commitment is included within the project-specific Outline WSI – document reference 8.5). Any impact will be temporary in nature and confined to the construction period. Direct impacts upon the Blickling Conservation Area as a result of duct installation works are therefore not considered to constitute harm to the significance of the Conservation Area following the completion of construction through into the operation stage (section 28.7).</p>
<p>'Where loss of significance of any heritage asset is justified on the merits of the new development, the IPC [now the</p>	<p>Section 5.8.17</p>	<p>This ES chapter has concluded that the project will not result in the loss of significance of (or harm to) any designated heritage assets identified in</p>

NPS requirement	NPS reference	ES reference
<p>Planning Inspectorate and the Secretary of State] should consider imposing a condition on the consent or requiring the applicant to enter into an obligation that will prevent the loss occurring until it is reasonably certain that the relevant part of the development is to proceed.'</p>		<p>this chapter (section 28.7). This conclusion has been based on the results of a staged programme of assessment comprising desk-based review, site visits and the incorporation and use of LVIA tool-kits (e.g. ZTVs and photomontages), with respect to heritage setting. The approach to assessment has been agreed with HE and NCC HES, as part of the pre-application consultation (Expert Topic Group – ETG) process.</p> <p>The significance of non-designated heritage assets has to date been established through an ADBA and staged programme of survey and 'evaluation' works (e.g. aerial photographic / LiDAR data assessment, priority geophysical survey and geoarchaeological monitoring of GI works) (Appendices 28.1, 28.2, 28.3 and 28.4).</p>
<p>'When considering applications for development affecting the setting of a designated heritage asset, the IPC [now the Planning Inspectorate and the Secretary of State] should treat favourably applications that preserve those elements of the setting that make a positive contribution to, or better reveal the significance of, the asset. When considering applications that do not do this, the IPC [now the Planning Inspectorate and the Secretary of State] should weigh any negative effects against the wider benefits of the application. The greater the negative impact on the significance of the designated heritage asset, the greater the benefits that will be needed to justify approval.'</p>	<p>Section 5.8.18</p>	<p>This ES chapter has concluded that indirect (non-physical) impacts arising as a result of the project with respect to setting will be no more than minor adverse / negligible (section 28.7), with no impact in the majority of cases. As outlined above, this conclusion has been based on the results of a staged programme of assessment comprising desk-based review, site visits and the incorporation and use of LVIA tool-kits (e.g. ZTVs and photomontages). The approach to assessment has been agreed with HE and NCC HES as part of the pre-application consultation (ETG) process.</p>
<p>EN-3 NPS for Renewable Energy Infrastructure</p>		
<p>'Consultation with the relevant statutory consultees should be undertaken by the applicants at an early stage of the development.'</p>	<p>Section 2.6.140</p>	<p>Regular consultation has been undertaken with the relevant statutory consultees (including NCC HES and HE), following the Scoping Opinion, and through the application of the Evidence Plan Process (EPP), as outlined in section 28.3. Consultation with the ETG as part of the EPP has been ongoing throughout the process.</p>

NPS requirement	NPS reference	ES reference
<p>'Assessment should be undertaken as set out in Section 5.8 of EN-1. Desk-based studies should take into account any geotechnical or geophysical surveys that have been undertaken to aid the wind farm design.'</p>	<p>Section 2.6.141</p>	<p>This ES chapter has been undertaken in accordance with section 5.8 of EN-1, as detailed above. It has also been informed by an ADBA (see Appendix 28.1) and staged programme of survey and 'evaluation' works (e.g. aerial photographic / LiDAR data assessment, priority geophysical survey and geoarchaeological monitoring of GI works) (Appendices 28.1, 28.2, 28.3 and 28.8).</p> <p>The results of the ADBA, including Aerial Photographic and LiDAR data assessment (Appendix 28.1, Annex 28.1.3), were used to identify areas for the targeted programme of priority onshore archaeological geophysical survey (as agreed with NCC HES and HE), which was undertaken between October 2017 and March 2018 (Appendix 28.2). Further geophysical survey was undertaken in the substation area in January 2019 (Appendix 28.8) and informs this ES chapter.</p>

16. 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 July 2018, 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, 2018).
17. 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.
18. To summarise, 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.

19. The NPPF's associated PPG 'Conserving and enhancing the historic environment' (MHCLG, 2018) 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 in respect to this project, EN-1 (the Overarching NPS for Energy) is the key decision making document.
20. Works affecting listed buildings and conservation areas are subject to the Planning (Listed Buildings and Conservation Areas) Act 1990 ("PLBCAA"), 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 considered to be historically important under the criteria set out in the Hedgerow Regulations 1997, as amended by The Hedgerows (England) (Amendment) Regulations 2002.
21. 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 PLBCAA 1990 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.

28.2.2 Guidance and Policy

22. This chapter further takes into account local policy and further national guidance relevant to the onshore project area.

28.2.2.1 Local Planning Policy

23. 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). Note: the Greater Norwich Emerging Local Plan

consultation closed March 2018. The Draft Plan Consultation is anticipated in September-October 2019;

- The Broadland Development Management Development Plan Document (Broadland District Council, 2015); and
- Breckland: Adopted Core Strategy and Development Control Policies Development Plan Document (Breckland Council, 2009).

24. 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 28.1.

28.2.2.2 Further National Guidance

25. 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, 2015);
- Managing Significance in Decision-Taking in the Historic Environment: Historic Environment Good Practice Advice in Planning Note 2 (Historic England, 2015a);
- The Setting of Heritage Assets: Historic Environment Good Practice Advice in Planning Note 3 (Second Edition) (Historic England, 2017); and
- Conservation Principles: Policy and Guidance for Sustainable Management of the Historic Environment (Historic England, 2008).

28.3 Consultation

26. Consultation is a key part of the EIA process. To date, consultation regarding onshore archaeology and cultural heritage has been conducted through the Scoping Report (Royal HaskoningDHV, 2017), the Evidence Plan Process (EPP) and feedback received on the PEIR (Norfolk Boreas Limited, 2018), which have all been incorporated into this ES.

Table 28.2 Consultation Responses for Norfolk Boreas

Consultee	Date /Document	Comment	Response / where addressed in the ES
The Planning Inspectorate (Secretary of State)	June 2017 / Scoping Opinion	Paragraphs 751 and 756 of the Scoping Report propose to scope out impacts to the setting of onshore heritage assets from the offshore elements of the Proposed Development during construction and operation. This is because the turbines would be located approximately 72km from the coast and would not be viewed from the shore. The SoS agrees that this can be scoped out; however, notes and welcomes that consideration will be given to potential impacts on the setting of onshore heritage assets during installation of offshore export cables close to the coast and activities at the landfall.	Potential impacts upon the setting of heritage assets during landfall works are considered as part of the heritage settings assessment (section 28.7.5), although it is noted that there will be no construction works on the beach at Happisburgh due to the use of long Horizontal Directional Drilling (HDD) at the landfall. Potential impacts upon the setting of onshore heritage assets during offshore construction works close to the coast are discussed in section 28.9.
The Planning Inspectorate (Secretary of State)	June 2017 / Scoping Opinion	Paragraph 1188 of the Scoping Report explains that the onshore archaeological study area is as described in section 1.1.4 of the Scoping Report. The SoS considers the defined areas to be relatively limited in terms of the archaeological assessment, particularly for potential consideration of indirect effects. The Applicant should ensure that the study area around the cable route corridor, cable relay station and substation are sufficiently broad to give consideration to heritage assets that could be indirectly impacted. This applies equally in the context of the reconfiguration of the overhead lines which does not appear to be specifically referred to as part of section 3.8 of the Scoping Report. The SoS expects the potential for direct and indirect effects of these reconfiguration works to be specifically considered as part of the archaeological assessment.	The study areas considered in this chapter have been devised specifically to encompass a broad area surrounding the onshore project area so that indirect impacts (e.g. settings implications) can be considered. The study areas proposed have been agreed in consultation with HE and NCC HES and are considered sufficiently broad for this purpose. The heritage settings assessment is detailed in sections 28.6.2.2, 28.6.3.3, 28.7.5.3, 28.7.6.1 and Appendix 28.4, and has been

Consultee	Date /Document	Comment	Response / where addressed in the ES
			further informed by reference to LVIA tool-kits (e.g. ZTVs and photomontages), where relevant. Impacts arising as a result of overhead line modification works are assessed in section 28.7.
The Planning Inspectorate (Secretary of State)	June 2017 / Scoping Opinion	The SoS agrees that direct impacts on archaeological remains during operation can be scoped out of the assessment.	No action.
The Planning Inspectorate (Secretary of State)	June 2017 / Scoping Opinion	The SoS welcomes references to the preparation of an outline WSI to be submitted as part of the ES to outline mitigation commitments. The SoS expects that the preparation of the WSI will be in conjunction with Historic England and the relevant local planning authorities and that agreements as to spatial and temporal coverage (as well as its delivery through DCO requirements) will be sought as part of the EPP. The SoS notes references at paragraph 1233 of the Scoping Report that a WSI has been prepared in respect of the Norfolk Vanguard project and that there will be significant overlap between WSI's across both projects.	Noted. The overarching outline summary details and principles of the post-consent initial informative stages of mitigation work and further mitigation measures (as and where necessary) will be set out in the Written Scheme of Investigation (WSI) (which is secured through DCO Requirement 23), an outline of which has been submitted with the DCO application (document reference 8.5). The WSI will be subject to agreement with NCC HES and HE, as required.
The Planning Inspectorate (Secretary of State)	June 2017 / Scoping Opinion	Appropriate cross reference should be made to the Landscape and Visual Impact Assessment (LVIA) section of the ES particularly in terms of viewpoint selection within the LVIA which should incorporate views from cultural heritage assets and should be agreed with the relevant authorities.	A number of 'heritage-specific' viewpoints have been identified in consultation with and feedback from NCC HES and HE and have been subject to consideration as part of a detailed heritage settings assessment (see section 28.6.2.2).

Consultee	Date /Document	Comment	Response / where addressed in the ES
			Cross-references have been made to the LVIA where relevant within the impact assessment (e.g. sections 28.7.5.3 and 28.7.6.1) and in section 28.9.
Lincolnshire County Council via The Planning Inspectorate (Secretary of State)	June 2017 / Scoping Opinion	The information in the heritage assessment / EIA needs to provide sufficient evidence to understand the impact of the proposal on the significance of any heritage assets and their settings, sufficient to meet the requirements of the National Planning Policy Framework (NPPF).	The impact of the project on the significance of heritage assets and their settings has been subject to consideration as part of a detailed heritage settings assessment (sections 28.6.2.2, 28.6.3.3, 28.7.5.3, 28.7.6.1 and Appendix 28.4), and has been further informed by the use of LVIA tool-kits (e.g. ZTVs and photomontages) and the specific assessment of cultural heritage viewpoints, where relevant.
Lincolnshire County Council via The Planning Inspectorate (Secretary of State)	June 2017 / Scoping Opinion	Regarding setting issues, potential impacts on the settings and significance of designated and non-designated heritage assets which would experience visual change should be evidenced using accurate visual representations. Viewpoints, including views of, from, and across heritage asset receptors as well as general intervisibility, all have historic context and need to be assessed properly to determine the contribution of the setting of the heritage asset and the potential impact upon it by development or proposed mitigation measures.	A number of 'heritage-specific' viewpoints have been identified in consultation with and feedback from NCC HES and HE and have been subject to consideration as part of a detailed heritage settings assessment (see sections 28.7.5.3 and 28.7.6.1).
Lincolnshire County Council via The Planning Inspectorate (Secretary of State)	June 2017 / Scoping Opinion	The NPPF states that 'Significance can be harmed or lost through alteration or destruction of the heritage asset or development within its setting' (para 132), and 'The effect of an application on the	Impacts upon both designated and non-designated heritage assets are identified and assessed in section 28.7, where relevant.

Consultee	Date /Document	Comment	Response / where addressed in the ES
		significance of a non-designated heritage asset should be taken into account in determining the application' (para 135).	
Lincolnshire County Council via The Planning Inspectorate (Secretary of State)	June 2017 / Scoping Opinion	The Environmental Impact Assessment should contain sufficient information to enable an informed planning decision to be made.	To date, a large body of assessment and survey work has been undertaken as part of a staged programme of survey and assessment and informs this ES chapter. Technical supporting documents are provided in Appendix 28.1, 28.2, 28.3, 28.4 and 28.8.
Norfolk County Council (NCC) via The Planning Inspectorate (Secretary of State)	June 2017 / Scoping Opinion	For both offshore and any associated onshore development / infrastructure (e.g. work compound, sub-station; relay stations etc.) the EIA / PEIR will need to provide an assessment of the impact of the development on the heritage landscape.	The Historic Landscape Character has been subject to consideration (section 28.6.4). Potential changes to the Historic Landscape Character arising as a result of the project are discussed and assessed in section 28.7.
NCC via The Planning Inspectorate (Secretary of State)	June 2017 / Scoping Opinion	Cultural Heritage and Archaeology: These issues should be discussed with Norfolk Historic Environment Service Planning Team.	NCC HES are key participants in the EPP ETG. Consultation undertaken to date with NCC HES is detailed in this table and Table 28.3 (in relation to Norfolk Vanguard) and comments have been addressed where relevant throughout the chapter.
Historic England (HE) via The Planning Inspectorate (Secretary of State)	June 2017 / Scoping Opinion	Paragraph 1187 states that the non-designated heritage assets are to be fully considered as part of the Archaeological Desk Based Assessment, as stated above this assessment will need to include the internationally significant remains and deposits at Happisburgh,	See ADBA (Appendix 28.1). Heritage assets (designated and non-designated) and other potential sub-surface

Consultee	Date /Document	Comment	Response / where addressed in the ES
		<p>particularly if this location is selected as the landfall site. The plan to utilise a working group of relevant specialists for this period and part of the country is sensible and something that Historic England would encourage and would support.</p>	<p>archaeological remains represented by the aerial photographic and LiDAR data assessment and geophysical survey data are included in section 28.6.</p> <p>A specific independent academic steering group (members of the Ancient Human Occupation of Britain (AHOB) / Pathways to Ancient Britain (PAB) Projects) has been established with respect to coastal, intertidal and nearshore archaeological considerations at the landfall – focussing on Happisburgh. Consultation with this steering group is ongoing and will continue through DCO submission and into the post-consent stages.</p>
<p>HE via The Planning Inspectorate (Secretary of State)</p>	<p>June 2017 / Scoping Opinion</p>	<p>It has been stated in paragraph 1213 that the development may alter the hydrology of an area that may result in the desiccation and degradation of wetland deposits and the archaeological and palaeoenvironmental evidence that they may hold. The potential impacts of the development on these vulnerable deposits needs to be investigated and an appropriate strategy implemented to mitigate any damage. We recommend that this is addressed in the WSI and further information provided in the ES. References to appropriate Historic England guidance would be appropriate (see 'Preservation of Archaeological Remains').</p>	<p>Noted. This potential impact is considered in section 28.7.5. Reference to Historic England's 'Preservation of Archaeological Remains' (2016) guidance is included in the Outline WSI (see document reference 8.5).</p>

Consultee	Date /Document	Comment	Response / where addressed in the ES
HE via The Planning Inspectorate (Secretary of State)	June 2017 / Scoping Opinion	The potential mitigation requirements presented in paragraph 1227 seem sensible, but it is important to note that a programme of coring may also be required in areas that are unsuitable for excavation, such as areas adjacent to rivers.	Two programmes of geoarchaeological watching brief (Phase 1 and Phase 2) of onshore engineering GI works have been undertaken within (and immediately beyond) the onshore project area to date, focussing at the Happisburgh South landfall and at a number of key crossing locations where trenchless methods (e.g. HDD) will be required (Appendix 28.3). The results of these monitoring activities inform this chapter. The potential for the project to encounter currently unrecorded geoarchaeological / palaeoenvironmental remains will also be mitigated by means of implementing a project-wide approach to geoarchaeological assessment / palaeoenvironmental survey, which will be established in the post-consent stages (detailed and secured within the Outline WSI – document reference 8.5).
HE via The Planning Inspectorate (Secretary of State)	June 2017 / Scoping Opinion	It is also stated that magnetometry will likely be the technique selected to survey the area of the proposed development (paragraph 1236). It would need to be noted that our guidance recommends a suite of techniques be used which are appropriate to the	A standard detailed magnetometry technique was utilised for the acquisition of priority archaeological

Consultee	Date /Document	Comment	Response / where addressed in the ES
		<p>circumstances, and therefore it may be necessary to use additional techniques to resolve some anomalies, or on some sites. Details of the geophysical programme will need to be provided (normally in a WSI), and this would need to address technical details (techniques, coverage and line spacing), as well as whether the survey will be carried out using a cart-based or hand-held system, and would need to reference the relevant HE guidance.</p>	<p>geophysical survey data (Appendix 28.2), as agreed with NCC HES and HE. A later magnetometry survey was undertaken in the proposed substation area (Appendix 28.8). Magnetometry was considered the only feasible method at this stage to cover an area of the size proposed for survey, which will allow post-consent trial trenching to be better targeted with a fuller data source. Additional geophysical survey (including the utilisation of alternative techniques, if/where relevant) will be considered within the post-consent stages of the project, as agreed with NCC HES and HE (i.e. as part of the initial information stages of mitigation). The application of any such methods will be outlined in a survey-specific WSI post-consent.</p>
<p>HE via The Planning Inspectorate (Secretary of State)</p>	<p>June 2017 / Scoping Opinion</p>	<p>In relation to the impact of the development on the setting of heritage assets we are concerned that the report does not adequately cover the assessment of the impacts on the significance of scheduled monuments and listed buildings through a development within their setting. This is considered in sections 3.2.2.1 and 3.8.2.2 of the report. We accept that a staged approach is appropriate in relation to the assessment of setting; however there is no mention</p>	<p>The impact of the project on the significance of any heritage assets and their settings has been subject to consideration as part of a detailed heritage settings assessment (sections 28.6.2.2, 28.6.3.3, 28.7.5.3, 28.7.6.1 and</p>

Consultee	Date /Document	Comment	Response / where addressed in the ES
		<p>about how heritage specific viewpoints would be decided and how they would be cross referenced with the landscape and visual chapter. Setting assessment would also need to include conservation areas where or if relevant as they are also considered to be designated heritage assets under the terms of the NPPF.</p>	<p>Appendix 28.4), and has been further informed by the use of LVIA tool-kits (e.g. ZTVs and photomontages) and the assessment of cultural heritage specific viewpoints, where relevant. The Blickling Conservation Area is also subject to detailed assessment given the interaction between duct installation works and landscape character elements of the Blickling Conservation Area (under Scenario 2) (see section 28.7.5.2).</p>
<p>HE via The Planning Inspectorate (Secretary of State)</p>	<p>June 2017 / Scoping Opinion</p>	<p>We note however that under chapter 4.2 (Landscape and Visual) Registered Parks and Gardens are considered landscape designations and are being considered under this chapter. Whilst there may be some crossover we would recommend that they are primarily a heritage designation and the setting issues would need to be considered in the Onshore archaeology and cultural heritage chapter. This would need to be rectified.</p>	<p>Registered Parks and Gardens within the study area are identified in section 28.6. The impact of the project on the significance of any heritage assets and their settings has been subject to consideration as part of a detailed heritage settings assessment (sections 28.6.2.2, 28.6.3.3, 28.7.5.3, 28.7.6.1 and Appendix 28.4), and has been further informed by the use of LVIA tool-kits (e.g. ZTVs and photomontages) and the assessment of cultural heritage specific viewpoints, where relevant.</p>

Consultee	Date /Document	Comment	Response / where addressed in the ES
HE via The Planning Inspectorate (Secretary of State)	June 2017 / Scoping Opinion	We also note that heritage specific viewpoints are not considered in Chapter 4.2 (see table 4.1). We recommend that heritage specific viewpoints are an important part of assessing the impact upon the setting of designated heritage assets. Heritage viewpoints would need to be considered and incorporated into the landscape chapter of the ES but cross referenced with the Onshore archaeology and cultural heritage chapters. It would be appropriate to consult Historic England on the list of appropriate heritage viewpoints, once this has been considered.	A number of 'heritage-specific' viewpoints have been identified in consultation with and feedback from NCC HES and HE and have been subject to consideration as part of a detailed heritage settings assessment (see section 28.6.2.2). Cross-reference has been made to the LVIA, where relevant, within the impact assessment (section 28.7) and in section 28.9.
SUGGESTED QUESTIONS FOR CONSIDERATION: ONSHORE (SCOPING)			
Q1. Please tell us about further data sources that could be reviewed as part of the site characterisation for each topic?			
HE via The Planning Inspectorate (Secretary of State)	June 2017 / Scoping Opinion	The scoping report would appear to identify key matters as relevant to this proposed development, further references to our guidance would be appropriate in follow-up documentation. Further consultation with the AHOB archive in relation to the Happisburgh area may be appropriate if this is the chosen location for the landfall.	Noted. The Outline WSI (document reference 8.5) makes further reference to available guidance documents issued by HE, as and where relevant. Consultation with the academic steering group as part of the AHOB engagement process will continue through DCO submission and into the post-consent stages of the project.
Q2. Tell us about any other relevant potential impacts for each topic?			
HE via The Planning Inspectorate (Secretary of State)	June 2017 / Scoping Opinion	The Scoping Report would appear to have included the key matters, although there are issues to note with regards to the setting of heritage assets (see specific comments above).	Noted. See previous comments.

Consultee	Date /Document	Comment	Response / where addressed in the ES
Q3. Do you agree with the potential impacts that have been scoped out for each topic? If not, please provide details.			
HE via The Planning Inspectorate (Secretary of State)	June 2017 / Scoping Opinion	We broadly support the approach taken in the report in relation to the historic environment. Regarding the conclusion that for Indirect disturbance of setting (landfall) during either operation or decommissioning that “Offshore Archaeology and Cultural Heritage” is not considered a relevant matter we have no further comment to offer at this stage. We also note again that we felt there were issues to resolve with regards to the setting of heritage assets as noted in our specific comments above.	Noted. See previous comments.
Q4. Have the relevant potential cumulative impacts been identified? If not, please provide details.			
HE via The Planning Inspectorate (Secretary of State)	June 2017 / Scoping Opinion	The Scoping Report would seem to have considered this matter as relevant to the EIA exercise, but please note our earlier comment in relation to other offshore wind farm arrays.	Potential cumulative impacts with reference to other offshore wind farms, where relevant to the project, are considered in Chapter 17 Offshore and Intertidal Archaeology and Cultural Heritage.
Q5. Have the relevant potential transboundary impacts been identified? If not, please provide details.			
HE via The Planning Inspectorate (Secretary of State)	June 2017 / Scoping Opinion	We broadly support the approach and consider that no specific matters can be identified at this stage.	No action.
Q6. Do you agree with the proposed approach to assessing each impact is appropriate? If not, please provide details.			
HE via The Planning Inspectorate (Secretary of State)	June 2017 / Scoping Opinion	No comment at this stage, please see comments above.	Noted. No action.
Q7. Is there any further guidance relating to each topic that we should be aware of? If so, please provide details.			
HE via The Planning Inspectorate (Secretary of State)	June 2017 / Scoping Opinion	Please see individual comments above.	Noted. No action. See previous comments.

Consultee	Date /Document	Comment	Response / where addressed in the ES
ETG (Norfolk County Council, Breckland Council, Broadland District Council, North Norfolk District Council)	January 2018 / Norfolk Boreas Archaeology and Cultural Heritage Method Statement	No comments on the proposed methodology received.	No action required
NCC HES / HE	March 2018 / EPP ETG Meeting	<p>Purpose of the meeting: To discuss the data sources and approach as outlined in the Onshore Archaeology and Cultural Heritage Method Statement. Key discussions included:</p> <p>(1) <u>Onshore priority programme of geophysical survey undertaken as part of the Norfolk Vanguard project - coverage and update on progress</u>: The benefits of the survey data feeding into the iterative design process were discussed. HE noted that the onshore project substation area represents a key area to survey for which access has not yet been possible. NCC HES sought further information regarding the ability for the proposed access works for the National Grid to avoid the medieval moated site.</p> <p>(2) <u>Project Description and overall assessment approach</u>: an overview of the Worst Case Scenario (WCS) with regards to the two scenarios and the approach to assessment were discussed.</p> <p>(3) <u>Settings assessment and the onshore project substation</u>: HE noted that settings issues aren't likely to be of key concern in the substation area, with the critical issue being potential below ground features. However, the need for a joined-up approach between heritage and the LVIA was discussed. Visualisations, including the benefits of negative viewpoints from a heritage perspective as being indicative of no adverse effects in relation to impacts upon the setting of heritage assets were also discussed.</p> <p>(4) <u>The potential hollow way at Smugglers' Lane</u>: NCC HES raised the potential for above ground earthworks relating to a hollow way along</p>	<p>(1) The results of the priority programme of geophysical survey data are provided in Appendix 28.2 and inform this ES chapter, where relevant. The geophysical survey data (alongside aerial photo, crop mark and LiDAR data) acquired has fed directly into the Iterative Design Process (cable routeing / micrositing discussions and considerations) in order to avoid the most sensitive and significant known sub-surface archaeological remains, wherever possible, as part of the project design (see section 28.7.2). Following PEIR submission, in January 2019 a geophysical survey (detailed magnetometry) was undertaken in the substation area (see Appendix 28.8). The results of the survey also inform this assessment, where relevant.</p>

Consultee	Date /Document	Comment	Response / where addressed in the ES
		<p>a parish boundary to be present in the wider substation vicinity. It was noted that this feature may need to be the subject of a site visit to assess any above ground remains.</p> <p>(5) <u>Data sources and surveys</u>: The intention for the source material, survey and assessment data acquired for Norfolk Vanguard to date to be used to inform the Norfolk Boreas assessment was discussed. HE and NCC HES agreed with this approach.</p> <p>(6) <u>Approach to Impact Assessment</u>: The approach was discussed, as was the need for the Norfolk Boreas PEIR and subsequent ES to operate as standalone documents. The appropriateness of cross-referencing to the Norfolk Vanguard was also a point of discussion.</p> <p>(7) <u>Beneficial Magnitude</u>: A discussion was had regarding how best to handle beneficial magnitude as part of the EIA. It was noted by HE that beneficial magnitude is better articulated by narrative. HE and NCC HES noted that beneficial impacts could be articulated in terms of 'public value'.</p> <p>(8) <u>Cumulative Impact Assessment (CIA)</u>: Projects scoped into the CIA were agreed with HE and NCC HES - no additional projects were suggested by HE or NCC HES for consideration.</p> <p>and NCC HES</p> <p>(9) <u>Geoarchaeological SI works at the landfall</u>: The onshore geoarchaeological data demonstrates the presence of a 'sinkhole' at the landfall and Cromer Forest Bed Formation has not been seen. If deposits are present, they will likely be at significant depth. HE noted that they are happy that the impacts at landfall will not be significant. This, combined with the fact that the long HDD will be employed, means that there will be no impact. As a result, HE stated that a line can effectively be drawn with impact upon Cromer Forest Bed deposits discounted on the grounds of reasonableness, given the onshore geotechnical assessment results, although opportunities for further geoarchaeological investigations should not be ruled out and consultation with the AHOB academic steering group should continue.</p>	<p>(2) No action.</p> <p>(3) As above, the impact of the project on the significance of any heritage assets and their settings has been subject to consideration as part of a detailed heritage settings assessment (sections 28.6.2.2, 28.6.3.3, 28.7.5.3, 28.7.6.1 and Appendix 28.4), and has been further informed by the use of LVIA tool-kits (e.g. ZTVs and photomontages) and the assessment of cultural heritage specific viewpoints, where relevant.</p> <p>(4) Further details were provided by NCC HES (see follow-up e-mail below dated 9th March 2018).</p> <p>(5) Data sources / survey data are detailed in section 28.5.2.</p> <p>(6) See section 28.4.</p> <p>(7) Beneficial magnitude is discussed in section 28.4 and assessed in section 28.7.</p> <p>(8) The CIA is assessed in section 28.8.</p> <p>(9) Potential impacts upon geoarchaeological / palaeoenvironmental remains are discussed in section 28.7.</p>

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NCC HES	9 th March 2018 / Smugglers Lane Necton / Bradenham (e-mail)	NCC HES provided a plan highlighting the section of Smugglers Lane that the landowner has indicated survives as a hollow way.	This has been considered as a potential above ground heritage asset in section 28.6.3.2 and 28.7.5.2 (RHDHV 1682). This asset will be subject to further consideration as a potential candidate for post-consent earthwork condition survey (to be agreed in consultation with HE and NCC HES). This mitigation measure is set out and secured in a project specific Outline WSI (document reference 8.5) and will be detailed further in a survey-specific WSI for earthwork condition survey post-consent.
HE	8 th May 2018 / Heritage Method Statement (e-mail)	We are broadly supportive of the approach taken and recognise that much has been learnt from the approach taken for the Vanguard scheme. We note the statement on page (i) which sets out the position in relation to the information presented, and we are aware of the two scenarios presented throughout the document scenarios. We are supportive of the co-location of cables within the Vanguard corridor for the on-shore part of the project. This is primarily because this much reduces the potential impact of this development on the historic environment. In this scenario we would have limited concerns in relation to any additional impacts upon designated heritage assets (see Chapter 3.1.3) and non-designated heritage assets (chapter 3.1.4). In relation to the non-designated heritage assets we note that data has already been collected in relation to Vanguard and that mitigation is proposed. Any proposal for	Noted. No immediate action.

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		mitigation would need to be agreed with the County's Councils specialist archaeological advisors.	
HE	8 th May 2018 / Heritage Method Statement (e-mail)	Table 3.2: Onshore Archaeology Data Collection – The text states in the Geophysical Survey section that magnetometry will form the basis of the survey and that there are no plans to use alternative techniques. Other techniques will be considered on a case by case basis where magnetometry was not found to be appropriate. We always recommend that a range of techniques is used therefore that a caveat should be included that says that alternative techniques will be utilised if it is warranted for a given site in order to understand the potential of the site in more detail. This is also in line with HE guidance. For example, if a site of great complexity / depth is revealed where an additional technique would help develop an understanding of risk. This is in line with the discussions we have had for the Vanguard scheme with the County's archaeological advisors.	Additional geophysical survey (including the utilisation of alternative techniques, if/where relevant) will be considered within the post-consent stages of the project, as agreed with NCC HES and HE (i.e. as part of the initial information stages of mitigation). The application of any such methods will be outlined in a survey-specific WSI post-consent.
HE	8 th May 2018 / Heritage Method Statement (e-mail)	Table 3.2 & Table 3.3: Likely Mitigation Requirements – this mentions the use of HDD to avoid the destruction of archaeological sites, permitting them to be preserved in-situ. We would suggest that issues associated with the use of bentonite slurry as part of the HDD process should be considered. For example, is there potential for the slurry to spread out from the drilling site / bore hole into surrounding archaeological deposits? How would this impact on any archaeological remains that may be present, including the preservation conditions of the deposits/remains?	The potential impact of drilling fluid breakout associated with HDD is discussed in section 28.7.5.5.
HE	8 th May 2018 / Heritage Method Statement (e-mail)	Paragraph 146 mentions the need to consider the impact that that development may have on below ground deposits through changes such as the hydrological changes. We are pleased that these issues are being considered as part of the development, and that the Historic England 'Preservation of Archaeological Remains' guidance	Noted. No immediate action.

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		document was included in the list of guidance documents in paragraph 135.	
NCC HES	28 th November 2018 / PEIR (Section 42 Consultee Response)	Vattenfall/Norfolk Boreas Ltd and their heritage consultants (Royal HaskoningDHV) should continue to liaise with Norfolk County Council Environment Service, Historic England and other key stakeholders (e.g. AHOB, National Trust) regarding the potential physical impact on buried and above-ground archaeological remains. It is requested that this includes discussion of archaeological written scheme of investigation for the proposed mitigation measures prior to the production of the full Environmental Statement for the DCO application.	Consultation with NCC HES, HE and other key stakeholders will continue beyond the DCO application (as required) and into the examination and subsequent post-consent stages of the project, if consented. The general approach, content and structure of the Outline WSI (document reference 8.5) was discussed with NCC HES in May 2019, in advance of the DCO application.
National Trust	6 th December 2018 / PEIR (Section 42 Consultee Response)	The proposed on-shore underground cable route will pass through the Blickling Estate, which is owned by the National Trust. The estate extends to just over 1900 hectares. It includes a Grade I listed mansion and Grade II* Registered Park and Garden. The Trust is pleased to see that the proposed route would avoid the Registered Park and Garden and would not impact upon the setting of the listed mansion.	Noted. No action.
National Trust	6 th December 2018 / PEIR (Section 42 Consultee Response)	The applicant should work with the National Trust's Archaeologist and the County Council Archaeologist to achieve a suitable and appropriate methodology for the archaeological work to be undertaken on the Estate prior to the submission of a Development Consent Order application. This should include agreement regarding a Written Scheme of Investigation and proposed mitigation. The potential impact of development on archaeological remains in the Estate is very significant for the Trust. Our preference would be for long-term preservation of buried remains. Where excavation is	The Outline WSI (document reference 8.5) includes a section on the National Trust Blickling Estate and associated project commitments, including consulting with the National Trust's Archaeologist in developing the programme of post-consent archaeology survey

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		<p>necessary, the National Trust would like to ensure thorough preservation by record. The National Trust would also like to secure a method to ensure that this information is made available to visitors and the community in a way that enriches their experience and understanding of the Estate.</p>	<p>work anticipated to take place across relevant parts of the Blickling Estate. The final WSI will be submitted to and approved by the relevant planning authority in consultation with HE and NCC HES. Norfolk Boreas Ltd welcomes working collaboratively with the National Trust’s Archaeologist in this regard to ensure positive outcomes for both parties. It is envisaged that more detailed discussions will take place in the post-consent stages of the project once additional detail is known. The Applicant is committed to exploring options for delivering wider benefits for local communities. Opportunities for public engagement and involvement (where appropriate – for example, public open days and presentations) will be sought and can also be discussed with the National Trust in developing the programme of post-consent archaeology survey work anticipated to take place across relevant parts of the Blickling Estate. This level of detail would be agreed and included in the</p>

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			subsequent WSIs to be produced post-consent.
National Trust	6 th December 2018 / PEIR (Section 42 Consultee Response)	As a minimum requirement, the National Trust seeks to better understand and interpret the archaeology within its care and contextualise any buried remains within the wider historic and ancient landscape. In order to achieve a greater sense of knowledge in terms of the nature, date, location, extent and significance of the archaeology that will be impacted upon by the development, the corridor through the estate should first be subjected to geophysical survey. This will help locate potential buried remains and examine the extent of the cropmark remains as well as collate surface finds and artefacts which have been disturbed by modern agriculture and ploughing. Artefact recovery may also provide indicative dating for some of the known or unknown buried remains (Saxon cemetery sites, for example are often found by metal detecting and fieldwalking).	A priority archaeological geophysical survey (Appendix 28.2) has been undertaken which includes the acquisition of survey data within relevant parts of the Blickling Estate. Additional geophysical survey (including the utilisation of alternative techniques, if/where relevant) will be considered within the post-consent stages of the project, as agreed with NCC HES and HE (i.e. as part of the initial informative stages of mitigation). Other surveys (metal detecting and field walking) will be undertaken post-consent as part of Norfolk Vanguard (or Norfolk Boreas under Scenario 2) at targeted locations and will be undertaken in discussion and agreement with NCC HES, and the National Trust in respect to the Blickling Estate. Survey-specific WSIs will be produced and agreed post-consent. The Project is committed to working collaboratively with the National Trust and their Archaeologist in this regard,

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			alongside NCC HES. The Outline WSI (document reference 8.5) provides further detail and commitment in this regard.
National Trust	6 th December 2018 / PEIR (Section 42 Consultee Response)	<p>On the basis of the geophysical results, a systematic trench evaluation should be conducted within the corridor of up to 5% of the total area, targeting specific anomalies and/ or blank spaces to test the nature, extent and date of the buried archaeological remains. The results of the geophysics and trench evaluation will help determine those areas in need of full excavation which will preserve by record any significant remains which will be lost or destroyed by the proposed development. The National Trust has a duty to investigate fully any significant remains and in line with this, it would be imperative to ensure that significant archaeological remains are excavated to a high standard and importantly, are excavated in their entirety where necessary. This would include, for example, if the corridor bisected a Bronze Age burial mound, then it would be essential to widen the excavation area to encompass the entire mound.</p> <p>The information above has been written as a basic guide to the National Trust archaeological requirements at Blickling and further consultation for any archaeological investigations should be sought, working in conjunction with the County Planning Archaeologist, the National Trust planning and archaeology consultants and the developer.</p>	<p>A project-wide programme of archaeological trial trenching will be undertaken within the post-consent phases of the project. Should archaeological remains of notable significance be encountered during the programme, they are to be considered on a case-by-case basis, in consultation with NCC HES and HE (as required), and will be subject to recognised standard and bespoke approaches to archaeological mitigation (as set-out in the project-specific Outline WSI, (document reference 8.5).</p> <p>The Outline WSI includes a section on the National Trust Blickling Estate and associated project commitments, including consulting with the National Trust's Archaeologist in developing the programme of post-consent archaeology survey work anticipated to take place across relevant parts of the Blickling Estate.</p>

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HE	7 th December 2018 / PEIR (Section 42 Consultee Response)	Overall we are broadly supportive of the approach taken to the PIER. It is detailed and provides a thorough analysis of the historic environment in relation to this development. In particular there are good summaries of what has been identified to date and the approaches taken to produce initial impact assessments as required by the Environmental Impact Assessment (EIA) Directive (85/337/EEC) (as amended).	Noted. No action.
HE	7 th December 2018 / PEIR (Section 42 Consultee Response)	A number of phases of work have been completed to date in order to define and characterise the baseline conditions for the footprint of proposed development. This has included a Desk-Based Assessment (DBA), aerial photography and LIDAR surveys, a priority programme of geophysical survey work, and geoarchaeological monitoring of Ground Investigation works (Section 28.1, paragraph 5). We are pleased to see that the limitations of the approaches used to inform the baseline evidence are considered (paragraphs 66 & 67), and that it is stated that additional buried remains may be present that have not been identified through the approaches used to date. For example, magnetometry cannot readily identify waterlogged archaeological remains which if found would require specific recording, excavation and storage considerations to be utilised as well as the involvement of various specialists. It is also noted that intrusive (trial trench) evaluations will be carried out post-consent on the potential features identified as part of this work.	Noted. No action.
HE	7 th December 2018 / PEIR (Section 42 Consultee Response)	In our response to the Scoping Application (letter June 2017, see Table 28.2 in Section 28.1) Historic England questioned the use of only one geophysics technique (magnetometry) to investigate the proposed footprint of the development onshore. The applicants have responded to this question with additional information (Table 28.2). We are satisfied that this technique forms the backbone of the survey carried out onshore, and that the need for any additional techniques	Since the submission of the PEIR, an additional detailed magnetometry survey has been undertaken within the substation area and further informs this ES chapter (Appendix 28.8).

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		<p>will be considered on a case-by-case basis. However, we also note that no recommendations for further work have been made following the completion of the initial phase of priority geophysical survey work (Appendix 28.2).</p>	<p>The most appropriate methodology for archaeological geophysical survey on large linear schemes is the use of detailed magnetometry. The Applicant has committed to investigating further and alternative methodologies alongside additional magnetometer survey, where appropriate and warranted, based upon existing/future information in the post-consent stages of the project, as agreed with NCC HES and HE (i.e. as part of the initial informative stages of mitigation). The application of any such methods will be included in a survey-specific WSI post-consent.</p>
HE	7 th December 2018 / PEIR (Section 42 Consultee Response)	<p>Section 28.7 discusses the potential direct and indirect impacts that may affect the heritage assets, which may include the physical damage and loss of archaeological remains, to changes to the setting of scheduled monuments and listed buildings. The potential impacts have also been summarised in Table 28.29 and 28.30 along with the proposed mitigation strategies that may be employed post-consent. The approaches summarised in these tables appear appropriate. It is our advice that the timetables needed to carry out these stages of work need to be considered carefully to allow the information generated at the evaluation stage to be reviewed so that it can be utilised to inform the subsequent phases of excavation and analysis. The timetables also need to be realistic to deal with the archaeology</p>	<p>High-level reference to post-consent timeframes are included within the Outline WSI (document reference 8.5). The overarching practicalities regarding such timeframes are acknowledged and will inform subsequent survey-specific WSIs and mitigation related WSIs post-consent, as/where relevant.</p>

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		that may be present on site, factoring in additional time if complex and/or significant features are identified.	
HE	7 th December 2018 / PEIR (Section 42 Consultee Response)	It is noted that ground works associated with the project have the potential to directly impact on non-designated assets if an appropriate mitigation strategy is not employed. However, programmes of avoidance by means of route-refinement and micro-siting will primarily be utilised where possible (paragraph 130), with agreed measures being employed where heritage remains cannot be avoided (paragraph 131 and Tables 28.13 & 28.14). We are pleased to see that avoidance will form the centre of the proposed mitigation strategy. The approaches that will be used to evaluate and assess heritage assets that cannot be avoided are summarised in paragraph 144 and include archaeological trial trenching, set-piece excavation, strip, map and sample excavations and watching briefs.	Noted. No action.
HE	7 th December 2018 / PEIR (Section 42 Consultee Response)	Section 28.7.5 presents the potential impacts during the construction phase of works in terms of the direct and indirect impacts. We agree that the magnitude of effect of direct impacts on buried archaeological remains during the construction phase could range from negligible to high, and that additional assessments will be needed to define the appropriate mitigation strategy. As previously stated, known or suspected features of high heritage significance will be avoided where possible. However, it may not be possible to avoid some features. It is stated in paragraph 166 that where assets cannot be avoided additional mitigation methods will be employed post consent on a case-by-case basis, including geophysical surveys, trial trench evaluation and further assessments. The approaches used will be presented in an outline WSI post-consent and discussed with Historic England. We feel that this approach is sensible and appropriate, but as stated above, the timetables of any excavation and post-excavation works carried out post-consent will need to be carefully considered to allow sufficient time to review the evidence	As above, high-level reference to post-consent timeframes are included within the Outline WSI (document reference 8.5). The overarching practicalities regarding such timeframes are acknowledged and will inform subsequent survey-specific WSIs and mitigation related WSIs post-consent, as/where relevant.

