

# **East Anglia ONE North Offshore Windfarm**

## **Appendix 24.5**

### **Archaeology and Cultural Heritage Cumulative Impact Assessment with the Proposed East Anglia ONE North Project**

Preliminary Environmental Information

Volume 3

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**Appendix 24.5** is supported by the tables listed below.

Table Number	Title
Table A24.1	Scenario 1 Realistic Worst Case Assumptions
Table A24.2	Scenario 2 Realistic Worst Case Assumptions
Table A24.3	Summary of Scenario 1 and Scenario 2 Realistic Worst Case Assumptions

## Glossary of Acronyms

CCS	Construction Consolidation Sites
CIA	Cumulative Impact Assessment
DCO	Development Consent Order
ES	Environmental Statement
HDD	Horizontal Directional Drilling
HE	Health England
LVIA	Landscape and Visual Impact Assessment
MW	Megawatt
NGET	National Grid Electricity Transmission
PEIR	Preliminary Environmental Information Report
ZTV	Zone of Theoretical Visibility

## Glossary of Terminology

Applicant	East Anglia ONE North Limited.
Construction consolidation sites	Compounds which will contain laydown, storage and work areas for onshore construction works. The HDD construction compound will also be referred to as a construction consolidation site.
Development area	The area comprising the Proposed onshore development Area and the Offshore Development Area
East Anglia ONE North project	The proposed project consisting of up to 67 wind turbines, up to four offshore electrical platforms, up to one construction operation and maintenance platform, inter-array cables, platform link cables, up to one operational meteorological mast, up to two offshore export cables, fibre optic cables, landfall infrastructure, onshore cables and ducts, onshore substation, and National Grid infrastructure.
European site	Sites designated for nature conservation under the Habitats Directive and Birds Directive, as defined in regulation 8 of the Conservation of Habitats and Species Regulations 2017 and regulation 18 of the Conservation of Offshore Marine Habitats and Species Regulations 2017. These include candidate Special Areas of Conservation, Sites of Community Importance, Special Areas of Conservation and Special Protection Areas.
Evidence Plan Process	A voluntary consultation process with specialist stakeholders to agree the approach to the EIA and the information required to support HRA.
Horizontal directional drilling (HDD)	A method of cable installation where the cable is drilled beneath a feature without the need for trenching.
Jointing bay	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	The area (from Mean Low Water Springs) where the offshore export cables would make contact with land, and connect to the onshore cables.
Link boxes	Underground chambers or above ground cabinets next to the cable trench housing electrical earthing links.
Mitigation areas	Areas captured within the Development Area specifically for mitigating expected or anticipated impacts.
National Grid infrastructure	A National Grid substation, connection to the existing electricity pylons and National Grid overhead line realignment works which will be consented as part of the proposed East Anglia ONE North project Development Consent Order but will be National Grid owned assets.
National Grid overhead line realignment works	Works required to upgrade the existing electricity pylons and overhead lines to transport electricity from the National Grid substation to the national electricity grid
National Grid overhead line realignment works area	The proposed area for National Grid overhead line realignment works.

National Grid substation	The substation (including all of the electrical equipment within it) necessary to connect the electricity generated by the proposed East Anglia ONE North project to the national electricity grid which will be owned by National Grid but is being consented as part of the proposed East Anglia ONE North project Development Consent Order.
National Grid substation location	The proposed location of the National Grid substation.
Onshore cable corridor	The corridor within which the onshore cable route will be located.
Onshore cable route	This is the construction swathe within the onshore cable corridor which would contain onshore cables as well as temporary ground required for construction which includes cable trenches, haul road and spoil storage areas.
Onshore cables	The cables which would bring electricity from landfall to the onshore substation. The onshore cable is comprised of up to six power cables and two fibre optic cables.
Proposed onshore development area	The area in which the landfall, onshore cable corridor, onshore substation, mitigation areas, temporary construction facilities (such as access roads and construction consolidation sites), and the National Grid Infrastructure will be located.
Onshore infrastructure	The combined name for all of the onshore infrastructure associated with the proposed East Anglia ONE North project from landfall to the connection to the national electricity grid.
Onshore substation	The East Anglia ONE North substation and all of the electrical equipment within it.
Onshore substation location	The proposed location of the onshore substation for the proposed East Anglia ONE North project.
Transition bay	Underground structures at the landfall that house the joints between the offshore export cables and the onshore cables.