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		and incorporate the findings into the subsequent phases of assessment and should be set out in the ES.	
HE	7 th December 2018 / PEIR (Section 42 Consultee Response)	We agree that there is potential for previously unrecorded buried archaeological remains to exist in the footprint of the onshore project substation (paragraph 170), and that the area will be investigated further post-consent. We are also pleased that the potential moated site noted at the National Grid substation will be largely avoided, with the exception of the more peripheral looking ditches to the south of the main moated site (paragraph 172). It should be noted that ditches have the potential to preserve deposits conducive to organic preservation, such as wood, leather and palaeoenvironmental remains; this will need to be considered when developing the mitigation strategy for this area of the proposed development.	The Outline WSI (document reference 8.5) sets out a broad mitigation strategy for post-consent geoarchaeological assessment and palaeoenvironmental survey. This approach will inform any subsequent post-consent survey-specific WSIs / mitigation related WSIs, as and where required.
HE	7 th December 2018 / PEIR (Section 42 Consultee Response)	We are pleased to see a discussion has been included regarding the impact that the proposed development may have on wetland deposits in terms of changes to hydrology and the desiccation of deposits that may preserve waterlogged archaeological remains (Section 28.7.5.4.1). A programme of geoarchaeological watching briefs has been carried out at key locations (Happisburgh landfall and the proposed trenchless crossing locations at Wooden Copse, North Walsham and Dilham Canal, Kings Beck and Wendling Beck, which demonstrated a negligible to minor adverse impact (paragraph 243). It is stated that any impacts will be mitigated through a programme of geoarchaeological assessment and palaeoenvironmental surveys, which will be established post-consent (paragraphs 244 & 248). This approach seems sensible and appropriate and should be provided for through the draft Development Consent Order.	Noted. As above, the Outline WSI (document reference 8.5) sets out a broad mitigation strategy for post-consent geoarchaeological assessment and palaeoenvironmental survey. This approach will inform any subsequent post-consent survey-specific WSIs / mitigation related WSIs, as and where required.
HE	7 th December 2018 / PEIR (Section 42	Appendix 28.2: Geophysics report (part 1) This document presents the results of the magnetometry survey that was carried out as part of the priority archaeological geophysics survey used to inform the	The application of alternative geophysical survey techniques is considered in section 28.5.3,

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	Consultee Response)	baseline evidence for the footprint of the development. A total of 127 surveys were carried out that identified 20 distinct areas of clear archaeological activity as well as numerous other locations interpreted as being of possible archaeological potential. In general, the report covers the main points required within a geophysics report, but it does not include any recommendations for further work. For example, should any areas be surveyed using alternative techniques, either because ambiguous or a lack of information was obtained following the magnetometer survey or because it would help improve our understanding about the nature, extent and complexity of a site. Additional survey work may also aid the development of appropriate mitigation or avoidance strategies. We consider this a relevant matter for elaboration in any ES subsequently produced for this proposed project.	Appendix 28.8 and the Outline WSI (document reference 8.5).
HE	7 th December 2018 / PEIR (Section 42 Consultee Response)	Appendix 28.2: Geophysics report (part 1) Section 3.2 mentions Illustration 2 -43 that present the processed greyscale magnetometer data, interpretive illustrations and geology data, but these figures do not appear to have been included as part of the PEIR documents.	Noted. These figures are included within Appendix 28.2 of this ES.
HE	7 th December 2018 / PEIR (Section 42 Consultee Response)	Appendix 28.2: Geophysics report (part 1) Section 1.2 summarises the geology of the survey areas but does not mention the suitability of the chosen technique for the given geology. It is stated in Section 4 that the reliability of the results over alluvial and colluvial, and over glacial sand and gravels is less clear, and so it would be useful to include a statement with recommendations about whether additional techniques should be utilised to fill in any gaps within the survey and explained within the outline WSI prepared to accompany any subsequent application.	As above, the application of alternative geophysical survey techniques is considered in section 28.5.3, Appendix 28.8 and the Outline WSI (document reference 8.5).
HE	7 th December 2018 / PEIR (Section 42	Appendix 28.3: Geoarchaeological watching brief report: GI works (Phase 1) A programme of geoarchaeological monitoring of Ground Investigation works was employed at the landfall sites (L1A and L1B)	Noted. No action.

Consultee	Date /Document	Comment	Response / where addressed in the ES
	Consultee Response)	<p>at the coast and at seven crossing locations where the proposed cable route interests major transport routes or waterways where HDD methods will be utilised. The assessment identified glacial and early Pleistocene deposits in all of the sample locations. It was noted that CF-bF deposits were not encountered, but if present they would likely be [at] considerable depth. The results have been linked to the work of the Ancient Human Occupation of Britain project (AHOB), which has carried out a series of investigations in and around Happisburgh. We are pleased to see such detail included which help to place the results of the work into context.</p>	

27. In addition to the consultation undertaken to date specifically in relation to Norfolk Boreas (see Table 28.2), pre-application consultation of direct relevance to the project has also been undertaken as part of Norfolk Vanguard. Consultation undertaken for Norfolk Vanguard considered to be relevant to Norfolk Boreas includes:
- A meeting held in May 2017 with the Ancient Human Occupation of Britain (AHOB) and Pathways to Ancient Britain (PAB) Team in respect to the landfall at Happisburgh South;
 - Feedback on the three ‘survey-specific’ WSIs to date (for the Onshore ADBA, the Geoarchaeological Monitoring of GI Works and for the Priority Archaeological Geophysical Survey);
 - Discussions regarding the approach to the heritage settings assessment (including correlation with LVIA, the application of associated tool-kits and the assessment of cultural heritage viewpoints); and
 - The National Trust’s interests within the Blickling Estate.
28. A summary of the consultation undertaken for Norfolk Vanguard is shown in Table 28.3, including an overview of the common themes each stage of consultation has in relation to Norfolk Boreas.

Table 28.3 Summary of common themes between Norfolk Boreas and Norfolk Vanguard consultation

Consultation stage	Consultees	Purpose of consultation	Common themes with Norfolk Boreas
Scoping Opinion November 2016	The Planning Inspectorate (SoS), NCC, HE	Establish scope of the archaeology and cultural heritage assessment.	Responses received as part of the Norfolk Vanguard scoping opinion have been taken into account and have informed decisions regarding the scope of the Norfolk Boreas PEIR, where relevant.
EPP ETG Onshore Archaeology Meeting February 2017	NCC HES / HE	To discuss main archaeological considerations and data sources and the approach to impact assessment.	The discussions regarding archaeological and cultural heritage considerations and the anticipated programme of survey and evaluation, as set out in this meeting, has formed the basis of assessment and survey data assessed within this ES chapter.
EPP ETG Coastal, Intertidal and Nearshore Archaeology Meeting May 2017	AHOB and PAB Representatives, including: Natural History Museum; British Museum;	Coastal, intertidal and nearshore archaeological considerations at the landfall options – focusing on Happisburgh.	Outcomes resulting from these discussions have informed this ES chapter and will continue to be considered as the project progresses. Opportunities for data sharing with regards to geophysical survey data (offshore) and geotechnical data will be discussed

Consultation stage	Consultees	Purpose of consultation	Common themes with Norfolk Boreas
	Queen Mary University of London; NCC HES; and North Norfolk District Council		further with the steering group post-consent.
Interim consultation (pre-PEIR submission - via e-mail) May 2017	HE / NCC HES	1) Onshore Archaeology Method Statement; 2) Minutes of the Onshore Archaeology Expert Topic Group Meeting (1 st Feb 2017); 3) Onshore Archaeology Topic Group Meeting Log; and 4) WSI for ADBA (Terrestrial Archaeology).	The ADBA (Appendix 28.1) was prepared in a manner consistent with these agreed documents and informs this ES chapter.
Interim consultation (pre-PEIR submission - via e-mail) May 2017	HE	To discuss scope, sources, methodologies / approach to assessment and the overarching approach to surveys as set-out in WSI for ADBA (Terrestrial Archaeology).	Agreements regarding the approach to geophysical survey, as outlined in this e-mail, were formalised within a survey-specific WSI. The results of this priority programme of geophysical survey inform this ES chapter (Appendix 28.2). Other surveys (metal detecting, field walking and earthwork condition surveys) were agreed to be undertaken post-consent as part of Norfolk Vanguard (or Norfolk Boreas under Scenario 2) at targeted locations and will be undertaken in discussion and agreement with NCC HES. Survey-specific WSIs will be produced and agreed post-consent.
Interim consultation (pre-PEIR submission - via e-mail) June 2017	HE	To discuss scope / approach to survey and geoarchaeological assessment as set out in the Geoarchaeological Watching Brief WSI.	Agreements regarding the approach to geoarchaeological assessment, as outlined in this e-mail, were formalised within a survey-specific WSI. The results of this geoarchaeological watching brief inform this ES chapter (Appendix 28.3).
EPP ETG Onshore Archaeology Meeting	NCC HES / HE / Broadland District Council / North	To discuss progress in relation to the staged programme of assessment and the	Outcomes of this meeting informed geophysical survey methodologies, which were later formalised within a survey-specific WSI. The results of

Consultation stage	Consultees	Purpose of consultation	Common themes with Norfolk Boreas
July 2017	Norfolk District Council	PEIR, high-level approach to priority geophysical survey and to provide an update on the geoarchaeological monitoring / Site Investigation works.	this priority programme of geophysical survey inform this ES chapter (Appendix 28.2). Other key discussions included the inclusion of a number of Grade I Listed churches for consideration as part of the settings assessment in relation to the formerly proposed cable relay stations (no longer required due to the utilisation of High Voltage Direct Current (HVDC) cable technology).
Interim consultation (pre-PEIR submission - conference call meeting) September 2017	NCC HES	To discuss priority archaeological geophysical survey and heritage settings.	Agreements regarding the approach to geophysical survey, as discussed, were formalised within a survey-specific WSI. The results of this priority programme of geophysical survey inform this ES chapter (Appendix 28.2). Agreements regarding the approach to the settings assessment were also taken on board and inform this chapter, where relevant.
Interim consultation (pre-PEIR submission - via e-mail) September 2017	NCC HES	To discuss scope / approach to geophysical survey and assessment as set out in the Priority Archaeological Geophysical Survey WSI.	Agreements regarding the approach to geophysical survey, as outlined in this e-mail, were formalised within a survey-specific WSI. The results of this priority programme of geophysical survey inform this ES chapter (Appendix 28.2).
Interim consultation (pre-PEIR submission - via e-mail) October 2017	NCC HES	To discuss scope / approach to geophysical survey and assessment as set out in the Priority Archaeological Geophysical Survey WSI.	Agreements regarding the approach to geophysical survey, as outlined in this e-mail, were formalised within a survey-specific WSI. The results of this priority programme of geophysical survey inform this ES chapter (Appendix 28.2).
PEIR Responses Review November 2017	Breckland Council, Broadland District Council, Campaign to Protect Rural England (CPRE), East Ruston Parish Council, Happisburgh Parish Council, HE, No To Relay Stations (N2RS), National Trust, Necton Parish Council, Norfolk	To gain feedback on Norfolk Vanguard PEIR, with comments made on onshore archaeology and cultural heritage assessment methodology, content and structure, assessment findings and mitigation.	PEIR responses received for Norfolk Vanguard were taken into account during the compilation of the Norfolk Boreas heritage method statement, and have informed decisions regarding the scope, methodology and assessment of the Norfolk Boreas PEIR, where relevant.

Consultation stage	Consultees	Purpose of consultation	Common themes with Norfolk Boreas
	Coastal Partnership, NCC, North Norfolk District Council, St. Peter's Ridlington - Church Warden		
EPP ETG Onshore Archaeology Meeting January 2018	NCC HES / HE / North Norfolk District Council / National Trust	To provide a summary of PEIR responses, heritage setting and cross-correlation with the LVIA, priority geophysical survey update, geoarchaeological monitoring, other ES-related surveys, the National Trust's interests and the mitigation strategy approach / Outline WSI.	Key discussions of relevance to Norfolk Boreas included: The approach to settings assessment, including the use of LVIA tool-kits and the assessment of cultural heritage specific viewpoints. Agreements regarding the approach to settings assessment have been taken on board as part of the settings assessment, which informs this ES chapter (Appendix 28.4) and has been developed further with specific reference to Norfolk Boreas. The use of geophysical survey results and other available data (e.g. aerial photographic and LiDAR data) to feed into design considerations / routeing as part of the iterative design process, including the avoidance of the moated site within the onshore project substation area to the greatest degree possible. Re. The National Trust's interests within the Blickling Estate - an additional meeting was held specifically in relation to the National Trust's interests on the 13 th March 2018 (detailed below).
Interim consultation (post-PEIR / pre-ES submission - meeting)	National Trust	To discuss archaeology and Norfolk Vanguard within the Blickling Estate.	Archaeology works / programmes to be agreed within the Blickling Estate (National Trust land) would be conducted post-consent as part of Norfolk Vanguard (Scenario 1). Such works would form part of a wider phased-approach to initial informative stages of post-consent archaeological mitigation works and then fuller archaeological mitigation works themselves, as / where required. This approach would be adhered to under Scenario 2.

29. Account has also been taken of Historic England’s and the National Trust’s Written Representation to the Norfolk Vanguard DCO application. Information provided as part of this process has been incorporated into the ES where relevant. The Applicant’s comments on Historic England’s and the National Trust’s Written Representation to the Norfolk Vanguard DCO application, where relevant to the onshore historic environment, are shown in Table 28.4 and Table 28.5 respectively.

Table 28.4 Historic England’s Written Representations to Norfolk Vanguard

Summary of Written Representation	Response / where addressed in the ES
<p>In general the mitigation strategy that has been proposed appears sensible, but we note that the majority of the work will be carried out post-consent. This may result in some issues that need to be taken into account. For example, previously unknown archaeological remains can be discovered even after an area has been evaluated as the evaluation process only focuses on a small percentage of the overall area. Carrying out investigative works post-consent, but pre-construction will require flexibility to be built into the proposed timetables of work to allow the time needed for previously unknown remains to be properly assessed. It is noted that avoidance, micrositing and route refinement will form the backbone of the mitigation strategy, which is good to see, but in some cases avoidance may not be possible. We therefore recommend that the potential of identifying previously unknown archaeological remains of significance are discussed with the Local Authority in terms of the risks that this may pose to the timely completion of the proposed project.</p>	<p>The Applicant welcomes Historic England’s advice and appreciates that evaluation (initial informative stages of mitigation) and subsequent mitigation (where required) undertaken pre-construction needs to have adequate time built into the programme. The Applicant also acknowledges that this is the case for any mitigation undertaken at construction.</p> <p>High-level reference to post-consent timeframes are included within the Outline WSI (document reference 8.5). The overarching practicalities regarding such timeframes are acknowledged and will inform subsequent survey-specific WSIs and mitigation related WSIs post-consent, as/where relevant.</p>
<p>In section 28.7.6.4 we note that the impact of the development on geoarchaeology / palaeoenvironmental remains and the hydrology of and area are discussed as well as how identified impacts may be mitigated. We were also pleased to see a discussion regarding the potential impact of HDD bentonite slurry outbreak (Section 28.7.6.5) and the impact of heat loss from the installed cables (Section 28.7.7.2). In general the strategies and approaches that will be utilised appear sensible; our detailed comments for the method statements are associated with the relevant appendices and will not be duplicated here.</p>	<p>The Applicant welcomes Historic England’s comments.</p> <p>Impact of the development on geoarchaeology / palaeoenvironmental remains and the hydrology of the area, the potential impact of HDD bentonite slurry outbreak and the impact of heat loss from the installed cables and how these impacts might be mitigated (if necessary) are discussed in 28.7.5, 28.7.6 and 28.7.7 of this chapter.</p>

30. In addition to Historic England’s Written Representation to Norfolk Vanguard outlined in Table 28.4, Historic England subsequently provided a further letter (dated 12th March 2019) in response to the Norfolk Vanguard Examining Authority’s second written questions and requests for information (issued on 27th February 2019). Of relevance to onshore archaeology and cultural heritage, in response to a request to

Historic England to provide a written response setting out their views with respect to the amended conclusions within the errata document on the impacts on the significance of heritage assets including the Grade I listed Church of St. Andrew, Historic England made the following comment: *Further to our evidence at the Issue Specific Hearing on 5th February 2019 we hereby confirm that the anticipated change introduced by the proposed development would amount to less than substantial harm to the Grade I listed Church of St Andrew.* It is noteworthy that the ‘amended conclusions’ referred to within the Norfolk Vanguard errata document are reflected within this ES Chapter in section 28.7.

Table 28.5 National Trust’s Written Representations to Norfolk Vanguard

Summary of Written Representation	Response / where addressed in the ES
<p>The Trust does not object to the principle of the Vanguard Offshore Windfarm and the accompanying infrastructure. But the Trust has three principal concerns:</p> <p>1.2.1. the impact of the proposals on the little understood archaeology of the Blickling Estate;</p> <p>1.2.2. the impact of disturbance to the highway network and the consequent effect on the Trust’s visitor based business during the construction period;</p> <p>1.2.3. the possibility of compulsory acquisition of the Trust’s interests in its inalienable land.</p>	<p>Noted. See following responses. These issues were also further addressed during the course of the Norfolk Vanguard examination.</p>
<p>Paragraph 85 Outline Written Scheme of investigation says “A comprehensive programme of post-consent archaeological survey work (in-line with proportionate and appropriate approaches to be adopted elsewhere across the June 2018 Norfolk Vanguard Offshore Wind Farm onshore project area) is also anticipated to take place across the relevant parts of the wider National Trust Blickling Estate, associated with the onshore project area and onshore works, in consultation with the Trust and NCC HES, due to the subsurface archaeological interests potentially associated with this landscape.”</p> <p>There has been little by way of discussion with Vattenfall about the Trust’s concerns about archaeology. There has been no formal proposal agreed as to how that will be manifested in practice, or how the developers will be required to understand that the Trust have a duty of care to protect any remains, designated or undesignated, and to ensure that they are not knowingly destroyed without the care and attention they deserve.</p>	<p>Within the Outline WSI (Norfolk Vanguard document reference 8.5) the Applicant has committed to consult with the National Trust and their archaeologist in developing the programme of post-consent archaeology survey work anticipated to take place across relevant parts of the Blickling Estate. The Outline WSI is secured through Requirement 23 of the dDCO which requires that a final WSI be submitted and approved by the relevant planning authority in consultation with Historic England and Norfolk County Council. The commitment is also included within the Norfolk Boreas Outline WSI (document reference 8.5).</p> <p>The Applicant welcomes collaborative working with the National Trust’s Archaeologist in this regard to ensure positive outcomes for both parties, in line with the Trust’s aims/objectives, duty of care etc. It is envisaged that more detailed discussions will take place in the post-consent stages of the project once additional detail is known.</p> <p>The Outline WSIs for both projects (Norfolk Vanguard and Norfolk Boreas) include a specific section on the National Trust Blickling Estate and associated project commitments, including consulting with the National Trust in developing the programme of post-consent</p>

Summary of Written Representation	Response / where addressed in the ES
	<p>archaeology survey work anticipated to take place across relevant parts of the Blickling Estate. The Outline WSIs for both projects (Norfolk Vanguard and Norfolk Boreas) have also been updated following discussions with the National Trust during the course of the Norfolk Vanguard examination.</p>
<p>Paragraph 95 of the Outline Written Scheme of investigation should be altered so that it requires the National Trust to be notified as well as the County Council, if archaeological remains are encountered or suspected during works within the Blickling Estate.</p> <p>Paragraph 81 of the OWRSI should be amended so that the National Trust is added to the consultees on any 'necessary next steps' in the event of a discovery of archaeological remains and on any proposed mitigation (in so far as it is relevant to the Trust's land at Blickling).</p>	<p>The National Trust's Archaeologist will be notified if archaeological remains are encountered or suspected during works within the Blickling Estate. The Trust's Archaeologist would also be included in discussions with respect to required next steps, as secured in the Outline WSI.</p> <p>The Outline WSIs for both projects (Norfolk Vanguard and Norfolk Boreas) have been updated following discussions with the National Trust during the course of the Norfolk Vanguard examination.</p>
<p>The Trust seek an acknowledgement from Vattenfall that the Trust is in a special position as a conservation organisation and that it would not be the Trust's normal protocol to destroy any buried remains. The Trust wants to work alongside necessary development as appropriate and especially where the development has significant public and environmental benefits.</p> <p>In order to protect its heritage assets, the Trust would ask that the section through the Estate be treated with particular care, given its history. In order to do right by the archaeology, Vattenfall must ensure that objects of historic value are properly excavated and understood prior to their destruction and that information is made available in an engaging way (as well as the standard technical reports which accompany archaeological works).</p>	<p>The Applicant acknowledges the National Trust's position as a conservation organisation as well as landowner in the case of Blickling Estate and will consult with the National Trust and their archaeologist in developing the programme of post-consent archaeology survey work anticipated to take place across relevant parts of the Blickling Estate, as secured in the Outline WSI (document reference 8.5). Opportunities for public engagement and involvement (where appropriate) can also be discussed with the Trust in developing the programme of post-consent archaeology survey work anticipated to take place across relevant parts of the Blickling Estate. This level of detail would be agreed and included in the subsequent WSIs to be produced post-consent. As well as the comprehensive programme of post-consent archaeological survey work, sensitive backfilling and reinstatement will be undertaken following construction, and field boundaries and hedgerows returned as close as possible to their pre-construction condition.</p>
<p>The National Trust would also like to secure a method (and funding for it) to ensure that recorded information is made available to visitors and the community in a way that enriches their experience and understanding of the Estate. This could be achieved by disseminating information through public engagement such as open days, site tours or</p>	<p>The Outline WSI (document reference 8.5) acknowledges the requirement for 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. The</p>

Summary of Written Representation	Response / where addressed in the ES
<p>local talks held at Blickling or elsewhere, opportunities for volunteering with digging or processing. It could include funding for exhibiting archaeological artefacts discovered and for information panels to be displayed, and material to be distributed on social media outlets and other media forums where appropriate.</p>	<p>current outline proposals are to deposit the site archive with the Norfolk Museums and Archaeology Services upon completion of all archaeological fieldwork and reporting associated with the project. It will then become publicly accessible. Opportunities for public engagement and involvement (where appropriate) can also be discussed with the Trust in developing the programme of post-consent archaeology survey work anticipated to take place across relevant parts of the Blickling Estate. This level of detail would be agreed and included in the subsequent WSIs to be produced post-consent.</p> <p>The Outline WSIs for both projects (Norfolk Vanguard and Norfolk Boreas) include a specific section on the National Trust Blickling Estate and associated project commitments. The Outline WSIs for both projects have also been updated following discussions with the National Trust during the course of the Norfolk Vanguard examination.</p>

28.4 Assessment Methodology

31. For the onshore archaeology and cultural heritage assessment, the assessment considers the two alternative scenarios as outlined in section 28.1. The application of the assessment methodology with regards to the scenarios is discussed, where relevant, in the following sections.

28.4.1 Impact Assessment Methodology

32. Chapter 6 EIA Methodology details the general impact assessment methodology, and the following sections describe more specifically the methodology used to assess the potential impacts of the project on onshore archaeology and cultural heritage. The impact assessment methodology for onshore archaeology and cultural heritage is consistent with that outlined in the Onshore Archaeology and Cultural Heritage Method Statement (Royal HaskoningDHV, 2018, unpublished), as agreed with NCC HES and HE, and rests on the notion that the matrix-based approach must be qualified through descriptive analysis (e.g. a narrative) and professional judgement.
33. This section details the methodology broadly used to determine the significance of the impacts of the onshore works of the project on onshore archaeological receptors (herein referred to as heritage assets). The assessment criteria and assignment of significance with respect to onshore archaeology and cultural heritage considerations are based on available standards and guidance (see section 28.2), good practice, consultation and on professional judgement.

34. The impact assessment methodology adopted for onshore archaeology and cultural heritage defines those assets likely to be impacted by the project. The assessment is not limited to direct physical impacts, but also assesses possible indirect (non-physical) impacts upon the setting of designated and non-designated heritage assets, whether visually, or in the form of noise and vibration, spatial associations and a consideration of historic relationships between places. Impacts of a development can also effect below ground deposits over a much wider area. For example, groundworks may result in hydrological changes, which could ultimately result in the desiccation and drying out of wetland deposits and preserved waterlogged archaeological remains (where present). As such, impacts on potential geoarchaeological / palaeoenvironmental remains potentially indicative of former land surfaces have also been considered.
35. More specifically the impact assessment presents:
- The perceived heritage importance (in many cases associated with heritage significance, including the contribution that setting makes to that significance) of any heritage assets identified as being affected, both designated and non-designated;
 - The anticipated magnitude of effect (change) upon those assets and their settings (where relevant);
 - The significance of any identified impacts upon those assets and their settings; and
 - The level of any harm (or benefit) and loss of heritage significance.
36. In the absence of a specific industry standard methodology for heritage impact assessment within the framework of EIA, the impact assessment methodology adopted will be broadly in line with the Design Manual for Roads and Bridges (DMRB), Volume 11, Section 3, Part 2: Cultural Heritage (Highways Agency document 208/07) (2008), in conjunction with various more recent policy and guidance documents, including:
- EN1 Overarching NPS for Energy (DECC, 2011a);
 - The NPPF (MHCLG, 2018);
 - National Planning Policy Guidance: Conserving and enhancing the historic environment (MHCLG, 2018);
 - The Setting of Heritage Assets: Historic Environment Good Practice Advice in Planning Note 3 (Second Edition) (Historic England, 2017); and
 - Conservation Principles: Policy and Guidance for Sustainable Management of the Historic Environment (Historic England, 2008).

37. The consideration of designated heritage assets will take account of the Planning Listed Buildings and Conservation Areas Act (PLBCAA) (1990) and the Ancient Monuments and Archaeological Areas Act (1979).
38. The impact assessment methodology adopted may differ from the standard approach adopted more generally within the ES, for other technical disciplines. The standardised and tailored EIA matrices will provide a useful guidance framework for the expert judgement of suitably experienced and qualified heritage practitioners based on the heritage specific legislation, policy and guidance documents available (see section 28.2 above), and using the fundamental concepts from the NPPF of benefit, harm and loss.
39. The potential for impacts to occur upon the onshore archaeological and cultural heritage resource may differ according to the scenario being assessed. In order to fully assess the impacts of Scenarios 1 and 2, each potential impact within this chapter will be divided into two sections, one for each scenario. The worst case scenario assessment will therefore include reference to both.

28.4.1.1 Sensitivity (Heritage Significance / Importance)

40. The sensitivity of a receptor (heritage asset) 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 a heritage asset cannot recover. For this reason, the sensitivity of heritage assets is determined by their heritage significance (archaeological importance). 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.
41. An assessment of effects on an asset involves an understanding of the heritage importance of the asset and in the case of an effect on the setting of that asset, the contribution that the setting makes to the heritage importance (or heritage significance) of the asset. Policy sets out that the level of detail should be proportionate to the significance of the heritage asset and no more than is sufficient to understand the potential impact of the project (NPPF paragraph 189, 2018).
42. 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.

43. Archaeological assessments that may alter the perceived heritage significance of an asset may be undertaken pre- and post-consent and include non-intrusive and intrusive survey programmes.
44. Establishing heritage importance (or likely heritage importance) of an asset or group of assets, and the related impact significance by considering the perceived magnitude of effect on the asset or assets, assists in the development of appropriate evaluation (or initial informative stages of mitigation work) and mitigation approaches. The heritage importance of a particular asset with regard to onshore archaeology and cultural heritage has been classified as per the indicative criteria outlined in
45. Table 28.6 using the data and information available to date. However, it is important to note that the heritage importance of an asset can be amended or revised as the stages of archaeological work progress and new information is made available.
46. Where uncertainty occurs, a precautionary approach is to assign high heritage significance (importance). This precautionary approach represents good practice in archaeological impact assessment and reduces the potential for impacts to be underestimated.

Table 28.6 Indicative criteria for determining heritage importance

Heritage significance (importance)	Definitions / example assets
High (perceived International / National Importance)	<ul style="list-style-type: none"> • World Heritage Sites; • Scheduled Monuments; • Grade I, II* and II Listed Buildings or structures; • Designated historic landscapes of outstanding interest; • Conservation Areas containing buildings with a high heritage significance; • Assets of acknowledged international / national importance; or Assets that can contribute significantly to acknowledged international / national research objectives.
Medium (perceived Regional Importance)	<ul style="list-style-type: none"> • 'Locally Listed' buildings or structures; • Designated special historic landscapes; • Assets that contribute to regional research objectives; or Assets with regional value, educational interest or cultural appreciation.
Low (perceived Local Importance)	<ul style="list-style-type: none"> • Assets that contribute to local research objectives; • Assets with local value, educational interest or cultural appreciation; or Assets that may be heavily compromised by poor preservation and / or poor contextual associations.
Negligible	Assets with no significant value or archaeological / historical interest.
Uncertain (unknown)	The importance / existence / level of survival of the asset has not been ascertained (or fully ascertained / understood) from available evidence.

28.4.1.2 Magnitude of Effect (Change)

47. The classification of the magnitude of effect on known heritage assets takes account of such factors as:
- The physical scale and nature of the anticipated impact; and
 - Whether specific features or evidence would be lost that are fundamental to the historic character and integrity of a given asset, and its understanding and appreciation.
48. Both direct physical and indirect non-physical (e.g. visual, setting) impacts on 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.
49. 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 upon the setting of heritage assets will depend upon the scale and longevity of the project and the sensitivity with which the landscape is re-instated subsequent to decommissioning / demolition, if applicable.
50. The indicative criteria used for assessing the negative magnitude of effect with regard to onshore archaeology and cultural heritage are presented in Table 28.7.

Table 28.7 Indicative criteria for assessing negative magnitude of effect

Magnitude	Definition
High	Total loss of or substantial harm to an asset.
Medium	Partial loss of, harm to or alteration of an asset which will affect its significance.
Low	Minor loss of or alteration to an asset which leave its current significance largely intact.
Negligible	Minor alteration of an asset which does not affect its significance in any notable way.

51. The magnitude of positive effect with regard to archaeology and cultural heritage directly relates to the level of public value associated with an individual effect. Benefits may correspond directly to the project 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) or ensure that a direct impact is avoided where possible (e.g. by ensuring archaeological / cultural heritage input into the iterative project design process so that route refinement / micrositing can be factored into the application boundary). 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 data). The measure of positive effect (high / medium / low) is, therefore, necessarily situational and specific to a given site, area

or subject. For this reason, magnitude of positive effect is discussed within the narrative of the assessment according to criteria defined on a case-by-case basis, and not defined by overarching indicative criteria as for adverse magnitude of effect in Table 28.7.

52. One such example of a beneficial magnitude of effect specific to this project is the acquisition and coverage of the geophysical (magnetometer) survey data gathered as part of Norfolk Vanguard as part of the priority survey programme agreed with NCC HES. The priority archaeological geophysical survey targeted areas in which buried archaeological remains may be present (as indicated by a review of the aerial photographic and LiDAR data assessment and NHER records) within a 200m cable corridor. The data acquired from this survey represents a fundamental aspect of baseline information assessed in relation to Norfolk Boreas within this ES chapter. In addition, the priority programme not only enabled the geophysical survey data (alongside aerial photographic, cropmark and LiDAR data) to feed directly into the iterative design process (cable routeing / refinement discussions and considerations undertaken in relation to Norfolk Vanguard and adhered to, where relevant, in Norfolk Boreas design) in order to avoid the most sensitive and significant known sub-surface archaeological remains, wherever possible, as part of the project design (see section 28.7.2), but it has also resulted in a significant amount of new data, which will ultimately be made publicly accessible through the NHER for both public and planning related enquiries.

28.4.1.3 Impact significance

53. Following the identification of the heritage importance of the receptor (heritage asset), and the magnitude of the impact (effect / change), it is possible to determine the significance of the impact using the matrix presented in Table 28.8.

Table 28.8 Significance of an impact resulting from each combination of receptor sensitivity (heritage importance) and the magnitude of the effect

		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

Table 28.9 Impact significance definitions

Impact significance	Definition
Major	May equate to substantial harm or total loss of the value of a designated heritage asset (or asset potentially worthy of designation) such that development may not be consented unless substantial public benefit is delivered by the project. Effective / acceptable mitigation options are still likely to be possible, to offset and / or reduce residual impacts to satisfactory levels.
Moderate	Less than substantial harm to the value of a designated heritage asset (or asset potentially worthy of designation) such that the harm should be weighed against the public benefit delivered by the project to determine consent. Effective / acceptable mitigation options are likely to be possible, to offset and / or reduce residual impacts to satisfactory levels.
Minor	Harm to a designated or non-designated heritage asset that can be adequately compensated through the implementation of a programme of industry standard mitigation measures.
Negligible	Impact that is nil, imperceptible and not significant.
No Impact	No change, therefore no impact on receptor (asset) condition.

54. Where an impact is assessed as causing no discernible impact to the receptor (asset) this is defined as “**no impact**” within the Potential Impacts section (section 28.7).
55. Note that ‘**major**’ and ‘**moderate**’ impacts are generally considered to be significant in EIA terms for the purposes of the ES. In addition, 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 between heritage assets or elements of the historic environment (or historic landscape).
56. Embedded mitigation (for example where potential impacts may be avoided where possible through detailed design, and hence heritage assets are therefore preserved ‘in-situ’, again where possible, and / or through the use of trenchless crossing techniques) has been referred to and included in the assessment of impacts as part of this ES chapter and DCO application. If mitigation is not proposed (or none is possible) the residual impact will remain the same. If, however, mitigation is proposed then there will be an assessment of the post-mitigation residual impact, if / where required.
57. With regard to beneficial impacts, as outlined for magnitude in section 28.4.1.2, definitions will be dependent upon the level of public value relevant to a given area, site or subject and will be discussed within the narrative on a case-by-case basis.

28.4.2 Historic Landscape Character

58. The approach to the assessment of Historic Landscape Character (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

59. Table 28.6 (where relevant).
60. 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 the project.
61. With regards to HLC, in terms of assessing impact, it is the alteration arising as a result of the project to the baseline HLC as assessed in this chapter 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 28.8, 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.

28.4.3 Cumulative Impact Assessment

62. Potential cumulative impacts arising from the project are considered in line with Chapter 6 EIA Methodology. Potential impacts will be identified and assessed in terms of significance and magnitude using the same methodology outlined above and where appropriate potential mitigation measures outlined.
63. For further details of the methods used for the Cumulative Impact Assessment (CIA) for archaeology and cultural heritage, see section 28.8.

28.4.4 Transboundary Impact Assessment

64. No transboundary impacts are anticipated as a result of the project in respect to onshore archaeology and cultural heritage, as the onshore project area is entirely within the UK and is not sited in proximity to any international boundaries. Transboundary impacts are therefore scoped out of this assessment and will not be considered further.

28.5 Scope

28.5.1 Study Area

65. The onshore project area includes the following elements:
- Landfall;
 - Onshore cable route, accesses, trenchless crossing technique (e.g. HDD) zones and mobilisation areas;
 - Onshore project substation; and
 - Extension to the Necton National Grid substation and overhead line modification.
66. Two study areas have been established for this assessment, defined as follows:
- Designated Heritage Assets study area: defined by a 1km boundary around (and including) the onshore cable route, the landfall, onshore project substation and National Grid substation extension and overhead line modification works area (Figure 28.1); and
 - Non-designated Heritage Assets study area: defined by a 500m boundary around (and including) the onshore cable route, the landfall and onshore project substation and National Grid substation and overhead line modification works area, as well as a 50m boundary around (either side of) the accesses and 100m boundary around the cable logistics area (a storage area required during the cable pulling phase) (Figure 28.2).
67. The study areas were determined based on previous experience and knowledge of similar projects and follow a standard approach. Both the non-designated and designated heritage assets study areas were set out in the Onshore Archaeology and Cultural Heritage Method Statement (Royal HaskoningDHV, 2018, unpublished), as agreed with NCC HES and HE. With respect to designated heritage assets and specifically the setting of designated heritage assets, the initial study area was established relevant to assets within a 1km buffer of all onshore infrastructure. In some instances, highly designated heritage assets recorded beyond this 1km parameter have also been considered with respect to the potential implications of the project upon their heritage setting. Any heritage assets that lie beyond 1km from the onshore infrastructure which have been screened into the assessment are highlighted in sections 28.6, 28.7 and Appendix 28.4. The assessment has been undertaken with reference to the LVIA produced for the project and use of associated tool kits such as ZTVs and heritage specific viewpoints (see section 28.6, Appendix 28.4 and Chapter 29 Landscape and Visual Impact Assessment).
68. Due to the extent of the onshore project area and study areas subject to assessment, this chapter incorporates references to numbered Mobilisation Areas (MA ID) and

Trenchless Crossing compounds (TC ID), which serve as useful points for reference and orientation to a given section of the onshore project area (see Figures 28.1 to 28.7).

28.5.2 Data Sources

69. The data sources consulted to inform this chapter, and the confidence levels associated with each data source, are presented in Table 28.10.

Table 28.10 Data sources

Data	Year	Coverage	Confidence	Notes
National Heritage List for England	Accessed 15/02/19	Designated heritage assets.	High. Comprehensive database of all heritage assets subject to designation within the study area.	Designated heritage assets were assigned a project-specific ID number (see Appendix 28.5).
NHER	Accessed 26/06/18	Non-designated heritage assets and historic landscape characterisation data.	Medium. The NHER is not a complete record of all surviving elements of the historic environment resource, but is a record of the discovery of a wide range of archaeological and historical components. It does not preclude the subsequent discovery of further elements of the historic environment that are, at present, unknown.	Non-designated heritage assets were assigned a project-specific ID number (see Appendix 28.6).
Local Authorities Heritage Conservation Areas	Accessed May - July 2018	Conservation Areas.	High. Conservation Areas within North Norfolk District Council, Broadland District Council and Breckland Council have been digitised from the available local authority resources on-line. Conservation Area plans were generally available in .pdf format.	Geographic Information System (GIS) Shapefiles were requested (20/06/2017) from North Norfolk District Council, Broadland District Council and Breckland Council for the Conservation Areas within each of the District Council areas. No shapefiles were available or have been received to date.

Data	Year	Coverage	Confidence	Notes
Regional, Local and Period Archaeological Studies and Journals	Accessed January – June 2017; and September 2017 – June 2018	Historic and archaeological data consulted to inform the wider baseline context.	Medium. The studies / journals consulted do not constitute an exhaustive account of all historical / archaeological data identified within the study area but inform upon the wider context, where relevant.	Includes the East Anglia Archaeology and Norfolk Archaeology Journal Series.
The Archaeology Data Service	Accessed May - July 2018	Consulted to inform the wider baseline context and previous archaeological investigations in the study area.	Medium. A non-exhaustive directory of archaeological research undertaken in the wider environment of the study area.	The results of archaeological research projects in the wider area were incorporated into the baseline environment review and assessment of potential, where relevant.
The AHOB and PAB Projects	Accessed May - July 2018	Archaeological investigation on data for key Pleistocene sites in Britain that document early hominin occupation in north-western Europe.	High. Thorough evidence-based research based on available known archaeological / palaeoenvironmental data for Britain that document early hominin occupation. High confidence regarding the known resource, but non-exhaustive account.	Consulted with respect to Happisburgh South and known sites of international importance, associated with the 'Cromer Forest Bed deposits'.
The Environment Agency's removal of failed sea defences – archaeological evaluation report re: Happisburgh (Birks, 2016)	Accessed May - July 2018	Archaeological investigation with a focus on the wider vicinity of the Happisburgh South landfall.	High. Targeted assessment of archaeological monitoring and borehole survey. An expert in Palaeolithic archaeology oversaw the borehole survey. High confidence in the data assessed, although restricted to the assessment area.	The results of this assessment were integrated into an account of the potential for geo-archaeological / palaeoenvironmental remains to exist at the landfall.
Other documentary sources relevant to the archaeological and historical	Accessed January – June 2017; and	Historic and archaeological data from the wider area, from local	Medium. These studies / journals do not constitute an exhaustive account of	Historic and archaeological data consulted to inform

Data	Year	Coverage	Confidence	Notes
background of the study area	September 2017 – June 2018	investigations to region-wide assessments.	all historical / archaeological data identified within the study area, but inform upon the wider context, where relevant.	the wider baseline context.
Cartographic sources (the NHER, NCC's Historic Map Explorer, Envirocheck Report and oldmapsonline.org)	Accessed June 2017; and September 2017 – June 2018	Historic mapping data for the study area.	Medium. Comprises 19 th / 20 th century mapping across the study area. Some cartographic data is fragmentary for the study area.	Includes 19 th century Enclosure and Tithe maps, and 1 st , 2 nd and later edition Ordnance Survey maps.
Aerial Photographic Data obtained from the HE Archive and the NHER, and ortho-rectified mosaics of vertical aerial photographs at Google Earth	Accessed May - July 2018	Aerial photographic data for the study area.	Medium. Aerial photographic evidence is limited by seasonal, agricultural, meteorological and environmental factors, which affect the extent to which either buried or upstanding archaeological features can be detected from the air. The visibility of archaeological features may therefore differ from year to year. Individual photographs often thus record only a small percentage of the actual extent of buried or upstanding features.	The archaeological assessment of this data was commissioned for Norfolk Vanguard and is considered relevant to Norfolk Boreas. This chapter integrates the results of the Aerial Photographic assessment undertaken by Air Photo Services. The full report is included as Annex 28.1.3 within Appendix 28.1.
LiDAR survey data (available for download, processing and interpretation via the UK Environment Agency website)	Accessed May - July 2018	The LiDAR Data, available via the UK Environment Agency website, has been collected from airborne survey platforms at varying resolutions and covers over c. 75% of the study area.	Low. The accuracy of the surface model derived from processing LiDAR data is limited by the resolution of the original survey. The only area where 25cm resolution data was available was in the coastal region near Bacton, and even this finer model did not show significant extant archaeological features.	An archaeological assessment of this data was commissioned for Norfolk Vanguard and is considered relevant to Norfolk Boreas. This chapter integrates the results of the LiDAR assessment undertaken by Air Photo Services. The full report is included as Annex 28.1.3

Data	Year	Coverage	Confidence	Notes
				within Appendix 28.1.
Geotechnical Data (geoarchaeological watching brief of onshore engineering GI works - Phase 1)	Survey undertaken July – August 2017	This project-specific survey focussed on two landfall sites at the Happisburgh South landfall and at seven key crossing locations where the current onshore cable route intersects major transport routes or waterways where trenchless methods will be required.	Medium. The assessment sought to establish the presence and / or absence of deposits of archaeological and geoarchaeological potential (particularly deposits of Palaeolithic age - such as the Cromer Forest Bed 'CFB'). No deposits resembling the CFB were encountered in boreholes in the landfall areas. The landfall sediments were considered to be glacial in origin. These results tally with suggestions from the AHOB team that a large doline-type geological feature in filled with glacial deposits may be present.	See Appendix 28.3. Although the survey data are targeted and cannot be considered as providing a conclusive account on all deposits / material of geoarchaeological and palaeoenvironmental interest present or absent within the study area as a whole, data assessed indicates that if CFB do survive, they are likely to be found at significant depth.
Geotechnical Data (geoarchaeological watching brief of onshore engineering GI works (Phase 2)	Survey undertaken November 2017 - January 2018	This project-specific survey focussed on four proposed crossing locations at Wooden Copse, the North Walsham and Dilham Canal, Kings Beck and Wendling Beck.	Medium. The assessment sought to further establish the presence and / or absence of deposits of archaeological and geoarchaeological potential.	Initial monitoring on some cable percussion boreholes was undertaken (at Crossing 3 - Kings Beck, 4 - Wendling Beck and 2 - North Walsham and Dilham Canal), with no CFB related deposits being recorded. The main focus of interest was to be the window sampling works at CRS and Substation sites, but these were put on hold, so the geoarchaeological monitoring was halted to reserve resources pending

Data	Year	Coverage	Confidence	Notes
				reactivation of these sites.
British Geological Survey (BGS) data (surface geology)	Accessed May - July 2018	Focussed on the Phase 1 and Phase 2 GI works areas, outlined above.	Medium. BGS data is based on a wide range of datasets and is regarded with high confidence, although the accuracy of the extent of mapped deposits at a large scale is unknown.	The assessment of this data was broadly incorporated within the Phase 1 and Phase 2 geoarchaeological watching brief of onshore engineering GI works.
Geophysical Survey Data ¹	Survey undertaken between October 2017 - March 2018	c. 164Ha of the onshore project area (c. 536Ha in total) has been subject to pre-consent geophysical survey. This equates to some 31% of the onshore project area.	High. Ground conditions were generally good across the priority archaeological geophysical survey areas and the data quality is correspondingly good throughout (see Appendix 28.2).	The acquisition of this data was commissioned for Norfolk Vanguard and is considered relevant to Norfolk Boreas. The survey programme approach and methodology has been detailed in a survey-specific WSI, prepared in agreement with HE and NCC HES, which includes survey requirements, areas and methodologies as discussed during a meeting held on the 6 th September 2017 with NCC HES.
Geophysical Survey, Onshore Substation Necton	Survey undertaken between January – February 2019	c. 96Ha site immediately north-east of Necton in the proposed onshore project substation area.	High. The ground conditions were good throughout and the overall data quality is good (see Appendix 28.8).	The acquisition of this data was commissioned for Norfolk Boreas.