## 24.6 Archaeology and Cultural Heritage Cumulative Impact Assessment with the proposed East Anglia ONE North Project

### 24.1 Introduction

1. This appendix covers the cumulative impact assessment of the proposed East Anglia ONE North project with the proposed East Anglia TWO project in relation to archaeology and cultural heritage.
2. The East Anglia TWO offshore windfarm project (the proposed East Anglia TWO project) is also in the pre-application stage. The proposed East Anglia TWO project will have a separate Development Consent Order (DCO) application but is working to the same programme of submission as the proposed East Anglia ONE North project. The two projects will share the same landfall location and cable route and the two onshore substations will be co-located, and feed into the same National Grid substation.
3. The proposed East Anglia ONE North project Cumulative Impact Assessment (CIA) for archaeology and cultural heritage will therefore initially consider the cumulative impact with only the East Anglia TWO project against two different construction scenarios (i.e. construction of the two projects simultaneously and sequentially). The realistic worst case scenario of each impact is then carried through to the main body of the CIA assessment which considers other developments which are in close proximity to the proposed East Anglia ONE North project.
4. For a more detailed description of the CIA please refer to **Chapter 5 EIA Methodology**.

### 24.2 Construction Scenarios Realistic Worst Case

5. This appendix considers the proposed East Anglia ONE North project and the proposed East Anglia TWO project under two construction scenarios:
  - Scenario 1 - the proposed East Anglia ONE North project and proposed East Anglia TWO project are built simultaneously; and



- Scenario 2 - the proposed East Anglia ONE North project and the proposed East Anglia TWO project are built sequentially.
6. As discussed in **section 24.1**, the realistic worst case (based on the assessment of these two construction scenarios) for each impact is then carried through to the wider CIA which considers other developments, projects or plans which have been screened into the CIA assessment for the proposed East Anglia ONE North project.
  7. It should be noted that the operational phase impacts on archaeology and cultural heritage will be the same irrespective of the construction scenario. Therefore, operational impacts identified in Scenario 1 will be the same as those for Scenario 2.
  8. Mitigation measures for the proposed East Anglia ONE North project and proposed East Anglia TWO project will be the same. These are detailed in **Chapter 24 Archaeology and Cultural Heritage**.

#### 24.2.1 Scenario 1

9. **Table A24.1** presents the realistic worst case parameters of Scenario 1. In this instance, the proposed East Anglia ONE North project and proposed East Anglia TWO project are built simultaneously.

**Table A24.1 Scenario 1 Realistic Worst Case**

Impact	Parameter	Notes
<b>Construction</b>		
Impacts related to the landfall	HDD temporary works area: 13,300m <sup>2</sup> (70m x 190m) Transition bay excavation footprint (for 4 transition bays): 3,108m <sup>2</sup> (37m x 42m) Landfall CCS: 40,950m <sup>2</sup> (210m x 195m) Landfall transition bays approximate quantity of spoil material (for 4 transition bays): 908m <sup>3</sup> See <b>Chapter 25 Noise and Vibration</b> for further details regarding noise and vibration levels during construction.	Landfall to be achieved via HDD. No beach access required.
Impacts related to the onshore cable corridor	Onshore cable route: 574,720m <sup>2</sup> (8,980m x 64m) Jointing bay construction excavation footprint: 570m <sup>2</sup> (30.6m x 18.6m). Total for 72 jointing bays: 41,040m <sup>2</sup> (570m <sup>2</sup> x 36) HDD (retained as an option to cross SPA / SSSI):	Onshore cable corridor construction footprint may be located anywhere within the proposed onshore development area.  The location strategy for access routes, CCS and jointing bays will be to site them near to field

Impact	Parameter	Notes
	<ul style="list-style-type: none"> <li>Entrance pit CCS (x1): 13,650m<sup>2</sup> (195m x 70m)</li> <li>Exit pit CCS (x1): 5,850m<sup>2</sup> (195m x 30m)</li> </ul> <p>Onshore cable route CCS: 40,950m<sup>2</sup> (210m x 195m). Total for 5 CCS: 204,750m<sup>2</sup> (40,950m<sup>2</sup> x 5)</p> <p>Temporary roads:</p> <ul style="list-style-type: none"> <li>Onshore cable route haul road between landfall and Snape Road (4.5m wide with additional 4m for passing places at approximately 87m intervals): 41,376m<sup>2</sup></li> <li>Onshore cable route and substation access haul road (9m width): 18,675m<sup>2</sup></li> <li>Temporary access road: 23,495m<sup>2</sup></li> </ul> <p>Onshore cable trench approximate quantity of spoil material: 26,642m<sup>3</sup> See <b>Chapter 25 Noise and Vibration</b> for further details regarding noise and vibration levels during construction.</p>	<p>boundaries or roads as far as practical.</p> <p>Two link boxes sit underground beside each jointing bay at a depth of approximately 1.2m. The construction footprint of these is included in the jointing bay construction excavation footprint.</p>
Impacts related to the onshore substation(s)	<p>Onshore substation CCS: 17,100m<sup>2</sup> (190m x 90m). Total for 3 CCS: 51,300m<sup>2</sup></p> <p>Permanent footprint (used as CCS during construction): 36,100m<sup>2</sup> (190m x 190m). Total for 2: 72,200m<sup>2</sup></p> <p>Substation operational access road: 12,800m<sup>2</sup> (1,600m x 8m)</p> <p>See <b>Chapter 25 Noise and Vibration</b> for further details regarding noise and vibration levels during construction.</p>	<p>Construction access is included above as the onshore cable route and substation access haul road.</p>
Impacts related to the National Grid Infrastructure	<p>National Grid substation CCS: 78,750m<sup>2</sup> (250m x 315m)</p> <p>Permanent footprint (used as CCS during construction): 45,500m<sup>2</sup> (325m x 140m)</p> <p>See <b>Chapter 25 Noise and Vibration</b> for further details regarding noise and vibration levels during construction.</p>	<p>Design for the required overhead line (OHL) realignment work (including cable sealing end CCSs and pylon realignment CCS) is currently on going. As more detail is made available, this will be fully assessed and included in the Environmental Statement (ES) and DCO application. However, indicative locations for cable sealing end CCSs and pylon realignment CCS are shown in <b>Figure 6.6 of Chapter 6 Project Description</b>.</p>