28.5.3 Assumptions and Limitations

70. Data used to compile this ES chapter includes secondary information derived from a variety of sources. The assumption is made that the secondary data, as well as those

¹ It has been calculated that c. 601.5 ha of the priority geophysical survey areas were surveyed, alongside an additional c. 11 ha of contingency areas. Excluding the contingency, this equates to c. 80.2% of the 750 ha outlined for priority survey (see Royal HaskoningDHV, 2017b) as agreed with NCC HES and HE.

derived from other secondary sources, are accurate enough to help inform assessment and the data sources have been previously agreed with NCC HES and HE.

71. 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.
72. In support of the Norfolk Vanguard DCO application, an aerial photographic and LiDAR data assessment and priority geophysical survey programme was undertaken. The results of this assessment are directly relevant to the project and therefore inform the baseline environment and impact assessment, as presented in this chapter. Whilst the results of these surveys highlight the potential for sub-surface remains and / or earthworks to be present across the onshore project area, their capacity to reveal archaeological features is dependent on a number of environmental and agricultural factors prevalent at the time of survey (see Appendix 28.1, Annex 28.1.1 and Appendix 28.2). The potential for additional buried remains not indicated by the survey results must therefore not be discounted.
73. In addition, the geophysical survey data acquired to date has also been subject to access restrictions. Although the coverage of geophysical survey data acquired across the project area is generally good, some areas identified for priority archaeological geophysical survey were not available for survey pre-consent, due to having been deep ploughed or still containing crops and / or wild bird cover, whilst access was not granted in other areas. Where warranted and possible, and relevant to the onshore project area, a number of these areas will be subject to survey post-consent as part of the project or under Scenario 1 as part of Norfolk Vanguard. At this juncture, the application of alternative geophysical survey techniques will also be considered. Although the magnetometer survey undertaken to date is considered to provide a reliable indication of the extent of sub-surface deposits within the areas surveyed, some isolated features and / or areas of unenclosed settlement, if present, may not manifest as magnetic anomalies in the datasets. Further geophysical investigation such as earth resistance survey and / or ground penetrating radar may provide clarity and definition on some features (for example, where possible sub-surface masonry may survive). This will be further considered during the post-consent stages of the project.
74. Areas subject to post-consent geophysical survey are to be agreed in consultation with HE and NCC HES, the results of which will inform upon additional initial informative stages of mitigation and subsequent mitigation strategies, as and where required (see section 28.7.2).

75. With respect to above ground archaeological and built heritage remains, it should be noted that it is not always possible to ascertain whether or not features are still extant (for example, a record may exist for a pillbox which has since been removed). Those heritage assets considered to represent potential above ground remains are therefore based on data available to date and may require verification as part of a ground-truthing exercise post-consent to ascertain what, if any, level of survival exists at their recorded locations.

28.6 Existing Environment

28.6.1 Introduction

76. The following section provides a summary of the known and potential archaeological and cultural heritage resource within the defined study areas (section 28.5.1). The baseline environment as presented below has been enhanced through the implementation of a staged programme of survey and evaluation, as outlined in the Onshore Archaeology and Cultural Heritage Method Statement (Royal HaskoningDHV, 2018, unpublished) and agreed in further consultation with HE and NCC HES. For the purposes of this ES chapter this has included:
- The baseline data and information gathering exercise and assessment undertaken as part of the ADBA² (Appendix 28.1);
 - A programme of aerial photographic and LiDAR data assessment (Appendix 28.1, Annex 28.1.3);
 - A priority programme of targeted archaeological geophysical survey (Appendix 28.2);
 - Geophysical survey data acquired and assessed within the substation area (Appendix 28.8);
 - Two phases of geoarchaeological watching brief focussing on two sites at the landfall and seven key crossing locations as part of Phase 1 GI works and four proposed crossing locations as part of the Phase 2 GI works (Appendix 28.3); and
 - Site visits to inform a heritage settings assessment (see Appendix 28.4).
77. The archaeological periods referred to in the text 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;

² The ADBA is a 'point in time' document prepared during the initial stages of the iterative project design process assessed in relation to the Norfolk Vanguard project. The project description, study areas and baseline information referred to therein have thus been refined and superseded by those set out in the Norfolk Vanguard ES, which informs this chapter.

- 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.

28.6.2 Designated Heritage Assets within the Study Area

78. There are 295 designated heritage assets within the Designated Heritage Assets study area (Appendix 28.5, Figure 28.1) comprising:

- Two Scheduled Monuments;
- Three Registered Parks and Gardens (RPGs);
- 281 Listed Buildings; and
- 9 Conservation Areas.

79. Ten additional heritage assets recorded beyond the parameters of the Designated Heritage Assets study area (located in the wider vicinity of the onshore project substation and associated infrastructure) have also been subject to assessment. Their inclusion within this assessment was considered necessary to ensure that any indirect (non-physical) setting impacts upon these assets arising as a result of the onshore project infrastructure (specifically the onshore project substation) are captured and reported on given their highly designated status or due to their potential intervisibility with the onshore project substation. These heritage assets comprise three Scheduled Monuments and seven Listed Buildings, as follows:

- ‘Two moated sites at Huntingfield Hall’ (RHDHV 5, Scheduled Monument);
- ‘Moated site 430m south-west of Bradenham Hall’ (RHDHV 6, Scheduled Monument);
- ‘Mona Hill’ (RHDHV 7, Scheduled Monument);
- The ‘Church of St. Andrew’ (Bradenham) (RHDHV 34, Grade I Listed Building);
- The ‘Church of St. Mary’ (Fransham) (RHDHV 35, Grade I Listed Building);
- The ‘Church of All Saints’, Necton (RHDHV 36, Grade I Listed Building);
- The Church of St. Mary, Bradenham (RHDHV 1825, Grade I Listed Building);
- The Church of St. Andrew, Holme Hale (RHDHV 1826, Grade I Listed Building);
- The Church of All Saints, Fransham (RHDHV 1827, Grade II* Listed Building); and
- Holme Hale Hall (and associated assets) (RHDHV 1828, Grade II Listed Building).

80. These assets have been included in the figures (Figure 28.1a (map 9), b and c and Figure 28.5), the project gazetteer (Appendix 28.5) and are discussed further in

relation to the settings assessment in section 28.6.2.2 and section 28.7, where relevant.

81. Of the designated heritage assets captured in the project gazetteer, all but one are beyond the parameters of the onshore project area. The only designated heritage asset identified as having a direct interaction with the onshore project area (through being intersected by duct installation works under Scenario 2 or cable pulling works under both scenarios) is the Blickling Conservation Area (356) (Figure 28.1a, map 4 and Appendix 28.5). On the basis of this interaction, the character of the Blickling Conservation Area is discussed separately in section 28.6.2.1 and informs the subsequent assessment of potential impacts of the project upon this designated heritage asset (see section 28.7).

28.6.2.1 Blickling Conservation Area (356)

82. As outlined in the Blickling Conservation Area Character Appraisal, '*... Conservation Areas can take on a much wider role in protecting larger areas of the countryside and in Norfolk historic parkland estates are suitable areas to be treated in this way.*' (Broadland District Council, 2007)
83. The Blickling Rural Conservation Area was first designated in June 1991 and was enlarged in 2007. With respect to the location and setting of the Conservation Area the Character Appraisal states:
84. '*The majority of the Conservation Area lies within an Area of Landscape Value as defined in the Broadland Local Plan. Blickling is one of a number of park or estate landscapes which occupy a belt between the rivers Wensum and Bure north west of Norwich. Blickling Hall and Park are a significant part of the Conservation Area but the wider landscape also has an influence on character.*' (Broadland District Council, 2007)
85. The primary focus of the Conservation Area is the Grade I Listed Blickling Hall (23), and the Conservation Area also covers and predominantly incorporates the Historic Park also named Blickling Hall (10), which is designated at Grade II* on the Historic England Register of Parks and Gardens (Figure 28.1a, map 4). The area of the parkland encompasses much the same area today as it did in the mid-19th century.
86. Blickling Hall (23), the Parish Church of St. Andrew (49) and the village of Blickling are '*a natural focal point of the Conservation Area, but Silvergate to the south and the farms, mill and landscape along the Bure also contribute to the character of the area.*' (Broadland District Council, 2007)
87. The character of the Conservation Area is, however, undoubtedly dominated by Blickling Hall (23) as its centrepiece, as well as associated built heritage and related

features within the park landscape (e.g. 24, 25, 48, 213, 214, 215, 216, 218 and 221), (see Appendix 28.5 and Figure 28.1a, map 4).

88. In the wider Conservation Area '*... settlements have a small, linear character with, in general, two storey cottages.*' (Broadland District Council, 2007)
89. The onshore cable route runs across the southern extent of the Conservation Area, to the south and south-east of Blickling Hall (23) and Blickling Park (10), for approximately 3.8km over predominantly arable land (mainly tenant farmed and owned by the National Trust). Silvergate is perhaps the most significant element of the Conservation Area that falls in closest proximity to the onshore cable route. Silvergate has a more unified character than for example Oulton Street and its associated buildings, consisting as it does of 18th and 19th century estate cottages (e.g. 226). Whereas, '*the dispersed farmsteads which border the River Bure and the south western part of the Conservation Area are largely of 18th century date.*' and '*... Despite the presence of three villages or hamlets and several farmsteads, the Conservation Area has a strong rural character.*' (Broadland District Council, 2007)
90. Trenchless crossing zones (e.g. HDD) and associated compounds are located either side of the River Bure. On the western side the trenchless crossing zone features within the Conservation Area, towards its eastern most extent. There are also eight accesses that feature within the Conservation Area, varying in length and representing a mixture of construction and operation related, which will be used in order to gain access to the onshore cable route. Operational vehicle movements will be far less in terms of volume, size of vehicle and frequency compared with that associated with the temporary construction period (see chapter 24 Traffic and Transport for further information).
91. Under the description of 'landscape and the wider setting of the Conservation Area', the Conservation Area Character Appraisal goes on to state that:
92. '*Much of the woodlands associated with the park have a high beech content, though ash, oak, horse chestnut and conifers are all present. Blickling Park is especially noted for its veteran oaks and sweet chestnuts, and the narrow winding lanes often have veteran oaks within the hedgerows or in the fields. The latter is particularly true of the area south of Silvergate and north of Park Farm.*' (Broadland District Council, 2007)
93. The majority of Blickling Park (10) is located to the north, north-west and west of Blickling Hall (23). '*The park is effectively encircled by cultivated agricultural land mainly used for cereals and root crops. These fields can be large and past hedgerow removal has exacerbated the open feel of this part of the Conservation Area.*' With the exception of the River Bure crossing and Silvergate, this more recent agricultural

character perhaps also most accurately reflects the landscape of the Conservation Area through which the onshore cable route will pass.

94. *'Apart from the park, grassland is largely confined to the water meadows along the River Bure and the watercourses north and south of Silvergate. Abel Heath on the southern boundary of the Conservation Area was historically a common and is a remnant of the land use which was once more widespread... In broad terms the subtle undulation of the landform, combined with the extensive woodlands of Blickling make it difficult to get an overview of the entire Conservation Area from any one location, even with the predominantly low-cut thorn dominated hedges of the wider farmland.'* (Broadland District Council, 2007)
95. In the south-west of the Conservation Area through which the onshore cable route passes, *'views can be glimpsed at field gates or road junctions across farmland.'* However, away to the north and north-west, *'... it is from the park that the best overall impression of the landscape can be obtained.'* (Broadland District Council, 2007)
96. In terms of 'detractors', The Conservation Area Character Appraisal states that *'the special character of the Conservation Area can be easily undermined by minor alterations such as unsuitable replacement windows and doors, use of inappropriate materials, unsympathetic paintwork'* and *'the removal of walls, trees or traditional boundary features.'*
97. Features that already detract from the special character of Blickling Conservation Area include, *'overhead cables which detract from the appearance of Oulton Street and to a lesser degree have an impact at Silvergate.'* (Broadland District Council, 2007)

28.6.2.2 Settings Assessment (Designated Heritage Assets)

98. The onshore project area and onshore works will avoid direct physical impacts upon known (e.g. previously listed / scheduled) designated heritage assets. As such, with the exception of duct installation works (under Scenario 2 only) and cable pulling works (under both scenarios) through the rural and arable elements of the Blickling Conservation Area, no direct physical impacts are anticipated to occur to designated heritage assets. Although the construction of the onshore cable route through the Blickling Conservation Area represents a direct physical impact on the landscape character of this Conservation Area, with the implementation of proposed mitigation work (i.e. sensitive / controlled backfilling and reinstatement and the returning of field boundaries and hedgerows to their pre-construction condition - commitments are included as part of a project-specific Outline WSI Document reference 8.5, supporting the DCO application), this impact will be temporary in nature and is not

considered to constitute harm to the significance of the Conservation Area following the completion of construction works (see section 28.7 for further discussion).

99. Designated heritage assets have also been considered as part of a heritage settings assessment, the results of which are discussed below, in Appendix 28.4 and incorporated into the impact assessment presented in this ES chapter (see section 28.7), thus enabling potential indirect non-physical impacts resulting from the project to be understood.
100. The heritage settings assessment initially focussed on all designated heritage assets (i.e. Scheduled Monuments, Listed Buildings, Conservation Areas and Historic Parks and Gardens), which are regarded as heritage assets with a high heritage significance, in line with criteria outlined in
101. Table 28.6. Throughout the assessment, more detailed attention was given to those assets in the immediate vicinity of the 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 above ground infrastructure options (e.g. the onshore project substation) and vice versa.
102. Details outlining the settings assessment process are provided in Appendix 28.4, the key points of which are summarised below. Non-designated assets have also been subject to settings considerations, with particular reference to those assets with perceived visibility of / intervisibility with above ground infrastructure (e.g. the onshore project substation), further information on which is outlined in section 28.6.3.

28.6.2.2.1 Designated heritage assets subject to settings assessment

103. The assessment of a heritage asset's setting (and if / how it contributes to the asset's heritage significance) is based on a staged approach, as outlined in HE's guidance on the Setting of Heritage Assets: Historic Environment Good Practice Advice in Planning Note 3 (Second Edition) (Historic England, 2017). This approach enables proportionate decision-making with respect to managing change within the setting of heritage assets.

Onshore project substation, National Grid substation extension and overhead line modifications

104. Step 1 of the approach identifies which heritage assets and their settings are potentially affected. Following a series of site visits, a cross-referencing exercise with the LVIA and associated tool kits and a review of LVIA viewpoint locations, a number of designated heritage assets were considered as being potentially vulnerable to the onshore project substation and associated infrastructure with respect to their

setting. Those assets screened into the settings assessment on this basis are as follows (Figure 28.1a (map 9), b and c and Figures 28.5a and b):

- Wendling Abbey, Scheduled Monument (4);
- Two moated sites at Huntingfield Hall (5);
- Moated site 430m south-west of Bradenham Hall (6);
- Mona Hill (7);
- Church of St. Andrew, Bradenham (34);
- Church of St. Mary, Fransham (35);
- Church of All Saints, Necton (36);
- The Old Hall, Fransham (58);
- Bradenham Hall (347);
- The Church of St. Mary, Bradenham (1825);
- The Church of St. Andrew, Holme Hale (1826);
- The Church of All Saints, Fransham (1827); and
- Holme Hale Hall (and associated assets) (1828).

105. Those underlined above have been identified and captured as heritage-specific viewpoints for further consideration and visual representation in this chapter (section 28.7 and Appendix 28.4), as shown in Table 28.11.

Table 28.11 Cultural Heritage Viewpoints

Viewpoint Name	Cultural Heritage Viewpoint No.	British National Grid (BNG)	
		Easting	Northing
Church of St Andrew, Bradenham (34)	CH1	591711	309148
All Saints, Necton (36)	CH2	587872	309726
Old Hall, Fransham (58)	CH3	590191	311793
The Church of St Mary, Bradenham (1825)	CH4	593069	308410
The Church of St Andrew, Holme Hale (1826)	CH5	588711	307543
Hale Road, East of Holme Hale	LVIA Viewpoint (10)	590576	307795

106. Section 28.7 and Appendix 28.4 details and describes the assets identified above in more detail, including their heritage significance and setting. It also includes the outcome of the settings assessment process in each case (taking primarily intervisibility into account with the onshore project substation and associated infrastructure which is considered to represent the WCS with regards to the setting of heritage assets insofar as it represents the introduction of new above ground infrastructure of height into the landscape), and includes whether further action was

required or not beyond the initial stage(s) of the stepped approach to the heritage setting assessment.

107. In summary, one designated heritage asset was found to have visibility of the onshore project substation. Under Scenario 2, Cultural Heritage Viewpoint No. 1 (CH1) (Appendix 28.4) shows a barely discernible glimpsed ‘roof-top’ section of the onshore project substation and a number of associated lightning protection masts as being visible in the photomontage view (seen at a distance of c. 1.6 km) from the grounds of the Church of St Andrew, Bradenham (34). Under Scenario 1, CH1 (Appendix 28.4) shows a small corner section of the onshore project substation and associated masts as being visible in the photomontage view, as well as a small section (glimpsed ‘roof-top’) and associated masts of the Norfolk Vanguard substation from the grounds of the Church of St Andrew, Bradenham (34). This is further assessed in sections 28.7 and 28.8, where relevant. None of the remaining assets identified above were found to share intervisibility with the onshore project substation and associated infrastructure, and due to their distance from the above ground onshore project infrastructure, no impacts to heritage setting (and associated significance) were identified and no further action is considered to be required. This is still, however, further evidenced in section 28.7 and Appendix 28.4.

Construction works

108. The designated heritage assets shown in Table 28.12 have been screened into the settings assessment (section 28.7) on the basis of their proximity to construction works (excluding those in relation to the onshore project substation, National Grid substation extension and overhead line modification which are captured above).

Table 28.12 Heritage assets screened into settings assessment with regards to construction works

Construction works	Heritage Assets
Landfall (Figure 28.1a, map 1)	Happisburgh Conservation Area (352), including: Happisburgh Manor RPG (8); St. Mary's including 2 Summerhouses (38); the Encircling Wall to St. Mary's (37); and the Church of St. Mary, Happisburgh (11)
	Happisburgh Lighthouse / Lighthouse Cottages (61)
Onshore cable route, trenchless crossing zones and mobilisation zones (Figure 28.1a, map 1-9)	Church of St. Peter, Ridlington (13)
	Friends Meeting House, North Walsham (43) and the Thatched Cottage (117). Including the non-designated Old Quaker Burial Ground (1408)
	Keepers Cottage (145)
	Church of St. Botolph, Colby (20)
	Aylsham Conservation Area (355)
	Abbots Hall Farmhouse (156)
	Blickling Conservation Area (356)
Salle Park (9) / Salle Park (52)	

Construction works	Heritage Assets
	Pettywell Farm and associated buildings (307, 308, 309 and 310)
	Scarning Dale (346)
Accesses (construction and operation) (Figure 28.1a, map 1-9)	Colby Hall Farm House and adjoining outbuildings (148)
	Blickling Hall Registered Park and Garden (10)
	Blickling Conservation Area (356)
	Flashpit Farmhouse (206)
	Old Hall Farmhouse (325)

28.6.2.3 Heritage Significance (Importance)

109. Based on the criteria shown in section 28.4, the designated heritage assets outlined in section 28.6.2.2 (Figure 28.1) are considered to be assets of high heritage significance with perceived national importance.

28.6.3 Non-Designated Heritage Assets and Archaeological Potential within the Study Area

110. There are 714 non-designated heritage assets recorded within the non-designated heritage assets study area, of which 178 fall within or intersect the onshore project area. These assets are shown on Figure 28.2 and are detailed in a gazetteer in Appendix 28.6. These assets have been assessed alongside various source material outlined in section 28.5.2 and referenced in section 28.12 in order to inform an archaeological and historical baseline account of the study area and onshore project area.

111. Table 28.13 draws out areas of archaeological potential identified in the ADBA (Appendix 28.1) and provides a high-level overview of the nature of archaeological evidence for each archaeological period, with reference to notable non-designated heritage assets. Not all assets are discussed within the table, but all are tabulated within Appendix 28.6 and / or Appendix 28.1, Annex 28.1.2 depending on their recorded location in relation to the study area³.

³ In order to provide an archaeological and historical context for the wider project area, reference may be made to non-designated heritage assets that are recorded beyond the study area parameters as assessed in this chapter. Those within the onshore project area red line boundary are stated as such. Assets beyond the study area were included as part of the ADBA, with further information provided in the relevant gazetteer (Annex 28.1.2).

Table 28.13 Summary of areas of archaeological potential and evidence by period

Period	Summary of potential and evidence
Palaeolithic	<p>Palaeolithic discoveries in the study area indicate that potential archaeological material of this date will most likely to be representative of subsistence activities associated with a nomadic lifestyle.</p> <p>The study area at the landfall is recognised as an internationally important region for Lower Palaeolithic archaeology. This importance is due to a number of discoveries, including a footprint surface in Early Pleistocene estuarine muds (RHDHV 367), which provides indirect anatomical evidence of the first hominins in northern Europe. <i>In situ</i> laminated silts, considered to be laterally equivalent to the estuarine muds in which the footprints were recorded, have been recorded in the Happisburgh area (Birks, 2016: 16) and sediments of the Cromer Forest-bed Formation are known to be intermittently exposed in this area of the coast. The lithic working site known as ‘Happisburgh 1’ (RHDHV 372) provides further evidence for in-situ remains in the wider vicinity of the onshore project area of this date. However, although the potential for encountering in-situ discoveries of a Lower Palaeolithic date in the coastal region cannot be discounted in the vicinity of the Happisburgh landfall location, the results of the Phase 1 geoarchaeological watching brief of GI works revealed no deposits resembling the CFB Formation (a pre-glacial deposit of Palaeolithic age) in the boreholes undertaken in the landfall areas (Appendix 28.3). The assessment concluded that if CFB deposits do survive, they will be found at significant depth.</p> <p>Artefactual remains attributed to the Middle and Upper Palaeolithic are less frequent in the archaeological record of the study area, and are predominated by isolated and presumably derived lithic discoveries. The evidence base thus indicates that further material of this date within the study area will be predominated by isolated finds, although the in-situ remains of a mammoth and associated Mousterian stone tools and debitage discovered within fill deposits of a palaeochannel at Lynford Quarry, Mundford (Boismier et al., 2012) in the wider environs of the study area suggests that in-situ material cannot be discounted. Upper Palaeolithic finds across East Anglia as a whole are poorly represented. As such, discoveries of this date are likely to be rare.</p>
Mesolithic	<p>Mesolithic discoveries in the study area are likely to be representative of activities associated with a nomadic / seasonal hunter-gatherer lifestyle.</p> <p>The archaeological record primarily consists of lithic artefacts, with evidence for pits, hearths and traces of ephemeral structures rare in Norfolk as a whole (Dennis, 2006). Mesolithic finds within the study area comprise isolated lithic artefacts. Potential Mesolithic discoveries are therefore likely to be isolated and / or derived in nature, although the discovery of larger Mesolithic assemblages in the wider area such as those at Kelling Heath (North Norfolk Coast) and Great Melton (west of Norwich) suggest that the potential larger assemblages should not be discounted.</p>
Neolithic	<p>Neolithic discoveries in the study area are likely to be representative of agricultural settlement of an increasingly sedentary nature, revolving around more static farming activities. Evidence representative of ritual activities is also possible.</p> <p>The archaeological record of the study area predominantly comprises discoveries relating to lithic artefacts, scattered variously across the study area with no significant areas of concentration apparent. However, the archaeological record also indicates an increase in landscape features from this date onwards, in the form of long and later round barrows which could have served as territorial markers as well as a means to inter the dead (Aldridge, 2005). The potential remains for further barrows of this date to exist within the study area. Such sites are likely to be visible in the form of cropmarks,</p>

Period	Summary of potential and evidence
	<p>which are at present either currently unidentified and / or undated. The aerial photographic and LiDAR data assessment identified two features of possible Neolithic date within the study area; comprising a possible long barrow (AP 235 / RHDHV 574) and a possible enclosure (AP 254 / RHDHV 621).</p>
Bronze Age	<p>Bronze Age discoveries in the study area are likely to be representative of activities associated with settlement, subsistence and ritual activity, with the introduction of bronze metalworking, changes in pottery styles, the increased occurrence of single burial traditions and changes in monumental building.</p> <p>The archaeological record for the study area is predominated by ring ditches / round barrow features. Other finds include isolated stone and metal artefact discoveries. Other landscape features of this date are rare, with some indications for small farmsteads. On the basis of this evidence, potential sites and finds of this date are likely to be in the form of round barrows, either currently unidentified and / or undated likely to be visible in the form of cropmarks or isolated artefactual remains. The aerial photographic and LiDAR data assessment identified numerous ring-ditch features of possible Bronze Age date within the study area, at least one of which is within the onshore project area (AP 270).</p>
Iron Age	<p>Iron age discoveries in the study area are likely to be representative of activities associated with settlement and subsistence, with the introduction of artefactual evidence in the form of weapons and tools made out of iron. Settlements of the period likely formed small farmsteads and villages, with a few larger settlements or towns known as oppida sites developing in the late Iron Age.</p> <p>The archaeological record within the study area comprises numerous cropmarks identified as field boundaries, trackways and enclosures of Iron Age date, with evidence of settlement in the form of a possible round house (RHDHV 824) (beyond the study area parameters) and a number of farmsteads. Artefactual remains comprise various artefacts with a scattered distribution throughout the study area, many of which comprise a multi-period assemblage. It is considered that potential sites and find spots of Iron Age date in the study area will most likely comprise evidence of farming-related activities, such as trackways and field boundaries shown as either currently unidentified and / or undated cropmarks. Evidence for small scale settlement (e.g. in the form of post-holes suggestive of a round house) is also possible. Artefactual discoveries of this date are also possible. The aerial photographic and LiDAR data assessment identified a number of features of possible Iron Age date within the study area, indicative of settlement and / or farming activities during this period. Of those identified, eight lie within or intersect the onshore project area (AP 6 / RHDHV 811, AP 80, AP 91, AP 231, AP 234, AP 240, AP 250 and AP 262).</p>
Romano-British	<p>Romano-British discoveries in the study area are likely to be representative of a continuation of farming activities alongside an intensification of settlement, production-related activities and an increase in military presence.</p> <p>The archaeological record for the study area largely includes evidence for field systems, boundaries, trackways and farmsteads signifying the continuation of farming activities in the area as well as small-scale settlements. Military presence in the study area and its environs is rare, provided by a probable Roman fort (AP 29 / RHDHV 837) located south of the onshore project area between Reephams and Aylsham. This evidence indicates that potential sites and finds of this date are expected to be predominated by features signifying farming activities in the study area, with artefactual remains also possible. The aerial photographic and LiDAR data assessment identified a number of features of possible Romano-British date within the</p>

Period	Summary of potential and evidence
	study area, indicative of settlement and / or farming activities during this period. Of those identified, 14 lie within or intersect the onshore project area (AP 6 / RHDHV 811, AP 34, AP 80, AP 91, AP 120, AP 131, AP 137, AP 225, AP 231, AP 233, AP 234, AP 240, AP 250 and AP 262).
Saxon	<p>The Saxon period is characterised by the migration of Saxon, and later Norse and Danish settlers into Britain, which saw the establishment of a network of trade and migration routes to the Continent. Discoveries in the study area, where present, may be representative of settlement, production, agricultural or ritual activities.</p> <p>The archaeological record for this period is relatively sparse, with a predominance of findspots. Features of this period are rare, and where present, commonly relate to field boundaries. Evidence of settlement, including a possible grubenhauser (sunken featured building) in Happisburgh (RHDHV 828) are present within the study area, as is the presence of religious and / or ceremonial activity (RHDHV 956, 977 and 988) in the wider environs of the study area. This evidence suggests that potential discoveries will likely occur in the form of field boundaries represented by cropmarks, although the potential for significant Saxon sites to be discovered should not be discounted, as indicated by the discovery of a Saxon cemetery site at Fulmodeston during the Dudgeon Offshore wind farm (Onshore Electrical Connection) project and the Anglo-Saxon Cemetery at Tittleshall found along the route of the Bacton to King's Lynn Gas Pipeline. The aerial photographic and LiDAR data assessment identified numerous undated features which may be assigned to the Saxon period, such as a linear feature to the north of the onshore project area (AP 238), south-west of Bacton, which may date from the Saxon period, although later dates are also possible.</p>
Medieval	<p>Medieval discoveries in the study area may be representative of the development growth of a number of East Anglian towns into busy trading centres, with discoveries representative of production and farming activities also possible.</p> <p>The archaeological record for the study area includes numerous settlements, tofts, buildings, manors, moats, chapels, enclosures and field boundaries, although findspots continue to dominate the record. Evidence suggests that potential archaeological sites and finds within the study area will most likely comprise features representative of farming activities, with evidence for settlement and production-related activities also possible. Artefactual discoveries of this date are likely to occur. The predominance of land-use of an agricultural nature is supported by the results of the aerial photographic and LiDAR data assessment, which identified numerous features considered to represent former field systems of possible medieval date within the study area, of which 15 such sites are identified within or intersecting the onshore project area (AP 1 / RHDHV 1015, AP 6 / RHDHV 811, AP 42 / RHDHV 1038, AP 78, AP 80, AP 84, AP 91, AP 116, AP 120, AP 128, AP 136, AP 137, AP 164, AP 220 and AP 237).</p>
Post-medieval and 19 th century	<p>Post-medieval discoveries in the study area may be representative of advances in transport, communications, industry and agriculture. This period is characterised by the Industrial Revolution. Agriculture also took on a more prominent role during this period, with East Anglia at the forefront of the 'Agricultural Revolution' in the 18th century with the improved communications developed to serve the farming economy and to facilitate the diverse trade of Norfolk (Gilman, 1997:67).</p> <p>The archaeological record for the study area is varied and includes records relating to transport (e.g. the introduction of the railway), industry (e.g. production represented by mills, brickworks etc.), settlement, religious activity and agriculture. A review of cartographic sources indicates that potential archaeological discoveries of this date will most likely relate to agricultural activities which characterised a vast extent of the land-use during</p>

Period	Summary of potential and evidence
	<p>this period, with the potential for artefactual remains also possible. The discovery of other such features should not be discounted but are not expected to predominate.</p>
Modern	<p>Modern discoveries in the study area are likely to be representative of the two World Wars.</p> <p>The archaeological record comprises a predominance of defensive measures employed in the area, including pill boxes, spigot mortar / gun emplacements, tank traps (e.g. anti-tank ditches and blocks), barbed wire, search light batteries and observation posts. The introduction of aviation-related assets is also witnessed in this period, as indicated by Oulton Airfield (RHDHV 1816), which intersects the onshore project storage area boundary. Potential archaeological remains of this date within the study area can be expected to be varied. Currently unknown sites may include the sites of no longer extant military infrastructure, which may be visible as cropmarks, or on aerial photographic / LiDAR data.</p>

28.6.3.1 Potential Sub-Surface Archaeological Remains

112. An understanding of the nature, extent and character of below ground archaeological remains is limited by their very nature of being buried and as such, there is an intrinsic ‘unknown’ factor relating to this resource. In order to assess the potential presence of sub-surface archaeological remains within the onshore project area, the results of the aerial photographic and LiDAR data assessment (Appendix 28.1, Annex 28.1.3), the archaeological assessment of geophysical survey data (Appendices 28.2 and 28.8) and the records for non-designated heritage assets as recorded by the NHER were considered, alongside historical cartographic sources for the onshore project area.
113. The purpose of this cross referencing exercise was to identify areas in which there is considered to be heightened potential for currently unrecorded / unconfirmed archaeological remains to be discovered. This identification process is based on available data and is with a view to enhancing our understanding of this potential and to further inform embedded and additional mitigation strategies which are both appropriate and proportionate to the remains that may be present and the condition in which they may survive.
114. In order to provide an overview of the sub-surface archaeological potential within the context of the project, the onshore project area has been conceptually divided between the landfall and onshore project substation by Mobilisation Area (MA) (only required under Scenario 2, which are shown on Figures 28.1 – 28.4), as follows:
- Onshore project substation (including National Grid extension and overhead line modifications);
 - Onshore project substation to MA 1b;
 - MA 1b to MA 2;
 - MA 2 to MA 3;
 - MA 3 to MA 4;
 - MA 4 to MA 5a;
 - MA 5a to MA 5b;
 - MA 5b to MA 6;
 - MA 6 to MA 7;
 - MA 7 to MA 8;
 - MA 8 to MA 9;
 - MA 9 to MA 10;
 - MA 10 to MA 10a;
 - MA 10a to MA 11;
 - MA 11 to Landfall; and
 - Landfall.
115. Key aspects relating to potential sub-surface archaeological remains for each area outlined above have been drawn out, as indicated by available data, and are detailed in Appendix 28.7.
116. The aerial photographic and LiDAR data assessment identified 270 sites of possible archaeological interest within the original (much wider) survey area assessed in relation to Norfolk Vanguard (Figure 28.4). These sites were each allocated a unique

project-specific site number (Aerial Photographic (AP) ID) as referred to in Appendix 28.7. The aerial photographic and LiDAR data assessment results informed upon a priority programme of geophysical survey undertaken pre-consent, as part of the non-intrusive evaluation work undertaken for Norfolk Vanguard (Appendix 28.2). This was later supplemented by the archaeological assessment of further geophysical survey data acquired within the area of the proposed onshore project substation and extension to the Necton National Grid substation (Appendix 28.8). Appendix 28.7 therefore also contains a high-level review of available geophysical survey results in association with the aerial photographic and LiDAR data assessment. The archaeological assessment of geophysical survey data tabulated the areas surveyed with a project-specific field number (assigned by Headland Archaeology). Reference to these field numbers, and the archaeological features (anomalies) potentially present therein, are also included in Appendix 28.7. Twenty distinct Areas of Archaeological Activity (AAA) were identified as part of the archaeological assessment of priority geophysical survey data (Appendix 28.2), ranging from individual features to extensive areas of settlement or enclosure. Two additional AAAs were identified within the geophysical survey data acquired north-east of Necton (Appendix 28.8). To avoid reference to duplicated IDs, the AAAs identified within the substation area are prefixed with NB (e.g. NB-AAA1 and NB-AAA2). Reference to these AAAs, where relevant, is also included in Appendix 28.7. A more detailed narrative of the results of both the aerial photographic and LiDAR data assessment and the archaeological assessment of geophysical survey data can be found in Appendix 28.1 (Annex 28.1.3) and Appendices 28.2 and 28.8. Reference is also included to data held by the NHER in Appendix 28.7, where relevant.

117. Appendix 28.7 identifies those features that are within or intersect the refined onshore project area considered within this ES chapter. Those within or intersecting the onshore project area are considered to have a potential interaction ('pathway') between receptor (asset) and the project and are taken forward into the impact assessment for further review and consideration (section 28.7).

28.6.3.2 Above Ground Non-Designated Heritage Assets

118. In order to assess the potential for the project to physically impact any above ground non-designated heritage assets, the NHER records and aerial photographic and LiDAR data assessment results were consulted with a view to identifying those which may relate to above ground archaeological and / or built heritage remains (extant structures / features, buildings and earthworks). It should be noted that due to the nature of the archaeological record, it is not always possible to ascertain whether or not features are still extant (for example, a record may exist for a pillbox which has since been removed). Those heritage assets considered to represent potential above ground remains are therefore based on data available to date and may require

further verification as part of a ground-truthing exercise post-consent to ensure what, if any, degree of survival exists at their recorded locations.

119. The non-designated heritage assets (considered to be representative of above-ground remains) identified within or intersecting the onshore project area are shown below in Table 28.14.

Table 28.14 Above ground non-designated heritage assets within the onshore project area

RHDHV ID / NHER / AP ID	Name	Description / Justification for Inclusion	Anticipated Heritage Importance
RHDHV 1101 NHER 29500 Figure 28.2a (map 8)	Undated earthworks and post-medieval bank.	Described in the NHER as a 'hollow way extending south from farm buildings, for approximately 200m... 0.3m deep and banked in part on both sides. Higher level to west than to east. Appears to correspond to common edge roadway shown on Faden's map'.	Low - Medium
RHDHV 1379 NHER 7361 ES Chapter Figure 28.2 (map 16)	Sparham Limekiln.	A post-medieval limekiln that ceased to function in the 19th century and was then converted into two cottages. The NHER refers to the demolition of the upper cottage - no mention is made of the lower cottage.	Low
RHDHV 1456 NHER 55475 Figure 28.2a (map 4)	Witton Park.	Witton Park is described in the NHER record as having been 'partially destroyed through compulsory ploughing during World War II'. This indicates that elements of the park may still remain.	Low
RHDHV 1529 NHER 15918 Figure 28.2a (map 1)	World War Two pillbox.	A Type 26 pillbox recorded as 'still present' in the NHER and visible on satellite imagery for the area.	Low
RHDHV 1559 NHER 40950 Figure 28.2a (map 18)	World War Two buildings and the site of a World War Two antenna array.	The NHER states that 'some of the buildings survive but are derelict'.	Low
RHDHV 1673 NHER 50412 Figure 28.2a (map 3)	Series of low banks in Witton.	Described in the NHER as a 'series of low banks, 0.2 - 0.3 metres high, up to 2 metres spread, forming incomplete enclosures'. Last	Low

RHDHV ID / NHER / AP ID	Name	Description / Justification for Inclusion	Anticipated Heritage Importance
		visited and surveyed in 1993, as part of an earthwork survey conducted by a B. Cushion.	
RHDHV 1682 NHER 7295 Figure 28.2a (map 22)	Smugglers' Lane.	The landowner has indicated that a section of this feature survives as a hollow way (earthwork). This asset has been assigned a precautionary medium heritage significance until such a time as the survival and condition of this feature can be more fully ascertained.	Medium
RHDHV 1816 NHER 7364 Figure 28.2a (map 11)	Oulton Airfield.	The NHER states that 'the runways were used as foundations for battery farm sheds. Some of the buildings remain, including the control tower'. The record also notes that the 'Hangar remains to the south-east. Several Nissen huts visible.'	Low - Medium
AP 6 RHDHV 811 NHER 2999 Figure 28.4a (map 16)	Extensive area of likely multi period eroded field boundaries, tracks, ditches and possible enclosures.	Three slight banks are recorded running parallel to one another in a north-south orientation across the cable route. A possible candidate for Earthwork Condition Survey, post-consent.	Medium - High
AP 48 RHDHV 1615 NHER 36454 Figure 28.4a (map 8)	A series of former field boundaries and trackways of unknown date. These features are likely to be more widespread than their visible extent.	A possible former field boundary recorded as a bank / earthwork is mapped intersecting (perpendicular to) the proposed cable route.	Low

120. There are also records relating to a number of linear features across the onshore cable route, predominantly comprising former railway lines, often dismantled and no longer extant, (RHDHV 1490, 1499, 1501, 1494, 1498, 1486 and 1487). Although the majority of these railway lines are no longer in use, a number of former railway buildings are still present (e.g. in relation to RHDHV 1494). The location of these structures is not 100% clear from the records and their existence may need to be further verified as part of post-consent initial informative stages of mitigation should an impact upon these assets be considered possible. These heritage assets are subject to consideration in section 28.7.

28.6.3.3 Settings Assessment (Non-Designated Heritage Assets)

121. In addition to the potential for non-designated heritage assets to be subject to direct physical impacts as a result of the project, indirect (non-physical) impacts also have the potential to occur. In view of this potential, select non-designated heritage assets which may be subject to indirect impacts with regards to their settings have also been considered as part of the heritage settings assessment. The following non-designated assets have been identified as potentially being vulnerable with regards to their setting:

- Onshore cable route and associated trenchless crossing technique (e.g. HDD) and mobilisation areas:
 - Barn, opposite the east wall of Ridlington churchyard (1423);
 - Witton Park (1456);
 - Old Quaker Burial Ground (1408); and
 - The Kerdiston Cross (1041).
- Access Routes:
 - Cottages associated with Old Hall Farm House (1394); and
 - Park Farm (1449).

122. The anticipated level of impact significance is, however, considered to be negligible, with the exception of the Burial Ground (1408), which is considered further in section 28.7 below. The duration of the impact on these assets is confined to the period of construction within the sections of the onshore cable route in which they are situated.

28.6.4 Historic Landscape Characterisation

123. The HLC (Figure 28.3) of the non-designated heritage assets study area can be summarised as comprising the following broad character types:

- 18th – 19th century enclosure;
- 20th century agriculture;
- Built up areas – historic;
- Built up areas – modern;

- Coastal – managed wetland;
- Commons, wastes and heaths;
- Historic earthwork;
- Horticulture;
- Industry;
- Inland – drained enclosure;
- Inland – managed wetland;
- Marginal;
- Military;
- Mineral;
- Parks, gardens and recreation;
- Pre-18th century enclosure;
- Water features; and
- Woodland.

124. The non-designated heritage assets study area is predominantly characterised by 20th century agriculture, with post-medieval enclosures of an 18th and 19th century date also well represented. Further information regarding HLC can be found in Appendix 28.1, which divided the study area into four principal areas (Areas 1 – 4) so that the character could be analysed in a manner that can be more meaningfully understood than that afforded by a broad scale characterisation of the study area as a whole.

125. The predominant HLC types of 20th century agriculture and post-medieval enclosures of an 18th and 19th century date are anticipated to be able to accommodate a temporary level of change to HLC during construction with fields / areas being returned to their preconstruction condition and character post-construction, as part of a sensitive programme of backfilling and reinstatement / landscaping. Certain hedgerows and field boundaries (e.g. county and parish boundaries) may require recording prior to the construction process and enhanced provisions made during backfilling and reinstatement.

28.6.5 Anticipated Trends in Baseline Conditions

126. The existing environment for onshore archaeology and cultural heritage in this section 28.6 has been shaped by a combination of factors, with the most prevalent considered to be previous land use and onshore development activity (see Appendix 28.1, section 28.6.3).

127. For the majority of the study area(s), the predominant form of previous impacts to buried archaeological remains from former and current land use are likely to have arisen as a result of farming regimes and activities such as ploughing. For the most part, the onshore project area has been subject to heavy agricultural use, and the aerial photographic and LiDAR assessment results indicate a marked plough erosion effect across the whole area (see Appendix 28.1, Annex 28.1.3). Given that the study area(s) extends across a largely rural landscape, the trend in agricultural land use is likely to continue. Although agricultural (farming) activities have the potential to result in the gradual degradation and / or disturbance of sub-surface archaeological remains, due to the longevity of agricultural activity within and surrounding the onshore project area, physical impacts upon buried archaeological remains are

considered likely to have largely already occurred resulting in their loss in part or to disturbing relationships between assets and their wider surroundings. Depending on the depths of modern farming practices, it is possible that ongoing impacts are occurring, resulting in new and further loss and / or disturbance, especially where deep ploughing activity is employed.

128. The landfall element of the onshore project area has also been subject to rapid coastal erosion, thought to at least in part arise as a result of sea-level and climate change. Historical records indicate the loss of over 250m of land between 1600 and 1850 at Happisburgh (<http://www.bgs.ac.uk/landslides/happisburgh.html>), with the parish of Whimpwell (formerly to the east of Happisburgh), long since eroded away with many once terrestrial heritage assets lost to the sea. Coastal erosion will likely continue, resulting in the erosion and exposure of heritage assets currently present within and along this stretch of the coastline. 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, as at Happisburgh and Pakefield for example, and certainly preferable to assets and remains being lost altogether.
129. The development of both small and larger scale modern infrastructure within the onshore project and surrounding areas has also shaped the existing environment, with the historic environment having been and continuing to be vulnerable to the impacts of development in both a physical (direct) and non-physical (indirect - e.g. relating to the setting of heritage assets) manner. With regards to physical impacts, many developments undertaken to date have resulted in the uncovering and discovery of a range of archaeological sites, monuments, features and find spots, as recorded within the NHER. Those identified and archaeologically recorded to date are included within the baseline conditions outlined throughout this section.
130. The onshore project area passes adjacent to a number of urban centres and 21st century expansion is considered likely to continue to further alter the hinterland of many such towns into larger areas of modern settlement. Other developments (e.g. industrial development, modern highway development / expansion) may also occur. However, due to the policy trend in the UK (see section 28.2), which recognises that heritage assets are an irreplaceable resource, it is anticipated that whilst the development of modern infrastructure will likely result in some large scale changes to buried archaeological remains, the information acquired from any archaeological site or feature subject to direct impact will be retained and made publicly available following proportionate mitigation approaches, recorded in the NHER and considered as part of the baseline resource. Development activity also presents opportunities to develop and further enhance the archaeological record.

131. There is a requirement in UK policy to take into account the desirability of sustaining and enhancing the significance of heritage assets and their setting (see section 28.2). As such, the historic character and setting of heritage assets may be subject to change, although the degree of change will depend on the public benefit of proposed developments as part of a weighted approach to decision making, in order for sustainable development to take place and for heritage assets to be safe-guarded in a manner that is both proportionate and appropriate to the significance of known assets, as well as any new sites / remains identified, their level of survival, as well as other factors.
132. The baseline conditions for onshore archaeology and cultural heritage (particularly with respect to non-designated sub-surface remains) are therefore considered to be subject to a gradual decline on the basis of ongoing land use and development within the onshore project and surrounding area, although the degree to which any change is likely to occur is difficult to predict based on information available to date. The sensitivity of onshore archaeology and cultural heritage as a non-renewable resource has been considered within this chapter and informs the embedded and ongoing mitigation strategy to be further developed and adopted by the project post-consent (see section 28.7.2) so that impacts can be avoided, reduced or offset, as and where appropriate.

28.7 Potential Impacts

28.7.1 Introduction

133. This section outlines potential impacts as a result of the project and their significance, using the assessment methodology described in section 28.4 and Chapter 6 EIA Methodology. Impacts to onshore archaeology and cultural heritage could include direct impacts to non-designated heritage assets, indirect impacts on both designated and non-designated heritage assets and changes to HLC.
134. The EIA is being undertaken for the following two alternative scenarios therefore an assessment of potential impacts has been undertaken for each scenario:
- **Scenario 1** – Norfolk Vanguard proceeds to construction and installs ducts and other shared enabling works for Norfolk Boreas.
 - **Scenario 2** – Norfolk Vanguard does not proceed to construction and Norfolk Boreas proceeds alone. Norfolk Boreas undertakes all works required as an independent project.
135. Where the assessment of the impact is different for Scenario 1 and Scenario 2 a separate assessment is presented under each impact heading. Where this is relevant, Scenario 2 is presented first as it would generally result in the more significant impacts.

28.7.1.1 Direct Impacts

136. Direct (physical) impacts, as stated in the NPS for Renewable Energy Infrastructure (EN-3) (DECC, 2011b: 49), encompass direct effects from the physical siting of the project. 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 the project which involve intrusive groundworks have the potential to directly impact heritage assets.
137. Direct impacts to designated heritage assets are not anticipated to occur as these receptors will be avoided, with the exception of duct installation works (under Scenario 2 only) and cable pulling works (under both scenarios) through landscape character elements of the Blickling Conservation Area (which will need to be sensitively managed and subject to full, thorough and strictly controlled backfilling and reinstatement) (as set out in section 28.7.2 and included within the project-specific Outline WSI, document reference 8.5). Direct impacts upon the landscape character of Blickling Conservation Area are discussed in further detail in section 28.7.5.2.
138. Direct impacts upon non-designated heritage assets, including both those above and below ground, do however, have the potential to occur. In the absence of appropriate mitigation, groundworks associated with the project have the potential to impact below ground archaeological remains and above ground archaeological remains such as earthworks or non-designated historic structures, although avoidance by means of route-refinement or micrositing as part of the iterative project design process provides a mitigation measure which seeks to remove this impact from occurring (see section 28.7.2). It is, however, not always possible to avoid direct impacts to all potential buried heritage assets as the locations of such sites are not always known, and where they are, there may not always be opportunities to route around such assets.
139. The impact significance of unavoidable direct impacts to potential heritage assets would generally be significant, although agreed measures (see section 28.7.2) to address these impacts, if they should occur, generally allows such impacts to be reduced (or offset) and as such be considered acceptable.

28.7.1.2 Indirect Impacts

140. Indirect (non-physical) impacts on the historic environment, as stated in NPS EN-3 (DECC, 2011b: 67), include effects on the setting of heritage assets. Indirect impacts upon the setting of heritage assets arising from the onshore project substation, National Grid extension works and overhead line modifications have the potential to occur throughout the lifetime of the project owing to their semi-permanent nature

(the lifetime of the project), thus encompassing all phases, from construction, operation and subsequent decommissioning.

141. Indirect impacts upon the setting of heritage assets arising from the landfall, onshore cable route, associated trenchless crossing zones (e.g. HDD) and mobilisation areas (under Scenario 2) are only likely to occur throughout the duration of construction and subsequent decommissioning works. This is on the basis that, during operation, there is no above ground infrastructure in association with these elements of the project that are considered likely to harm heritage setting and associated heritage significance (see section 28.7.6.1).

28.7.2 Mitigation

28.7.2.1 Embedded Mitigation

142. Norfolk Boreas Limited has committed to a number of techniques and engineering designs / modifications inherent as part of the project, during the pre-application phase, in order to avoid a number of impacts or reduce impacts as far as possible. Embedding mitigation into the project design is a type of primary mitigation and is an inherent aspect of the EIA process.
143. A range of different information sources has been considered as part of embedding mitigation into the design of the project (for further details see Chapter 4 Site Selection and Assessment of Alternatives, Chapter 5 Project Description, and Chapter 7 Technical Consultation), including engineering requirements, feedback from communities and landowners, ongoing discussions with stakeholders and regulators, commercial considerations and environmental best practice.
144. The following sections outline the key embedded mitigation measures relevant for this assessment. These measures are presented in Table 28.15. Where embedded mitigation measures have been developed into the design of the project with specific regard to historic environment, these are described in Table 28.16.

Table 28.15 Embedded project mitigation

Parameter	Mitigation measures embedded into the project design	Notes
Project Wide		
Commitment to HVDC technology	<p>Commitment to HVDC technology minimises environmental impacts through the following design considerations;</p> <ul style="list-style-type: none"> HVDC requires fewer cables than the HVAC solution. During the duct installation phase under Scenario 2 this reduces the cable route working width for Norfolk Boreas to 35m from the previously identified worst case of 50m. As a result, the overall footprint of the onshore cable route required for the duct 	Norfolk Boreas Limited has reviewed consultation received and in light of the feedback, has made a number of decisions in relation to the project design. One of these decisions is to deploy

Parameter	Mitigation measures embedded into the project design	Notes
	<p>installation phase is reduced from approx. 300ha to 210ha:</p> <ul style="list-style-type: none"> • The width of permanent cable easement is also reduced from 25m to 13m; • Removes the requirement for a cable relay station as permanent above ground infrastructure; • Reduces the maximum duration of the cable pulling phase from three years down to two years; • Reduces the total number of jointing pits for Norfolk Boreas from 450 to 150; and • Reduces the number of drills needed at trenchless crossings (including landfall). 	<p>HVDC technology as the export system.</p>
<p>Site selection</p>	<p>The project has undergone an extensive site selection process which has involved incorporating environmental considerations in collaboration with the engineering design requirements. Considerations include (but are not limited to) adhering to the Horlock Rules (for explanation see Chapter 4 Site Selection and Alternatives) for the onshore project substations and National Grid substation extension and associated infrastructure, a preference for the shortest route length (where practical) and developing construction methodologies to minimise potential impacts.</p> <p>Key design principles from the outset were followed (wherever practical) and further refined during the EIA process, including:</p> <ul style="list-style-type: none"> • Avoiding proximity to residential dwellings; • Avoiding proximity to historic buildings; • Avoiding designated sites; • Minimising impacts to local residents in relation to access to services and road usage, including footpath closures; • Utilising open agricultural land, therefore reducing road carriageway works; • Minimising requirement for complex crossing arrangements, e.g. road, river and rail crossings; • Avoiding areas of important habitat, trees, ponds and agricultural ditches; • Installing cables in flat terrain maintaining a straight route where possible for ease of pulling cables through ducts; • Avoiding other services (e.g. gas pipelines) but aiming to cross at close to right angles where crossings are required; • Minimising the number of hedgerow crossings, utilising existing gaps in field boundaries; • Avoiding rendering parcels of agricultural land inaccessible; and 	<p>Constraints mapping and sensitive site selection to avoid a number of impacts, or to reduce impacts as far as possible, is a type of primary mitigation and is an inherent aspect of the EIA process. Norfolk Boreas Limited has reviewed consultation received to inform the site selection process (including local communities, landowners and regulators) and in response to feedback, has made a number of decisions in relation to the siting of project infrastructure. The site selection process is set out in Chapter 4 Site Selection and Assessment of Alternatives.</p>

Parameter	Mitigation measures embedded into the project design	Notes
	<ul style="list-style-type: none"> Utilising and upgrading existing accesses where possible to avoid impacting undisturbed ground. 	
Long HDD at Landfall	Use of long HDD at landfall to avoid restrictions or closures to Happisburgh beach and retain access to the beach for the public during construction. Norfolk Boreas Limited have also committed to not using the beach car park at Happisburgh South.	Norfolk Boreas Limited has reviewed consultation received and in response to feedback, has made a number of decisions in relation to the project design. One of those decisions is to use long HDD at landfall.
Scenario 1		
Strategic approach to delivering Norfolk Boreas and Norfolk Vanguard	<p>Under Scenario 1, onshore ducts will be installed for both projects at the same time as part of the Norfolk Vanguard construction works. This would allow the main civil works for the cable route to be completed in one construction period and in advance of cable delivery, preventing the requirement to reopen the land in order to minimise disruption. Onshore cables would then be pulled through the pre-installed ducts in a phased approach at later stages.</p> <p>In accordance with the Horlock Rules, the co-location of Norfolk Boreas and Norfolk Vanguard onshore project substations will keep these developments contained within a localised area and, in so doing, will contain the extent of potential impacts.</p>	The strategic approach to delivering Norfolk Boreas and Norfolk Vanguard has been a project commitment from the outset of each project.
Scenario 2		
Duct installation strategy	The onshore cable duct installation strategy is proposed to be conducted in a sectionalised approach in order to minimise impacts. Construction teams would work on a short length (approximately 150m section) and once the cable ducts have been installed, the section would be back filled and the top soil replaced before moving onto the next section. This would minimise the amount of land being worked on at any one time and also minimise overall disruption.	This has been a project commitment from the outset. Chapter 5 Project Description provides a detailed description of the process.
Trenchless crossings	<p>Commitment to trenchless crossing techniques to minimise impacts to the following specific features;</p> <ul style="list-style-type: none"> Wendling Carr County Wildlife Site; Little Wood County Wildlife Site; Land South of Dillington Carr County Wildlife Site; Kerdiston proposed County Wildlife Site; Marriott's Way County Wildlife Site / Public Right of Way; Paston Way and Knapton Cutting County Wildlife Site; 	A commitment to a number of trenchless crossings at certain sensitive locations was identified at the outset. However, Norfolk Boreas Limited has committed to certain additional trenchless crossings as a direct

Parameter	Mitigation measures embedded into the project design	Notes
	<ul style="list-style-type: none"> • Norfolk Coast Path; • Witton Hall Plantation along Old Hall Road; • King's Beck; • River Wensum; • River Bure; • Wendling Beck; • Wendling Carr; • North Walsham and Dilham Canal; • Network Rail line at North Walsham that runs from Norwich to Cromer; • Mid-Norfolk Railway line at Dereham that runs from Wymondham to North Elmham; and • Trunk Roads including A47, A140, A149. 	response to stakeholder requests.

Table 28.16 Embedded mitigation for onshore archaeology and cultural heritage

Parameter	Mitigation measures for onshore archaeology and cultural heritage	Notes
Avoidance, Micrositing and Route Refinement	<p>The onshore project area has undergone an extensive site selection process to avoid direct physical impacts on designated heritage assets, wherever possible, from the outset (Chapter 4 Site Selection and Assessment of Alternatives). In addition, the access strategy for the project has incorporated a preference for utilising and upgrading existing accesses where possible (see Chapter 5 Project Description and Chapter 24 Traffic and Transport). As such, the embedded mitigation of the project in this regard ensures that no designated heritage assets will be subject to direct physical impacts arising from the project. The exception being where the duct installation works run through landscape character elements of Blickling Conservation Area (see section 28.7.5.2).</p> <p>Non-designated above ground heritage assets and potential sub-surface archaeological remains have also been avoided by means of micrositing and route refinement, where possible, within the confines of other engineering, environmental and landowner constraints and requests. Heritage assets recorded by the NHER, the results of the aerial photographic and LiDAR data assessment and the results of the priority programme of archaeological geophysical survey have been input directly into the iterative design process and reviewed throughout a series of workshops so that features and areas indicative of more substantial sub-surface archaeological remains identified to date have been avoided, wherever possible. This process has enabled the project design to be developed in a manner which takes into account known and suspected features of likely high heritage significance (e.g. possible Prehistoric ring ditches) or concentrated areas of complex archaeological features indicative of Prehistoric, Roman and medieval enclosures and settlement activity so that direct impacts can be avoided (where possible). This approach is directly in-line with the wider project aims of minimising the environment and historic environment impacts of the project, and represents a good practice example of detailed and methodical embedded mitigation.</p> <p>The decision to deploy HVDC cable technology has further facilitated this process, with the maximum onshore cable route width being</p>	More information on the site selection process can be found in Chapter 4 Site Selection and Assessment of Alternatives.

Parameter	Mitigation measures for onshore archaeology and cultural heritage	Notes
	reduced affording a greater level of flexibility with a view to routing around areas where extant non-designated heritage assets or potentially significant sub-surface archaeological remains may be present. In the event that non-designated heritage assets cannot be avoided, initial informative stages of mitigation work will be employed and undertaken post-consent, followed by additional mitigation measures, as required (see section 28.7.2.2).	
Landscape Screening and Planting	The project has made a further commitment to incorporate effective, appropriate and suitable landscape screening and planting (as part of the ongoing onshore project substation design).	See Chapter 29 Landscape and Visual Impact Assessment for more details.

28.7.2.2 Additional Mitigation

28.7.2.2.1 Temporary suspension of works in the event of an archaeological discovery

145. Should previously unknown buried archaeological remains of a significant nature be encountered during construction works, the project has made a commitment to the temporary suspension of intrusive groundworks upon agreement with HE and NCC HES. The provision for the temporary suspension of works in the event of a significant archaeological discovery will be achieved through the implementation of an industry standard archaeological reporting protocol, at times when intrusive groundworks are being carried out where an archaeologist is not present. This will be achieved through the application of the Offshore Renewables Protocol for Archaeological Discoveries (ORPAD) (The Protocol) (The Crown Estate, 2014).
146. Although The Protocol refers primarily to the offshore schemes of development, it has been designed in such a way so as to operate in inshore, inter-tidal, and in fully terrestrial localities where an archaeologist is not present (The Crown Estate, 2014, section 1.2).
147. The main objective of The Protocol will be to reduce direct impacts from occurring on currently unrecorded heritage assets by enabling people working on the project to report unexpected archaeological discoveries in a manner that is conducive to their everyday work and that allows for efficient reporting so that archaeological advice can be provided in a timely manner.
148. The Protocol sets out a sequence of reporting and outlines the relevant roles and responsibilities required for its effective implementation. The Protocol is supported by an Implementation Service, whose duties include providing advice about immediate actions upon an archaeological discovery. Should a significant archaeological discovery be reported (as assessed on a case-by-case basis in consultation with the Archaeological Contractor, Archaeological Consultant, NCC HES

and HE), groundworks would continue elsewhere until the remains have been subject to appropriate archaeological investigation and any further requirements from an archaeological perspective ascertained and undertaken. In the event of such a discovery, archaeological requirements and necessary 'next steps' will be agreed in consultation with NCC HES and HE.

149. Further details regarding the application of The Protocol will be included in a WSI specific to the construction related package(s) of works considered to require the application of this type of mitigation measure. Tool-box talks will be provided to construction crews in-advance, with the aim being both to help ensure the identification and protection of archaeological remains (not previously known) and to ensure any associated disruption / delay to construction activities is minimised, wherever possible.

28.7.2.2.2 *Reinstatement of field boundaries and hedgerows*

150. Impact to the HLC has been minimised through careful route selection and will be mitigated further by returning field boundaries / hedgerows to their preconstruction condition and character post-construction, wherever possible.

28.7.2.2.3 *Commitment to undertake initial informative stages of mitigation works*

151. As part of the embedded mitigation, the project has submitted a project-specific draft (outline) WSI as part of the DCO application (document reference 8.5), which outlines a commitment to undertake additional programmes of survey and evaluation post-consent (to be referred to as initial informative stages of mitigation work), as previously discussed and agreed in consultation with NCC HES and HE. It is anticipated that any intrusive archaeological investigations (pre-mitigation) such as project-wide trial-trenching and targeted metal detecting / fieldwalking will take place as part of a post-consent / pre-construction programme. Intrusive archaeological surveys have the potential to indicate the presence of previously unknown buried archaeology (and further verify previously known / anticipated buried site remains as indicated by the previous non-intrusive survey methods), enabling it to be safe-guarded by means of mitigating any impacts in a manner that is proportionate to the significance of the remains present. These measures will comprise additional mitigation measures adopted by the project and will be determined as the project progresses. The project will ensure that adequate time is built into the overall programme to allow for the encountering of previously unknown remains, in order that they can be properly assessed pre-construction and appropriate mitigation approaches adopted, where required.
152. Specific and bespoke mitigation requirements will be tailored on a case-by-case / area-by-area basis (as required) accordingly and in response to the combination of

archaeological and cultural heritage assessment undertaken to date, alongside the results of the non-intrusive programme of geophysical survey. Further evaluation (initial informative stages of mitigation) and subsequent mitigation requirements (set out in the project-specific Outline WSI, document reference 8.5) are expected to comprise a combination of the following recognised standard approaches both in advance of and / or during construction:

- Additional project-wide geophysical survey;
- Targeted metal detecting and field walking;
- Earthwork condition survey;
- Archaeological Trial-trenching;
- Set-piece (open-area) Excavation. Including subsequent post-excavation assessment, and analysis, publication and archiving (where appropriate);
- Preservation in-situ (avoidance / micrositing);
- Strip, Map and Sample Excavation. Including subsequent post-excavation assessment, and analysis, publication and archiving (where appropriate); and
- Watching Brief (targeted and general monitoring and recording). Including subsequent post-excavation assessment, and analysis, publication and archiving (where appropriate).

153. In addition to those outlined above, once the project design has been further finalised (in the post-consent / pre-construction stages), certain hedgerows and field boundaries (e.g. county and parish boundaries) may require recording prior to / during the construction process and enhanced provisions made during backfilling and reinstatement. This potential requirement is included in the Outline WSI (document reference 8.5) and will be further agreed in consultation with NCC HES and HE post-consent.

28.7.3 Monitoring

154. Monitoring specific to onshore archaeology and cultural heritage will be undertaken in relation to each post-consent initial informative stage of mitigation work. Such works will be subject to a bespoke survey-specific WSI (Method Statement) to be prepared in consultation with and ultimately approved by NCC HES and HE. Having agreed the survey-specific WSIs in each case, Norfolk Boreas Limited's Archaeological Consultant / Coordinator / Contractor(s) will inform NCC HES and HE of the likely and then actual commencement dates of fieldwork for each survey / investigation type, and then provide regular updates on the progress of the surveys / investigations on site. Reasonable and regular access to the site will be arranged for representatives of NCC HES and HE, as appropriate, for inspection and monitoring visits. These will be accompanied by the Archaeological Consultant / Coordinator and Archaeological Contractor(s).

155. Archaeological investigations undertaken as part of subsequent, additional and further mitigation measures (e.g. Set-Piece Excavation, Strip, Map and Sample and Archaeological Monitoring / Watching Brief) will also be agreed with NCC HES and HE as part of pre-construction related and construction related WSIs and the archaeological works will be subject to regular monitoring visits by Norfolk Boreas Limited’s Archaeological Consultant / Coordinator to ensure that it is being carried out to the required standards and that it will achieve the stated aims and objectives. Monitoring progress meetings between Norfolk Boreas Limited, the Archaeological Consultant / Coordinator and the Archaeological Contractor(s) will be held on site during the course of the Set-Piece Excavation, Strip, Map and Sample works and any area excavated archaeologically during monitoring / watching brief. Representatives from NCC HES and HE (where applicable) shall be invited to attend in order to monitor the works on behalf of the local authorities.
156. Further details regarding monitoring in relation to onshore archaeology and cultural heritage considerations are set out in the Outline WSI (document reference 8.5).

28.7.4 Worst Case

157. The worst case assumptions with regard to onshore archaeology and cultural heritage are presented in Table 28.17 for Scenario 1 and Table 28.18 for Scenario 2. By employing a worst case approach for each project phase, element and scenario, this assessment presents the maximum possible effect upon the onshore archaeological and cultural heritage resource within the study areas and onshore project area. As such, impacts of greater adverse significance would not arise should any other project elements (from those described in Chapter 5 Project Description) than that assessed within this chapter be taken forward in the final project design. The implementation of embedded and additional mitigation measures (strategies) (see section 28.7.2) will ensure the application of appropriate levels of protection / off-set type mitigation responses for heritage assets when the project design is finalised.

Table 28.17 Worst Case Assumptions Scenario 1

Worst case assumptions			
Parameter	Worst case criteria	Worst case definition	Notes
Landfall			
Construction	Method	Trenchless technique	HDD
	HDD horizontal length (m)	1,000m	Indicative length
	Maximum number of drills	3	Maximum considers allowance for a failed drilling attempt.
	Maximum drill diameter	750mm	

Worst case assumptions			
Parameter	Worst case criteria	Worst case definition	Notes
	Indicative target depth of drill	Up to 20m	Depth relative to mean sea level
	Number of cable ducts	2	One duct per drill (duct would not be installed in a failed drill).
	Maximum temporary works duration	20 weeks.	Based on 7am-7pm normal working hours. 7 Days a week.
	Excavated material	1,325m ³	Excavated material based on maximum drill dimensions (1000m by 750mm) and a maximum of 3 drills.
	Temporary access track width	6m	
	Expected noise level	See Chapter 25 Noise and Vibration	
Landfall compounds	Maximum number and maximum land take for temporary landfall compounds	6,000m ²	Assumes two compounds at 3,000m ² (50m x 60m) to support parallel drilling rigs.
	Landfall transition pits maximum footprint	1,500m ²	Two pits in total, one pit required per circuit. 10m x 15m x 5m deep.
Onshore cable route			
Construction (cable pulling only)	Method	Pulling of cables through pre-installed ducts	Cables will be pulled through the ducts installed by Norfolk Vanguard.
	Cable pull maximum footprint	85,500m ²	Cable pull footprint includes the running track and jointing pits
	Gaps at hedgerow / other crossing points	6m	For running track reinstallation only.
	Running Track width and length	6m and 12km	Up to 20% of the running track utilised by Norfolk Vanguard will need to be reinstalled to facilitate cable pulling
	Running track excavated depth	300mm	
	Excavated material for running track	21,600m ³	Volume based on worst case assumption of reinstallation of 12km length of the running

Worst case assumptions			
Parameter	Worst case criteria	Worst case definition	Notes
			track, with a width of 6m and a depth of 0.3m
Permanent jointing pits	Maximum number and required dimensions	Assumes 150 at 90m ² and 2m deep each	Dimensions 6m (w) x 15m (l). Spaced approximately one per circuit per 800m cable.
Permanent link boxes	Maximum number and required dimensions	Assumes 24 at 1.5m x 1.5m if below ground and 1.2m x 0.8m x 1.8m if above ground	1 link box per circuit typically be placed at 5km intervals. Type of link box and exact locations to be defined during detailed design. Above ground boxes typically sited on a 0.15m deep concrete slab.
Cable logistics area	Maximum number and required dimensions	Assumes one compound with an area of 4,190m ²	A cable logistics area has been identified for the storage of materials, welfare facilities, etc.
	Area of ground protection at cable logistics area	100% existing hardstanding	
Construction Programme	Cable pulling works	2026-2027	
	Total construction window	2 years	2 years phased cable pulling
Operation	Maximum number of link boxes	24	1 link box per circuit typically be placed at 5km intervals
	Access	Annual	Periodic access to installed link boxes may be required for inspection, estimated to be annually.
Decommissioning	Method	Jointing pits and ducts left in-situ	Where cables are in pre-installed ducts, cables may be extracted once de-energised.
Onshore project substation			
Construction	Maximum land take for construction works at the onshore project substation	95,000m ²	Operational area for substation (250m x 300m) plus temporary construction compound (200m x 100m).
	Maximum land take for temporary works area at Spicers Corner	10,000m ²	Spicers Corner compound 100 x 100m.
	Maximum duration	30 months	Indicative construction window 24 months.
	Substation foundations	Piled	Assumes worst case there is piling as part of construction of foundations

Worst case assumptions			
Parameter	Worst case criteria	Worst case definition	Notes
	Access road construction	6m width and approx. 300m extension length	Extension to the existing access road installed by Norfolk Vanguard from the A47 via the new junction at Spicers Corner.
	Vehicle movements	3,934 (total one way deliveries)	Access would be shared with Norfolk Vanguard. Vehicle movements include those for associated temporary works compound.
	Construction noise level	See Chapter 25 Noise and Vibration	
Operation	Maximum land take for permanent substation footprint	75,000m ²	The total land requirement for the onshore project substation to the perimeter fence is 250m x 300m
	Substation Tallest Structure	25m	Lightning Protection Masts
	Substation Largest building	19m	Two Converter Hall buildings required
	Height of fencing	3.4m	2.4m palisade + 1m electrified
	Maximum land take for new access road	1,800 m ²	Dimensions 300m x 6m.
	Operation period	30 years	
	Appearance of building	Steel framed with cladding and palisade fencing	
	Expected noise level	See Chapter 25 Noise and Vibration	
	Maintenance visits	One visit per week, site lighting required during maintenance visits	
Decommissioning	No decision has been made regarding the final decommissioning policy for the onshore project substation, as it is recognised that industry best practice, rules and legislation change over time. However, the onshore project equipment will likely be removed and reused or recycled. 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, for the purposes of a worst case scenario, impacts as for the construction phase are assumed.		
National Grid substation extension and overhead line modifications			
Construction	Maximum land take for construction works at substation extension	95,250m ²	Operational area (135m x 150m) plus temporary compound adjacent to

Worst case assumptions			
Parameter	Worst case criteria	Worst case definition	Notes
			eastern extension site (150m x 200m) and compound adjacent to the Norfolk Vanguard Extension (300m x 150m).
	Maximum duration	30 months	Indicative construction window 24 months.
	Number of 400kV HVAC interface cables	12	Up to 4 trenches, 3 cables per trench, total of 12 cables
	400kV HVAC interface cable route indicative length	1,750m	
	Vehicle movements	1,531 (total one way deliveries)	
	Construction noise level	See Chapter 25 Noise and Vibration	
Operation	National Grid substation permanent eastern extension	Outdoor busbars and landing gantries for 5 AIS bays	
	Maximum land take for substation extension permanent footprint	20,250m ²	Permanent eastern extension footprint approx. 135m length and 150m wide
	Maximum height of equipment	15m	Gantries
	Height of fencing	4m	2.4m palisade (outer) and 4m electrified (inner)
	Operation period	30 years	
	Access	1 visit per month approximately	Site lighting required during maintenance visits

Table 28.18 Worst Case Assumptions Scenario 2

Worst case assumptions			
Parameter	Worst case criteria	Worst case definition	Notes
Landfall			
Construction	Method	Trenchless technique (e.g. HDD)	Horizontal Directional Drilling (HDD).
	HDD horizontal length (m)	1,000m	Indicative length
	Maximum no. of drills	3	Maximum considers allowance for a failed drilling attempt.
	Maximum drill diameter	750mm	
	Indicative target depth of drill	Up to 20m	Depth relative to mean sea level.
	No of cable ducts	2	One duct per drill (duct would not be installed in a failed drill).
	Maximum temporary works duration	20 weeks	Based on 7am-7pm normal working hours. 7 Days a week.
	Excavated Material	1,325m ³	Excavated material based on maximum drill dimensions (1000m by 750mm) and a maximum of 3 drills.
	Temporary access track width	6m	
Expect noise level	See Chapter 25 Noise and Vibration		
Landfall compounds	Maximum number and maximum land take for temporary landfall compounds	6,000m ²	Assumes two compounds at 3,000m ² (50m x 60m) to support parallel drilling rigs.
	Landfall transition pits maximum footprint	1,500m ²	Two pits in total, one pit required per circuit. 10m x 15m x 5m deep.
Onshore cable route			
Construction – duct installation	Method	Open cut trenching and trenchless crossing methods	Trenchless crossing methods (HDD, micro tunnelling or auger boring).
	Maximum working width and length	35m and 60km	
	Onshore cable route maximum footprint	2,100,000m ²	60km length of cable route x 35m working width
	Minimum burial depth	1.05m to top of duct	Minimum 1.05m to top of ducts for 'normal' agricultural, 1.2m 'deep ploughing' agricultural to top of duct. Up to 20m at trenchless crossings.
	Depth of trench	1.5m	

Worst case assumptions			
Parameter	Worst case criteria	Worst case definition	Notes
	Width of cable trench	1m	Trench per circuit so two separate trenches of 1m width
	Trench excavated material	180,000m ³	Volume based on 1.5 depth by 1m wide trench over 60km route x 2 circuits
	Gaps at hedgerow / other crossing points.	13m	Assumes perpendicular crossing, angled crossing up to 16.5m
	Hedgerows to be removed	165	See footnote ⁴
	Running Track width and length	6m and 60km	
	Running track excavated depth	300mm	
	Running track excavated material	108,000m ³	Volume based on worst case assumption of installation of 60km length of the running track, with a width of 6m and a depth of 0.3m
	Expected noise level	See Chapter 25 Noise and Vibration	
Mobilisation Areas	Maximum number and required dimensions	Assumes 14 at 10,000m ²	Dimensions 100m x 100m. 14 including area at Spicers Corner to be used for substation
Trenchless crossing areas (e.g. HDD)	Number of trenchless crossings	16	
	Trenchless reception sites. Maximum number and maximum land take	Assumes 16 pairs at 5,000m ²	Up to 100m x 50m if stop end employed
	Trenchless launch sites. Maximum number and maximum land take	Assumes 16 pairs at 7,500m ²	Up to 150m x 50m if stop end employed
Construction - cable pulling	Cable pulling maximum footprint	85,500m ²	Cable pull footprint includes the running track and jointing pits
Permanent jointing pits	Maximum number and required dimensions	Assumes 150 at 90m ² and 2m deep each	Dimensions 6m (w) x 15m (l). Spaced approximately one per circuit per 800m cable.
Permanent link boxes	Maximum number and required dimensions	Assumes 24 at 1.5m x 1.5m if below ground and 1.2m x 0.8m x 1.8m if above ground	1 link box per circuit typically be placed at 5.0 km intervals. Type of link box and exact locations to be defined during detailed design.

⁴ Hedgerows estimated based on 110 hedgerows surveyed within the onshore infrastructure plus a further 55 identified from the Norfolk Living Map and aerial photography taken in 2017. The final number of hedgerows to be removed will be determined during surveys of the unsurveyed areas post-consent when access becomes available.

Worst case assumptions			
Parameter	Worst case criteria	Worst case definition	Notes
			Above ground boxes typically sited on a 0.15m deep concrete slab.
Cable logistics area	Maximum number and required dimensions	Assumes one compound with an area of 4,190m ²	A cable logistics area has been identified for the storage of materials, welfare facilities, etc.
	Area of ground protection at cable logistics area	100% existing hardstanding	
Construction programme - overall	Total Construction programme	2021-2026	Pre-construction works would consist of road modifications, hedge and tree removal, ecological preparations, archaeological survey and pre-construction drainage.
	Pre-construction works	2021-2022	
	Duct installation	2023-2024	
	Cable pulling works	2025-2026	
Operation	Maximum number of link boxes	24	1 link box per circuit typically be placed at 5.0 km intervals
	Access	Annual	Periodic access to installed link boxes may be required for inspection, estimated to be annually.
Decommissioning	Method	Joining pits and ducts left in situ	Where cables are in pre-installed ducts, cables may be extracted once de-energised.
Onshore project substation			
Construction	Maximum land take for construction works for onshore project substation	95,000m ²	Operational area for Substation 250m x 300m= 75,000m ² plus additional temporary construction compound 20,000m ² .
	Maximum duration	30 months	Indicative construction window 24 months.
	Substation foundations	Piled	Assumes worst case there is piling as part of construction of foundations
	Construction Access road from A47	6m width and approx. 1.8m length	Installation of new access road from A47, including junction improvements
	Vehicle movements	4,315 (total one way deliveries)	Vehicle movements include for associated temporary works compound.
	Construction noise level	See Chapter 25 Noise and Vibration	

Worst case assumptions			
Parameter	Worst case criteria	Worst case definition	Notes
Operation	Maximum land take for permanent substation footprint	75,000m ²	The total land requirement for the onshore project substation to the perimeter fence is 250m x 300m
	Substation Tallest Structure	25m	Lightning Protection Masts
	Substation Largest building	19m	Two Converter Hall buildings required
	Height of fencing	3.4m	2.4m palisade + 1m electrified
	Maximum land take for access road	10,800m ²	Dimensions 1.8km x 6m. New access road from A47.
	Operation period	30 years	
	Access	One visit per week on average	Site lighting required during maintenance visits
	Expected noise level	See Chapter 25 Noise and Vibration	
Decommissioning	<p>No decision has been made regarding the final decommissioning policy for the onshore project substation, as it is recognised that industry best practice, rules and legislation change over time. However, the onshore project equipment will likely be removed and reused or recycled. 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, for the purposes of a worst case scenario, impacts as for the construction phase are assumed.</p> <p>Foundations for the project will either exist in the form of concrete pad foundations (which would likely be broken out and removed) or piled foundations (which would likely be cut off sub-surface). The application of best practice measures during transformer drainage operations would ensure that any leakage would be dealt with quickly and efficiently. As such, for the purposes of a WCS, impacts are assumed to be no worse than impacts assessed for the construction phase.</p>		
National Grid substation extension and overhead line modification			
Construction	Maximum land take for construction works at substation extension	97,500m ²	Operational area (200m x 150m) plus temporary compounds (150m x 150m and 300m x 150m).
	Maximum duration	30 months	Indicative construction window 24 months.
	Number of 400kV HVAC interface cables	12	Up to 4 trenches, 3 cables per trench, total of 12 cables
	400kV HVAC interface cable route indicative length	1,850m	
	Maximum land take for temporary works area – overhead line	176,310 m ²	

Worst case assumptions			
Parameter	Worst case criteria	Worst case definition	Notes
	Temporary towers number of max. height	3 at 45m	
	New permanent overhead line towers number and max. height	2 at 55m	The existing corner tower will be demolished such that the net new number of towers is one.
	Tower foundations	Piled	4 piles required per tower
	Vehicle movements	2,450 (total one way deliveries)	
	Construction noise level	See Chapter 25 Noise and Vibration	
Operation	National Grid substation permanent western extension	Outdoor busbars and landing gantries for 7 AIS bays	
	Maximum land take for substation extension permanent footprint	30,000m ²	Permanent western extension footprint approx. 200m length and 150m wide
	Maximum height of equipment	15m	Gantries
	Height of fencing	4m	2.4m palisade (outer) and 4m electrified (inner)
	Operation period	30 years	
	Access	1 visit per month approximately	Site lighting required during maintenance visits
	Maximum number and height of new overhead line towers	2 towers at 55m	1 new tower and 1 replacement tower.
	Maximum land take for overhead line permanent footprint	Up to 1,000m ²	Assumes two new permanent overhead line towers will be required.

158. Chapter 5 Project Description outlines the timings to be assessed in relation to the phasing of the works. For archaeology and cultural heritage, with regards to direct (physical) impacts, there is no identified increased impact arising from either a one phased or two phased approach. As such, the phasing of works is not a material consideration with respect to determining a WCS in relation to direct impacts upon heritage assets. However, with regards to indirect (non-physical) impacts upon the setting of heritage assets, the two phase option is assumed to be the worst case, due to the increased length of time that heritage assets will be potentially impacted by the project.

28.7.5 Potential Impacts during Construction

28.7.5.1 Impact (1) Direct Impact on (Permanent Change to) Buried Archaeological Remains

159. Impacts resulting in potential effects as part of construction work are those associated with intrusive groundworks. All direct impacts to archaeological heritage assets are considered permanent. 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.
160. Direct impacts to the fabric or physical setting could represent a total loss of an asset, or part of it, and the character, composition or attributes of the asset could be fundamentally changed or lost from the site altogether. As such, direct impacts on buried archaeological remains are generally considered to be of high magnitude of effect. However, the extent of any impact will 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 area of the asset subject to impact. 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. The magnitude of effect of direct impacts on buried archaeological remains during the construction phase could therefore range from negligible to high.
161. Areas in which sub-surface archaeological remains may be present (based on available data) have been identified as part of a staged programme of assessment (see section 28.6.3.1 and Appendix 28.7). Those considered to be most vulnerable with regards to the various elements of construction are highlighted below. Post-consent initial informative stages of mitigation work (see section 28.7.2) have the potential to verify previously known / anticipated buried site remains (as indicated by previous non-intrusive survey works) and may further inform the nature and extent of any features present. Such mitigation work therefore has the potential to alter the perceived heritage significance of assets encountered as indicated by current available data.
162. Post-consent initial informative stages of mitigation work and / or subsequent mitigation measures may also indicate the presence of previously unknown buried archaeology not currently represented by available data. In the absence of further data regarding the 'potential' archaeological resource, such assets must be considered as potentially having a high perceived heritage significance based upon a WCS.

28.7.5.1.1 Scenario 2

163. Impacts resulting in potential effects as part of construction work under Scenario 2 are those associated with intrusive groundworks, including:

- The removal of topsoil anywhere across the onshore project area;
- The excavation of transition pits at the landfall;
- The application of trenchless techniques at the landfall and at crossing locations;
- Open cut trenching as part of the duct installation works;
- The excavation of jointing pits along the onshore cable route;
- The excavation for link box installation;
- Groundworks associated with the onshore cable route working width, mobilisation areas, and associated access trackways; and
- Groundworks associated with onshore infrastructure (e.g. onshore project substation, and the National Grid substation extension and overhead line modifications).

Landfall

164. Construction activities in the landfall area that have the potential to directly impact buried archaeological remains are those associated with HDD works (up to a maximum of three onshore bores), the excavation of the transition pits (to be sited within the landfall compounds within the landfall compound zone) and groundworks associated with the HDD compound areas and associated access routes.
165. Potential sub-surface remains of archaeological interest that intersect the landfall are outlined in Table 28.19.

Table 28.19 Interaction between the landfall and archaeological remains

Route Section	ID (AP, RHDHV, NHER) (Headland Field Number)	Anticipated heritage significance (importance)	Interaction (WCS)	Magnitude of Effect	Adverse Impact Significance (pre- mitigation)
Landfall Figures 28.2a, 28.4a, 28.6a and 28.7a (map 1)	AP 80 RHDHV 814 NHER 36495 (F162 and F164 to F166)	Medium	Yes: the landfall compound zone intersects a small number of cropmark features captured as AP 80, although there is only a slight interaction with these cropmarks and the landfall indicative compounds, as a result of micrositing undertaken as part of the engineering design.	Low - Medium	Minor - Moderate
	AP 91 RHDHV 828 NHER 16015 (F165 and F166)	High (as a WCS)	Yes: the landfall compound zone intersects a small number of cropmark features captured as AP 91, although there is only a slight interaction with these cropmarks and the landfall indicative compounds, as a result of micrositing undertaken as part of the engineering design.	Low	Moderate (as a WCS)
	AP 84 RHDHV 1143 NHER 38773 (F165)	Low	No. This feature is located beyond the landfall compound zone and will not be subject to direct impact.	N/A	No impact
	AP 86 RHDHV 1529 NHER 15918 (F165)	Low - Medium	No. This feature is located beyond the landfall compound zone and will not be subject to direct impact.	N/A	No impact
	AP 88 RHDHV 1627 NHER 38776 (F165)	Low	No. This feature is located beyond the landfall compound zone and will not be subject to direct impact.	N/A	No impact
	RHDHV 916 / NHER 38778	Low	No. This feature is located beyond the landfall compound zone and will not be subject to direct impact.	N/A	No impact

166. The landfall compound zone intersects a small number of potential linear features captured as AP 80 (extensive area of multi period cropmarked ditches - likely field systems tracks and boundaries) and AP 91 (extensive cropmarked multi period landscape, field trackways, and ditches). These linear features are, in part, corroborated by the geophysical survey data acquired in F163-166. The access route to the landfall also interacts with a small number of linear features (cropmarks) captured as AP 80.
167. In the absence of mitigation, all direct impacts to areas of possible archaeological interest (as signified by AP80 and AP91) as part of construction works at the landfall could result in a **minor to moderate adverse** impact significance, based upon a worst case assumption. However, with the application of site-specific additional mitigation measures (where required), it is anticipated that such impacts can be reduced to residual levels considered **non-significant** in EIA terms. If / when a DCO is granted initial informative stages of mitigation work (see section 28.7.2.2) will be undertaken in agreement with NCC HES and HE in order to further establish specific and bespoke mitigation requirements on a case-by-case / area-by-area basis, as required. These commitments are set out in a project-specific Outline WSI (document reference 8.5).

Onshore Cable Route

168. Construction activities under Scenario 2 along the onshore cable route that have the potential to directly impact buried archaeological remains are those associated with top-soil stripping, cable trenching, trenchless techniques (e.g. HDD) at key crossing points, excavation for jointing pits and link boxes and groundworks associated with construction work areas (e.g. mobilisation areas and trenchless crossing compounds) and the running track.
169. Due to the extent (60km length and up to 35m width) of the onshore cable route, there is potential for interaction to occur between the construction activities and a large number of potential areas of sub-surface archaeological remains. In order to help identify the interactions which have the potential to occur, the various project elements relating to the onshore cable route have been drawn out in Table 28.20 and identified in relation to the area in which there is considered to be potential for buried archaeological remains to be present.
170. As sub-surface archaeological remains have not as yet been evaluated through intrusive survey techniques (e.g. ground truthed through archaeological trial trenching), the exact condition, nature and extent of many features currently identified within the cable route is unknown. In addition, prior to ground truthing exercises, there is an inherent inability to accurately ascertain the presence / absence and extent of the potential buried remains therein. Table 28.20 has therefore been produced based on information available to date and incorporates a worst case (precautionary) approach.

Table 28.20 Interaction between the cable route and archaeological remains

Route Section	Project Element	ID (AP, RHDHV, NHER) + (Headland AAAs / Field Number)	Anticipated heritage significance (importance)	Interaction (WCS)	Magnitude of Effect	Adverse Impact Significance (pre-mitigation)
Onshore project substation to MA 1b (Figures 28.2a (maps 21-22) and 28.2b and c, 28.4a (maps 21-22) and 28.4b and c, 28.6a (maps 21-22) and 28.6 b and c) and 28.7a (maps 21-22) and 28.7 b and c)	Cable route	AP 3 (F10)	Low	Minimal: Cable route intersects the outer-most mapped boundary of this feature by c. 7m. The cable has been routed southwards in this location to avoid these cropmark features.	Low	Minor
		AP 4 (F10)	Low	Yes: Cable route interacts with small sections of these linear features (former field system, post-enclosure field boundaries now removed and visible only as cropmarks) identified and captured as AP 4.	Medium	Minor
		Wood Farm and Grove Farm	Low	Yes (in part): Level of surviving sub-surface remains unquantifiable / unknown based on current data.	Medium	Minor
MA 1b to 2 (Figures 28.2a, 28.4a, 28.6a, and 28.7a, map 21)	No features of possible archaeological interest were identified by the aerial photographic and LiDAR data assessment within this section of the route and as such, it has not been subject to priority geophysical survey pre-consent. It will, however, be further considered as part of the initial informative stages of mitigation work (e.g. further geophysical survey, targeted metal detecting / field walking and archaeological trial trenching) post-consent.					