Impact	Parameter	Notes
		<p>Construction access is included above as the onshore cable route and substation access haul road.</p> <p>Operational access is included above as the substation operational access road,</p>
<b>Operation</b>		
Impacts related to the landfall	4 transition bays will be installed underground, each with an operational volume of 227m <sup>3</sup>	Transition bays will be buried approximately 1.2m underground – there will no above ground infrastructure.
Impacts related to the onshore cable corridor	72 jointing bays will be installed underground, each with an operational volume of 77m <sup>3</sup> 144 link boxes will be installed underground (2 per jointing bay), each with an operational volume of 3m <sup>3</sup>	<p>Jointing bays will be buried approximately 1.2m underground – there will no above ground infrastructure.</p> <p>Link boxes will be located underground immediately adjacent to jointing bays – there will be no above ground infrastructure.</p>
Impacts related to the onshore substation(s)	<p>Operational footprint: 36,100m<sup>2</sup> (190m x 190m). Total for 2: 72,200m<sup>2</sup></p> <p>Substation operational access road: 12,800m<sup>2</sup> (1,600m x 8m)</p>	The operational footprint does not include the additional landscaping footprint (which will be agreed post-PEIR).
Impacts related to the National Grid Infrastructure	National Grid operational substation: 45,500m <sup>2</sup> (325m x 140m)	<p>The operational footprint does not include the additional landscaping footprint (which will be agreed post-PEIR).</p> <p>Design for the required overhead line (OHL) realignment work (including cable sealing end CCSs and pylon realignment CCS) is currently on going. As more detail is made available, this will be fully assessed and included in the Environmental Statement (ES) and DCO application. However, indicative locations for cable sealing end CCSs and pylon realignment CCS are shown in <b>Figure 6.6 of Chapter 6 Project Description</b>.</p>

Impact	Parameter	Notes
<b>Decommissioning</b>		
		No decision has been made regarding the final decommissioning policy for the onshore infrastructure as it is recognised that industry best practice, rules and legislation change over time. However, the onshore substation will likely be removed and be reused or recycled. It is expected that the onshore cables will be removed and recycled, with the transition bays and cable ducts (where used) left <i>in situ</i> . 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 no greater than those identified for the construction phase are expected for the decommissioning phase.

### 24.2.2 Scenario 2

10. Scenario 2, and **Table A24.2**, represents the realistic worst case scenario in the eventuality that the proposed East Anglia ONE North project and proposed East Anglia TWO project are built with a construction gap. It is intended that the construction of the proposed East Anglia TWO project will be progressed prior to commencing construction of the proposed East Anglia ONE North project.
11. Scenario 2 assumes that when permission is granted, the proposed East Anglia TWO project will be constructed as soon as permission is granted. The proposed East Anglia ONE North project will leave the largest possible gap (between the reinstatement of the proposed East Anglia TWO project and start of construction for the proposed East Anglia ONE North project) to begin construction within the consent period. Further detail regarding the likely construction gap is provided in **Chapter 5 EIA Methodology**.

**Table A24.2 Scenario 2 Realistic Worst Case**

Impact	Proposed East Anglia TWO Project Parameters	Proposed East Anglia ONE North Project Parameters (on the assumption that the proposed East Anglia TWO project is post-construction)	Notes
<b>Construction</b>			
Impacts related to the landfall	HDD temporary works area: 7,000m <sup>2</sup> (70m x 100m) Transition bay excavation footprint (for 2 transition bays): 1,554m <sup>2</sup> (37m x 42m) Landfall CCS: 18,400m <sup>2</sup> (160m x 115m)	HDD temporary works area: 7,000m <sup>2</sup> (70m x 100m) Transition bay excavation footprint (for 2 transition bays): 1,554m <sup>2</sup> (37m x 42m) Landfall CCS: 18,400m <sup>2</sup> (160m x 115m)	Landfall to be achieved via HDD. No beach access required.  See <b>Chapter 25 Noise and Vibration</b> for further details regarding