Route Section	Project Element	ID (AP, RHDHV, NHER) + (Headland AAAs / Field Number)	Anticipated heritage significance (importance)	Interaction (WCS)	Magnitude of Effect	Adverse Impact Significance (pre-mitigation)
MA 2 to 3 (Figures 28.2a, 28.4a, 28.6a and 28.7a, maps 19-21)	Trenchless Crossing Zone (Little; Wood): TC3a/b	AP 5 (F14 and F16)	Low	Yes: There is a limited interaction between the trenchless crossing zone to the west of Gressenhall and a small number of cropmark features (ditches) identified and captured as AP 5. Some of the cropmark features intersect the proposed Indicative Trenchless Crossing Footprint in this area.	Medium	Minor
		(F18 and F19)	Low	Yes: There is an interaction between the trenchless crossing zone to the east of Gressenhall Road and a number of linear features (former field boundaries) shown in geophysical data acquired in F18 / 19.	Low	Minor
MA 3 to MA 4 (Figures 28.2a, 28.4a 28.6a and 28.7a, maps 18-19)	Cable route	AP 159 RHDHV 1180 NHER 50699	Medium	Yes (in part): Cable route interacts with the southern extent of this medieval / post-medieval road.	Low	Minor
	Trenchless Crossing Zone: TC4	(F20 and F22)	Low	Yes: Interaction between indicative trenchless crossing footprint and field boundary feature in F22.	Low	Minor
MA 4 to MA 5a (Figures 28.2a, 28.4a, 28.6a and 28.7a maps 16-18)	Trenchless Crossing Zone: TC5a/b	(F25 to F29)	Low	No: Ferrous material from a demolished structure on historical maps (F27) is within a trenchless crossing location, but is unlikely to be directly impacted.	Negligible	Negligible
	Trenchless Crossing Zone: TC5a/b	AP 6 RHDHV 811 NHER 2999 (F32, F33 and F38 / 39)	Medium - High (as a WCS)	Yes (in part): There is an interaction between the trenchless crossing zone to the east of the River Wensum and a number of cropmark features (field boundaries, trackways and ditches) identified and captured as AP 6. A number of these features are within the proposed Indicative Trenchless Crossing Footprint in this area. Geophysics appears to show less density and complexity of remains, requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	Low	Minor - Moderate (as a WCS)

Route Section	Project Element	ID (AP, RHDHV, NHER) + (Headland AAAs / Field Number)	Anticipated heritage significance (importance)	Interaction (WCS)	Magnitude of Effect	Adverse Impact Significance (pre-mitigation)
	Cable route			Yes: Cable route interacts with a number of linear features (field boundary, field system, trackway and ditch) identified and captured on the periphery of AP 6. Geophysics appears to show a lesser density and complexity of remains, requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	Low	Minor-Moderate (as a WCS)
	Side access: South of Bylaugh Road (between River Wensum and Mill Street)			Minimal: Slight interaction between side access and the northernmost extent on a small number of cropmark features.	Low	Minor – Moderate (as a WCS)
	Cable route	RHDHV 1524 NHER 50771	Low	Yes: The possible WWII roadside ammunitions stores / defences follow the route of Bylaugh / Lime Kiln Road. Sub-surface remains, if present are, however, likely to be minimal.	Low	Minor
	Cable route	RHDHV 947 NHER 14228 F40/41	Low - Medium	Yes: cropmarks of an undated possible Roman road intersect the cable route at this location.	Medium	Minor – Moderate (as a WCS)
	Cable route	AP 14 RHDHV 1104 NHER 3024 (F40b and F41b)	Low	Minimal: Cable route interacts with a single linear feature, features (field boundary, field system, extractive pit) identified and captured as AP 14.	Low	Minor
MA 5a to MA 5b (Figures 28.2a,	MA 5a			Minimal: Mobilisation zone MA 5a interacts with a number of linear features (post-medieval field boundary, field system or extractive pit) identified and captured as AP 14, although only one feature intersects the indicative mobilisation area footprint (in the north-eastern extent of the mobilisation zone).	Medium	Minor

Route Section	Project Element	ID (AP, RHDHV, NHER) + (Headland AAAs / Field Number)	Anticipated heritage significance (importance)	Interaction (WCS)	Magnitude of Effect	Adverse Impact Significance (pre-mitigation)
28.4a, 28.6a and 28.7a maps 15-16)		AP 15 RHDHV 1523 NHER 50770	Low	Yes: MA5a (including the indicative mobilisation area compound) interacts with former WWII features (sub-surface remains may be present) identified and captured as AP 15.	Medium	Minor
	Cable route			Yes (in part): Cable route interacts with former WWII features (sub-surface remains may be present) identified and captured as AP 15.	Medium	Minor
MA 5b to MA 6 (Figures 28.2a, 28.4a, 28.6a and 28.7a, maps 12-15)	Cable route	RHDHV 434 NHER 2796	Medium	Yes: The Fen Causeway Roman road intersects the cable route at this location.	Medium (as a WCS)	Moderate (as a WCS)
	Trenchless Crossing Zone: TC6	RHDHV 1499 NHER 13585	Low	No: Interaction between this asset (the Midland and Great Northern Joint Railway) and the construction works is negligible due to the adoption of trenchless crossing techniques at this location.	Negligible	Negligible
	Trenchless Crossing Zone: TC7	RHDHV 1498 NHER 13587	Low	No: Interaction between this asset (the Route of East Norfolk Railway, Aylsham Branch, including Bure Valley Railway) and the construction works is negligible due to the adoption of trenchless crossing techniques at this location.	Negligible	Negligible
		RHDHV 966 / NHER 56980	High (as a WCS)	Yes: Level and survival of sub-surface remains unquantifiable / unknown based on current data. The indicative trenchless crossing footprint is located within an area in which metal finds of Anglo-Saxon date have been previously discovered.	Unknown	Unknown
	Cable route	RHDHV 966 / NHER 56980	High (as a WCS)	Yes: Level and survival of sub-surface remains unquantifiable / unknown based on current data. The cable route intersects an area in which metal finds of Anglo-Saxon date have been previously discovered.	Unknown	Unknown
	Cable route	AP 27 (F49 to F52)	Low	Yes: Cable route interacts with linear features (field boundary ditches) identified and captured as AP 27 and visible in F49 and 52. Additional linear features (former field boundaries) are also visible in F49 and intersected by the cable route.	Medium	Minor
	Trenchless Crossing Zone: TC8			Minimal: There is an interaction between the trenchless crossing zone and a small number of cropmark features (ditches / field boundaries) identified and captured as AP 27. A number of linear	Medium	Minor

Route Section	Project Element	ID (AP, RHDHV, NHER) + (Headland AAAs / Field Number)	Anticipated heritage significance (importance)	Interaction (WCS)	Magnitude of Effect	Adverse Impact Significance (pre-mitigation)
	Side access: South of the Cawston Road (B1145) to the west of Cawston			features (possible former field boundaries) are shown on geophysical survey data acquired in F50 / 51. Features within the proposed Indicative Trenchless Crossing Footprint in this area are confined to a curved feature identified as being possible archaeology within the geophysical survey data for F50. Yes: Interaction between side access and two minor cropmark features.	Medium	Minor
MA 6 to MA 7 (Figures 28.2a, 28.4a, 28.6a and 28.7a, maps 11-12)	MA 6	F54 AAA3	Medium - High (as a WCS)	Yes: Mobilisation zone MA 6 interacts with a number of linear features (possible former field boundaries / enclosures) identified in geophysical survey data acquired in F54. The indicative mobilisation area footprint (in the south-eastern extent of the mobilisation zone) is proposed in an area which intersects a few linear features (former field boundaries only).	Low	Minor – Moderate (as a WCS)
	Cable route			Yes: the cable route intersects a relatively high concentration of potential sub-surface remains as indicated in the geophysical survey data for F54. Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	Medium - High (as a WCS)	Moderate – Major (as a WCS)
	Cable route	F55 and F56	Low	No: the cable route does not intersect features identified as being of archaeological interest within this area.	Negligible	Negligible
	Cable route	AP 28 RHDHV 1183 / 698 NHER 51469 / 21848 AAA4	Low - Medium	Yes (slight): The cable route intersects a small number of linear features identified as being of possible archaeological interest in F57. The main concentration of archaeological features in the northern extent of this field, and within the wider extent of AP 28, are avoided by the cable route.	Low	Minor

Route Section	Project Element	ID (AP, RHDHV, NHER) + (Headland AAAs / Field Number)	Anticipated heritage significance (importance)	Interaction (WCS)	Magnitude of Effect	Adverse Impact Significance (pre-mitigation)
		(F57)				
	Cable route	RHDHV 1266 NHER 23276 (F58)	Low	Yes: the cable route intersects an area in which ferrous material has been identified in the geophysical survey data (area of a former brickyard) and a linear feature identified as being of possible archaeological interest.	Medium	Minor
	Cable route	AP 34 (F59)	Medium	Yes (in part): the cable route intersects a small number of linear features (ditches) identified and captured as AP 34 and visible in F59.	Medium	Moderate
	Cable route	AP 30 RHDHV 1597 / NHER 22903 AAA5 F60 and F61	Medium - High (as a WCS)	Yes: although the cropmark features captured as AP 30 are avoided, the geophysical survey data indicates archaeological features in the north-west of F60 (rectilinear enclosure and trackway), which are intersected by the cable route. These features may be associated with AP 30 in F61. Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	High (as a WCS)	Major (as a WCS)
	Cable route	AP 36 RHDHV 1600 NHER 29565 (F62 and F63)	Low	Yes: the cable route intersects linear features (potential ditches and trackways) identified and captured as AP 36. These features are not visible on the geophysical survey data for F62 and F63.	Medium	Minor
	Cable route	(F65)	Low	Yes (slight): the cable route intersects at least two former field boundaries identified in the geophysical survey data for F65.	Low	Minor
	Cable route	AP 37 (F64)	Medium	Yes (slight): the cable route intersects a possible ditch identified and captured as AP 37 (not visible on geophysical survey data for F64).	Medium	Minor - Moderate
MA 7 to MA 8	MA 7			Yes (slight): Mobilisation zone MA 7 interacts with two linear features (ditches) identified and captured as AP 37. The indicative mobilisation area footprint (in the northern extent of the	Low	Minor

Route Section	Project Element	ID (AP, RHDHV, NHER) + (Headland AAAs / Field Number)	Anticipated heritage significance (importance)	Interaction (WCS)	Magnitude of Effect	Adverse Impact Significance (pre-mitigation)
(includes National Trust Land) (Figures 28.2a, 28.4a, 28.6a and 28.7a, maps 9-11)				mobilisation zone) is proposed in an area which intersects one such linear feature (ditch) observed in AP 37.		
	MA 7	RHDHV 1490 NHER 13581	Low	Yes: Mobilisation zone MA 7 (including the indicative mobilisation area footprint) intersects the route of the Midland and Great Norfolk Joint Railway at this location, now dismantled.	Medium	Minor
	Cable route			Yes: the cable route intersects the route of the Midland and Great Norfolk Joint Railway at this location, now dismantled.	Medium	Minor
	Cable route	AP 39 RHDHV 1588 NHER 12974 (F67 and F68)	Medium – High (as a WCS)	Yes: the cable route intersects a number of linear features (field systems and trackways) identified and captured as AP 39 and shown in F67-68 although the 45m wide cable route has been routed to avoid the densest concentration of cropmarks, where possible. Geophysics appears to show a lesser density and complexity of remains, requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	Medium	Moderate - Major (as a WCS)
	Side access: Descending south from Whitetop Lane (to the west of Silvergate Lane)			Yes: Interaction with linear features (possible archaeology) visible in geophysical survey data acquired in the east of F68, requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	Low	Minor - Moderate (as a WCS)
Cable route	AP 40 RHDHV 1589 NHER 12975 (F70 to F74)	Medium – High (as a WCS)	Yes: the cable route intersects a few linear features (former field boundaries / ditches) identified and captured as AP 40 and shown in F70, although many of the cropmark features captured in AP 40 are avoided.	Low	Minor - Moderate (as a WCS)	

Route Section	Project Element	ID (AP, RHDHV, NHER) + (Headland AAAs / Field Number)	Anticipated heritage significance (importance)	Interaction (WCS)	Magnitude of Effect	Adverse Impact Significance (pre-mitigation)
				Geophysics appears to show a lesser density and complexity of remains, requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.		
	Side access: Descending south-west from Blickling Road (to the east of Silvergate Lane)			<p>Yes (slight): the side access intersects the end of a cropmark feature in this location.</p> <p>Geophysics appears to show a lesser density and complexity of remains, requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.</p>	Low	Minor - Moderate (as a WCS)
	Cable route	(F75 and F76)	Low (for traditional shallow sub-surface)	Yes (slight): cable route interacts with a single field boundary visible in the geophysical survey data acquired for F75.	Low	Minor
	Side access: Adjacent and parallel to Drabblegate Road (east of the River Bure)	AP 43 RHDHV 1616 NHER 36453 (F79 and F80)	Low	Yes (very slight): Interaction with cropmark feature identified and captured as AP 43.	Low	Minor
	Trenchless Crossing Zone: TC9a/b			Yes: To the east, there is an interaction between the trenchless crossing zone and a small number of cropmark features (ditches) identified and captured as AP 43. These linear features are not corroborated by geophysical data acquired in F79 / 80. No features have been identified based on data available to date within the indicative trenchless crossing compound to the west in this area.	Medium	Minor

Route Section	Project Element	ID (AP, RHDHV, NHER) + (Headland AAAs / Field Number)	Anticipated heritage significance (importance)	Interaction (WCS)	Magnitude of Effect	Adverse Impact Significance (pre-mitigation)
	Trenchless Crossing Zone: TC10			Yes: There is an interaction between the trenchless crossing zone and cropmark features identified and captured as AP 43, with one cropmark feature (former field boundary) located within the indicative trenchless crossing compound.	Medium	Minor
		AP 46 RHDHV 531 / 1614 NHER 60062 / 3370 (F80 to F83)	Medium - High (as a WCS)	<p>Yes: There is an interaction between the trenchless crossing zone and cropmark features identified and captured as AP 46, with a number of cropmark features (ditches / trackways) located within the indicative trenchless crossing compound.</p> <p>Geophysics appears to show a lesser density and complexity of remains, requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.</p> <p>The most significant looking feature (the Henge Monument) has been deliberately and proactively avoided.</p>	Medium (as a WCS)	Moderate - Major (as a WCS)
MA 8 to MA 9 (Figures 28.2a, 28.4a, 28.6a and 28.7a, maps 7-9)	MA 8			<p>Yes: Mobilisation zone MA 8 (including the indicative mobilisation area footprint) intersects a trackway captured in AP 46.</p> <p>Geophysics appears to show a lesser density and complexity of remains, requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.</p> <p>The most significant looking feature (the Henge Monument) has been deliberately and proactively avoided by the project design.</p>	Medium (as a WCS)	Moderate - Major (as a WCS)
	MA 8	AP 44 RHDHV 531 NHER 60062	Medium - High (as a WCS)	Yes: AP 44 is intersected by the mobilisation zone but is beyond the parameters of the indicative mobilisation area footprint.	Low	Minor - Moderate

Route Section	Project Element	ID (AP, RHDHV, NHER) + (Headland AAAs / Field Number)	Anticipated heritage significance (importance)	Interaction (WCS)	Magnitude of Effect	Adverse Impact Significance (pre-mitigation)
		(F82)		Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.		
	Side access: Running westwards from Banningham Road and northwards directly adjacent to the A140			<p>Yes: there is an interaction with cropmark features identified and captured as AP 44, including a possible enclosure (which is in the location of the A140, but with only partial survival likely at best).</p> <p>Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.</p>	Low	Minor - Moderate
	Trenchless Crossing Zone: TC10	AP 45 RHDHV 531 NHER 3370 (F82)	High	No: although the outer mapped feature boundary intersects the trenchless crossing zone, the ring-ditch (Henge Monument) feature has been deliberately and proactively avoided by the project design.	Negligible	Minor
	Cable route	AP 48 RHDHV 1615 NHER 36454 (F85 and F86)	Low	Yes (slight): the cable route intersects a feature mapped as an earthwork (bank - possible former field boundary). This feature is considered in relation to above ground archaeological remains. Sub-surface remains intersected by the cable route in this location are confined to a possible trackway visible in the geophysical survey data for F86.	Medium	Minor
	Cable route	AP 50 AAA7 and AAA8 (F87, F88, F91)	Medium – High (as a WCS)	Yes: the cable route intersects a number of linear features (former field boundaries, ditches, trackways and enclosures) identified and captured as AP 50, with additional field boundaries and enclosures also seen in F87/F88.	Medium	Moderate - Major (as a WCS)

Route Section	Project Element	ID (AP, RHDHV, NHER) + (Headland AAAs / Field Number)	Anticipated heritage significance (importance)	Interaction (WCS)	Magnitude of Effect	Adverse Impact Significance (pre-mitigation)
				Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.		
	Trenchless Crossing Zone: TC11			<p>Yes: there is an interaction between the trenchless crossing zone and cropmark features identified and captured as AP 50. These features include former field boundaries, ditches, trackways and possible enclosures. Two cropmark features are recorded within the indicative trenchless crossing compound in this area, as is an archaeological feature identified in the geophysical survey data for F91.</p> <p>Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.</p>	Medium	Moderate - Major (as a WCS)
	Trenchless Crossing Zone: TC11	AP 51 RHDHV 1607 NHER 36499 AAA9 (F93)	High (as a WCS)	<p>Yes: there is an interaction between the trenchless crossing zone and cropmark features identified and captured as AP 51. These features, which include a possible ring-ditch, are corroborated by geophysical data acquired in F93. Features within the indicative trenchless crossing compound in this area comprise an extensive complex of criss-crossing linear and rectilinear anomalies forming multiple interlinking enclosures.</p> <p>Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.</p>	High (as a WCS)	Major (as a WCS)
	Cable route	(F95)	Low	Yes: the cable route intersects a number of former field boundaries.	Medium	Minor
	Cable route	AP 53 RHDHV 1612 NHER 35549 (F95 and F96)	Medium	<p>Yes: the cable route interacts with a number of linear features (ditches / possible enclosure) identified and captured as AP 53 (not observed on geophysical survey data for F95 and F96)</p> <p>Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.</p>	Medium	Moderate

Route Section	Project Element	ID (AP, RHDHV, NHER) + (Headland AAAs / Field Number)	Anticipated heritage significance (importance)	Interaction (WCS)	Magnitude of Effect	Adverse Impact Significance (pre-mitigation)
	Side access: Extending eastwards from Rectory Road, south of Brick Kiln Lane			Yes: Slight interaction with three recorded cropmark features identified and captured as AP 53.	Low	Minor
	Cable route	AP 54 (F98)	Low - Medium	Yes (slight): although the continuation of cropmark features into the cable route cannot be discounted, based on information to date, no cropmark features indicative of sub-surface remains are intersected by the cable route at this location. The geophysical survey data acquired in F98 suggests that a former field boundary may be intersected by the cable route at this location.	Low	Minor
	Cable route	AP 56 (F99 and F100)	Low	Yes: the cable route intersects a number of linear features (former field boundaries, trackways and ditches) identified and captured as AP 56 and observed in F99 and F100.	Medium	Minor
	Cable route	AP 55 RHDHV 435 / 762 NHER 12821 / 37987 F101	Medium – High (as a WCS)	Yes: the cable route intersects a possible enclosure / ditch identified and captured as AP 55. Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	Medium	Moderate - Major (as a WCS)
MA 9 to MA 10 (Figures 28.2a, 28.4a, 28.6a)	Trenchless Crossing Zone: TC12 / TC13	AP 57 RHDHV 435 NHER 12821 F103	Medium - High (as a WCS)	Yes (slight): The trenchless crossing zone between the East Norfolk Railway and the A149 intersects a number of cropmark features identified and captured as AP 57. There is currently (pre-application) no geophysical survey data for this area. Despite this interaction, just one linear feature (ditch) intersects an indicative trenchless crossing compound in this area (to the immediate east of the A149).	Low	Minor - Moderate

Route Section	Project Element	ID (AP, RHDHV, NHER) + (Headland AAAs / Field Number)	Anticipated heritage significance (importance)	Interaction (WCS)	Magnitude of Effect	Adverse Impact Significance (pre-mitigation)
and 28.7a, map 6)				Requires geophysical survey and subsequent ground truthing (as part of the programme of archaeological trial trenching) post-consent.		
	Trenchless Crossing Zone: TC12 / TC13	RHDHV 1494 NHER 13586	Low	No: Interaction between this asset (the East Norfolk Railway, later great Eastern, Cromer Line) and the construction works is negligible due to the adoption of trenchless crossing techniques at this location.	Negligible	Negligible
	Cable route	AP 260	Low	Yes: The cable route intersects linear features (ditches) identified and captured as AP 260.	Medium	Minor
MA 10 to MA 10a (Figures 28.2a, 28.4a, 28.6a and 28.7a, maps 4-6)	MA 10	AP 270 RHDHV 1609 NHER 36505 (F107)	Medium - High (as a WCS)	Yes (slight): Mobilisation zone MA 10 interacts with a small number of former field boundary features observed in geophysical survey data acquired in F107. Only a fraction of a single field boundary intersects the indicative mobilisation footprint in this area.	Low	Minor
	Trenchless Crossing Zone: TC14a/b			Yes: To the west of the B1145, linear features and a possible ring-ditch identified and captured as AP 270 intersect the trenchless crossing zone. These features are only partially corroborated by geophysical data acquired in F107. The possible ring-ditch feature is within the indicative trenchless crossing compound at this location.	Medium - High	Moderate - Major (as a WCS)
	Trenchless Crossing Zone: TC14a/b	RHDHV 1501 NHER 13585	Low	No: Interaction between this asset (the Norfolk and Suffolk Joint Railway (Northern Section) and the construction works is negligible due to the adoption of trenchless crossing techniques at this location.	Negligible	Negligible

Route Section	Project Element	ID (AP, RHDHV, NHER) + (Headland AAAs / Field Number)	Anticipated heritage significance (importance)	Interaction (WCS)	Magnitude of Effect	Adverse Impact Significance (pre-mitigation)
	Trenchless Crossing Zone: TC14a	AP 262 RHDHV 1608 RHDHV 36504 (F108)	Medium - High (as a WCS)	No: Interaction between these features and the construction works is negligible due to the adoption of trenchless crossing techniques at this location.	Negligible	Negligible
	Trenchless Crossing Zone: TC15	(F109 and F110)	Low	Yes (slight): The indicative trenchless crossing footprint intersects a former field boundary at this location.	Low	Minor
	Cable route	AP 261 (F113)	Low	Yes: the cable route interacts with linear features (boundary ditches) captured in AP 261 and extending into F113.	Medium	Minor
	Cable route			Yes: the cable route partly interacts with linear features captured in AP 163 (former site of WWII barbed wire entanglement).	Medium	Minor - Moderate
	Side access: Extending south-west and south-east from Paston Road (north-west of Bacton Wood)	AP 163 RHDHV 1586 NHER 39000	Low - Medium	Yes: Interaction with former extant features identified and captured as AP 163.	Medium	Minor - Moderate
	Cable route	AP 164 RHDHV 1152 NHER 39007	Low	Yes: the cable route interacts in part with a linear feature captured in AP 164 (ditches, field boundaries).	Medium	Minor
	Cable route	RHDHV 1604 NHER 32172 and RHDHV 1675 / NHER 52898	Medium - High	No: There is no interaction with RHDHV 1675 (undated pits). RHDHV 1604 (possible prehistoric hearths) intersects the cable route, however, these features have been previously excavated under an earlier unrelated project.	Negligible	Minor

Route Section	Project Element	ID (AP, RHDHV, NHER) + (Headland AAAs / Field Number)	Anticipated heritage significance (importance)	Interaction (WCS)	Magnitude of Effect	Adverse Impact Significance (pre-mitigation)
	Cable route	(F115 and F116)	Low	No: the cable route intersects linear features observed in F115, which have been identified as being of agricultural origin. Former field boundaries lie beyond the cable route.	Negligible	Negligible
	Cable route	AP 227 RHDHV 1290 NHER 39031 (F117 and F118)	Low	Yes: the cable route intersects linear features (ditches and field boundaries) identified and captured as AP 227 (F117).	Medium	Minor
MA 10a to 11 (Figures 28.2a, 28.4a, 28.6a and 28.7a, maps 3-4)	Trenchless crossing location: TC16	AP 239 RHDHV 1635 NHER 39026 (F118)	Low	No: Interaction between this feature and the construction works is negligible due to the adoption of trenchless crossing techniques at this location.	Negligible	Negligible
	Side access: Parallel and adjacent to Plantation Road (north of Bacton Wood)			Yes (slight): Slight interaction with northern extent of boundary ditch features identified and captured as AP 239.	Low	Minor
	Trenchless crossing location: TC16	AP 240 RHDHV 791 NHER 39032 (F119)	Medium - High	No: based on information available to date, the cropmark features recorded at this location are not visible within the trenchless crossing zone or within the indicative trenchless crossing compound. Although the possibility that they do extend into these areas should not be discounted altogether, based on available data no interaction is considered to have been identified.	Low	Minor – Moderate (as a WCS)
	Trenchless crossing location: TC16	AP 237 RHDHV 1018 NHER 39111	Low	Yes: a number of cropmark features (ditches / field boundaries) intersect the trenchless crossing zone and indicative trenchless crossing compound at this location.	Medium	Minor

Route Section	Project Element	ID (AP, RHDHV, NHER) + (Headland AAAs / Field Number)	Anticipated heritage significance (importance)	Interaction (WCS)	Magnitude of Effect	Adverse Impact Significance (pre-mitigation)
	Cable route	(F119 and F120)		Yes (slight): a limited number of cropmark features are intersected by the cable route.	Medium	Minor
	Side access: Two accesses extending northwards from Mill Common Road (east of Plantation Road)			Yes (slight): Very slight interaction with field boundary feature (ditch) identified and captured as AP 237.	Medium	Minor
	Cable route	AP 234 RHDHV 795 / NHER 7014 F120 and F121	Medium - High	Yes: the cable route intersects a small number of linear features captured in AP 234 (ditches, field boundaries, trackways). Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	Low	Minor - Moderate
	Side access: Two accesses extending northwards from Mill Common Road (east of Plantation Road)			Yes (slight): Very slight interaction with cropmark feature (linear) identified and captured as AP 234.	Low	Minor - Moderate
	Cable route	AP 231 RHDHV 822 NHER 27237	Medium - High	Yes: the cable route intersects a small number of linear features captured in AP 231 and possible archaeology (linear features) visible in the geophysical survey data acquired in F122.	Low	Minor - Moderate

Route Section	Project Element	ID (AP, RHDHV, NHER) + (Headland AAAs / Field Number)	Anticipated heritage significance (importance)	Interaction (WCS)	Magnitude of Effect	Adverse Impact Significance (pre-mitigation)
		F122 and F123				
	Cable route	AP 225 RHDHV 854 NHER 27242 (F122)	Medium	Yes: the cable route intersects a small number of linear features captured in AP 225 and possible archaeology (linear features) visible in the geophysical survey data acquired in F122.	Low	Minor
	Cable route	AP 223 RHDHV 1149 NHER 38864 AAA11 (F123)	Low - Medium	Yes: the cable route intersects this recorded medieval / post-medieval road / Holloway visible as cropmarks.	Medium	Minor - Moderate
	Cable route	AP 220 RHDHV 1166 NHER 27241 AAA12 (F123)	Low - Medium	Yes: the cable route intersects a number of cropmark features (enclosures, ditches and trackways) recorded at this location.	Medium	Minor - Moderate
	Cable route	AP 226 RHDHV 747 NHER 27243 AAA12 (F122 and F123)	High	Yes: the cable route intersects a number of cropmark features (ditches, enclosures and field systems) recorded at this location. Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	Low	Moderate
	Cable route	AP 157 RHDHV 1632 NHER 38860 (F125)	Medium - High (as a WCS)	Yes: The cable route intersects cropmark (boundary) features which are visible as being more extensive in the geophysical survey data for F125, which shows additional boundary features and enclosures. Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	Medium - High (as a WCS)	Moderate - Major (as a WCS)

Route Section	Project Element	ID (AP, RHDHV, NHER) + (Headland AAAs / Field Number)	Anticipated heritage significance (importance)	Interaction (WCS)	Magnitude of Effect	Adverse Impact Significance (pre-mitigation)
	Cable route	(F125 and F126)	Medium - High (as a WCS)	<p>Yes: the cable route intersects features of archaeological interest identified in the geophysical survey data acquired in F125, including a rectangular double-ditched enclosure (F125) and linear features of possible archaeological interest (F126).</p> <p>Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.</p>	Medium - High (as a WCS)	Moderate - Major (as a WCS)
	Cable route	AP 153 RHDHV 1631 NHER 38853	Medium	<p>Yes: the cable route intersects cropmark (ditch / field boundary) features as well as features of archaeological interest identified in the geophysical survey data acquired in F130.</p> <p>Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.</p>	Medium	Moderate
	Side access: South-east of North Walsham / Happisburgh Road (south-west of Ridlington)	AAA13 and AAA14 (F128 to F134)		<p>Yes (slight): Interaction with field boundary features identified and captured as AP 153.</p>	Low	Minor
	Cable route	AP 136 RHDHV 1146 NHER 38842 (F135 and F136)	Low - Medium	<p>No: only the northernmost boundary of this AP feature intersects the cable route (by some 5m) with the cropmark features recorded within it avoided by the cable route.</p>	Negligible	Negligible

Route Section	Project Element	ID (AP, RHDHV, NHER) + (Headland AAAs / Field Number)	Anticipated heritage significance (importance)	Interaction (WCS)	Magnitude of Effect	Adverse Impact Significance (pre-mitigation)
	Cable route	AP 137 RHDHV 807 NHER 21835 AAA15 and AAA16 (F136 to F138)	Medium - High	<p>Yes: The cable route interacts with a dense concentration of features at the northern extent of F137 as shown in the geophysical survey data. In the area of AP 137 itself, the highest concentration of archaeological features has been avoided by means of deliberate and proactive routeing of the cable route to the north-west. There is nonetheless an interaction between the cable route and some of the more peripheral looking features of archaeological interest visible in F137 and captured as AP 137.</p> <p>Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.</p>	Medium-High	Moderate - Major (as a WCS)
MA 11 to Landfall (Figures 28.2a, 28.4a, 28.6a and 28.7a, maps 1-3)	MA 11			<p>Yes: Mobilisation zone MA 11 interacts with a number of linear features observed in F137, including a dense concentration of features at the northern extent, just south of the Happisburgh Road. The indicative mobilisation area footprint is proposed in a location adjacent to the cable route, just to the south of this concentration of features.</p> <p>Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.</p>	Low	Minor - Moderate (as a WCS)
	Cable route	AP 250 RHDHV 784 NHER 38730 AAA17 (F147 to F152)	Medium - High	<p>Yes: the cable route intersects a small number of cropmark features (trackways, field boundaries, ditches) or linear features of possible archaeological interest identified in the geophysical survey data acquired in F149 and F151. Despite this interaction, the cable has been deliberately and proactively routed to the east to avoid the densest concentration of archaeological features in this area.</p>	Low	Minor - Moderate (as a WCS)

Route Section	Project Element	ID (AP, RHDHV, NHER) + (Headland AAAs / Field Number)	Anticipated heritage significance (importance)	Interaction (WCS)	Magnitude of Effect	Adverse Impact Significance (pre-mitigation)
	Side Access: Running north-south, parallel and adjacent to Grub Street (south-west of Happisburgh)			Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent. Yes: Interaction with features visible on geophysical data acquired in the east of F149 (possible archaeology).	Low	Minor - Moderate
	Cable route	AP 128 RHDHV 1133 NHER 38738 AAA18 (F157 and F158)	Low	Yes (slight): there is a slight / minimal interaction between the northern-most crop features captured in AP 128 and the cable route.	Low	Minor
	Cable route	AP 120 RHDHV 915 NHER 38769 AAA19 (F159 and F160)	Medium - High	Yes: the cable route intersects a number of cropmark features (trackways, ditches, field boundaries and coaxial field system) captured in AP 120. Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	Low	Minor - Moderate
	Cable route	(F161 and F162 (west))	Medium	Yes: there is an interaction between the cable route and a number of features of archaeological or possible archaeological interest identified in geophysical survey data acquired for F161. Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	Medium	Moderate

Route Section	Project Element	ID (AP, RHDHV, NHER) + (Headland AAAs / Field Number)	Anticipated heritage significance (importance)	Interaction (WCS)	Magnitude of Effect	Adverse Impact Significance (pre-mitigation)
Landfall (Figures 28.2a, 28.4a, 28.6a and 28.7a, map 1)	Cable route	AP 80 RHDHV 814 NHER 36495 AAA19 and AAA20 (F162 and F164 to F166)	Medium	Yes: the cable route extending from the landfall intersects a small number of cropmark features captured as AP 80. Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	Low - Medium	Minor - Moderate
	Cable route	AP 91 RHDHV 828 NHER 16015 AAA19 (F165 and F166)	Medium - High (as a WCS)	Yes: the cable route extending from the landfall intersects a small number of cropmark features captured as AP 91. Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	Low	Minor - Moderate (as a WCS)

171. In the absence of mitigation, all direct impacts to areas in which sub-surface archaeological remains may be present within the onshore cable route could represent adverse impact significance levels ranging between **negligible** and **major adverse** (depending on the significance of the heritage asset in question and the likely magnitude of effect on the asset), based upon a WCS (as shown in Table 28.18). Of the 103 features identified within Table 28.18, 45 features have been assigned an impact significance considered significant in EIA terms, prior to the application of mitigation.
172. As part of the iterative project design process, as detailed in Chapter 4 Site Selection and the Assessment of Alternatives, where possible, many known and suspected features of likely high heritage significance or concentrated areas of complex archaeological features have been avoided (see section 28.7.2). However, due to engineering and other environmental constraints, it has not been possible to avoid all features indicative of sub-surface archaeological remains within the onshore cable route. Where significant interactions remain, these often occur in the form of direct impacts upon potential sub-surface archaeological remains on the periphery of larger and / or more complex sites or features, as indicated by available data.
173. With the application of initial informative stages of mitigation and additional mitigation measures (where required) it is anticipated that impacts arising as a result of these effects can be reduced or offset to levels considered **non-significant** in EIA terms. The proposed mitigation measures and other commitments are summarised below and are set out in greater detail in the project-specific Outline WSI (document reference 8.5).
174. Further geophysical survey will be undertaken post-consent in areas of the onshore project area not previously covered by the priority programme (October 2017 to March 2018) or the geophysical survey for the substation area (January to February 2019). This, alongside other data sets (including aerial photographic cropmark data and cartographic sources), will inform the placement of archaeological trial trenches as part of a comprehensive project-wide programme of archaeological trial trenching. Should archaeological remains of notable significance be encountered during the programme, they are to be considered on a case-by-case basis, in consultation with NCC HES and HE, and will be subject to recognised standard and bespoke approaches to archaeological mitigation (as set-out in the project-specific Outline WSI, document reference 8.5) in a manner that is directly proportionate to the nature, level of survival and extent of the remains identified as being present. In addition, as part of the post-consent detailed design phase, further consideration will be given, where possible, to minor route and design refinement (within the confines of the DCO boundary) which will seek to avoid / microsite around and / or

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

175. The most pronounced outstanding interactions, including areas of uncertainty on the edges of more substantial remains, between the cable route (and associated compounds and trenchless crossing zones) and potential sub-surface remains have been indicated primarily by the results of the non-intrusive archaeological surveys. These outstanding interactions are listed below in relation to where they appear along the cable route with reference to mobilisation areas and trenchless crossing compounds (where necessary). These sites / areas / features are likely to be priority locations (post-consent) for site-specific initial informative stages of mitigation and additional mitigation measures, as required. The application of which will ensure that archaeological information from these sites will be gathered and retained, and informed decisions made around any further opportunities for preservation in-situ and where necessary preservation by record, ensuring that the residual impact significance will be offset to levels considered **non-significant** in EIA terms.

Table 28.21 Notable interactions between the onshore cable route and sub-surface archaeological remains

Cable Route Section	Heritage Asset (archaeological remains)
MA 4 to MA 5a	AP 6 (F33) : Extensive area of likely multi period eroded field boundaries, tracks, ditches and possible enclosures, only partly corroborated by the geophysical survey data.
MA 6 to MA 7	F54 (adjacent to MA6): Archaeological features visible in geophysical survey data in the form of possible enclosures and other linear features (e.g. possible boundaries, trackways).
	AP 30 / RHDHV 1597 / NHER 22903 (F60 and F61) : Geophysical survey data shows a continuation of the features observed in AP 30 to the west, with two possible enclosures (one of which directly intersects the cable route) and a trackway also visible.
MA 7 to MA 8 (National Trust Land)	AP 39 / RHDHV 1588 / NHER 12974 (F67 and F68) : Geophysical survey appears to show a lesser density and complexity of remains compared to cropmark data, which records an extensive field system with a rectangular enclosure with trackways. Ditches may run further than mapped extent.
	AP 40 / RHDHV 1589 / NHER 12975 (F70 to F74) : Geophysical survey appears to show a lesser density and complexity of remains compared to cropmark data, which records former field boundaries possibly relating to post-medieval agriculture. But there are also a large number of ditched features, which are most likely earlier in date.
MA 8 to MA 9	AP 46 / RHDHV 531 + 1614 / NHER 60062 + 3370 (F80 to F83) : A number of cropmark features (ditches / trackways) located within the indicative trenchless crossing footprint (TC 9a/b and TC10). Geophysics appears to show a lesser density and complexity of remains. The most significant looking feature (the Henge Monument) has been deliberately and proactively avoided, but is still in close proximity.

Cable Route Section	Heritage Asset (archaeological remains)
	<p>AP 50 (F87, F88, F91): a number of linear features (former field boundaries, ditches, trackways and enclosures), and a large linear archaeological feature is also identified in the geophysical survey data for F91.</p> <p>AP 51 / RHDHV 1607 / NHER 36499 (F93): Area of large ditches which may be part of a field system. There is also a possible large enclosure in the south-east of the area and also a large possible ring ditch in the centre. Geophysical data acquired in the location of AP 51 (F93) indicates the presence of a more complex and concentrated area of features of archaeological interest than indicated by the cropmark data alone.</p> <p>AP 53 / RHDHV 1612 / NHER 35549 (F95 and F96): the cable route intersects a number of linear features (ditches / possible enclosure) identified and captured as AP 53 (not obviously shown on geophysical survey data for F95 and F96).</p> <p>AP 55 / RHDHV 435 + 762 / NHER 12821 + 37987 (F101): the cable route intersects a possible enclosure / ditch identified and captured as AP 55. Not subject to geophysical survey, due to access constraints.</p> <p>AP 57 / RHDHV 435 / NHER 12821 (F103): Trenchless crossings TC12 and TC 13 intersect a number of cropmark features identified and captured as AP 57. Area was identified for, but not subject to, priority archaeological geophysical survey, due to access constraints.</p>
MA 10 to MA 10a	<p>AP 270 / RHDHV 1609 / NHER 36505 (F107): To the west of the B1145, linear features and a possible ring-ditch have been identified and captured as AP 270. These intersect the trenchless crossing zone (TC14a/b). The NHER identifies an oval enclosure and square enclosure. These features may, however, be formed by natural deposits affecting the crop and producing an irregular pattern of cropmarks. An old windmill is also recorded in this general location on the 1st Edition OS mapping, which may have left a circular surface impression similar to that of an earlier ring ditch at this location.</p>
MA 10a to MA 11	<p>AP 234 / RHDHV 795 / NHER 7014 / (F120 and F121): Cropmarks of Iron Age to Roman rectilinear enclosure complex and field system. The cable route intersects a small number of linear features only.</p> <p>AP 226 / RHDHV 747 / NHER 27243 (F122 and F123): Cropmarks of possible Bronze Age or Iron Age boundary ditch and multi-period enclosures. The cable route intersects a number of cropmark features (ditches, enclosures and field systems) recorded at this location. Although it has been routed to avoid the densest concentration of remains.</p> <p>F125 and F126: Complex enclosure / boundary features are visible in this field, and may relate to both AP 157 and / or AP 154.</p> <p>AP 153 / RHDHV 1631 / NHER 38853 (F128 to F134): Multi-period field boundaries. Many of the cropmark features are corroborated by the geophysical survey data at this location. A number of additional archaeological features are also visible, which may indicate a potentially more dense and complex arrangement and indicate higher potential for subsurface remains than that indicated by the cropmark data alone.</p>

Cable Route Section	Heritage Asset (archaeological remains)
	<p>AP 137 / RHDHV 807 / NHER 21835 (F136 to F138): Cropmarks of probable Iron Age to Roman and medieval to post-medieval features. Many of the cropmark features are corroborated by the geophysical survey data at this location. A number of additional archaeological features are also visible, indicating a potentially more dense and complex arrangement and higher potential for subsurface remains than that indicated by the cropmark data alone. Albeit that the highest concentration of archaeological features as indicated by cropmark data has been avoided by means of deliberate and proactive routeing of the cable route to the north-west.</p>
MA 11 to Landfall	<p>AP 250 / RHDHV 784 / NHER 38730 (F147 to F152): the cable route intersects a small number of cropmark features (trackways, field boundaries, ditches) or linear features of possible archaeological interest identified in the geophysical survey data acquired in F149 and F151. Despite this interaction, the cable has been deliberately and proactively routed to the east to avoid the densest concentration of archaeological features in this area.</p>
	<p>AP 120 / RHDHV 915 / NHER 38769 (F159 and F161): the cable route intersects a number of cropmark features (trackways, ditches, field boundaries and coaxial field system) captured in AP 120. There is an interaction between the cable route and a number of features of archaeological or possible archaeological interest identified in geophysical survey data acquired for F161. Particularly on the east side of The Street (Whimpwell Street), Happisburgh.</p>

Onshore Project Substation

176. Construction activities under Scenario 2 in the onshore project substation that have the potential to directly impact buried archaeological remains are those associated with groundworks relating to onshore project substation construction.
177. There are no known / recorded heritage assets or AP / cropmark features identified within the footprint of the onshore project substation area or within that of the onshore project substation temporary works area (Figure 28.4b and c), with the exception of a former field boundary (no longer extant) recorded on the 1st Edition OS mapping at the onshore project substation. This is visible within F9 of the geophysical survey data acquired at the onshore project substation area (Appendix 28.8 and Figures 28.7b and c and 28.6b and c), which is considered to be of low or negligible heritage significance. Due to the former field boundary no longer being extant, even if low-level traces currently survive subsurface, the magnitude of effect is considered to be negligible. As such, direct impacts upon sub-surface archaeological remains (as indicated by available data) as a result of these elements of work are considered to be of **negligible adverse** impact significance.
178. However, the potential for currently unrecorded buried archaeological remains to exist in the area should not be discounted altogether, and will be investigated further as part of post-consent general and site-specific initial informative stages of mitigation and additional mitigation measures, as required.