Impact	Proposed East Anglia TWO Project Parameters	Proposed East Anglia ONE North Project Parameters (on the assumption that the proposed East Anglia TWO project is post-construction)	Notes
	Landfall transition bays approximate quantity of spoil material (for 2 transition bays): 454m <sup>3</sup>	Landfall transition bays approximate quantity of spoil material (for 2 transition bays): 454m <sup>3</sup>	noise and vibration levels during construction.
Impacts related to the onshore cable corridor	<p>Onshore cable route: 287,360m<sup>2</sup> (8,980m x 32m)</p> <p>Jointing bay construction excavation footprint: 570m<sup>2</sup> (30.6m x 18.6m). Total for 36 jointing bays: 20,520m<sup>2</sup> (570m<sup>2</sup> x 36)</p> <p>HDD (retained as an option to cross SPA / SSSI):</p> <ul style="list-style-type: none"> <li>Entrance pit CCS (x1): 7,000m<sup>2</sup> (100m x 70m)</li> <li>Exit pit CCS (x1): 3,000m<sup>2</sup> (100m x 30m)</li> </ul> <p>Onshore cable route CCS: 18,400m<sup>2</sup> (160m x 115m). Total for 5 CCS: 92,000m<sup>2</sup> (18,400m<sup>2</sup> x 5)</p> <p>Temporary roads:</p> <ul style="list-style-type: none"> <li>Onshore cable route haul road between landfall and Snape Road (4.5m wide with additional 4m for passing places at approximately 87m intervals): 41,376m<sup>2</sup></li> <li>Onshore cable route and substation access haul road (9m width): 18,675m<sup>2</sup></li> <li>Temporary access road: 23,495m<sup>2</sup></li> </ul> <p>Onshore cable trench approximate quantity of spoil material: 13,321m<sup>3</sup></p>	<p>Onshore cable route: 287,360m<sup>2</sup> (8,980m x 32m)</p> <p>Jointing bay construction excavation footprint: 570m<sup>2</sup> (30.6m x 18.6m). Total for 36 jointing bays: 20,520m<sup>2</sup> (570m<sup>2</sup> x 36)</p> <p>HDD (retained as an option to cross SPA / SSSI):</p> <ul style="list-style-type: none"> <li>Entrance pit CCS (x1): 7,000m<sup>2</sup> (100m x 70m)</li> <li>Exit pit CCS (x1): 3,000m<sup>2</sup> (100m x 30m)</li> </ul> <p>Onshore cable route CCS: 18,400m<sup>2</sup> (160m x 115m). Total for 5 CCS: 92,000m<sup>2</sup> (18,400m<sup>2</sup> x 5)</p> <p>Temporary roads:</p> <ul style="list-style-type: none"> <li>Onshore cable route haul road between landfall and Snape Road (4.5m wide with additional 4m for passing places at approximately 87m intervals): 41,376m<sup>2</sup></li> <li>Onshore cable route and substation access haul road (9m width): 18,675m<sup>2</sup></li> <li>Temporary access road: 23,495m<sup>2</sup></li> </ul> <p>Onshore cable trench approximate quantity of spoil material: 13,321m<sup>3</sup></p>	<p>Onshore cable corridor construction footprint may be located anywhere within the proposed onshore development area.</p> <p>The location strategy for access routes, CCS and jointing bays will be to site them near to field boundaries or roads as far as practical.</p> <p>Two link boxes sit underground beside each jointing bay at a depth of approximately 1.2m. The construction footprint of these is included in the jointing bay construction excavation footprint.</p> <p>See <b>Chapter 25 Noise and Vibration</b> for further details regarding noise and vibration levels during construction.</p>

Impact	Proposed East Anglia TWO Project Parameters	Proposed East Anglia ONE North Project Parameters (on the assumption that the proposed East Anglia TWO project is post-construction)	Notes
Impacts related to the onshore substation	<p>Onshore substation CCS: 17,100m<sup>2</sup> (190m x 90m)</p> <p>Permanent footprint (used as CCS during construction): 36,100m<sup>2</sup> (190m x 190m)</p> <p>Substation operational access road: 12,800m<sup>2</sup> (1,600m x 8m)</p>	<p>Onshore substation CCS: 17,100m<sup>2</sup> (190m x 90m)</p> <p>Permanent footprint (used as CCS during construction): 36,100m<sup>2</sup> (190m x 190m)</p> <p>Substation operational access road: 12,800m<sup>2</sup> (1,600m x 8m)</p>	<p>Construction access is included above as the onshore cable route and substation access haul road.</p> <p>See <b>Chapter 25 Noise and Vibration</b> for further details regarding noise and vibration levels during construction.</p>
Impacts related to the National Grid Infrastructure	<p>National Grid substation CCS: 78,750m<sup>2</sup> (250m x 315m)</p> <p>Permanent footprint (used as CCS during construction): 45,500m<sup>2</sup> (325m x 140m)</p>	<p>National Grid substation CCS: 78,750m<sup>2</sup> (250m x 315m)</p> <p>Permanent footprint (used as CCS during construction): 45,500m<sup>2</sup> (325m x 140m)</p>	<p>Design for the required overhead line (OHL) realignment work (including cable sealing end CCSs and pylon realignment CCS) is currently on going. As more detail is made available, this will be fully assessed and included in the Environmental Statement (ES) and DCO application. However, indicative locations for cable sealing end CCSs and pylon realignment CCS are shown in <b>Figure 6.6 of Chapter 6 Project Description</b>.</p> <p>Construction access is included above as the onshore cable route and substation access haul road.</p> <p>Operational access is included above as the substation</p>

Impact	Proposed East Anglia TWO Project Parameters	Proposed East Anglia ONE North Project Parameters (on the assumption that the proposed East Anglia TWO project is post-construction)	Notes
			operational access road.  See <b>Chapter 25 Noise and Vibration</b> for further details regarding noise and vibration levels during construction.
<b>Operation</b>			
Impacts related to the landfall	2 transition bays will be installed underground, each with an operational volume of 227m <sup>3</sup>	2 transition bays will be installed underground, each with an operational volume of 227m <sup>3</sup>	Transition bays will be buried approximately 1.2m underground – there will no above ground infrastructure.
Impacts related to the onshore cable corridor	36 jointing bays will be installed underground, each with an operational volume of 77m <sup>3</sup>  72 link boxes will be installed underground (2 per jointing bay), each with an operational volume of 3m <sup>3</sup>	36 jointing bays will be installed underground, each with an operational volume of 77m <sup>3</sup>  72 link boxes will be installed underground (2 per jointing bay), each with an operational volume of 3m <sup>3</sup>	Jointing bays will be buried approximately 1.2m underground – there will no above ground infrastructure.  Link boxes will be located underground immediately adjacent to jointing bays – there will be no above ground infrastructure.
Impacts related to the onshore substation	Operational footprint: 36,100m <sup>2</sup> (190m x 190m)  Substation operational access road: 12,800m <sup>2</sup> (1,600m x 8m)	Operational footprint: 36,100m <sup>2</sup> (190m x 190m)  Substation operational access road: 12,800m <sup>2</sup> (1,600m x 8m)	The operational footprint does not include the additional landscaping footprint (which will be agreed post-PEIR).
Impacts related to the National Grid Infrastructure	National Grid operational substation: 45,500m <sup>2</sup> (325m x 140m)	National Grid operational substation: 45,500m <sup>2</sup> (325m x 140m)	The operational footprint does not include the additional landscaping footprint (which will be agreed post-PEIR).



Impact	Proposed East Anglia TWO Project Parameters	Proposed East Anglia ONE North Project Parameters (on the assumption that the proposed East Anglia TWO project is post-construction)	Notes
			Design for the required overhead line (OHL) realignment work (including cable sealing end CCSs and pylon realignment CCS) is currently on going. As more detail is made available, this will be fully assessed and included in the Environmental Statement (ES) and DCO application. However, indicative locations for cable sealing end CCSs and pylon realignment CCS are shown in <b>Figure 6.6 of Chapter 6 Project Description</b> .
<b>Decommissioning</b>			
<p>No decision has been made regarding the final decommissioning policy for the onshore infrastructure as it is recognised that industry best practice, rules and legislation change over time. However, the onshore substation will likely be removed and be reused or recycled. It is expected that the onshore cables will be removed and recycled, with the transition bays and cable ducts (where used) left <i>in situ</i>. 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 no greater than those identified for the construction phase are expected for the decommissioning phase.</p>			