National Grid Substation Extension and Overhead Line Modifications

179. Construction activities under Scenario 2 in the National Grid substation extension area that have the potential to directly impact buried archaeological remains are those associated with substation groundworks, the installation of 400kV cables, temporary works areas and the installation of AIS bays, landing gantries and new / replacement towers.
180. The above work elements have the potential to result in direct impacts upon AP 1 (RHDHV 1015 / NB-AAA2) (Figure 28.4b and c and Figure 28.2b and c) or other sub-surface remains currently unrecorded that may be associated with this site. The site represents the likely sub-surface remains of a moated site of possible medieval date and associated ditches, boundaries and enclosures and has been assigned a perceived medium - high heritage significance as a WCS. In order to minimise the interaction between the works and AP 1, the potential presence and survival of this site was taken into direct consideration as part of the iterative design process, which sought to avoid it to the greatest degree possible. As such, interaction between the works in this area and the recorded extent of the site is minimal, and limited to the more peripheral looking ditches to the south of the main moated site area (with the 400kV cable route intersecting only the southern-most cropmark features associated with the site) and to the north-west of the site in the National Grid temporary works area, the character and extents of which were partially corroborated by the geophysical survey data, and appear to be associated with agriculture or the extensions of former field boundaries. Based on available data, in the absence of mitigation, the magnitude of effect upon these peripheral features (which has been assigned a perceived medium - high heritage significance as a WCS) is anticipated to be low, giving rise to a **moderate adverse** impact significance, based upon a WCS.
181. Work elements associated with the National Grid substation extension also have the potential to result in direct impacts upon NB-AAA1 (Appendix 28.8). NB-AAA1 was identified within the proposed 400kV cable route geophysical survey data and is interpreted as the possible ploughed down remains of a Bronze Age funerary monument (round barrow) or alternatively a medieval/post-medieval post mill. As a post-medieval post-mill, this asset has been assigned a low heritage significance. However, should the asset represent a Bronze Age funerary monument, it has been assigned a high heritage significance as a WCS. Given its location and the level of interaction with the proposed works, the magnitude of effect is considered to be high, resulting in a possible **moderate to major adverse** impact significance (based upon a WCS) depending on the identification of the asset.
182. However, with the application of site-specific mitigation (see section 28.7.2.2), it is anticipated that any such impacts can be off-set or reduced to residual levels considered **non-significant** in EIA terms.

Summary

183. The assessment above indicates that there is the potential for construction works to directly impact buried archaeological remains under Scenario 2, resulting in a broad range of **negligible** to **major adverse** impact significance levels, prior to the implementation of mitigation and based upon a WCS.
184. Initial informative stages of mitigation work (see section 28.7.2 and the project-specific Outline WSI, document reference 8.5) post consent will be planned and undertaken in agreement with NCC HES and HE in order to further establish specific and bespoke additional mitigation requirements on a case-by-case / area-by-area basis, as / where required. It is anticipated that the application of appropriate and proportionate initial informative stages of mitigation and subsequent mitigation measures / commitments will help reduce (or offset) impact significance to levels considered **non-significant** in EIA terms.

28.7.5.1.2 Scenario 1

185. Impacts resulting in potential effects as part of construction work under Scenario 1 are those associated with intrusive groundworks, including:
- The removal of topsoil anywhere across the onshore project area;
 - The excavation of transition pits at the landfall;
 - The application of trenchless techniques at the landfall;
 - The excavation of jointing pits along the onshore cable route;
 - The excavation for link box installation; and
 - Groundworks associated with onshore infrastructure (e.g. onshore project substation and to the National Grid substation extension).

Landfall

186. The potential for direct impacts on buried archaeological remains arising under Scenario 1 is the same as that outlined for Scenario 2. With the application of site-specific mitigation measures, (where required) it is anticipated that such impacts can be reduced to residual levels considered **non-significant** in EIA terms. See section 28.7.5.1.1 for further details and a more detailed discussion.

Onshore Cable Route

187. Construction activities under Scenario 1 along the onshore cable route that have the potential to directly impact buried archaeological remains are confined to groundworks associated with excavation for jointing pits and link boxes.
188. The precise location of jointing pits required under Scenario 1 will not be determined until the detailed design phase of the project, post-consent. However, jointing pit locations will be within areas that have been previously subject to top-soil stripping as part of the duct installation works (undertaken by Norfolk Vanguard) and will have

been subject to the application of initial informative stages of mitigation measures (where required). On this basis, with heritage assets identified within the onshore cable route ranging in heritage significance from low to high (as a WCS) the magnitude of effect is considered to be negligible, resulting in a **negligible to minor adverse** impact significance.

189. It is, however, anticipated that groundworks required for the jointing pits may require additional subsoil excavation and thus exceed the depths of soil stripping and / or archaeological investigation (the initial informative stages of mitigation measures) undertaken under or as part of Norfolk Vanguard. The potential for groundworks exceeding these depths is considered in relation to geoarchaeology and palaeoenvironmental remains and is discussed in section 28.7.5.4 below.
190. The precise location of link boxes required under Scenario 1 will also not be determined until the detailed design phase of the project, post-consent. Link boxes may be buried to ground level or may be installed as above ground cabinets. The chances of significant impacts occurring upon buried archaeological remains due to groundworks undertaken as part of link box installation are considered unlikely. However, in order to ensure that significant direct impacts do not occur, it would be prudent to check the proposed locations of the link boxes during the detailed design phase against the recorded location of potential subsurface archaeological remains (see sections 28.6.3.1 and 28.7.5.1.1). In order to mitigate potential direct impacts from occurring upon currently unrecorded archaeological remains, a general precautionary approach will be adopted whereby the groundworks required for link box installation would fall under an archaeological reporting protocol ('The Protocol' - see section 28.7.2.2.1). Should the proposed siting of a link box be located within an area of archaeological potential (as indicated by available data), there may be an additional requirement for a more bespoke programme of archaeological monitoring and recording. This will be considered as part of the application of initial informative stages of mitigation measures, where required on a case-by-case basis (set out in a project-specific Outline WSI, document reference 8.5). With the application of these mitigation measures, it is anticipated that any such impacts can be reduced to residual levels considered **non-significant** in EIA terms.
191. Other works along the cable route necessary under Scenario 1 comprise the reinstatement of the running tracks (approximately 20%⁵). Groundworks in these areas will have been undertaken as part of Norfolk Vanguard and will have been subject to the application of initial informative stages of mitigation measures (where

⁵ In some locations, isolated sections of the running track will be left in place from Norfolk Vanguard under Scenario 1 or required to be reinstated to allow access to more remote jointing pit locations. This is anticipated to be in the order of 20% of the total cable route length with an estimated breakdown based on an even 3.8km sectionalisation of the route (see Chapter 5 Project Description).

required), which are anticipated to reduce or offset impact significance levels to non-significant in EIA terms. On this basis, there will be **no further impact** during construction arising as a result of access reinstatement.

Onshore Project Substation

192. Construction activities under Scenario 1 within the onshore project substation area that have the potential to directly impact buried archaeological remains are those associated with groundworks relating to onshore project substation construction.
193. There are no known / recorded heritage assets or AP / cropmark features identified within the footprint of the onshore project substation and the onshore project substation temporary works area footprint, with the exception of one former field boundary (no longer extant) recorded on the 1st Edition OS mapping at the substation location and visible within F11 of the geophysical survey data acquired in the substation area (Appendix 28.8), which are considered to be of low or negligible heritage significance. Due to the former field boundaries no longer being extant, even if low-level traces currently survive subsurface, the magnitude of effect is considered to be negligible. As such, direct impacts upon sub-surface archaeological remains (as indicated by available data) as a result of these elements of work are considered to be of **negligible** impact significance.
194. However, the potential for currently unrecorded buried archaeological remains to exist in the area should not be discounted altogether, and will be investigated further as part of post-consent general and site-specific initial informative stages of mitigation and additional mitigation measures, as required.

National Grid Substation

195. The National Grid substation extension, 400kV cables installation and National Grid temporary works area differ in location under Scenario 1, with a slightly increased interaction arising as a result of the National Grid's temporary works area in comparison to Scenario 2. However, despite this interaction, the impact is still limited to the more peripheral looking ditches of AP 1 (RHDHV 1015 / NB-AAA2) (Figure 28.4b and c and Figure 28.2b and c) to the south of the main moated site area (with the 400kV cable route intersecting only the southern-most cropmark features associated with the site) and to the north-west of the site in the National Grid temporary works area. In the absence of mitigation, the magnitude of effect upon these peripheral features (assigned a perceived medium - high heritage significance as a WCS) is anticipated to be low, giving rise to a **moderate adverse** impact significance, based upon a WCS.
196. Work elements associated with the National Grid substation extension also interact with the possible ploughed down Bronze Age funerary monument (barrow) or medieval/post-medieval post mill NB-AAA1, which has been identified within the

400kV cable route. However, as the ring-ditch feature has been identified within an area in which the 400kV cables for the Norfolk Boreas and Norfolk Vanguard projects overlap, under Scenario 1 groundworks in this area will have already been undertaken as part of Norfolk Vanguard and will have been subject to the application of initial informative stages of mitigation measures (where required), which are anticipated to reduce or offset impact significance levels to non-significant in EIA terms. On this basis, there will be no further impact to the ring-ditch feature during construction.

197. Direct impacts arising from the 400kV cables and National Grid temporary works construction and associated works to areas of possible archaeological interest could result in a **moderate adverse** impact significance, based upon a WCS. With the application of site-specific mitigation (see section 28.7.2.2), it is anticipated that any such impacts can be reduced to residual levels considered **non-significant** in EIA terms. See section 28.7.5.1.1 for further details and a more detailed discussion.

Summary

198. The assessment indicates that there is the potential for construction works to directly impact buried archaeological remains under Scenario 1, resulting in a range of **negligible to moderate adverse** impact significance levels, prior to the implementation of mitigation and based upon a WCS.
199. Initial informative stages of mitigation work (see section 28.7.2 and the project-specific Outline WSI, document reference 8.5) post consent will be planned and undertaken in agreement with NCC HES and HE in order to further establish specific and bespoke additional mitigation requirements on a case-by-case / area-by-area basis, as / where required. It is anticipated that the application of appropriate and proportionate initial informative stages of mitigation and subsequent mitigation measures / commitments will help reduce (or offset) impact significance to levels considered **non-significant** in EIA terms.

28.7.5.2 Impact (2) Direct Impact on (permanent change to) Above Ground Archaeological Remains e.g. historic earthworks (including Historic Landscape Character)

200. Impacts resulting in potential effects as part of construction works are those associated with intrusive groundworks. The extent of any impact will depend on the presence and nature of any such remains. Any adverse impacts may as a WCS be permanent and irreversible in nature. In the absence of mitigation, direct impacts on above ground archaeological remains are therefore generally considered to be of high magnitude. However, the extent of any impact will depend on the presence and nature of any such remains, in association with the proposed location of construction-related groundworks, as well as the specific elements, aspects or area of the asset subject to impact. As such, a reduced magnitude of effect may be relevant where the anticipated interaction between the proposed groundworks and

the potential above ground archaeological remains (as indicated by available data) is considered to be unlikely or limited. The magnitude of effect of direct impacts on above ground archaeological remains during the construction phase could therefore range from low to high.

201. Extant earthworks and field boundaries are an integral part of the HLC of the wider area, and any loss of such features therefore has the potential to impact upon the HLC of the study area. This change to the HLC arising from the potential loss of above ground features is discussed below.

28.7.5.2.1 Scenario 2

202. Impacts resulting in potential effects as part of construction work under Scenario 2 are those associated with intrusive groundworks, as outlined in section 28.7.5.1.1.

Landfall

203. Construction activities in the landfall area that have the potential to directly impact above ground archaeological / built heritage remains (extant structures / features, buildings and earthworks) are those associated with the excavation of the transition pit (to be sited within the landfall compound zone), groundworks at HDD entry pit / exit point locations, groundworks associated with the HDD compound area and associated access routes.
204. One feature representative of above ground archaeological remains has been identified within the landfall, comprising a Type 26 pill box dating to WWII (RHDHV 1529). This asset is likely to have a low heritage significance.
205. This heritage asset is not, however, located within the landfall compound zone and as such, is not considered vulnerable to direct impacts associated with construction works. No direct impacts (**no impacts**) are therefore anticipated to arise as a result of landfall works on above ground archaeological remains.

Onshore Cable Route

206. Construction activities for the onshore cable route that have the potential to directly impact above ground archaeological remains are those associated with top-soil stripping, cable trenching, groundworks at HDD entry pit / exit point locations, excavation for jointing pits and link boxes and groundworks associated with construction work areas (e.g. MAs and TC compounds) and the cable route working width.
207. Nine assets / features considered as possibly being representative of (previously recorded and documented) above ground archaeological remains have been identified within the onshore cable route and may be subject to impact as a result of construction works. The potential for further heritage assets representative of above

ground remains to exist within the onshore project area should not be discounted on the basis that it is not always possible to ascertain whether or not features are still extant based on available records (see section 28.6.3.2).

208. Of those heritage assets identified based on available data, six refer to the presence of earthworks or other such landscape features. The heritage significance of these heritage assets, alongside the magnitude of effect (the determination of which is based on the likely interaction between the heritage asset in question and the proposed groundworks) and pre-mitigation impact significance with respect to construction works within the onshore cable route are summarised in Table 28.22.

Table 28.22 Interaction between earthworks and the onshore cable route

RHDHV ID / NHER / AP ID	Name	Anticipated Heritage Significance	Magnitude of Effect	Adverse Impact Significance (pre-mitigation)
RHDHV 1101 NHER 29500 Figure 28.2a (map 8)	Undated earthworks and post-medieval bank.	Low - Medium	Medium	Minor - Moderate
RHDHV 1673 NHER 50412 Figure 28.2a (map 3)	Series of low banks in Witton.	Low	Medium	Minor
RHDHV 1682 NHER 7295 Figure 28.2a (map 22)	Smugglers' Lane.	Medium	Medium	Moderate
AP 6 RHDHV 811 NHER 2999 Figure 28.4a (map 16)	Extensive area of likely multi period eroded field boundaries, tracks, ditches and possible enclosures.	Medium - High	Low	Minor
AP 48 RHDHV 1615 NHER 36454 Figure 28.4a (map 8)	A series of former field boundaries and trackways of unknown date. These features are likely to be more widespread than their visible extent.	Low	Medium	Minor
RHDHV 1456 NHER 55475 Figure 28.2a (map 4)	Witton Park (the historically mapped extent of which is now in arable use with many landscaped features recorded as being partially destroyed by ploughing).	Low	Low	Minor

209. The remaining three heritage assets relate to above ground structures, buildings or features, some aspects of which may still be extant within the onshore project area. The heritage significance of these heritage assets, alongside the magnitude of effect (the determination of which is based on the likely interaction between the heritage asset in question and the proposed groundworks) and pre-mitigation impact significance with respect to construction works within the onshore cable route are summarised in Table 28.23.

Table 28.23 Interaction between above ground heritage assets and the onshore cable route

RHDHV ID / NHER / AP ID	Name	Anticipated Heritage Significance	Magnitude of Effect	Adverse Impact Significance (pre- mitigation)
RHDHV 1379 NHER 7361 Figure 28.2a (map 16)	Sparham Limekiln (partially demolished, recorded on a side operation access route to the cable route).	Low	Low	Minor
RHDHV 1559 NHER 40950 Figure 28.2a (map 18)	World War Two buildings and the site of a World War Two antenna array.	Low - Medium	Low	Minor
RHDHV 1816 NHER 7364 Figure 28.2a (map 11)	Oulton Airfield (which intersects the proposed storage area).	Low - Medium	Low	Minor

210. With the application of site-specific mitigation measures (see section 28.7.2.2), it is anticipated that all such impacts can be reduced to levels considered **non-significant** in EIA terms.

211. Earthwork condition surveys and built heritage / historic building surveys and recording are two approaches that are likely to be implemented at targeted locations as part of post-consent initial informative stages of mitigation. This may be followed by additional backfilling, reinstatement and conservation / restoration requirements, where required on a case-by-case basis (initially set out in the project-specific Outline WSI, document reference 8.5).

212. Trenchless crossing techniques (e.g. HDD) will be used during construction with regards to the canal (RHDHV 1479) and the majority of former / extant railway crossings (RHDHV 1499, 1501, 1494, 1498, 1486 and 1487) and as such, the low heritage significance of these assets when set against a magnitude of effect of no more than negligible would result in a **negligible** impact significance. One exception

to this is RHDHV 1490, the former Route of the Midland and Great Northern Joint Railway (Great Yarmouth to Sutton Bridge). This linear heritage asset crosses the cable route in the location of MA7 and is not within a trenchless crossing zone. The NHER records a number of stations, signal boxes, goods sheds and concrete mileposts that remain associated with this wider heritage asset, the presence / absence of which within the onshore project area would need to be further verified as part of post-consent initial informative stages of mitigation. The anticipated magnitude of effect upon this heritage asset (which has been assigned a low heritage significance) is also considered to be low, however, and therefore having the potential to result in an impact significance of **minor adverse**.

213. It is estimated that the onshore cable route will cross in the region of 165 hedgerows of low heritage significance. The magnitude of effect on these hedgerows is also considered to be low, resulting in an impact significance of **minor adverse**. Provision will be made to restore any important hedgerows to their pre-construction condition and character, where possible. Additional recording and enhanced provisions may also be required during reinstatement at certain locations. It is expected that the implementation of these mitigation measures will help reduce (or offset) the significance of impact upon hedgerows (including any county and parish boundaries).
214. The Blickling Conservation Area (356) will also be subject to a degree of temporary direct impact (to landscape character, as discussed in section 28.6.2.1, and not any associated built heritage) on the basis that it contains a proposed Trenchless Crossing (e.g. HDD) Zone (TC9a/b), on the west side of the River Bure, and a c. 3.8km stretch of the 35m wide onshore cable route. At this location, the areas associated with the onshore project area and onshore works are owned predominantly by the National Trust (Figure 28.1a – map 4 of 9) and are subject to tenant farming. Although the construction of the onshore cable route through the Blickling Conservation Area represents a direct physical impact on the landscape character of the Conservation Area, the areas through which the onshore cable route passes are considered to have been largely subject to certain levels of alteration and ‘recent’ change already, through the former historic removal of hedgerows in order to create larger more open fields suitable for agricultural cultivation. The impact highlighted here will be temporary in nature and confined to the construction period and is not considered to constitute harm to the significance of the Conservation Area following the completion of construction.
215. The landscape which the cable route passes through will be sensitively backfilled and reinstated following construction, and field boundaries and hedgerows returned to their pre-construction condition. As such impacts are anticipated to be **non-significant** following the implementation of proposed mitigation work. This will include an initial informative stage of mitigation in the form of earthwork condition

(Global Positioning System (GPS) / topographic) survey prior to construction, the subsequent sensitive management of duct installation works through the Conservation Area and later the strictly controlled backfilling and reinstatement returning field boundaries and hedgerows to their pre-construction condition, as referred to above, and highlighted within the project-specific Outline WSI (document reference 8.5). A comprehensive programme of post-consent archaeological survey work is also anticipated to take place across the relevant parts of the wider National Trust's Blickling Estate, in consultation with the National Trust and NCC HES. This commitment is also set out in the project-specific Outline WSI (document reference 8.5).

Onshore Project Substation

216. No above ground archaeology / built heritage remains are currently recorded within the onshore project substation area and associated indicative onshore project substation temporary construction compound footprint based on data available to date. As such, impacts arising from construction works within the onshore project substation and associated works area upon above ground archaeological remains are anticipated to result in **no impact**.

National Grid Substation and Overhead Line Modification

217. No above ground archaeology / built heritage remains are currently recorded or identified within the National Grid substation extension, National Grid temporary works area and 400kV cable route based on data available to date. As such, impacts arising from construction works within the National Grid substation extension and overhead line modification area upon above-ground archaeological remains are considered to result in **no impact**.

Summary

218. The assessment indicates that there is the potential for significant impacts upon above-ground archaeological / built heritage remains (extant structures / features, buildings and earthworks) as a result of construction works within the onshore cable route, with impact significance ranging from **minor** to **moderate adverse** (as a WCS), prior to mitigation. However, as part of a staged approach to post-consent specific surveys (initially informative stages of mitigation), and the application of subsequent mitigation measures / commitments (see section 28.7.2), as required, considering both preservation in-situ by means of further micrositing and route refinement (with the confines of the DCO limits) or preservation by record options, it is considered that this will reduce (or offset) impact significance to levels considered **non-significant** in EIA terms.

219. As noted above under section 28.6.4, within the onshore project area the predominant HLC types of 20th century agriculture and to a lesser degree post-medieval enclosures of an 18th and 19th century date, as well as the rare occurrence

of pre-18th century enclosure (Figure 28.3), are anticipated to be able to accommodate a temporary level of change to HLC during construction with fields / plots / areas being returned to their pre-construction condition and character post-construction, as part of a controlled and sensitive programme of backfilling and reinstatement / landscaping. Certain hedgerows and field boundaries (e.g. county and parish boundaries) may require a more formal approach to recording prior to / during the construction process and enhanced provisions during backfilling and reinstatement.

28.7.5.2.2 Scenario 1

Landfall

220. The potential for direct impact on above ground archaeological remains arising under Scenario 1 is the same as that outlined for Scenario 2. No direct impacts (**no impact**) are therefore anticipated to arise as a result of landfall works on above ground archaeological remains. See section 28.7.5.2.1 for further details and a more detailed discussion.

Onshore Cable Route

221. Construction activities under Scenario 1 along the onshore cable route that have the potential to directly impact above ground archaeological remains are confined to groundworks associated with excavation for jointing pits and link boxes.
222. The precise location of jointing pits required under Scenario 1 will not be determined until the detailed design phase of the project, post-consent. Despite this, jointing pit locations will be within areas that have been previously subject to top-soil stripping as part of the Norfolk Vanguard duct installation works and will have been subject to the application of initial informative stages of mitigation measures (where required). Above ground archaeological remains within the onshore cable route have been assigned a heritage significance ranging between low and medium. On this basis of the previous works undertaken as part of Norfolk Vanguard, described above, the magnitude of effect is considered to be negligible, resulting in a **negligible to minor adverse** impact significance.
223. The precise location of link boxes required under Scenario 1 will also not be determined until the detailed design phase of the project, post-consent. Link boxes may be buried to ground level or may be installed as above ground cabinets. In order to ensure that significant direct impacts do not occur, it would be prudent to check the proposed locations of the link boxes during the detailed design phase against the recorded location of potential above ground archaeological remains (see sections 28.6.3.2 and 28.7.5.2.1). Should the proposed siting of a link box be located within an area in which potential above ground archaeological remains may be present (as indicated by available data), there may be an additional requirement for the

implementation of targeted mitigation in the form of earthwork condition surveys or built heritage / historic building surveys, depending on the heritage asset in question. This may be followed by additional backfilling, reinstatement and conservation / restoration requirements, where required on a case-by-case basis (set out in the project-specific Outline WSI, document reference 8.5). With the application of these mitigation measures, it is anticipated that such impacts can be reduced to residual levels considered **non-significant** in EIA terms. Efforts would also be made to site link boxes away from (in order to avoid) direct impacts upon known above ground heritage assets, where possible and practical to do so, within the confines of other engineering, environmental and landowner constraints.

Onshore Project Substation

224. The potential for direct impacts on above ground archaeological remains arising under Scenario 1 is the same as that outlined for Scenario 2. No direct impacts (**no impact**) are therefore anticipated to arise as a result of construction works within the onshore project substation and associated works area on above ground archaeological remains. See section 28.7.5.2.1 for further details and a more detailed discussion.

National Grid Substation

225. The potential for direct impacts on above ground archaeological remains arising under Scenario 1 is the same as that outlined for Scenario 2. No direct impacts (**no impact**) are therefore anticipated to arise as a result of construction works within the National Grid substation extension area on above ground archaeological remains. See section 28.7.5.2.1 for further details and a more detailed discussion.

Summary

226. The assessment indicates that there is the potential for significant impacts upon above-ground archaeological / built heritage remains (extant structures / features, buildings and earthworks) as a result of construction works within the onshore cable route, with a **minor adverse** impact significance (as a WCS), prior to mitigation. However, as part of a staged approach to post-consent specific surveys (initially informative stages of mitigation), and the application of subsequent mitigation measures / commitments (see section 28.7.2), as required, it is considered that this will reduce (or offset) impact significance to levels considered **non-significant** in EIA terms.

28.7.5.3 Impact (3) Indirect Impact on the Setting of Heritage Assets (both Designated and Non-Designated)

227. Activities undertaken as part of construction works for the project have the potential to impact designated and non-designated heritage assets in an indirect (non-physical) manner, related to the setting of heritage assets. Indirect impacts are likely to arise through the temporary presence of machinery, construction traffic and

general construction activities taking place within the onshore project area. Predominantly the sight, and potentially noise and dust, created during the construction phase could have a temporary impact upon heritage assets and their settings.

28.7.5.3.1 Scenario 2

Landfall

228. The designated assets shown in Table 28.24 (all of which have been subject to site visits from publicly accessible areas) have been identified and assessed as possibly being subject to indirect impacts upon their setting (of a temporary nature) as a result of their relative proximity to the landfall (Figure 28.1a, map 1).

Table 28.24 Heritage assets screened into settings assessment (landfall construction works)

Construction Element	Name (RHDHV ID)
Landfall	Happisburgh Manor RPG (8)
	The Church of St. Mary (11)
	The Encircling Wall to St. Mary's (37)
	St. Mary's including 2 Summerhouses (38)
	Happisburgh Lighthouse / Lighthouse Cottages (61)
	Happisburgh Conservation Area (352)

229. Happisburgh Lighthouse (61), as a tall and prominent asset in closest proximity to the landfall, was taken forward and prioritised for further consideration. Happisburgh Lighthouse and lighthouse Cottages (61) are Grade II Listed Buildings, first listed in May 1987. The lighthouse is located immediately south-east / south of the main historic core of the village of Happisburgh. The lighthouse is located c. 250m from the cliff edge (to the east) within a large arable field, with further fields to the south, Lighthouse Lane to the west and Beach Road to the north (see Figure 28.1). The setting of the lighthouse contributes to its heritage significance being located as it is in a prominent (increasingly) coastal position, and was obviously designed to be seen from offshore, by ships, boats and vessels passing out at sea.

230. The lighthouse can also be seen widely from the surrounding inland and coastal areas. At 26m tall with its lantern 40.8m above sea level, the lighthouse is one of the tallest, most prominent buildings / structures within the immediate area, along with the Church of St. Mary, Happisburgh (11). The lighthouse is open to the public on occasional Sundays and Bank Holidays throughout the summer, or by requested appointment. It is a 112 step climb to the lantern with views from the top afforded both seaward, up and down the coast and inland. The lighthouse is an iconic

structure and local landmark, which is also appreciated for its distinctive and traditional colourings.

231. Although the setting of Happisburgh Lighthouse evidently contributes to its heritage significance with its elevated position looking out to sea, the temporary presence of the landfall and specifically the landfall compound to the south / south-east will only have a short term, temporary, low or negligible adverse magnitude of effect on the setting the lighthouse, which will as a WCS represent a **minor adverse** impact significance and will not constitute harm to the lighthouse’s heritage significance.
232. Any indirect impacts upon the setting of the remaining designated heritage assets identified above associated with construction works at the landfall compound will also only be short term and temporary in nature (and therefore of negligible magnitude of effect), which will as a WCS represent **minor adverse** impact significance. No harm to heritage setting and associated heritage significance will occur.
233. The same conclusions have been reached with respect to construction works immediately offshore associated with bringing the offshore cables ashore and connecting the onshore and offshore elements of the project at this location. Under a long HDD approach these works are anticipated to be located c. 1km from the coastline north-east of the landfall compound zone within the nearshore area of the wider landfall (Figure 28.1a, map 1). There will be no construction works on the beach at Happisburgh.

Onshore Cable Route (e.g. trenchless crossings and mobilisation areas)

234. The heritage assets identified and assessed as possibly being subject to an adverse magnitude of effect as a result of their relative proximity to onshore cable route construction works, TC Zones and / or MAs (Figure 28.1 and Figure 28.2a, maps 3-5, 13 and 16-17) are shown in Table 28.25. During the construction works there may be temporary, short-term effects, upon their heritage settings as a result of their proximity to the trenchless crossing zones (e.g. HDDs) and / or mobilisation areas. These are considered to represent effects of negligible magnitude and of **minor adverse** impact significance as a WCS for the duration of construction activities at these specific locations.

Table 28.25 Heritage assets screened into settings assessment (onshore cable route construction)

Reason for assessment / Construction Element	Name (RHDHV ID)
Proximity to MA 11	The Church of St. Peter, Ridlington (13) (Grade I LB)
	Barn (non-designated) now converted private residence (1423) opposite the east wall of Ridlington churchyard
Proximity to MA 10 and TC 14 a/b	The Friends Meeting House, North Walsham (43) (Grade II* LB)

Reason for assessment / Construction Element	Name (RHDHV ID)
	The Thatched Cottage (117) (Grade II LB)
	The (non-designated) Old Quaker Burial Ground (1408)
Proximity to 10a and TC16, which overlaps with the very south-west corner only of the recorded extent of the Park (the relevant field is now under arable)	The (non-designated) Witton Park (1456)
Proximity to TC 11 (King's Beck)	Keepers Cottage (145) (Grade II LB)
Proximity to cable route, MA 8 and TC 10	Church of St. Botolph, Colby (20) (Grade I LB)
Proximity to TC9a/b associated with the River Bure	Aylsham Conservation Area (355)
Proximity to TC9a/b associated with the River Bure	Abbots Hall Farmhouse (156) (Grade II LB)
With respect to an c. 3.8km stretch of the cable route and TC9a/b associated with the River Bure	Blickling Conservation Area (356)
Proximity to MA 6	Salle Park (9) (Grade II RPG) / Salle Park (52) (Grade II* LB)
Proximity to TC7 (c. 100m away at its closest point) to the west of Reepham	The (non-designated) Kerdiston Cross (1041)
TC6 associated with The Marriott's Way	Pettywell Farm and associated buildings (307, 308, 309 and 310) (Grade II LBs)
MA 1b and 2 and associated trenchless crossing zones	Scarning Dale (346) (Grade II LB)
Proximity to construction accesses	Colby Hall Farm House (148) (within 50m of a proposed access route)
	Blickling Hall Registered Park and Garden (10) (within 50m of a proposed access route)
	Blickling Conservation Area (356) (within 50m of, and containing, proposed access routes)
	Flashpit Farmhouse (206) (beyond 50m of a proposed access route)
	Old Hall Farmhouse (325) (beyond 50m of a proposed access route)
	The (non-designated) cottages associated with Old Hall Farm House (1394) (beyond 50m of a proposed access route)
	The (non-designated) Park Farm (1449) (within 50m of a proposed access route)

235. On the basis that no ongoing or longer-term harm to heritage setting and associated heritage significance is considered likely to occur following construction, the majority

of heritage assets listed in Table 28.25 are not considered further as part of this assessment. However, two areas have been considered further as follows:

- Heritage assets in proximity to MA 10 and TC 14 a/b (see Table 28.25); and
- Blickling Conservation Area (356).

236. Heritage assets in proximity to MA 10 and TC 14 a/b and screened into the settings assessment comprise the Friends Meeting House, North Walsham (43), the Thatched Cottage (117) and the Old Quaker Burial Ground (1408) (Figure 28.1a, map 2 and Figure 28.2a, map 5). The cable route is highly constrained in this area and represents a significant pinch point at the crossings of Little London Road, the Paston Way and the B1145. Construction works at this location will likely be short term and temporary, representing an effect of negligible magnitude of effect on the setting of the Friends Meeting House (43) and the Thatched Cottage (117) (each regarded as assets of high heritage significance). As a WCS this represents an impact of **minor adverse** significance and will not constitute any ongoing harm to these buildings' heritage significance post-construction at this location.
237. The Old Quaker Burial Ground (1408) is beyond the parameters of the onshore project area (by some 7m at its closest point) and will not be subject to direct impact. Nonetheless, construction work around the Old Quaker Burial Ground (1408) will need to be conducted in a sensitive and controlled manner, with associated signage and temporary barriers in order to avoid any accidental damage or physical interactions occurring. This is noted in the project-specific Outline WSI (document reference 8.5) and will ultimately need to be included and detailed in a Construction Stage Plan(s), Contractor Environmental Action Plan(s), or similar. In terms of indirect setting impacts, the temporary and short-term presence and undertaking of construction works at this location would again only represent a **minor adverse** impact significance as a WCS, and will not constitute any ongoing harm to the Burial Ground's heritage significance post-construction.
238. The presence and undertaking of construction works across a relatively small proportion of Blickling Conservation Area (356) will also likely be short term and temporary, representing an effect of negligible magnitude of effect on the setting of the Conservation Area. This will as a WCS represent a **minor adverse** impact significance and again will not constitute any ongoing harm to the heritage significance of the Conservation Area post-construction. As well as temporary, short-term indirect setting impacts, Blickling Conservation Area will be subject to a degree of temporary direct impact (to landscape character, as set out in section 28.6.2.1, and not any associated built heritage), which is discussed in greater detail in section 28.7.5.2.1.

Onshore Project Substation and the National Grid Substation Extension and Overhead Line Modification

239. As the only 'permanent' new above ground infrastructure associated with the project, the onshore project substation and National Grid substation extension has formed the main focus of the heritage settings assessment work undertaken for the EIA. The settings assessment related to the onshore project substation is considered most relevant to the operational phase of the project (i.e. once the substation has been built and is present within the landscape) (see section 28.7.6 below).
240. The following heritage assets have been subject to consideration as part of any indirect heritage setting impacts associated with construction.
- Two moated sites at Huntingfield Hall (5) (Scheduled Monument);
 - Moated site 430m south west of Bradenham Hall (6) (Scheduled Monument);
 - Mona Hill (7) (Scheduled Monument);
 - Church of St. Andrew, Bradenham (34) (Grade I LB);
 - Church of St. Mary, Fransham (35) (Grade I LB);
 - Church of All Saints, Necton (36) (Grade I LB);
 - The Old Hall, Fransham (58) (Grade II* LB); and
 - Bradenham Hall (347) (Grade II LB).
241. There are, however, no identified or relevant heritage setting impacts (**no impact**) on these assets associated with the onshore project substation (and related) construction, based predominantly on the distance of the assets from the onshore project substation and associated infrastructure.
242. These assets alongside selected others as identified in association with LVIA tool-kits (e.g. ZTVs and photomontages) have, however, been considered in more detail under potential operational impacts as described in section 28.7.6 below.

Summary

243. No indirect impacts upon the setting of heritage assets are anticipated to be greater than **minor adverse** significance (as a WCS), as a result of onshore construction related activity. These would also be of a short term, temporary nature. The majority of impacts have been identified as **negligible** significance, again due predominantly to their temporary and short-term nature.
244. The noise assessment (Chapter 25 Onshore Noise and Vibration) for the project concluded that, with the adoption of best practice and enhanced mitigation measures, residual impacts arising as a result of noise and vibration in relation to the construction phase will be reduced to **no impact**. As such noise and vibration impacts are not considered to represent a material consideration with respect to heritage setting and the construction works.

28.7.5.3.2 Scenario 1

Landfall

245. The potential for indirect impact upon the setting of heritage assets under Scenario 1 is the same as that outlined for Scenario 2. As a WCS, construction works at the landfall will represent a **minor adverse** impact significance. See section 28.7.5.3.1 for further details and a more detailed discussion.

Onshore Cable Route

246. Construction activities under Scenario 1 along the onshore cable route that have the potential to indirectly impact upon the setting of heritage assets are confined to construction works associated with jointing pits excavation, cable pulling activities and link boxes installation.

247. The precise location of jointing pits (and the later associated cable pulling activities) and link boxes will be determined as part of the detailed design phase, post-consent. As such, the heritage assets which may be subject to indirect impact as a result of the proposed works are not known at this stage. Despite this, such works are likely to be short term and temporary, representing a negligible magnitude of effect on the setting of any heritage assets present, and (as a WCS) a **minor adverse** impact significance. The works will not constitute any ongoing harm to the heritage significance of any heritage assets with proximity to the works. Should a jointing pit and / or link box be sited in proximity to the Old Quaker Burial Ground (1408), as above (see section 28.7.5.3.1), any such construction works will need to be conducted in a sensitive and controlled manner, with associated signage and temporary barriers in order to avoid any accidental damage or physical interactions occurring. This is noted in the project-specific Outline WSI (document reference 8.5) and will ultimately need to be included and detailed in a Construction Stage Plan(s), Contractor Environmental Action Plan(s), or similar.

Onshore Project Substation and the National Grid Substation Extension

248. The potential for indirect impact upon the setting of heritage assets under Scenario 1 is the same as that outlined for Scenario 2. There are no identified or relevant heritage setting impacts (**no impact**) on heritage assets subject to assessment associated with the onshore project substation (and related) construction. See section 28.7.5.3.1 for further details and a more detailed discussion.

Summary

249. No indirect impacts upon the setting of heritage assets are anticipated to be greater than **minor adverse** significance (as a WCS), as a result of onshore construction related activity. These would also be of a short term, temporary nature. The majority of impacts have been identified as **negligible** significance, again due predominantly to their temporary and short-term nature. In addition, as discussed in section

28.7.5.3.1, based on conclusions reached by Chapter 25 Onshore Noise and Vibration, noise and vibration impacts are not considered to represent a material consideration with respect to heritage setting and the proposed construction works.

28.7.5.4 Impact (4) Impact on potential Geoarchaeological / Palaeoenvironmental remains, potentially indicative of former land surfaces

28.7.5.4.1 Scenario 2

250. Construction activities undertaken as part of the project have the potential to effect below ground deposits over a wider area than that of the footprint of the infrastructure. For example, through hydrological changes that may cause desiccation and drying out of wetland deposits and associated preserved waterlogged archaeological / geoarchaeological remains.
251. Impacts resulting in potential effects as part of construction works are those associated with intrusive groundworks, outlined above in section 28.7.5.1. Of particular interest in relation to geoarchaeological and palaeoenvironmental 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.
252. The onshore project area at the landfall is part of an internationally important region for Lower Palaeolithic archaeology. Deposits identified as CFB Formation have been encountered at Happisburgh and Pakefield, within which the earliest evidence for prehistoric hominin activity in the UK has been discovered (Parfitt et al., 2010; Parfitt et al., 2005). Potential palaeoenvironmental and geoarchaeological remains of this nature are regarded as having a high heritage significance, again under a WCS.
253. In order to ascertain the presence / absence of deposits of palaeoenvironmental potential such as the CFB Formation within the onshore project area, two phases of geoarchaeological watching brief (Phase 1 and Phase 2) of onshore engineering GI works have been undertaken within (and now immediately beyond) the onshore project area. The Phase 1 watching brief focussed on two landfall sites at the Happisburgh South landfall and at seven key crossing locations where trenchless methods (e.g. HDD) will be required. The Phase 2 watching brief focussed on four proposed trenchless crossing locations at Wooden Copse, North Walsham and Dilham Canal, Kings Beck and Wendling Beck.
254. No deposits resembling the CFB were encountered in boreholes assessed as part of the geoarchaeological watching brief (with depths down to approximately 20 metres

below ground level recorded) (see Appendix 28.3). Sediments encountered at the landfall location were considered to be glacial in origin. These results align with suggestions from the AHOB team that a large doline-type geological feature in-filled with glacial deposits may be present within the landfall compound zone. Data assessed indicates that if CFB deposits do survive, they are likely to be found at significant depth.

255. The maximum target depth of drill for trenchless techniques is c. 20m (relative to mean sea level). On this basis, it has been concluded (in consultation with HE and NCC HES - see section 28.3) that impacts upon geoarchaeological / palaeoenvironmental remains are likely to be of a negligible magnitude of effect, resulting in a **negligible to minor adverse** impact significance, at this location, as an interaction ('pathway') between receptor and impact is not considered likely based on information available to date.
256. The potential for the project to encounter currently unrecorded geoarchaeological / palaeoenvironmental remains will be mitigated by means of implementing the additional mitigation measures and commitments (set-out in the project-specific Outline WSI, document reference 8.5), which will include reference to a project-wide approach to geoarchaeological assessment / palaeoenvironmental survey, which will be established in the post-consent stages.
257. The opportunity to capture and geoarchaeologically assess sediments of possible palaeoenvironmental interest within this internationally important region can also be regarded as a beneficial effect arising as a result of the project. The accumulation of data pertaining to the wider stratigraphy of this region not only builds upon an understanding of the potential for geoarchaeological / palaeoenvironmental remains to exist with the project area, but also feeds into the wider research framework regarding British Palaeolithic archaeology through engagement with the AHOB and PAB projects. Any beneficial effect, however, must be demonstrated by the completion of studies to professional archaeological standards, and the results produced must be made publicly available (this commitment is set out in the project-specific Outline WSI, document reference 8.5).

28.7.5.4.2 Scenario 1

258. Impacts on potential geoarchaeological / palaeoenvironmental remains as part of construction works under Scenario 1 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 route.
259. As outlined above in section 28.7.5.4.1, the onshore project area at the landfall is part of an internationally important region for Lower Palaeolithic archaeology, with

deposits (CFB) containing the earliest evidence for prehistoric hominin activity in the UK encountered at Happisburgh and Pakefield. On this basis, potential palaeoenvironmental and geoarchaeological remains of this nature are regarded as having a high heritage significance under a WCS. Despite this, on the basis of the results of two phases of geoarchaeological watching briefs (Phase 1 and Phase 2), it has been concluded (in consultation with HE and NCC HES) that impacts upon geoarchaeological / palaeoenvironmental remains are likely to be of a negligible magnitude of effect, resulting in a **negligible to minor adverse** impact significance (see section 28.7.5.4.1).

260. The potential for the project to encounter currently unrecorded geoarchaeological / palaeoenvironmental remains within transition and jointing pits will nonetheless be mitigated by means of implementing the additional mitigation measures and commitments (set-out in the project-specific Outline WSI, document reference 8.5), which will include reference to a project-wide approach to geoarchaeological assessment / palaeoenvironmental survey, which will be established in the post-consent stages. Specifically, in relation to transition and jointing pit excavation under Scenario 1, this may include a requirement for additional archaeological / geoarchaeological monitoring or sampling, where required, on a case-by-case basis.

28.7.5.5 Impact (5) Impacts to site preservation conditions from drilling fluid breakout

28.7.5.5.1 Scenario 2

261. The potential for drilling fluid to breakout and spread into archaeological deposits, features and materials thereby causing an adverse effect upon site preservation has been taken into consideration.
262. As part of the HDD works, a drilling fluid (comprising a combination of water and natural clays such as bentonite) will be employed to lubricate the drilling process and cool the drill head. Bentonite is a common drilling fluid for HDD and is a naturally occurring clay which, when mixed with water, provides a gel like lubricant known as 'drilling mud' for the drilling process. Bentonite typically has a neutral pH level of 7.0 – 9.5 (similar to that of water / seawater) and typically contains less than 3-6% solids by volume and weight to water ratio.
263. Fluid pressures will be monitored throughout the drilling process to minimise the potential for breakout of the drilling fluid and an action plan will be developed and procedures adopted during the drilling activity to respond to any drilling fluid breakout. High level studies have indicated that the total worst case drilling fluid losses to the sea could be up to 300m³ per duct (noting that ~95% of this fluid is water). Moreover, GIS and geoarchaeological assessments have shown that if the CFB deposits associated with potential Palaeolithic archaeology are still extant, they

are expected to occur beneath the glacial tills at significant depth and likely beneath the HDD target depths (see Appendix 28.3).

264. The potential for drilling fluid to breakout and spread into / 'coat' archaeological deposits, features and materials thereby causing an adverse impact upon site preservation has as such been assessed as an effect of negligible magnitude, resulting in a **negligible** to **minor adverse** impact significance as a WCS.

28.7.5.5.2 Scenario 1

265. Under Scenario 1, HDD works are confined to the landfall. The potential for impacts to site preservation conditions from drilling fluid breakout under Scenario 1 is the same as that outlined for Scenario 2. As a WCS, the potential for drilling fluid to breakout and spread into / 'coat' archaeological deposits have been assessed as resulting in a **negligible** to **minor adverse** impact significance. See section 28.7.5.5.1 for further details and a more detailed discussion.

28.7.6 Potential Impacts during Operation

28.7.6.1 Impact (1) Indirect Impact on the Setting of Heritage Assets (Designated and Non-Designated)

266. The presence of above ground infrastructure could have an impact on the setting of heritage assets as a result of new above ground onshore infrastructure associated with the project being present within the landscape.

28.7.6.1.1 Scenario 2

Landfall

267. The landfall requires no above ground onshore infrastructure as part of operation. As a result, there are no indirect impacts (**no impact**) upon the setting of heritage assets with regards to this element of the project.

Onshore Cable Route

268. The onshore cable route requires no above ground onshore infrastructure that is considered likely to have any implications with regards to the setting of heritage assets. The only above ground components associated with the onshore cable route are confined to link boxes. The link boxes will be located close to field boundaries and in accessible locations (where possible) with the exact location to be determined during detailed design phases (post-consent) and are typically placed at 5km intervals along the cable route (approximately 24 in total). The link boxes may be buried to ground level or may be installed as above ground cabinets. Where they are above ground, the link box cabinets are relatively small in size (1.2m x 0.8m x 1.8m). On the basis of the size and anticipated siting (i.e. adjacent to field boundaries / roads, where possible) of the link boxes, no indirect impacts (**no impact**) with

respect to heritage setting are considered likely to occur in relation to the onshore cable route.

269. In addition, the Blickling Conservation Area (356), which contains a number of operational access routes may also be subject to temporary, short-term effects of negligible magnitude upon its heritage setting as a result of its proximity to proposed access routes (Figure 28.1a, map 4). However, during operation, access to the onshore cable route would only be required to conduct emergency repairs, if necessary. The use of these access routes by vehicles conducting repair works during the operation phases is therefore likely to be infrequent and intermittent. As a result, indirect impacts upon the setting of heritage assets with regards to this element of the project during operation are considered to be of **minor adverse** impact significance (as a WCS) given the Conservation Area's high heritage significance.

Onshore Project Substation and the National Grid Substation Extension and Overhead Line Modification

270. The following designated heritage assets (Figure 28.1a (map 9) and c and Figure 28.5) have been subject to further consideration with respect to indirect setting impacts as a result of the onshore project substation and the National Grid substation extension (see section 28.6.2):

- Wendling Abbey (4);
- Two moated sites at Huntingfield Hall (5);
- Moated site 430m SW of Bradenham Hall (6);
- Mona Hill (7);
- Church of St. Andrew, Bradenham (34);
- Church of St. Mary, Fransham (35);
- Church of All Saints, Necton (36);
- The Old Hall, Fransham (58);
- Bradenham Hall (347);
- Church of St. Mary, Bradenham (1825);
- The Church of St. Andrew, Holme Hale (1826);
- The Church of All Saints, Fransham (1827); and
- Holme Hale Hall (and associated assets) (1828).

271. The assets above were identified based on discussions and agreements with NCC HES and HE and following discussions with the LVIA consultant project team as part of Norfolk Vanguard (see Appendix 28.4). These are relevant to Norfolk Boreas given the strategic commitment of co-locating of the projects. Appendix 28.4 tabulates and details these assets further, with reference to supporting visuals. A summary of the settings assessment outcomes is shown in Table 28.26.

Table 28.26 Scenario 2 Onshore project substation summary of settings assessment outcomes

Name	Settings assessment summary
Wendling Abbey, Scheduled Monument (4)	<p>There is no intervisibility from this location, as the development is concealed by landform and tree cover.</p> <p>No further action and no mitigation required. No Impact.</p>
Two moated sites at Huntingfield Hall (5)	<p>The LVIA ZTV (Chapter 29 Landscape and Visual Impact Assessment, section 29.5.4.1 and Figures 29.5 and 29.6) shows no intervisibility between the monument(s) and the onshore project substation located approx. 3.2km to the west. A site visit (December 2017) also confirmed this to be the case, with much existing screening (and intervening woodland, vegetation and topography) noted. The moated sites are tree covered and / or surrounded by trees and located to the east side of New Lane.</p> <p>No further action and no mitigation required. No Impact.</p>
Moated site 430m SW of Bradenham Hall (6)	<p>The LVIA ZTV (Chapter 29 Landscape and Visual Impact Assessment, section 29.5.4.1 and Figures 29.5 and 29.6) shows no intervisibility between the monument and the onshore project substation located approx. 1.6km to the north-west. There is significant woodland screening (Great Wood) between the moated site and the substation location. The moated site is tree covered and located to east of Wood Lane.</p> <p>No further action and no mitigation required. No Impact.</p>
Mona Hill (7)	<p>The Monument is located within a dense woodland block on Necton Common, as shown on the LVIA ZTV (Chapter 29 Landscape and Visual Impact Assessment, section 29.5.4.1 and Figures 29.5 and 29.6) and is surrounded by trees on all sides. As such there is no intervisibility between the monument and the onshore project substation located approx. 1.6km to the north.</p> <p>No further action and no mitigation required. No Impact.</p>
Church of St. Andrew, Bradenham (34)	<p>The LVIA ZTV (Chapter 29 Landscape and Visual Impact Assessment, section 29.5.4.1 and Figures 29.5 and 29.6) suggests medium to low intervisibility between the church and the onshore project substation located approx. 2km to the north-west. However, during the site visit (December 2017) the church was noted as being situated in a hollow and although views towards the onshore project substation may be afforded from the top of the tower, views from ground level are well-screened by intervening topography, vegetation, trees and hedgerows. The site was subsequently visited by the LVIA consultant project team in March 2018, at the request of the heritage consultant project team, and as such is included as a representative heritage specific viewpoint location (CH1).</p> <p>The visualisation produced indicates visibility of a barely discernible glimpsed 'roof-top' section of the onshore project substation and a number of masts associated with the substation from the northern-most extent of the church grounds.</p> <p>On the basis of this visibility, the Church of St. Andrew has been taken forward and prioritised for further heritage setting consideration below.</p>
Church of St. Mary, Fransham (35)	<p>The LVIA ZTV (Chapter 29 Landscape and Visual Impact Assessment, section 29.5.4.1 and Figures 29.5 and 29.6) suggests low intervisibility between the church and the onshore project substation located approx. 1.7km to the south. The tower does not survive and there are no views from ground level, as these are well-screened by intervening vegetation, trees and hedgerows and the A47. Other intervening features of note further to the south are the existing 400kV overhead lines and Necton Wood.</p> <p>No further action and no mitigation required. No Impact.</p>

Name	Settings assessment summary
Church of All Saints, Necton (36)	<p>The LVIA ZTV (Chapter 29 Landscape and Visual Impact Assessment, section 29.5.4.1 and Figures 29.5 and 29.6) suggests medium to low intervisibility between the church and the onshore project substation located approx. 2km to the north-east. However, the church is very well-screened by intervening vegetation, trees, hedgerows and built form. Whilst views towards the substation site may be afforded from the top of the tower, there are no views in that direction from ground level. Any such views would also encompass the existing Dudgeon and National Grid Substation sites at Necton and the 400kV overhead lines. The tower is not believed to be publicly accessible.</p> <p>The site was subsequently visited by the LVIA consultant project team in March 2018, at the request of the heritage consultant project team, and as such is included as a representative heritage specific viewpoint location (CH2). This has confirmed that there is no visibility from this location, as the development is concealed by landform and tree cover.</p> <p>No further action and no mitigation considered to be required. No Impact.</p>
The Old Hall, Fransham (58)	<p>The LVIA ZTV (Chapter 29 Landscape and Visual Impact Assessment, section 29.5.4.1 and Figures 29.16 and 29.17) suggests medium to low intervisibility between the building and the onshore project substation located approx. 1.3km to the south. However, the building is believed to be well-screened by intervening vegetation, trees, hedgerows and built form, including woodland blocks, not least Necton Wood. Although some isolated views towards the substation site may be afforded from certain locations across the farm complex, this must be taken within the context of other existing large modern farm buildings (barns and silos) within the immediate setting of Old Hall Farm, as well as the large 400kV overhead lines running east - west further to the south, adjacent to Necton Wood on its northern side.</p> <p>The site was, however, still subsequently visited by the LVIA consultant project team in March 2018, at the request of the Heritage consultant project team, and as such is included as a representative heritage specific viewpoint location (CH3). This has confirmed that there is no intervisibility from this location, as the development is concealed by tree cover.</p> <p>No further action and no mitigation required. No Impact.</p>
Bradenham Hall (347)	<p>The LVIA ZTV (Chapter 29 Landscape and Visual Impact Assessment, section 29.5.4.1 and Figures 29.16 and 29.17) suggests no intervisibility between the building and the onshore project substation located approx. 1.9km to the west / north-west. The building is well screened by intervening woodland blocks on its west side and further afield by Great Wood, and other vegetation, trees and hedgerows.</p> <p>No further action and no mitigation required. No Impact.</p>
Church of St. Mary, Bradenham (1825)	<p>The site was visited by the LVIA consultant project team in March 2018, at the request of the heritage consultant project team, and as such is included as a representative heritage specific viewpoint location (CH4). This has confirmed that there is no intervisibility from this location, as the development is concealed by landform and tree cover.</p> <p>No further action and no mitigation required. No Impact.</p>
The Church of St. Andrew, Holme Hale (1826)	<p>The site was visited by the LVIA consultant project team in March 2018, at the request of the heritage consultant project team, and as such is included as a representative heritage specific viewpoint location (CH5). This has confirmed that there is no intervisibility from this location, as the development is concealed by landform and tree cover.</p> <p>No further action and no mitigation required. No Impact.</p>

Name	Settings assessment summary
The Church of All Saints, Fransham (1827)	There is no intervisibility from this location, as the development is concealed by landform and tree cover. No further action and no mitigation required. No Impact.
Holme Hale Hall (and associated assets) (1828)	There is no known intervisibility from these locations, as the development is concealed by landform and tree cover. No further action and no mitigation required. No Impact.

272. CH1 (see Appendix 28.4) shows a barely discernible glimpsed ‘roof-top’ section of the onshore project substation and a number of masts under Scenario 2 as being visible in the photomontage view (in the approximate centre of the CH1 visualisation as seen at a distance of c. 1.6 km) from the grounds of the Church of St Andrew, Bradenham (34).
273. The setting of the church has a rural feel and one of relative isolation, being located away from the main settlement of Bradenham itself. Although there is visibility from the grounds of the church to the onshore project substation and associated lightning masts, based on an assessment of the visualisations generated from CH1 (see Appendix 28.4), this visibility is minimal. From a landscape perspective, the visibility of the onshore project substation from this location neither re-defines the character of that view nor constitutes a defining feature in the view. From a heritage perspective, the very slight visibility of the onshore project substation from the grounds of the Church of St Andrew is not considered to constitute harm to the heritage significance of the church nor represent any associated loss of appreciation of the heritage assets significance. This indirect (non-physical) impact is therefore considered to represent a negligible magnitude of effect upon the heritage setting of the church, resulting in a **minor adverse** impact significance as a WCS.
274. The very slight visibility of the onshore project substation from the grounds of the Church of St Andrew may nonetheless be further reduced by mitigation planting. Embedded mitigation planting is detailed in Chapter 29 Landscape and Visual Impact Assessment. The implementation of a scheme of mitigation planting will be considered as part of the post-consent phase of the project. Those areas considered to benefit from additional mitigation planting (such as the bolstering of hedgerows and tree planting), above and beyond the on-site landscape screening and planting mitigation embedded within the project, may be informed by any heritage setting concerns identified, detailed and discussed within this ES chapter. Although the visibility of the onshore project substation is only very slight from the grounds of the Church of St Andrew, this heritage asset may be subject to further consideration in relation to the possibility of additional mitigation planting during the post-consent phase, in order to potentially reduce the impact significance (as identified above).

Summary

275. No indirect impacts upon the setting of heritage assets are anticipated to be greater than **minor adverse** significance during operation, and minor adverse would very much represent a precautionary WCS.
276. For the most part, **no impact** to heritage setting (and associated heritage significance) has been identified and no further action and no further mitigation is considered to be required. With the exception of the Church of St Andrew, Bradenham (34), none of the heritage assets above were found to share visibility or intervisibility with the onshore project substation and associated infrastructure, and due to their distance from these above ground elements of the project and the intervening vegetation, trees, hedgerows, landform and built form, **no impact** to heritage setting (and associated heritage significance) was identified and no further action and no further mitigation is considered to be required.
277. The Church of St Andrew, Bradenham (34), may be subject to an impact of **minor adverse** significance. This impact significance may be further reduced by mitigation planting (see Chapter 29 Landscape and Visual Impact Assessment). This heritage asset may nonetheless be subject to further consideration in relation to additional mitigation planting during the post-consent phase to potentially further reduce this impact significance. Nonetheless, the very slight visibility of the onshore project substation from the grounds of the Church of St Andrew is not considered to constitute harm to the heritage significance of the church nor represent any associated loss of appreciation of the heritage assets significance.
278. The Blickling Conservation Area (356) may also be subject to indirect impacts upon its setting due to infrequent and intermittent use of operation accesses for repair works, the impact is considered to be of **minor adverse** significance (as a WCS) given its high heritage significance.
279. The noise assessment (Chapter 25 Noise and Vibration) for the project concluded that the presence of the onshore project substation, with the application of noise mitigation measures, will result in no impact or negligible impact significance at the identified noise receptor locations. Two of the noise receptor locations were located in the vicinity of Bradenham Hall (347), but generally the noise receptors were in closer proximity to the onshore project substation than the designated heritage assets subject to further heritage setting consideration, including those which were taken forward as heritage specific viewpoints. As such noise impacts are not considered to represent a material consideration with respect to heritage setting and the onshore project substation.
280. The nature of the landscape surrounding the onshore project substation, including topography, intervening built form, pockets of small, medium and larger woodland

blocks and established hedgerows, all contribute to a partially enclosed landscape character. Views of the onshore project substation are therefore typically contained within the short range, with medium to distant range views limited in their occurrence and extent. Mature tree cover within settlements, especially surrounding the sites of heritage assets, provide enclosure and limit the visual association with the wider landscape. As such it is not believed, and has not been identified to date, that the onshore substation features within any important views (e.g. views of the assets from outside of their immediate settings) of the heritage assets identified for further heritage setting consideration. No harm to heritage significance in this respect has therefore been identified and no associated loss of appreciation of the heritage assets, as listed above in Table 28.26.

28.7.6.1.2 Scenario 1

Landfall

281. The potential for indirect impact on the setting of heritage assets under Scenario 1 is the same as that outlined for Scenario 2. No indirect impacts (**no impact**) are anticipated to arise as a result of the project within the landfall. See section 28.7.6.1.1 for further details and a more detailed discussion.

Onshore Cable Route

282. The potential for indirect impact on the setting of heritage assets under Scenario 1 is the same as that outlined for Scenario 2. As a WCS, indirect impacts upon the setting of heritage assets with regards to this element of the project during operation are considered to be of **minor adverse** impact significance. See section 28.7.6.1.1 for further details and a more detailed discussion.

Onshore Project Substation and the National Grid Substation Extension

283. The heritage assets (Figure 28.1a (map 9), b and Figure 28.5) subject to further consideration with respect to indirect impacts as a result of the onshore project substation and the National Grid substation extension operation works under Scenario 1 are the same as those subject to consideration with respect to Scenario 2 (see section 28.7.6.1).

284. The siting of the onshore project substation under Scenario 1 is to the east of the Norfolk Vanguard substation and therefore differs to the siting of the onshore project substation, as assessed under Scenario 2. Nonetheless, with all but one of the heritage assets assessed, the conclusions reached with respect to indirect impacts upon setting were the same as those underlined in section 28.7.6.1, whereby no further action and no mitigation is required (**no impact**).

285. The fundamental assessment element specific to Scenario 1 with regards to heritage setting and the onshore project substation and National Grid substation extension occurs in relation to the Church of St Andrew, Bradenham (34).
286. The grounds of the Church of St Andrew are included as a representative heritage specific viewpoint location (CH1) (Appendix 28.4). CH1 shows a very small corner section of the onshore project substation mostly shielded by intervening vegetation (just visible to the right of the CH1 visualisation, mostly shielded by intervening vegetation - seen at a distance of c. 1.6 km) and a number of masts under Scenario 1 (in the approx. centre of the CH1 visualisation) as being partly visible in the photomontage view from the northern-most extent of the grounds of the church of St Andrew, Bradenham (34). Views of the onshore project substation are, however, largely concealed by intervening tree cover, with visibility unlikely in the summer months due to an increased concentration of tree foliage.
287. The same conclusions have been reached with regards to the setting of the church as outlined in section 28.7.6.1.1. Although there is visibility from the grounds of the church to the onshore project substation, based on an assessment of the visualisations generated from CH1, this visibility is not considered to constitute harm to the heritage significance of the church nor any associated loss of appreciation of the heritage assets significance. This indirect impact is therefore considered to represent a negligible magnitude of effect upon the heritage setting of the church, resulting in a **minor adverse** impact significance as a WCS.
288. In addition, under Scenario 1, the visualisation produced from CH1 suggests some low-level visibility of the onshore project substation and the Norfolk Vanguard substation and associated masts from the grounds of the Church of St Andrew, Bradenham (34). Cumulative indirect impact upon the setting of the church, on the basis of this dual visibility, is considered further in section 28.8.
289. As outlined in section 28.7.6.1.1, the very slight visibility of the onshore project substation from the grounds of the Church of St Andrew may nonetheless be further reduced by mitigation planting. Embedded mitigation planting is detailed in Chapter 29 Landscape and Visual Impact Assessment. The implementation of a scheme of mitigation planting will be considered as part of the post-consent phase of the project. Those areas considered to benefit from additional mitigation planting (such as the bolstering of hedgerows and tree planting), above and beyond the on-site landscape screening and planting mitigation embedded within the project, will be informed by any heritage setting concerns identified, detailed and discussed within this ES chapter. Although the visibility of the onshore project substation is only very slight from the northern-most extent of the grounds of the Church of St Andrew, this heritage asset may be subject to consideration in relation to the possibility of

additional mitigation planting during the post-consent phase, in order to potentially reduce the impact significance (as identified above).

Summary

290. No indirect impacts upon the setting of heritage assets are anticipated to be greater than **minor adverse** significance during operation, and minor adverse would very much represent a precautionary WCS. For the most part, **no impact** to heritage setting (and associated heritage significance) has been identified and no further action and no further mitigation is considered to be required. This is with the exception of the Church of St Andrew, Bradenham (34), which may be subject to an impact of **minor adverse** significance (as a WCS). This impact significance may be further reduced by mitigation planting (see Chapter 29 Landscape and Visual Impact Assessment). This heritage asset may nonetheless be subject to consideration in relation to additional mitigation planting during the post-consent phase to potentially further reduce this impact significance. Nonetheless, the very slight visibility of the onshore project substation from the Church of St Andrew is not considered to constitute harm to the heritage significance of the church or any associated loss of appreciation of the heritage assets significance.

28.7.6.2 Impact (2) Impacts to site preservation conditions from heat loss from installed cables

28.7.6.2.1 Scenario 1 and Scenario 2

291. Heat loss from electrical cables has the potential to have a damaging effect on any waterlogged archaeological remains that may be present, such as palaeoenvironmental / geoarchaeological remains, other organic material and waterlogged wood.
292. The soil structure (thermal properties) and final engineering design will determine the maximum heat loss and subsequent dissipation of heat through the soil. However, heat dissipation will be localised to areas immediately around the cables and ducts.
293. The soil surrounding the immediate locality of a large portion of the cables will have been subject to disturbance as a result of cable trenching. As any sub-surface archaeological remains present therein will have been considered as vulnerable to the effects of cable trenching, any assets identified will have been subject to initial informative stages of mitigation work, where necessary (see section 28.7.2), and subsequent and additional mitigation measures, where required. On this basis, there will be **no further impact** during operation associated with the heat loss from cables.
294. Sections of the ducts installed by means of trenchless techniques will occur at such a depth that there are no anticipated impacts upon sub-surface archaeological

remains. Moreover, data assessed to date indicates that the likely interaction between HDD works and palaeoenvironmental / geoarchaeological deposits are also likely to be negligible (see section 28.7.5.4). As such, it is considered that there will be **no impact** to sub-surface archaeological remains or palaeoenvironmental / geoarchaeological deposits associated with the heat loss from cables during the operational phase.

28.7.7 Potential Impacts during Decommissioning

295. No decision has been made regarding the final decommissioning policy for the onshore cables, as it is recognised that industry best practice, rules and legislation change over time.
296. In relation to the onshore project substation, the programme for decommissioning is expected to be similar in duration to the construction phase. The detailed activities and methodology would be determined later within the project lifetime, but are expected to include:
- Dismantling and removal of outside electrical equipment from outside of the onshore project substation buildings;
 - Removal of cabling from site;
 - Dismantling and removal of electrical equipment from within the onshore project substation buildings;
 - Removal of main onshore project substation building and minor services equipment;
 - Demolition of the support buildings and removal of fencing; and
 - Landscaping and reinstatement of the site (including land drainage); and
 - Removal of areas of hard standing.
297. Whilst details regarding the decommissioning of the onshore project substation are currently unknown, considering the WCS, it is anticipated that the impacts would be no worse than those during construction (see sections 28.7.7.1 and 28.7.7.2 for a more detailed discussion).
298. 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. The decommissioning works could be subject to a separate licencing approach, which may require an EIA.

28.7.7.1 Impact (1) Direct Impact on (Permanent Change to) Buried Archaeological Remains

28.7.7.1.1 Scenario 1 and Scenario 2

299. Although no decision has been made regarding the final decommissioning plan for the onshore cables and other onshore elements of the project, it is likely that the onshore cables will be removed from the ducts and recycled, with the jointing pits and ducts capped and sealed then left in-situ. Direct impacts as part of decommissioning works may as such result from the removal of onshore cables and the onshore project substation. The extent of any impact will depend on the presence, nature and depth of any such remains, in association with the depth of the proposed decommissioning-related groundworks. Any adverse impacts would likely be permanent and irreversible in nature.
300. It was noted by HE in the Scoping Opinion (Planning Inspectorate, June 2017) for Norfolk Vanguard 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. Although a final decommissioning plan has not been established at this stage, it is not anticipated that the grubbing out of foundations will be undertaken. Foundations for the project will either exist in the form of concrete pad foundations (which would likely be broken out and removed) or piled foundations (which would likely be cut off sub-surface) (see Chapter 5 Project Description). Additionally, although there is the potential for small oil spills associated with transformer drainage operations, the application of best practice measures would ensure that any leakage would be dealt with quickly and efficiently, thus ensuring that decommissioning activities will not give rise to a major transformer leak. On this basis, direct impacts on buried archaeological remains are assumed to be no worse than those identified during the construction stage. Given that direct impacts on buried archaeological remains are likely to have already occurred as part of the construction phase, impacts of this nature occurring as a result of decommissioning works are considered to be of negligible magnitude of effect.
301. In the absence of further information at this stage, a precautionary **minor adverse** impact significance is predicted (as a WCS, and in the absence of both embedded and site-specific / additional mitigation measures, as considered to be required at the time). This would require substantiation following a more thorough and detailed assessment at the decommissioning stage. As mentioned above, a full EIA may be carried out ahead of any decommissioning works to be undertaken, including any requisite archaeological and cultural heritage impact assessment. It is also anticipated, however, that appropriate and proportionate mitigation can be applied,

as required at the time, which will reduce (offset) impact significance to levels considered **non-significant** in EIA terms.

28.7.7.2 Impact (2) Indirect Impact on the Setting of Heritage Assets (Designated and Non-Designated)

28.7.7.2.1 Scenario 1 and Scenario 2

302. Temporary / short-term effects are expected related to the presence of machinery, decommissioning traffic and general decommissioning activities taking place within the onshore decommissioning areas, which would represent low or negligible magnitude of effect. The sight, noise and smell, as well as any dust created during the decommissioning phase could have a temporary indirect (non-physical) impact upon heritage assets and their settings.
303. Impacts upon the setting of heritage assets are likely to be confined to the works associated with the removal of onshore infrastructure and related components. As noted above, these works will be temporary in nature. A full EIA may be carried out ahead of any decommissioning works to be undertaken. However, indirect impacts associated with decommissioning and the setting of heritage assets are not considered likely to be any greater than those identified for the construction and operation and maintenance stages. As such no impacts would be greater than a temporary level of **minor adverse** impact significance, and at this stage of assessment most are anticipated to be **negligible** or **no impact**.

28.8 Cumulative Impacts

304. Cumulative impacts are those which arise from the interaction of the project with other known plans or projects. Table 28.27 summarises the project-specific impacts identified in section 28.7 that have the potential to act cumulatively with other projects.

Table 28.27 Potential cumulative impacts

Impact	Potential for cumulative impact	Data confidence	Rationale
Construction			
Direct impact on buried archaeological remains	Yes	Low - Medium	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 in an area of overlap or those with an extent which intersects two or more project boundaries (where groundworks are anticipated). Impacts may also occur which affect

Impact	Potential for cumulative impact	Data confidence	Rationale
			the nature of the buried archaeological resource on a wider scale.
Direct impact on above ground archaeological remains (including built heritage assets)	Yes	Medium - High	Cumulative direct impacts arising from two or more projects are possible. Impacts may occur to non-designated heritage assets or individual archaeological features (e.g. earthworks). Such impacts also have the potential to affect the HLC of the study area (e.g. loss of earthworks and / or historic field boundaries as a result of one project could affect the HLC as summarised for the purposes of another project).
Indirect impact on the setting of heritage assets	Yes	High	Cumulative indirect impacts arising from two or more projects are possible, particularly in the event that the construction of two or more projects is concurrent and within sight of an individual heritage asset or group of heritage assets, although additional (external) factors affecting setting may also occur.
Impact on potential geoarchaeological / palaeoenvironmental remains	Yes	Low - Medium	Cumulative direct impacts arising from two or more projects are possible. Impacts may occur to geoarchaeological / palaeoenvironmental remains where deposits of geoarchaeological importance present within two or more project boundaries are directly impacted as the result of groundworks.
Operation			
Indirect impact on the setting of heritage assets	Yes	High	Cumulative indirect impacts 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 or group of heritage assets, although additional (external) 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 no worse than those identified during the construction stage.			

305. Projects identified for potential cumulative impacts that were agreed as part of the Norfolk Boreas PEIR (Norfolk Boreas Limited, 2018) consultation are also considered relevant to the Norfolk Boreas CIA. These projects, as well as any relevant development applications submitted since this consultation have been considered and their anticipated potential for cumulative impact are detailed in Table 28.28.

306. The remainder of the section (28.8) details the nature of the cumulative impacts against all those receptors (assets) scoped in for cumulative assessment.

Table 28.28 Summary of projects considered for the CIA in relation to onshore archaeology and cultural heritage

Project	Status	Development period	⁶ Distance from Norfolk Boreas site (km)	Project definition	Project data status	Included in CIA	Rationale
National Infrastructure Planning							
Norfolk Vanguard Offshore Wind Farm	Application submitted	Expected construction 2020 to 2025	0 – projects are co-located	Full ES available: https://infrastructure.planninginspectorate.gov.uk/projects/eastern/norfolk-vanguard/?ipcsection=docs	High	Yes	Overlapping project boundaries may result in impacts of a direct and / or indirect nature.
Hornsea Project Three Offshore Wind Farm	Application submitted	Expected construction start date 2021. Duration 6 to 10 years dependent on phasing.	0 – cable intersects project 32 - between substation locations	https://infrastructure.planninginspectorate.gov.uk/projects/eastern/hornsea-project-three-offshore-wind-farm/	High	Yes	Overlapping project boundaries may result in impacts of a direct and / or indirect nature.
Dudgeon Offshore Wind Farm	Commissioned	Constructed	0	http://dudgeonoffshorewind.co.uk/	High	No	The Dudgeon Offshore Wind Farm is constructed and therefore comprises part of the baseline environment. It is not assessed within the CIA on this basis.

⁶ Shortest distance between the considered project and Norfolk Boreas – unless specified otherwise.

Project	Status	Development period	⁶ Distance from Norfolk Boreas site (km)	Project definition	Project data status	Included in CIA	Rationale
A47 corridor improvement programme – North Tuddenham to Easton	Pre-application (application due 2020)	Start works April 2021 Open May 2023	26.7	https://highwaysengland.co.uk/projects/a47-north-tuddenham-to-easton-improvement-scheme/	Medium	No	No overlapping project boundaries and therefore direct cumulative impacts are negligible. Indirect cumulative impacts, should they occur, would only arise as a result of concurrent construction works in relation to the project and the North Tuddenham to Easton dualling due to its proximity (2.5km at the closest point).
A47 corridor improvement programme – A47 Blofield to North Burlingham	Pre-application (application due 2019)	Start works 2021 Open 2022	25	https://highwaysengland.co.uk/projects/a47-blofield-to-north-burlingham/	Medium	No	Designated heritage assets identified in this Chapter which may have intervisibility associated with the concurrent construction of the project and this project are the Grade I LB Elsing Hall (RHDHV 31) and the Grade II LB remains to the gatehouse of Elsing Hall (RHDHV 327). However, satellite imagery indicates that these heritage assets lie directly north of a wooded area and are unlikely to have any intervisibility with the A47 corridor improvement programme at this location. Indirect cumulative impacts are therefore considered to be negligible.
A47 corridor improvement programme – A47 / A11 Thickthorn Junction	Pre-application (application due 2019)	Start works 2020 Open 2023	18	https://highwaysengland.co.uk/projects/a47-thickthorn-junction/	Medium	No	Indirect cumulative impacts are therefore considered to be negligible.
Norwich Western Link	Pre-application	Expected construction start late 2022	2.8	https://www.norfolk.gov.uk/roads-and-transport/major-projects-and-improvement-	Medium	No	No overlapping project boundaries and therefore direct cumulative impacts are negligible. Indirect cumulative impacts, should they occur, would only arise as a result of concurrent construction works in relation to the project and the Norwich Western Link.

Project	Status	Development period	⁶ Distance from Norfolk Boreas site (km)	Project definition	Project data status	Included in CIA	Rationale
				plans/norwich/norwich-western-link			However, no heritage assets have been identified within this Chapter that will likely share any intervisibility with the construction activities associated with both the project and the Norwich Western Link. Indirect cumulative impacts are therefore also considered to be negligible.
Third River Crossing (Great Yarmouth)	Pre-application (application due 2019)	Expected construction start in late 2020 Open early 2023	28	https://www.norfolk.gov.uk/roads-and-transport/major-projects-and-improvement-plans/great-yarmouth/third-river-crossing	Medium	No	No overlapping project boundaries and therefore direct cumulative impacts are negligible. Indirect cumulative impacts, should they occur, would only arise as a result of concurrent construction works in relation to the project and the Third River Crossing project. However, due to the distance between these projects, no heritage assets have been identified within this Chapter that will likely share any intervisibility with the construction activities associated with both the project and the Third River Crossing. Indirect cumulative impacts are therefore also considered to be negligible.
King's Lynn B Power Station amendments	Approved	Expected construction start 2019 to 2022	28	https://www.kingslynbcct.co.uk/	High	No	No overlapping project boundaries and therefore direct cumulative impacts are negligible. Indirect cumulative impacts, should they occur, would only arise as a result of concurrent construction works in relation to the project and the King's Lynn B Power Station amendments. However, due to the distance

Project	Status	Development period	⁶ Distance from Norfolk Boreas site (km)	Project definition	Project data status	Included in CIA	Rationale
							between these projects, no heritage assets have been identified within this Chapter that will likely share any intervisibility with the construction activities associated with both the project and the King's Lynn B Power Station amendments. Indirect cumulative impacts are therefore also considered to be negligible.
North Norfolk District Council							
PF/17/1951 Erection of 43 dwellings and new access with associated landscaping, highways and external works	Approved	Anticipated Q2 2018	0.7	Application available: https://idoxpa.norfolk.gov.uk/online-applications/applicationDetails.do?activeTab=summary&keyVal=_NORF_DCAPR_92323	High	No	No overlapping project boundaries and therefore direct cumulative impacts are negligible. There is no above ground infrastructure for the project in this section of the cable route (north of North Walsham). Indirect cumulative impacts, should they occur, would therefore only arise as a result of con-current construction works. No heritage assets have been identified within this Chapter that will likely share any intervisibility with the construction activities associated with both the project and the proposed dwellings at this location. Indirect cumulative impacts are therefore considered to be negligible.

Project	Status	Development period	⁶ Distance from Norfolk Boreas site (km)	Project definition	Project data status	Included in CIA	Rationale
Bacton and Walcott Coastal Management Scheme	Approved	Expected construction start date Spring 2019	1.0	Public information leaflets available: https://www.norfolk.gov.uk/media/3371/bacton-to-walcott-public-information-booklet-july-2017.pdf	Medium	Yes	Although there is no geographical overlap between the project boundaries, cumulative impacts of a direct or indirect nature may occur to deposits of geoarchaeological interest that are present and intersect both the onshore project area and the proposed Bacton and Walcott Coastal Management Scheme.
Coastal defence/ protection works , Happisburgh PF/18/0751	Approved	Coastal protection over 10-year duration from August 2018	0.12	https://idoxpa.norfolk.gov.uk/online-applications/applicationDetails.do?activeTab=summary&keyVal=_NORF_DCAPR_93543	Medium	Yes	Although there is no geographical overlap between the project boundaries, cumulative impacts of a direct or indirect nature may occur to deposits of geoarchaeological interest that are present and intersect both the onshore project area and the proposed Happisburgh coastal defence and protection works.

Project	Status	Development period	⁶ Distance from Norfolk Boreas site (km)	Project definition	Project data status	Included in CIA	Rationale
Breckland Council							
Erection of 85 Dwellings with Associated Open Space 3PL/2018/1246/F	Awaiting Decision	Application received 04/10/18.	1.26	http://planning.breckland.gov.uk/OcellaWeb/planningDetails?reference=3PL/2018/1246/F&from=planningSearch	Medium	No	<p>No overlapping project boundaries and therefore direct cumulative impacts are negligible.</p> <p>There is no above ground infrastructure for the project in this section of the cable route (south of Swanton Morley). Indirect cumulative impacts, should they occur, would therefore only arise as a result of con-current construction works. No heritage assets have been identified within this Chapter that will likely share any intervisibility with the construction activities associated with both the project and the proposed dwellings at this location. Indirect cumulative impacts are therefore considered to be negligible.</p>
Residential development of 40 No. units comprising a mix of housing types, accommodating open space and appropriate associated infrastructure with vehicle	Approved	Application approved 11/02/19. Construction must begin within 2 years.	1.42	http://planning.breckland.gov.uk/OcellaWeb/planningDetails?reference=3PL/2018/0993/F&from=planningSearch	Medium	No	<p>No overlapping project boundaries and therefore direct cumulative impacts are negligible.</p> <p>There is no above ground infrastructure for the project in this section of the cable route (south of Bawdeswell). Indirect cumulative impacts, should they occur, would therefore only arise as a result of con-current construction works. No heritage assets have been identified within this Chapter that will likely share any intervisibility with the construction activities</p>

Project	Status	Development period	⁶ Distance from Norfolk Boreas site (km)	Project definition	Project data status	Included in CIA	Rationale
access via Hall Road 3PL/2018/0993/F							associated with both the project and the proposed dwellings at this location. Indirect cumulative impacts are therefore considered to be negligible.

307. In summary, the following projects will be assessed for potential direct cumulative impacts (where relevant):

Scenario 1

- Norfolk Vanguard project;
- Hornsea Project Three;
- Bacton and Walcott Coastal Management Scheme; and
- Happisburgh coastal defence and protection works

Scenario 2

- Hornsea Project Three;
- Bacton and Walcott Coastal Management Scheme;
- Happisburgh coastal defence and protection works.

308. Consideration of Norfolk Vanguard within the CIA presented is confined to Scenario 1 and is based on the following assumptions:

- Norfolk Vanguard is consented, with construction commencing as per the anticipated programme set out as part of the final DCO submission; and
- Concurrent construction will be taking place between the two projects at the onshore project substation and National Grid substation extension and could take place at the landfall.

28.8.1 Potential Cumulative Impacts during Construction

28.8.1.1 Impact (1) Cumulative Direct Impact on (permanent change to) Above Ground and / or Buried Archaeological Remains (Heritage Assets)

309. Due to the geographical overlap between the Norfolk Boreas, Norfolk Vanguard and Hornsea Project Three, there is the potential for direct cumulative impacts upon both above ground and buried archaeological remains (heritage assets).

310. Effects resulting in these potential impacts as part of construction work are those associated with intrusive groundworks in relation to the three projects. The extent of any impact will depend on the presence and nature of any such remains. Any adverse impacts may be permanent and irreversible in nature and have the potential to affect individual heritage assets (or group of heritage assets), as well as the nature of the known archaeological resource as a whole. In the absence of mitigation (both embedded and site-specific / additional mitigation), the magnitude of effect on buried and above ground archaeological remains could be considered to be medium or high, resulting in an impact significance ranging between **moderate to major adverse**, as a WCS.

311. Under Scenario 1, many of the groundworks and construction activities undertaken for Norfolk Vanguard will also serve to facilitate Norfolk Boreas (e.g. cable duct installation / trenchless crossings / mobilisation areas / onshore project substation access road). Despite this, groundworks specific to each project will also be undertaken (including landfall duct installation and compound areas, transition / jointing pits, link box installation, the onshore project substations and associated construction areas, 400kV interface cable installation and National Grid extension and associated construction compound). There is thus the potential for cumulative direct impacts to occur. Despite this potential, it should be noted that the strategic approach to delivering Norfolk Vanguard and Norfolk Boreas has been devised in such a way so as to contain the extent of potential direct impacts, thus helping to ensure that impacts are minimised as much as possible.
312. Moreover, areas subject to groundworks as part of Norfolk Boreas will also be in proximity to the Norfolk Vanguard works and as such, any post-consent survey work undertaken for Norfolk Vanguard or construction learning will be able to further inform Norfolk Boreas and the application of appropriate mitigation measures therein. The survey, identification and recording of archaeological remains associated with Norfolk Vanguard will help inform any assessment subsequently undertaken for Norfolk Boreas, thereby resulting in a beneficial effect through the accumulation of data which can be fed into the project design process and de-risk the project from an archaeological / cultural heritage perspective (e.g. micro-siting, input into the iterative design process), where possible, and within the confines of engineering and other environmental constraints.
313. In addition, both the Norfolk Vanguard and Hornsea Project Three projects are subject to an EIA, and adopt mitigation strategies which will seek to avoid, reduce or offset direct impacts upon both buried and above ground archaeological remains (including built heritage assets). Such strategies if implemented effectively are considered highly likely to reduce (or offset) the impact significance to a residual level(s) considered **non-significant** in EIA terms.

28.8.1.2 Impact (2) Cumulative Indirect Impact on the Setting of Heritage Assets (Designated and Non-Designated)

314. Cumulative indirect impacts have the potential to occur upon heritage assets which share intervisibility with both construction works associated with the project and those undertaken for other projects and activities, where construction works are concurrent.
315. Under Scenario 1 the construction works for the Norfolk Vanguard and Norfolk Boreas projects have been designed in such a way that the concurrent construction of specific project elements in any one location is, for the most part, not anticipated.

This is with the exception of duct installation at the landfall where works may take place in parallel (see Chapter 5 Project Description).

316. As such, there is the potential for cumulative indirect impacts on the setting of heritage assets with respect to construction works associated with these projects in the landfall area. Those assets which may be subject to impact are outlined in section 28.7.5.3.1. Despite this potential, the findings of the setting assessment conclude that construction works at the landfall compounds will only be short term and temporary in nature (and therefore a negligible magnitude of effect), which will as a WCS, represent a **minor adverse** impact significance. No harm to the heritage setting and associated heritage significance will occur. The same conclusions have been reached with respect to construction works immediately offshore associated with bringing the offshore cables ashore and connecting the onshore and offshore elements of the project at this location. See section 28.7.5.3.1 for further details and a more detailed discussion.
317. The expected construction start date for the onshore works of the Hornsea Project Three Offshore Wind Farm is 2021. The construction programme for Norfolk Boreas is anticipated to commence in 2021 under Scenario 2 and 2022 under Scenario 1. There is therefore the potential for concurrent construction to occur with respect to these projects. However, cumulative indirect impacts upon setting would only occur should construction works take place concurrently within the area where the cable routes cross.
318. The indicative construction programme for Hornsea Project Three illustrates that onshore cable installation activities may commence in the second year of construction (c. 2022) (Ørsted, 2018). For Norfolk Boreas, under Scenario 2, duct installation works are likely to commence in 2023. Should duct installation undertaken for both projects occur concurrently within the area in which the cable routes cross, there may be a potential for cumulative indirect impacts upon the setting of nearby heritage assets. The heritage asset considered most likely to be vulnerable in this regard and identified in this assessment comprises Salle Park (Registered Park and Garden, RHDHV 9 and Grade II* LB, RHDHV 52). However, any cumulative indirect impacts upon the setting of these heritage assets associated with construction works will be temporary in nature only (if concurrent construction takes place at all) and are therefore considered **non-significant** in EIA terms.
319. As duct installation (with the exception of the landfall) for Norfolk Boreas under Scenario 1 will have been undertaken as part of Norfolk Vanguard, the only construction activity with the potential to interact cumulatively with Hornsea Project Three under Scenario 1 is cable pulling. Under Scenario 1, cable pulling activities for Norfolk Boreas are anticipated to take place in 2026-2027. Should Hornsea Project

Three be built in two fully sequential phases, there is the potential for concurrent construction to take place between the two projects.

320. The location of the jointing pits (in which cable pulling activities will take place) will not be determined until the detailed design phase, post-consent. Should a jointing pit be located in the vicinity in which the cable routes cross, as above, the heritage asset considered most likely to be vulnerable in this regard and identified in this assessment comprises Salle Park (Registered Park and Garden, RHDHV 9 and Grade II* LB, RHDHV 52). However, any cumulative indirect impacts upon the setting of these heritage assets associated with construction works will be temporary in nature only (if concurrent construction takes place at all) and are therefore considered **non-significant** in EIA terms.

28.8.1.3 Impact (3) Cumulative Impact on potential Geoarchaeological / Palaeoenvironmental remains, potentially indicative of former land surfaces

321. The Happisburgh area is regarded as an internationally important region for Lower Palaeolithic archaeology, with recorded Palaeolithic deposits of significant archaeological / palaeoenvironmental potential along this section of the coast of high heritage significance. On this basis, it is considered that there is the potential for geoarchaeological deposits to span across / along this section of the coast, thereby intersecting the onshore project area (e.g. landfall) and other coastal projects, including Norfolk Vanguard, the Bacton Coastal Protection Scheme and Happisburgh coastal defence and protection works.
322. Impacts resulting in potential effects as part of construction work are those associated with intrusive groundworks in relation to the three projects, should they occur. The extent of any impact will depend on the presence and nature of any such remains.
323. On the basis of two project-specific phases of geoarchaeological monitoring (watching briefs) undertaken as part of Norfolk Vanguard, this assessment has concluded in consultation with HE and NCC HES, that the magnitude of effect upon geoarchaeological / palaeoenvironmental remains at the landfall arising as a result of the Norfolk Boreas and Norfolk Vanguard projects is likely to be negligible as an interaction ('pathway') between receptor and impact is not considered likely to occur based on the information available to date (see section 28.7.5.4). The cumulative impact significance is thus considered to be **negligible**.
324. The potential for the Norfolk Boreas and Norfolk Vanguard projects to encounter currently unrecorded geoarchaeological / palaeoenvironmental remains more widely across the onshore project area will be mitigated by means of implementing the embedded mitigation measures and commitments. The Outline WSI prepared for Norfolk Vanguard, and the project-specific Outline WSI prepared for Norfolk Boreas

(document reference 8.5) includes reference to a project-wide approach to geoarchaeological assessment / palaeoenvironmental survey, which will be planned, agreed and undertaken post-consent. The adoption of mitigation measures which take into account the potential for deposits of geoarchaeological / palaeoenvironmental interest to be present is anticipated to offset or reduce any identified impacts, should any such impacts arise as a result of these projects, and represents good practice in approaches to geoarchaeology and the palaeoenvironment with respect to large linear schemes.