## 24.3 Cumulative Impact Assessment during Construction

### 24.3.1 Cumulative Impact 1: Direct Impact on (Permanent Change to) Buried Archaeological Remains

12. Cumulative direct impacts on buried archaeological remains arising as a result of the proposed East Anglia ONE North project together with the proposed East Anglia TWO project during construction may occur where groundworks associated with either the proposed East Anglia ONE North project and proposed East Anglia TWO project overlap or where a particular site or feature is present across the footprint of both the proposed East Anglia ONE North project and proposed East Anglia TWO projects (in which invasive groundworks are anticipated to take place).
13. Although the worst case parameters with respect to the total area disturbed as a result of groundworks differ between the scenarios, it is assumed that all works will be confined within the same outline regardless of the scenario taken forward. As such, although some parameters outlined in Scenario 2 seemingly exceed those under Scenario 1 (e.g. maximum construction corridor width), groundworks undertaken as part of the proposed East Anglia ONE North project under Scenario 2 will include some areas of ground already disturbed as part of the proposed East Anglia TWO project. On this basis, both scenarios are considered to be equal with respect to direct (physical) impact on buried archaeological remains.
14. The combined construction works of both the proposed East Anglia ONE North project and the proposed East Anglia TWO project necessarily result in a greater area of disturbance than the proposed East Anglia ONE North project alone assessment (considered in **section 24.6.1.1 of Chapter 24 Archaeology and Cultural Heritage**). It thereby follows that the effects of the proposed East Anglia ONE North project and proposed East Anglia TWO projects combined have the potential to impact a greater number or extent of buried archaeological remains or features than would occur as a result of the proposed East Anglia ONE North project alone.
15. However, at this PEIR stage, the onshore cable route has not yet been defined, and several other refined and specific project parameters currently undetermined. As such, at this stage of enquiry the impact assessment as presented in this PEIR chapter assumes that activities associated with construction may theoretically occur anywhere within the proposed onshore development area. On this basis, cumulative direct impacts of the proposed East Anglia ONE North project on buried archaeological remains in combination with the proposed East Anglia TWO project will be broadly in line with those outlined in **section 24.6.1.1 of Chapter 24 Archaeology and Cultural Heritage** for the proposed East Anglia ONE North project alone

(which considers potential impacts within the proposed onshore development area as a whole). Based on current available data, only HA3 has been identified intersecting the parameters of the East Anglia ONE North onshore substation, East Anglia TWO onshore substation and National Grid substation footprints, with AAA9 identified as intersecting the East Anglia ONE North onshore substation and National Grid substation footprints.

16. With the application of site specific / additional mitigation (as outlined in **section 24.3.3.1 and 24.6.1.1.2** of **Chapter 24 Archaeology and Cultural Heritage**), the residual impact significance is expected to be reduced or offset to levels considered non-significant in EIA terms (i.e. anticipated in the majority of cases to be no worse than **minor adverse**).

#### **24.3.2 Cumulative Impact 2: Direct Impact on (Permanent Change to) Above Ground Archaeological Remains and Heritage Assets e.g. historic earthworks (including Historic Landscape Character); and built heritage (buildings, structures etc.)**

17. Cumulative direct impacts on above ground archaeological remains and heritage assets arising as a result of the proposed East Anglia ONE North project together with the proposed East Anglia TWO project during construction may occur where groundworks associated with either the proposed East Anglia ONE North project or proposed East Anglia TWO project overlap or where a particular site or feature is present across the footprint of both the proposed East Anglia ONE North or proposed East Anglia TWO projects (in which invasive groundworks are anticipated to take place).
18. As discussed with respect to Cumulative Impact 1 (**section 24.3.1**), it is assumed that all works will be confined within the same outline regardless of the scenario taken forward. On this basis, both scenarios are considered to be equal with respect to direct (physical) impact on above ground archaeological remains and heritage assets.
19. The combined construction works of both the proposed East Anglia ONE North project and the proposed East Anglia TWO project necessarily result in a greater area of disturbance than the proposed East Anglia ONE North project alone assessment (considered in **Chapter 24 section 24.6.1.2**). It thereby follows that the effects of the proposed East Anglia ONE North and proposed East Anglia TWO projects combined have the potential to impact a greater number or a larger extent of above ground archaeological remains or heritage assets than would occur as a result of the proposed East Anglia ONE North project alone.

20. However, as outlined above in relation to Cumulative Impact 1 (**section 24.3.1**), in the absence of a refined onshore cable route, at this stage of enquiry, the impact assessment as presented in this PEI chapter assumes that activities associated with construction may theoretically occur anywhere within the proposed onshore development area. On this basis, cumulative direct impacts on above ground archaeological remains and heritage assets in-combination with the proposed East Anglia TWO project will be broadly in line with those outlined in **section 24.6.1.2 of Chapter 24 Archaeology and Cultural Heritage** for the proposed East Anglia ONE North project alone (which considers potential impacts within the proposed onshore development area as a whole). Based on current available data, no features considered to represent above ground archaeological remains and heritage assets have been identified within the parameters of the East Anglia ONE North onshore substation, East Anglia TWO onshore substation and National Grid substation footprints.
21. With the application of embedded and site specific / additional mitigation (as outlined in **sections 24.3.3 and 24.6.1.2.2 of Chapter 24 Archaeology and Cultural Heritage**) the residual impact significance is expected to be reduced or offset to levels considered non-significant in EIA terms (i.e. anticipated in the majority of cases to be no worse than **minor** adverse).

#### **24.3.3 Cumulative Impact 3: Indirect (non-physical) Impact on the Setting of Heritage Assets (both Designated and Non-Designated)**

22. Cumulative indirect impacts upon the setting of heritage assets arising as a result of the proposed East Anglia ONE North project in-combination with the proposed East Anglia TWO project during construction may occur where the construction activities associated with the proposed East Anglia ONE North and proposed East Anglia TWO projects combine to give rise to a change in conditions (e.g. sight, sound, any dust created, and even smell) which may indirectly impact heritage assets and their settings.
23. As part of the initial heritage settings assessment undertaken to date (see **Appendix 24.1 section 3.8**) it has been concluded that any changes in setting due to construction activities would be temporary and of sufficiently short duration that they would not give rise to material harm. Given that Scenario 1 accounts for the concurrent construction of the proposed East Anglia ONE North and proposed East Anglia TWO projects, the impacts resulting from the concurrent construction of the proposed East Anglia ONE North and proposed East Anglia TWO projects are also likely to be temporary and of sufficiently short duration that they would not give rise to material harm. As such, cumulative indirect impacts upon the setting of

heritage assets under Scenario 1 will be as that outlined in **section 24.6.1.3** of **Chapter 24 Archaeology and Cultural Heritage** (no impact).

24. Scenario 2 requires two separate periods of construction for the proposed East Anglia TWO project and the proposed East Anglia ONE North project (rather than the concurrent construction required under Scenario 1) and as a result is considered to be the worst case scenario on the basis that impacts upon the historic landscape and the setting of heritage assets as a result of the proposed East Anglia TWO project and the proposed East Anglia ONE North project combined will be of greater duration. However, despite the duration of works, it is considered that construction activities would still be temporary and of sufficiently short duration that they would not give rise to material harm. As such, cumulative indirect impacts upon the setting of heritage assets under Scenario 2 will also be as that outlined in **section 24.6.1.3** of **Chapter 24 Archaeology and Cultural Heritage** (no impact).

#### **24.3.4 Cumulative Impact 4: Impact on Potential Geoarchaeological / Palaeoenvironmental Remains, Potentially Indicative of Former Land Surfaces**

25. Cumulative impacts on geoarchaeological / palaeoenvironmental remains arising as a result of the proposed East Anglia ONE North project in combination with the proposed East Anglia TWO project during construction may occur where groundworks associated with either the proposed East Anglia ONE North project or the proposed East Anglia TWO project overlap or where a particular feature or deposit of geoarchaeological interest is present across the footprint of both the proposed East Anglia ONE North and proposed East Anglia TWO projects (in which invasive groundworks are anticipated to take place).
26. As discussed with respect to Cumulative Impact 1 (**section 24.3.1**), it is assumed that all works will be confined within the same outline regardless of the scenario taken forward. On this basis, both scenarios are considered to be equal with respect to direct (physical) impact on potential geoarchaeological / palaeoenvironmental remains.
27. The combined construction works of both the proposed East Anglia ONE North project and the proposed East Anglia TWO project necessarily result in a greater area of disturbance than the proposed East Anglia ONE North project alone assessment (considered in **Chapter 24 section 24.6.1.4**). It thereby follows that the effects of the proposed East Anglia ONE North project and the proposed East Anglia TWO projects combined have the potential to impact a greater extent of geoarchaeological /

palaeoenvironmental remains than would occur as a result of the proposed East Anglia ONE North project alone.

28. As outlined above, in the absence of a refined onshore cable route, at this stage of enquiry, the impact assessment as presented in this PEIR chapter assumes that activities associated with construction may theoretically occur anywhere within the proposed onshore development area. On this basis, with regards to the landfall location and the onshore cable corridor, cumulative direct impacts on above ground archaeological remains and heritage assets in-combination with the proposed East Anglia TWO project will be broadly in line with those outlined in **section 24.6.1.4 of Chapter 24 Archaeology and Cultural Heritage** for the proposed East Anglia ONE North project alone (which considers potential impacts within the proposed onshore development area as a whole).
29. With the application of site specific / additional mitigation (as outlined in **section 24.3.3 and 24.6.1.4.2 of Chapter 24 Archaeology and Cultural Heritage**) the residual impact significance is expected to be reduced or offset to levels considered non-significant in EIA terms (i.e. anticipated in the majority of cases to be no worse than **minor** adverse).

#### **24.3.5 Cumulative Impact 5: Impact to Site Preservation Conditions from Drilling Fluid Breakout or Oil Spills**

30. Impact to site preservation conditions arising as a result of potential drilling fluid breakout or oil spills may occur irrespective of construction phasing. On this basis, both scenarios are considered to be equal with respect to this impact.
31. As outlined in **section 24.6.1.5 of Chapter 24 Archaeology and Cultural Heritage**, the embedded application of best practice measures as part of the proposed East Anglia ONE North project and anticipated as part of the proposed East Anglia TWO project will ensure that oil spills associated with transformer filling operations or any drilling fluid breakout during HDD are handled quickly and efficiently, thereby not giving rise to any major leakage (see **section 24.6.1.5 of Chapter 24 Archaeology and Cultural Heritage** for further detail).
32. The potential for oil spills / drilling fluid to breakout and spread into / 'coat' archaeological deposits, features and materials, thereby causing an adverse impact upon site preservation as a result of the proposed East Anglia ONE North and proposed East Anglia TWO projects combined, has as such been assessed as being of negligible magnitude of effect, resulting in a **minor adverse** significance as a worst case scenario.