325. A beneficial cumulative magnitude of effect is the accumulation of geoarchaeologically monitored and recorded geotechnical data. Such data may be considered to contribute to a greater understanding of the palaeoenvironmental and geoarchaeological resource across a large coastal area of Norfolk.

28.8.2 Potential Cumulative Impacts during Operation

28.8.2.1 Impact (1) Cumulative Indirect Impact on the Setting of Heritage Assets (designated and non-designated)

326. Cumulative indirect impacts upon the setting of heritage assets may occur during the operational phase due to the visibility and presence in the landscape of above ground project infrastructure alongside above ground infrastructure arising as a result of other projects or activities. Projects scoped into this assessment comprise Norfolk Vanguard under Scenario 1.
327. The settings assessment as presented in this chapter has concluded that significant indirect impacts upon the setting of heritage assets are not considered to occur as a result of the presence of the onshore project substation. This is largely due to the natural screening surrounding the onshore project substation area, which has resulted in little or no visibility or intervisibility from the surrounding heritage assets towards the above ground infrastructure at this location.
328. The visualisation prepared from Cultural Heritage Viewpoint No. 1 (CH1) (Appendix 28.4) indicate a potential for dual visibility of both the Norfolk Boreas and Norfolk Vanguard onshore project substations and associated lightning masts from a location within the northern-most extent of the grounds of the Church of St. Andrew, Bradenham (34). There is therefore the potential for a cumulative impact to occur. Despite the potential visibility of both the Norfolk Boreas and Norfolk Vanguard onshore project substations from this location, in each case it has been concluded that the visibility from the grounds of the church is very slight, and is not considered to constitute harm to the heritage significance of the church nor any associated loss of appreciation of the heritage asset's significance (see section 28.7.6). This cumulative indirect (non-physical) impact is therefore considered to represent an effect of negligible magnitude upon the heritage setting (and associated significance)

of the church, resulting in a **minor adverse** impact significance - and minor adverse would very much represent a precautionary WCS.

329. The very slight visibility of the onshore project substations from the grounds of the Church of St Andrew may nonetheless be further reduced by mitigation planting. Mitigation planting is embedded within the project. The implementation of a scheme of additional planting will be considered as part of the post-consent phase of the project. Those areas considered to benefit from additional mitigation planting (such as the bolstering of hedgerows and tree planting), above and beyond the on-site landscape screening and planting mitigation embedded within the project, may be informed by any heritage setting concerns identified, detailed and discussed within this ES chapter. Although the visibility of the onshore project substations is only very slight from the grounds of the Church of St Andrew, this heritage asset may be subject to consideration in relation to the possibility of additional mitigation planting during the post-consent phase, in order to potentially reduce the impact significance, as identified above.
330. Cultural Heritage Viewpoint No. 3 (CH3) (Appendix 28.4) indicates a section of the Norfolk Vanguard onshore project substation as being visible in the photomontage view (seen at a distance of c. 1.25 km) from the field boundary to the south-west of Old Hall (58), although visibility from the hall itself is considered unlikely. However, this does not give rise to a cumulative impact because the Norfolk Boreas substation is not visible from this heritage asset. An assessment of the impact arising from the Norfolk Vanguard substation alone has been conducted as part of the Norfolk Vanguard EIA.

28.8.3 Potential Cumulative Impacts during Decommissioning

331. Decommissioning of the Norfolk Vanguard and Hornsea Project Three projects have the potential to take place at the same time as Norfolk Boreas. The detail and scope of the decommissioning works for Norfolk Boreas will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. Appropriate mitigation strategies for the decommissioning phase will be developed for Norfolk Boreas, Norfolk Vanguard and Hornsea Project Three projects in line with best practice at the time of decommissioning. A decommissioning plan will be provided. As such, cumulative impacts during the decommissioning stage are predicted to be no worse than those identified during the construction stage.

28.9 Inter-relationships

332. Inter-relationships exist between onshore archaeology and cultural heritage and predominantly the assessments undertaken for offshore archaeology and cultural heritage, landscape and visual impact and onshore noise and vibration. Information from these chapters has been used to help establish any further potential impacts to

the onshore archaeology and cultural heritage resource and help inform the impact assessment presented in this chapter.

Table 28.29 Onshore archaeology and cultural heritage inter-relationships

Topic and description	Related chapter	Where addressed in this chapter	Rationale
The setting of heritage assets (including indirect impacts).	Chapter 29 Landscape and Visual Impact Assessment.	Sections 28.5, 28.6 and 28.7.	There could be potential impacts with respect to landscape and visual receptors which could also represent potential impacts to the setting of heritage assets.
The setting of heritage assets (including indirect impacts).	Chapter 25 Onshore Noise and Vibration.	Sections 28.6 and 28.7.	Potential impacts related to noise and vibration could impact on the setting of heritage assets.
CFB deposits and the setting of heritage assets (including direct and indirect impacts).	Chapter 17 Offshore and Intertidal Archaeology and Cultural Heritage	Sections 28.5, 28.6 and 28.7.	Potential impacts on nearshore, intertidal and coastal archaeology and cultural heritage, for example Cromer Forest Bed deposits could continue into the onshore project area.

333. Cross-references, where relevant, have been made to the LVIA chapter (Chapter 29) throughout this chapter in relation to the assessment of heritage setting. In particular, this underlines the cross-correlation between the chapters through the incorporation of LVIA tool-kits (e.g. ZTVs and photomontages) into the onshore archaeology and cultural heritage assessment, alongside identification and review of heritage specific viewpoints, which have been captured in collaboration with the LVIA consultants and agreed with HE and NCC HES, as part of the pre-application EPP ETG consultation process undertaken for Norfolk Vanguard (and of relevance to Norfolk Boreas).
334. The potential for an inter-relationship to occur between onshore archaeology and cultural heritage and intertidal archaeology (Chapter 17 Offshore and Intertidal Archaeology and Cultural Heritage) has also been considered, where activities in the intertidal zone / offshore and onshore have the potential to impact the same heritage asset or group of heritage assets, either directly or indirectly. This area of cross over includes an assessment of the potential for impacts to occur upon the setting of heritage assets, with consideration made to the surrounding landscape / seascape, where relevant to the heritage asset in question (discussed in further detail below).
335. Norfolk Boreas Limited have made the decision to adopt a long HDD approach at the landfall, which means that no works will take place on the beach or within the intertidal zone, with the HDD passing under the cliffs and exiting at an offshore

location beyond 5.5m below Lowest Astronomical Tide (LAT) (up to 1,000m in total drill length, minimum target depth 10m, maximum target depth 20m). As a result, there will be no impacts to archaeological remains within the upper beach sand deposits. Although HDD works may, in theory, impact the CFB deposits (corresponding to Yarmouth Roads Formation offshore, see Chapter 17 Offshore and Intertidal Archaeology and Cultural Heritage), the geoarchaeological monitoring (watching brief) undertaken on GI works conducted for Norfolk Vanguard to date has revealed no deposits resembling the CFB in boreholes monitored and assessed (Appendix 28.3). On this basis, it has been concluded in consultation with HE and NCC HES that impacts upon geoarchaeological / palaeoenvironmental remains are likely to be negligible at this location, as an interaction ('pathway') between receptor and impact is not considered likely based on information available to date (section 28.7.5.4).

336. The potential for the project to encounter currently unrecorded geoarchaeological / palaeoenvironmental remains will, however, be mitigated by means of implementing the mitigation measures and commitments (set-out in the project-specific Outline WSI, document reference 8.5) (see sections 28.7.2 and 28.7.5.4) and addressed through ongoing consultation with members of the AHOB / PAB research teams, HE and NCC HES.
337. Intertidal and / or offshore activities could have an impact upon the setting of heritage assets onshore, albeit temporary and limited to construction activities only. However, due to the decision to adopt a long HDD approach, there will be no construction works on the beach at Happisburgh. Any indirect impacts upon the setting of onshore / coastal heritage assets associated with bringing the offshore cables ashore and connecting the onshore and offshore elements of the project will be short term and temporary in nature and represent effects of negligible magnitude, which will as a WCS represent **minor adverse** impact significance (see section 28.7.5). No harm to heritage setting and associated heritage significance will occur. Additionally, as discussed in Chapter 17 Offshore and Intertidal Archaeology and Cultural Heritage, the setting of intertidal heritage assets is not considered to contribute to their heritage significance and there is, therefore, no potential for impact from onshore activities upon the setting of intertidal heritage assets.
338. No impacts are anticipated to occur upon the setting of heritage assets onshore during the operational phase as a result of the presence of offshore infrastructure. It was proposed within the Scoping Report prepared for the project (Royal HaskoningDHV, 2017c) that landscape, visual and cumulative impacts of the offshore components for all phases of the development were scoped out of the EIA given the distance from the coast (72km), the relative sensitivity of the offshore seascape and visual receptors and the existing influence of other offshore development and

shipping vessels (document reference PB5640-102-101 - Royal HaskoningDHV, 2017c); an approach which was agreed with the SoS in the Scoping Opinion (The Planning Inspectorate, June 2017). To this end, significant impacts are also considered highly unlikely to occur upon the setting of onshore (coastal) heritage assets as a result of offshore infrastructure. As a result **no impact** is considered to arise in relation to this potential inter-relationship, as further explained and evidenced below.

339. The vast majority of onshore heritage assets do not derive any primary heritage significance from long ranging (e.g. 72km) seaward views towards the area that the offshore infrastructure would be located. Examples of heritage assets where seaward views may contribute in part to their heritage significance include lighthouses, lifeboat lookout stations, coastal forts, batteries and other defences. Moreover, although the tips of the turbines may be theoretically visible, at a distance of 72km from the coast, actual visibility would be unlikely owing to the clarity visible over this distant range. The presence of the offshore turbines is therefore not considered to impact the heritage significance of such coastal heritage assets within the context of other coastal, nearshore and offshore activities, which take place within the southern North Sea.
340. Taking the Happisburgh Lighthouse (61) as an example. The lighthouse is the oldest working light in East Anglia, and the only independently run lighthouse in Great Britain, which contributes historic value to its heritage significance. The setting of the lighthouse is also considered to contribute to its heritage significance being located as it is in a prominent (increasingly coastal) position, and designed to be seen from offshore, by ships, boats and vessels passing out to sea. The lighthouse can also be seen widely from the surrounding inland and coastal areas. It is one of the tallest, most prominent buildings / structures within the immediate area, along with the Church of St. Mary, Happisburgh (11).
341. Although the setting of Happisburgh Lighthouse evidently contributes to its heritage significance with its elevated position looking out to sea and also affording views inland, the presence of the offshore infrastructure is not considered to feature within the lighthouse's immediate setting or adversely impact upon the heritage significance of the lighthouse. As above, although the tips of the turbines may be theoretically visible, at a distance of 72km from the coast, actual visibility would be unlikely. The presence of the offshore infrastructure would not constitute harm to the lighthouse's heritage significance or the ability of members of the public to appreciate its heritage significance. The lighthouse is open to the public on occasional Sundays and Bank Holidays throughout the summer, or by requested appointment. It is a 112 step climb to the lantern with views both seaward, up and down the coast and inland. As per views from the top of St. Mary's Tower, views

from the lighthouse’s lantern viewing platform would also likely include numerous churches, water towers, corn and drainage mills, existing wind farms, Trimmingham RAF radar installation, Bacton gas terminal and possibly the Cathedral spire in Norwich (Happisburgh Village Website - www.happisburgh.org).

342. This conclusion is further evidenced by the landscape, visual and cumulative impacts of the offshore components for all phases of the development being scoped out of the EIA given the distance from onshore landscape and visual receptors (72km). As such no wire-frame analysis, ZTV (in regard to the offshore infrastructure) or photomontages were considered necessary or produced.

28.10 Interactions

343. The impacts identified and assessed in this chapter have the potential to interact with each other, which could give rise to synergistic impacts as a result of that interaction. The worst case impacts assessed within the chapter take these interactions into account and for the impact assessments are considered both conservative and robust. For clarity, the areas of interaction between impacts are presented in Table 28.30, along with an indication as to whether the interaction may give rise to synergistic impacts.

Table 28.30 Interaction between impacts

Potential interaction between impacts					
Construction					
	1 Direct impact on buried archaeological remains	2 Direct impact on above ground archaeological remains	3 Indirect impact on the setting of heritage assets	4 Impact on potential geoarchaeological / palaeoenvironmental remains	5 Impacts to site preservation conditions from drilling fluid breakout
1 Direct impact on buried archaeological remains	-	No	No	Yes	Yes
2 Direct impact on above ground archaeological remains	No	-	Yes	No	No
3 Indirect impact on the setting of heritage assets	No	Yes	-	No	No

Potential interaction between impacts					
Construction					
	1 Direct impact on buried archaeological remains	2 Direct impact on above ground archaeological remains	3 Indirect impact on the setting of heritage assets	4 Impact on potential geoarchaeological / palaeoenvironmental remains	5 Impacts to site preservation conditions from drilling fluid breakout
4 Impact on potential geoarchaeological / palaeoenvironmental remains	Yes	No	No	-	Yes
5 Impacts to site preservation conditions from drilling fluid breakout	Yes	No	No	Yes	-
Operation					
	1 Indirect Impact on the Setting of Heritage Assets		2 Impacts to site preservation conditions from heat loss from installed cables		
1 Indirect Impact on the Setting of Heritage Assets	-		No		
2 Impacts to site preservation conditions from heat loss from installed cables	No		-		
Decommissioning					
It is anticipated that the decommissioning impacts will be no worse than those of construction.					

28.11 Summary

344. The construction, operation and decommissioning phases of the project have the potential to result in a range of impacts upon the onshore archaeological and cultural heritage resource. The significance of these impacts has been assessed based on good practice, consultation and professional judgement. A summary of the assessment for Scenario 1 is presented in Table 28.31 and for Scenario 2 in Table 28.32.
345. Prior to the implementation of additional site-specific mitigation requirements, impacts are predicted to occur ranging between **no impact** and **major adverse** impact significance levels. However, it is anticipated that, following the application

of the initial informative stages of mitigation and additional site-specific mitigation measures (as and where required, to be agreed in consultation with NCC HES and HE) (see section 28.7.2), to be undertaken post-consent, the significance of any impacts, where relevant, will be reduced or offset to levels considered **non-significant** in EIA terms.

346. As part of the additional mitigation, a project-specific draft outline WSI (document reference 8.5) has been prepared in adherence to previous discussions with NCC HES and HE, which outlines a commitment to undertake initial informative stages of mitigation post-consent. The information acquired from these additional programmes of survey and evaluation (Note: for consistency of reference and terminology these are to be referred to as initial informative stages of mitigation) will inform further decisions regarding the subsequent archaeological mitigation strategy for the project so that the historic environment resource can be safeguarded and / or effectively considered and addressed in a manner that is both appropriate and proportionate to the significance of the archaeological remains (heritage assets) identified and present.
347. Further mitigation approaches and measures will be determined as the project progresses into and through the post-consent stages and are expected to comprise a combination of the following recognised standard approaches both in advance of and / or during construction.
348. Initial informative stages:
- Additional project-wide archaeological geophysical survey;
 - Targeted archaeological metal detecting and field walking;
 - Archaeological trial-trenching;
 - Earthwork condition (GPS / topographic) survey;
 - Built Heritage Survey / Historic Buildings Recording (if / where required); and
 - Geoarchaeological assessment / palaeoenvironmental survey.
349. Additional (subsequent) site-specific measures:
- Set-piece (open-area) excavation. Including subsequent post-excavation assessment, and analysis, publication and archiving (where appropriate);
 - Preservation in-situ (further avoidance / micrositing);
 - Strip, Map and Sample Excavation. Including subsequent post-excavation assessment, and analysis, publication and archiving (where appropriate); and
 - Archaeological Monitoring / Watching Brief (targeted and general). Including subsequent post-excavation assessment, and analysis, publication and archiving (where appropriate).

350. Through the application of an appropriate and proportionate mitigation strategy, applying a range of techniques, significant direct adverse impacts to known heritage assets (including buried archaeological remains) post-mitigation are considered unlikely to occur, or to be satisfactorily reduced or offset. This is based on:
- The avoidance of physical impacts to all designated heritage assets, wherever possible, reasonable and practicable (e.g. this does not apply to physical impacts to landscape character elements of the Blickling Conservation Area, as previously discussed with NCC HES and HE, which will be subject to the implementation of additional mitigation work as discussed below);
 - The avoidance of non-designated heritage assets / potential sub-surface archaeological remains by means of micrositing (where possible within the confines of engineering, environmental and other project-related constraints); and
 - The preservation either in-situ or by record of all non-designated heritage assets where avoidance has not been possible.
351. The presence, exact nature and extent of all potential heritage assets is at present often uncertain or unknown, and as such direct impacts cannot be entirely avoided. However, the staged programme of assessment and survey undertaken to date has been designed to identify the presence of hitherto unsubstantiated, unknown and unrecorded heritage assets within and across the onshore project area. The avoidance, where possible, of any areas in which potentially significant sub-surface archaeological remains may be present (as indicated by available data) has enabled individual features and areas considered to be of heightened archaeological sensitivity to be avoided, where possible, by means of micrositing as part of the iterative design process and reviewed throughout a series of pre-application workshops. It is anticipated that this approach, alongside the initial informative stages of mitigation post-consent, which will help further elucidate the potential for buried archaeological remains whilst also corroborating the heritage significance of previously known / identified or suspected assets, will enable direct impacts upon heritage assets to be minimised through good practice approaches to mitigation, thus reducing (or offsetting) the impact significance upon the potential resource to levels considered non-significant in EIA terms.
352. Following a robust assessment supported by a desk-based review, site visits, the incorporation and use of LVIA tool-kits (photomontages, ZTVs) and the consideration and capturing of a number of heritage-specific viewpoints, it has been demonstrated in this chapter that impacts upon the setting of heritage assets arising as a result of the project are likely to be non-significant in EIA terms. This assessment has revealed that one heritage asset identified within the study area was found to share visibility or intervisibility with the onshore project substation and associated infrastructure,

which represents the only ‘permanent’ (the indicative design life is 30 years) new above ground onshore infrastructure associated with the project with the potential to result in an indirect (non-physical) impact upon the setting of heritage assets. From a heritage perspective, the very slight visibility of the onshore project substation (which occurs in relation to both Scenario 1 and 2) from the grounds of the Church of St Andrew, Bradenham (34) is not considered to constitute harm to the heritage significance of the church nor any associated loss of appreciation of the heritage assets significance and is considered to result in a minor adverse impact significance as a WCS.

353. It is acknowledged, however, that those heritage assets within closest proximity to onshore construction works may be subject to short term / temporary impacts, albeit that these have been determined as being non-significant in EIA terms.
354. It has also been concluded that the cumulative indirect impact upon the setting of the Church of St Andrew, Bradenham (34) due to the dual (low-level) visibility of both the onshore project substation and Norfolk Vanguard substation and associated masts under Scenario 1 will not constitute harm to the heritage significance of the Church nor any associated loss of appreciation of the heritage assets significance and is also considered to result in a minor adverse impact significance as a WCS.
355. Impact to the HLC will, in part, be off-set by returning field boundaries / hedgerows to their preconstruction condition and character post-construction, wherever possible, as part of a sensitive programme of backfilling and reinstatement / landscaping (where appropriate). Certain hedgerows and field boundaries (e.g. parish and county boundaries) may require recording prior to / during the construction process and enhanced provisions made during backfilling and reinstatement (set-out in the project specific Outline WSI, document reference 8.5).
356. The landscape character elements of the Blickling Conservation Area, through which the cable route is constructed under Scenario 2, will be sensitively backfilled and reinstated following construction and field boundaries and hedgerows returned to their pre-construction condition and as such no significant adverse impacts are anticipated to occur following the implementation of proposed mitigation work. This will include an initial informative stage of mitigation in the form of earthwork condition (GPS / topographic) survey prior to construction, and the subsequent sensitive management of duct installation works through the Conservation Area and later the strictly controlled backfilling and reinstatement returning field boundaries and hedgerows to their pre-construction condition, (set-out in the project specific Outline WSI, document reference 8.5).
357. This chapter has also concluded that whilst cumulative impacts may occur to heritage assets, this potential and the significance of any such impacts is also

considered to be reduced (or offset) on the basis of the application of industry standard initial informative stages of mitigation and subsequent mitigation measures to be implemented as part of the project, as well as the mitigation strategies anticipated, outlined and adopted for the existing and future projects reviewed as part of this chapter.

358. Whilst the impacts anticipated and assessed as part of this chapter are generally of an adverse nature, the benefits associated with the application of appropriate initial informative stages of mitigation and subsequent site-specific mitigation measures that contribute overall to a greater understanding of the onshore archaeological and cultural heritage resource could be considered to represent a beneficial cumulative magnitude of effect that cannot be discounted, especially where archaeological sites are under threat from other non-project related impacts, for example as a result of arable farming (e.g. deep ploughing).
359. The beneficial cumulative effect of data accumulation described above is obviously dependent, however, on the demonstration that the archaeological works to be undertaken (following a logical and heritage stakeholder approved staged approach) are completed to high professional archaeological standards and on the basis that any results produced and important findings made will ultimately be made publicly available. Compliance to industry best practice standard and guidance documents is set out in the project-specific Outline WSI (document reference 8.5).

Table 28.31 Scenario 1 Potential impacts identified for onshore archaeology and cultural heritage

Potential impact	Heritage asset type	Heritage significance (importance)	Magnitude of effect (change)	Impact significance (significance of impact)	Next steps: post-consent initial informative stages of mitigation / subsequent mitigation measures (as required)	Residual impact
Construction						
(1) Direct impact on (permanent change to) buried archaeological remains	Buried (sub-surface) archaeological remains	Low to High	Negligible to High (as a WCS)	Negligible to Moderate adverse (as a WCS)	<p><u>Landfall, onshore project substation and National Grid extension:</u></p> <p>1) Additional project-wide geophysical survey to further ascertain presence / absence and likely extent of buried archaeological remains, <i>where not undertaken as part of the priority programme.</i></p> <p>2) Targeted metal detecting and field walking, if / where required.</p> <p>3) Trial trenching (i.e. ground truthing).</p> <p>Followed by the most appropriate subsequent mitigation approaches to be agreed with NCC HES / HE:</p> <ul style="list-style-type: none"> • Preservation in situ; • Set-piece excavation; 	<p>Predicted to be non-significant in EIA terms following the application of: embedded mitigation; initial informative stages of mitigation; and additional mitigation measures, where required (to be agreed in consultation with NCC HES / HE).</p> <p>This further information regarding potential sub-surface remains will be gathered post-consent, and will directly inform decisions made around any further opportunities for preservation in-situ and where required and necessary preservation by record, ensuring that the residual impact significance is offset to levels considered non-significant in EIA terms.</p>

Potential impact	Heritage asset type	Heritage significance (importance)	Magnitude of effect (change)	Impact significance (significance of impact)	Next steps: post-consent initial informative stages of mitigation / subsequent mitigation measures (as required)	Residual impact
					<ul style="list-style-type: none"> Strip, map and sample excavation; and Targeted and general monitoring / watching brief. <p><u>Cable route:</u></p> <ol style="list-style-type: none"> 1) Screening of the proposed locations of the link boxes, once known, during the detailed design phase against the recorded location of potential subsurface archaeological remains; 2) The implementation of 'The Protocol for Archaeological Discoveries' during link box installation; and 3) A bespoke programme of archaeological monitoring and recording, where required. 	

Potential impact	Heritage asset type	Heritage significance (importance)	Magnitude of effect (change)	Impact significance (significance of impact)	Next steps: post-consent initial informative stages of mitigation / subsequent mitigation measures (as required)	Residual impact
(2) Direct impact on (permanent change to) above ground archaeological remains e.g. historic earthworks (including the Historic Landscaping Character)	Above ground archaeological remains (e.g. extant structures / features, buildings and earthworks)	Low to Medium	Low	Minor adverse (as a WCS)	<p><u>Landfall, onshore project substation and National Grid extension:</u></p> <p>None required.</p> <p><u>Cable route:</u></p> <p>1) Screening of the proposed locations of the link boxes, once known, during the detailed design phase against the recorded location of potential above ground archaeological remains.</p> <p>2) Targeted earthwork condition or built heritage / historic building survey and recording, where necessary, followed by the most appropriate subsequent mitigation approaches (e.g. additional backfilling, reinstatement and sensitive conservation/ restoration requirements), where required on an area by area, site by site and case by case basis.</p>	<p>Predicted to be non-significant in EIA terms following the application of: embedded mitigation; initial informative stages of mitigation; and additional mitigation measures, where required (to be agreed in consultation with NCC HES / HE).</p> <p>As such it is anticipated that such impacts can be reduced or offset to levels considered non-significant in EIA terms.</p>

Potential impact	Heritage asset type	Heritage significance (importance)	Magnitude of effect (change)	Impact significance (significance of impact)	Next steps: post-consent initial informative stages of mitigation / subsequent mitigation measures (as required)	Residual impact
(3) Indirect impact on the setting of heritage assets (both designated and non-designated)	Designated and certain non-designated heritage assets	Low to High	Negligible	Negligible to Minor adverse (as a WCS)	<p><u>Landfall, onshore project substation and National Grid extension:</u></p> <p>None required.</p> <p><u>Cable route:</u></p> <p>None required.</p> <p>Other than due care, attention and diligence should link box excavation, jointing pit excavation and / or cable pulling activities take place in the proximity of the designated and non-designated heritage assets identified in section 28.7.5 throughout the duration of construction.</p> <p>Certain assets (e.g. the Old Quaker Burial Ground at North Walsham - 1408) may require associated signage and temporary barriers in order to avoid any accidental damage or physical interactions occurring. This is set out in the project specific Outline</p>	Minor adverse (as a WCS)

Potential impact	Heritage asset type	Heritage significance (importance)	Magnitude of effect (change)	Impact significance (significance of impact)	Next steps: post-consent initial informative stages of mitigation / subsequent mitigation measures (as required)	Residual impact
					WSI (document reference 8.5) and will ultimately need including and detailing in a Construction Stage Plan(s), Contractor Environmental Management Plan(s), or similar.	
(4) Impact on potential geoarchaeological / palaeoenvironmental remains, potentially indicative of former land surfaces	Palaeoenvironmental and geoarchaeological deposits / remains	High (as a WCS)	Negligible	Negligible to Minor adverse (as a WCS)	Potential / currently unrecorded geoarchaeological / palaeoenvironmental remains will be mitigated by means of implementing the embedded mitigation measures and commitments, set-out in the project-specific Outline WSI (document reference 8.5), which will include reference to a project-wide approach to geoarchaeological assessment / palaeoenvironmental survey, which will be planned and undertaken in the post-consent stages, in agreement and ongoing	Negligible (non-significant in EIA terms): Following the application of: embedded mitigation; initial informative stages of mitigation; and additional mitigation measures (to be agreed in consultation with NCC HES and HE), as required.

Potential impact	Heritage asset type	Heritage significance (importance)	Magnitude of effect (change)	Impact significance (significance of impact)	Next steps: post-consent initial informative stages of mitigation / subsequent mitigation measures (as required)	Residual impact
					consultation with NCC HES and HE. Specifically in relation to transition and jointing pit excavation under Scenario 1, this may include a requirement for additional archaeological / geoarchaeological monitoring or sampling, where required, on a case-by-case basis.	
(5) Impacts to site preservation conditions from drilling fluid breakout	Palaeoenvironmental and geoarchaeological deposits / buried archaeological remains	Low to High	Negligible	Negligible to Minor adverse (as a WCS)	<u>Landfall:</u> Fluid pressures are to be monitored throughout the drilling process to minimise the potential for breakout of the drilling fluid and an action plan will be developed and procedures adopted during the drilling activity to respond appropriately to any drilling fluid breakout. <u>Cable route, onshore project substation and National Grid extension:</u>	Anticipated to be Negligible .

Potential impact	Heritage asset type	Heritage significance (importance)	Magnitude of effect (change)	Impact significance (significance of impact)	Next steps: post-consent initial informative stages of mitigation / subsequent mitigation measures (as required)	Residual impact
					None required.	
Operation						
(1) Indirect impact on the setting of heritage assets (designated and non-designated)	Designated and certain non-designated heritage assets	High	Negligible	Minor adverse (as a WCS), but generally No impact	None required. Church of St. Andrew, Bradenham (34) may be subject to consideration in relation to the possibility of off-site mitigation planting during the post-consent phase, in order to potentially reduce this impact significance.	Minor adverse (as a WCS), but generally No impact .
(2) Impacts to site preservation conditions from heat loss from installed cables	Palaeoenvironmental and geoarchaeological deposits / buried archaeological remains	Negligible to High	N/A	No impact	None required.	No impact .
Decommissioning						
(1) Direct impact on (permanent change to) buried archaeological remains	Buried (sub-surface) archaeological remains	Negligible to High	Negligible	Minor adverse (as a WCS)	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	It is anticipated that appropriate and proportionate mitigation can be applied, as required at the time, which will reduce / off-set impact significance to levels considered non-significant in EIA terms.

Potential impact	Heritage asset type	Heritage significance (importance)	Magnitude of effect (change)	Impact significance (significance of impact)	Next steps: post-consent initial informative stages of mitigation / subsequent mitigation measures (as required)	Residual impact
					would be agreed with the relevant authorities and statutory consultees. The decommissioning works could be subject to a separate licencing approach, which may require EIA, including any requisite archaeological and cultural heritage impact assessment.	
(2) Indirect impact on the setting of heritage assets (designated and non-designated)	Designated and certain non-designated heritage assets	Low to High	Negligible to Low	Negligible to Minor adverse (as a WCS)	None required. Indirect impacts associated with decommissioning and the setting of heritage assets are not considered likely to be any worse than those identified for the construction and operation and maintenance stages.	Minor adverse (as a WCS) Although a full EIA may be carried out ahead of any decommissioning works to be undertaken.
Cumulative: Construction						
(1) Cumulative direct impact on (permanent change to) above ground and / or buried archaeological remains	Above ground archaeological remains (e.g. extant structures / features, buildings and earthworks) and	Negligible to High	Medium to High (as a WCS)	Negligible to Major adverse (as a WCS)	Norfolk Vanguard and Hornsea Project Three are subject to EIA, and adopt mitigation strategies which will seek to avoid, reduce or offset direct impacts upon both above ground and	Predicted to be non-significant in EIA terms following the application of: embedded mitigation; initial informative stages of mitigation; and additional mitigation measures,

Potential impact	Heritage asset type	Heritage significance (importance)	Magnitude of effect (change)	Impact significance (significance of impact)	Next steps: post-consent initial informative stages of mitigation / subsequent mitigation measures (as required)	Residual impact
	buried (sub-surface) archaeological remains				buried archaeological remains.	where required (to be agreed in consultation with NCC HES / HE).
(2) Cumulative Indirect impact on the setting of heritage assets (designated and non-designated)	Designated and certain non-designated heritage assets	Low to High	Negligible	Negligible to Minor adverse (as a WCS)	None required.	Negligible to Minor adverse (as a WCS)
(3) Cumulative Impact on potential geoarchaeological / palaeoenvironmental remains, potentially indicative of former land surfaces	Palaeoenvironmental and geoarchaeological deposits / remains	High (as a WCS)	Negligible	Minor adverse (as a WCS)	Potential / currently unrecorded geoarchaeological / palaeoenvironmental remains will be mitigated by means of implementing the embedded mitigation measures and commitments as set-out in the Outline WSI (document reference 8.5), which will include reference to a project-wide approach to geoarchaeological assessment / palaeoenvironmental survey, which will be planned and undertaken in the post-consent stages, in agreement and ongoing	Negligible (non-significant in EIA terms): Following the application of: embedded mitigation; initial informative stages of mitigation; and additional mitigation measures (to be agreed in consultation with NCC HES and HE), as required. A beneficial cumulative magnitude of effect is the accumulation of geoarchaeologically monitored and recorded geotechnical data, which may contribute to a greater understanding of the palaeoenvironmental and geoarchaeological resource

Potential impact	Heritage asset type	Heritage significance (importance)	Magnitude of effect (change)	Impact significance (significance of impact)	Next steps: post-consent initial informative stages of mitigation / subsequent mitigation measures (as required)	Residual impact
					consultation with NCC HES and HE.	across a large coastal area of the county.
Cumulative: Operation						
(1) Cumulative Indirect Impact on the Setting of Heritage Assets (designated and non-designated)	Designated and certain non-designated heritage assets	High	Negligible	Minor adverse (as a WCS)	None required. Church of St. Andrew, Bradenham (34) may be subject to consideration in relation to the possibility of off-site mitigation planting during the post-consent phase, in order to potentially reduce this impact significance.	Minor adverse (as a WCS)
Cumulative: Decommissioning						
Cumulative 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. A full EIA may be carried out ahead of any decommissioning works being undertaken, including any requisite archaeological and cultural heritage cumulative impact assessment.					

Table 28.32 Scenario 2 Potential impacts identified for onshore archaeology and cultural heritage

Potential impact	Heritage asset type	Heritage significance (importance)	Magnitude of effect (change)	Impact significance (significance of impact)	Next steps: post-consent initial informative stages of mitigation / subsequent mitigation measures (as required)	Residual impact
Construction						
(1) Direct impact on (permanent change to) buried archaeological remains	Buried (sub-surface) archaeological remains	Low to High	Negligible to High (as a WCS)	Negligible to Major adverse (as a WCS)	<p>1) Additional project-wide geophysical survey to further ascertain presence / absence and likely extent of buried archaeological remains, <i>where not undertaken as part of the priority programme.</i></p> <p>2) Targeted metal detecting and field walking.</p> <p>3) Trial trenching (i.e. ground truthing).</p> <p>Followed by the most appropriate subsequent mitigation approaches to be agreed with NCC HES / HE:</p> <ul style="list-style-type: none"> • Preservation in-situ; • Set-piece excavation; • Strip, map and sample excavation; and • Targeted and general monitoring / watching brief. 	<p>Predicted to be non-significant in EIA terms following the application of: embedded mitigation; initial informative stages of mitigation; and additional mitigation measures, where required (to be agreed in consultation with NCC HES / HE).</p> <p>This further information regarding potential sub-surface remains will be gathered post-consent, and will directly inform decisions made around any further opportunities for preservation in-situ and where required and necessary preservation by record, ensuring that the residual impact significance is offset to levels considered non-significant in EIA terms.</p>

Potential impact	Heritage asset type	Heritage significance (importance)	Magnitude of effect (change)	Impact significance (significance of impact)	Next steps: post-consent initial informative stages of mitigation / subsequent mitigation measures (as required)	Residual impact
(2) Direct impact on (permanent change to) above ground archaeological remains e.g. historic earthworks (including the Historic Landscape Character)	Above ground archaeological remains (e.g. extant structures / features, buildings and earthworks)	Low to Medium	Low to Medium	Minor to Moderate adverse (as a WCS)	<p>Targeted earthwork condition or built heritage / historic building survey and recording, where necessary, followed by the most appropriate subsequent mitigation approaches (e.g. additional backfilling, reinstatement and sensitive conservation/ restoration requirements), where required on an area by area, site by site and case by case basis.</p> <p>Duct installation works through Blickling Conservation Area are to be sensitively managed and subject to full, thorough and strictly controlled backfilling, and reinstatement of landscape character elements of the Conservation Area.</p>	<p>Predicted to be non-significant in EIA terms following the application of: embedded mitigation; initial informative stages of mitigation; and additional mitigation measures, where required (to be agreed in consultation with NCC HES / HE).</p> <p>As such it is anticipated that such impacts can be reduced or offset to levels considered non-significant in EIA terms.</p>
(3) Indirect impact on the setting of heritage	Designated and certain non-	Low to High	Negligible	Negligible to Minor adverse (as a WCS)	<p>None required.</p> <p>Other than due care, attention and diligence to</p>	Negligible to Minor adverse (as a WCS).

Potential impact	Heritage asset type	Heritage significance (importance)	Magnitude of effect (change)	Impact significance (significance of impact)	Next steps: post-consent initial informative stages of mitigation / subsequent mitigation measures (as required)	Residual impact
assets (both designated and non-designated)	designated heritage assets				<p>the presence and proximity of the designated and non-designated heritage assets identified in section 28.7.5 throughout the duration of construction.</p> <p>Certain assets (e.g. the Old Quaker Burial Ground at North Walsham - 1408) may require associated signage and temporary barriers in order to avoid any accidental damage or physical interactions occurring. This is set out in the project specific Outline WSI (document reference 8.5) and will ultimately need including and detailing in a Construction Stage Plan(s), Contractor Environmental Action Plan(s), or similar.</p>	
(4) Impact on potential geoarchaeological / palaeoenvironmental remains, potentially	Palaeoenvironmental and geoarchaeological deposits / remains	High (as a WCS)	Negligible	Negligible to Minor adverse (as a WCS)	Potential / currently unrecorded geoarchaeological / palaeoenvironmental remains will be mitigated	Negligible (i.e. non-significant in EIA terms): Following the application of: embedded mitigation; initial informative stages of mitigation; and

Potential impact	Heritage asset type	Heritage significance (importance)	Magnitude of effect (change)	Impact significance (significance of impact)	Next steps: post-consent initial informative stages of mitigation / subsequent mitigation measures (as required)	Residual impact
indicative of former land surfaces					by means of implementing the embedded mitigation measures and commitments, set-out in a project-specific Outline WSI (document reference 8.5), which will include reference to a project-wide approach to geoarchaeological assessment / palaeoenvironmental survey, which will be planned and undertaken in the post-consent stages, in agreement and ongoing consultation with NCC HES and HE.	additional mitigation measures (to be agreed in consultation with NCC HES and HE), as required.
(5) Impacts to site preservation conditions from drilling fluid breakout	Palaeoenvironmental and geoarchaeological deposits / buried archaeological remains	Low to High	Negligible	Negligible to Minor adverse (as a WCS)	Fluid pressures are to be monitored throughout the drilling process to minimise the potential for breakout of the drilling fluid and an action plan will be developed and procedures adopted during the drilling activity to respond	Anticipated to be Negligible .

Potential impact	Heritage asset type	Heritage significance (importance)	Magnitude of effect (change)	Impact significance (significance of impact)	Next steps: post-consent initial informative stages of mitigation / subsequent mitigation measures (as required)	Residual impact
					appropriately to any drilling fluid breakout.	
Operation						
(1) Indirect impact on the setting of heritage assets (designated and non-designated)	Designated and certain non-designated heritage assets	High	Negligible	Minor adverse (as a WCS), but generally No Impact	None required. Church of St. Andrew, Bradenham (34) may be subject to consideration in relation to the possibility of off-site mitigation planting during the post-consent phase, in order to potentially reduce this impact significance.	Minor adverse (as a WCS), but generally No impact.
(2) Impacts to site preservation conditions from heat loss from installed cables	Palaeoenvironmental and geoarchaeological deposits / buried archaeological remains	Negligible to High	N/A	No Impact	None required.	No impact.
Decommissioning						
(1) Direct impact on (permanent change to) buried archaeological remains	Buried (sub-surface) archaeological remains	Negligible to High	Negligible	Minor adverse (as a WCS)	The decommissioning methodology would need to be finalised nearer to the end of the lifetime of the	It is anticipated that appropriate and proportionate mitigation can be applied, as required at the time, which will

Potential impact	Heritage asset type	Heritage significance (importance)	Magnitude of effect (change)	Impact significance (significance of impact)	Next steps: post-consent initial informative stages of mitigation / subsequent mitigation measures (as required)	Residual impact
					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. The decommissioning works could be subject to a separate licencing approach, which may require EIA, including any requisite archaeological and cultural heritage impact assessment.	reduce / off-set impact significance to levels considered non-significant in EIA terms.
(2) Indirect impact on the setting of heritage assets (designated and non-designated)	Designated and certain non-designated heritage assets	Low to High	Negligible to Low	Negligible to Minor adverse (as a WCS)	None required. Indirect impacts associated with decommissioning and the setting of heritage assets are not considered likely to be any worse than those identified for the construction and operation and maintenance stages.	Minor adverse (as a WCS). Although a full EIA may be carried out ahead of any decommissioning works to be undertaken.

Potential impact	Heritage asset type	Heritage significance (importance)	Magnitude of effect (change)	Impact significance (significance of impact)	Next steps: post-consent initial informative stages of mitigation / subsequent mitigation measures (as required)	Residual impact
Cumulative: Construction						
(1) Cumulative direct impact on (permanent change to) above ground and / or buried archaeological remains	Above ground archaeological remains (e.g. extant structures / features, buildings and earthworks) and buried (sub-surface) archaeological remains	Negligible to High	Medium to High (as a WCS)	Negligible to Major adverse (as a WCS)	Hornsea Project Three is subject to EIA, and adopts mitigation strategies which will seek to avoid, reduce or offset direct impacts upon both above ground and buried archaeological remains.	Predicted to be non-significant in EIA terms following the application of: embedded mitigation; initial informative stages of mitigation; and additional mitigation measures, where required (to be agreed in consultation with NCC HES / HE).
(2) Cumulative Indirect impact on the setting of heritage assets (designated and non-designated)	Designated and certain non-designated heritage assets	Low to High	Negligible	Negligible to Minor adverse (as a WCS)	None required.	Negligible to Minor adverse (as a WCS).
(3) Cumulative Impact on potential geoarchaeological / palaeoenvironmental remains, potentially indicative of former land surfaces	Palaeoenvironmental and geoarchaeological deposits / remains	High (as a WCS)	Negligible	Minor adverse (as a WCS)	Potential / currently unrecorded geoarchaeological / palaeoenvironmental remains will be mitigated by means of implementing the embedded mitigation measures and commitments, set-out in a project-specific Outline WSI	Negligible (non-significant in EIA terms): Following the application of: embedded mitigation; initial informative stages of mitigation; and additional mitigation measures (to be agreed in consultation with NCC HES and HE), as required.

Potential impact	Heritage asset type	Heritage significance (importance)	Magnitude of effect (change)	Impact significance (significance of impact)	Next steps: post-consent initial informative stages of mitigation / subsequent mitigation measures (as required)	Residual impact
					(document reference 8.5), which will include reference to a project-wide approach to geoarchaeological assessment / palaeoenvironmental survey, which will be planned and undertaken in the post-consent stages, in agreement and ongoing consultation with NCC HES and HE.	A beneficial cumulative magnitude of effect is the accumulation of geoarchaeologically monitored and recorded geotechnical data which may contribute to a greater understanding of the palaeoenvironmental and geoarchaeological resource across a large coastal area of the county.
Cumulative: Operation						
(1) Cumulative Indirect Impact on the Setting of Heritage Assets (designated and non-designated)	Designated and certain non-designated heritage assets	High	N/A	No Impact	None required. Church of St. Andrew, Bradenham (34) may be subject to consideration in relation to the possibility of off-site mitigation planting during the post-consent phase, in order to potentially reduce this impact significance.	No impact

Potential impact	Heritage asset type	Heritage significance (importance)	Magnitude of effect (change)	Impact significance (significance of impact)	Next steps: post-consent initial informative stages of mitigation / subsequent mitigation measures (as required)	Residual impact
Cumulative: Decommissioning						
Cumulative 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. A full EIA may be carried out ahead of any decommissioning works being undertaken, including any requisite archaeological and cultural heritage cumulative impact assessment.					

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