## 24.4 Cumulative Impact Assessment during Operation

33. Operational impacts on archaeology and cultural heritage will be the same irrespective of construction scenario.

### 24.4.1 Cumulative Impact 1: Indirect (non-physical) Impact on the Setting of Heritage Assets (both Designated and Non-Designated)

34. Cumulative indirect impacts upon the setting of heritage assets arising as a result of the proposed East Anglia ONE North project in-combination with the proposed East Anglia TWO project may occur during the operational phase due to the combined visibility and presence of above ground project infrastructure.
35. The heritage settings assessment undertaken to date (see **Appendix 24.1**) has been informed by site visits and integration with available Landscape and Visual Impact Assessment (LVIA) tool kits. The assessment includes consideration of those heritage assets that may be subject to significant impacts, in EIA terms, as a result of potential changes in their setting due to the proposed East Anglia ONE North project.
36. The heritage assets discussed in **section 24.6.2.1** of **Chapter 24 Archaeology and Cultural Heritage**, which are considered to warrant further heritage setting consideration, will be further assessed, following the Health England (HE) guidance and the stepped approach outlined within. The assessment will be supplemented by further site re-visits and available LVIA tool kits (e.g. Zone of Theoretical Visibility (ZTVs), photomontages) in specific relation to the more refined infrastructure locations for the proposed East Anglia ONE North project in-combination with the proposed East Anglia TWO project. This assessment will be reported on as part of the Environmental Statement (ES).

### 24.4.2 Cumulative Impact 2: Impacts to Archaeological Site Preservation Conditions, where Present, from Heat Loss from Installed Onshore Cables

37. As outlined in **section 24.6.2.2** of **Chapter 24 Archaeology and Cultural Heritage**, the maximum heat loss from installed onshore cables and subsequent dissipation of heat through the soil will not be determined until the soil structure (thermal properties) and final engineering design are known and confirmed. However, it is expected that any heat dissipation will be localised and confined to the areas immediately surrounding the cables and ducts. Given that the areas within the immediate locality of the cables will have been subject to disturbance as a result of cable installation, any sub-surface archaeological / geoarchaeological remains (where present) therein

will have already been subject to the initial informative stages of mitigation work. On this basis, there will be **no impact** during operation associated with the heat loss from cables as a result of the proposed East Anglia ONE North and East Anglia TWO projects combined.

## 24.5 Summary

38. **Table A24.3** gives an overarching summary of which of the two construction scenarios, detailed above, will be the realistic worst case in terms of impacts relating to archaeology and cultural heritage.

**Table A24.3 Summary of Scenario 1 and Scenario 2 Realistic Worst Case Assumptions**

Impact	Worst Case	Notes
Impact related to permanent change to buried archaeological remains	N/A	Both scenarios are considered to be equal with respect to direct (physical) impact on buried archaeological remain. This impact will be broadly the same as for the proposed East Anglia ONE North project alone.
Direct impacts on above ground archaeological remains and heritage assets	N/A	Both scenarios are considered to be equal with respect to direct (physical) impact on above ground archaeological remains and heritage assets. This impact will be broadly the same as for the proposed East Anglia ONE North project alone.
Indirect (non-physical) impact on the setting of heritage assets (designated and non-designated)	Scenario 2	Greater impact due to increased duration of construction under scenario 2.
Impact on potential geoarchaeological / palaeoenvironmental remains, potentially indicative of former land surfaces	N/A	Both scenarios are considered to be equal with respect to direct (physical) impact on potential geoarchaeological / palaeoenvironmental remains. This impact will be broadly the same as for the proposed East Anglia ONE North project alone.
Impacts to site preservation conditions from drilling fluid breakout or oil spills	N/A	Both scenarios are considered to be equal with respect to impacts to site preservation conditions.
Indirect (non-physical) Impact on the Setting of Heritage Assets (both Designated and Non-Designated)	N/A	Operation impacts are the same regardless of scenario
Impacts to archaeological site preservation conditions, where present, from heat loss from installed onshore cables	N/A	Operation impacts are the same regardless of scenario

39. Overall, construction scenario 2 creates a realistic worst case in terms of impacts to archaeology and cultural heritage. Therefore, scenario 2 will be carried through into the wider CIA with other developments, see **section 24.7** in **Chapter 24 Archaeology and Cultural Heritage**.