

Norfolk Boreas Offshore Wind Farm Clarification Note Archaeological Interests and survey at the Landfall Site

Applicant: Norfolk Boreas Limited
Document Reference: ExA.AS-7.D4.V1
Deadline 4

Date: January 2020
Revision: Version 1
Author: Royal HaskoningDHV

Photo: Ormonde Offshore Wind Farm

Date	Issue No.	Remarks / Reason for Issue	Author	Checked	Approved
29/01/2020	01D	First draft for Deadline 4	VC	DT/JT	JL
30/01/2020	01F	Final draft for Deadline 4	VC	DT	JL



Table of Contents

1	Introduction	1
2	Archaeological Interests.....	1
3	Approach to Installation below Mean Low Water at the Landfall	4
4	Post-consent surveys	4
5	Summary.....	6

Table of Figures

	Figure 1: Seabed Features at the Landfall (Environmental Statement Figure 17.5, Map 4 of 4)	3
--	------------------------------------------------------------------------------------------------------	---

Glossary of Acronyms

AEZ	Archaeological Exclusion Zone
AHOB	Ancient Human Occupation of Britain
DCO	Development Consent Order
EIA	Environmental Impact Assessment
HDD	Horizontal Directional Drilling
LAT	Lowest Astronomical Tide
MHW	Mean High Water
MLW	Mean Low Water
PAB	Pathways to Ancient Britain
WSI	Written Scheme of Investigation

Glossary of Terminology

Aviation archaeology	The remains of crashed aircraft and archaeological material associated with historic aviation activities.
Geoarchaeology	The application of earth science principles and techniques to the understanding of the archaeological record. Includes the study of soils and sediments and of natural physical processes that affect archaeological sites such as geomorphology, the formation of sites through geological processes and the effects on buried sites and artefacts.
Maritime archaeology	The remains of boats and ships and archaeological material associated with prehistoric and historic maritime activities.
Palaeoenvironmental Analysis	The study of sediments and the organic remains of plants and animals to reconstruct the environment of a past geological age.
Palaeogeographic features	Features seen within sub-bottom profiler data (buried) and multibeam bathymetry data (sea floor) interpreted as representing prehistoric physical landscape features such as former river channels (palaeochannels).
Palaeolithic	500000 to 10000 BC The Old Stone Age defined by the practice of hunting and gathering and the use of chipped flint tools. This period is usually divided into Lower, Middle and Upper Palaeolithic.
Seabed features	Features seen on the seafloor in the sidescan sonar or multibeam bathymetry data which are interpreted to represent heritage assets, or potential heritage assets. Also includes magnetic anomalies which may represent shallow buried ferrous material of archaeological interest.
Seabed prehistory	Archaeological remains on the seabed corresponding to the activities of prehistoric populations that may have inhabited what is now the seabed when sea levels were lower.

1 Introduction

1. The purpose of this clarification note is to assist understanding of how the Applicant proposes to manage procedures and sequencing for post-consent surveys of the landfall site below Mean Low Water (MLW) with regard to managing risks and opportunities for archaeological assets on and below seabed.
2. This note also considers the implications upon archaeological interests of the selection of horizontal directional drill (HDD) method.
3. This clarification note has been prepared in response to Hearing Action point 1 of the Norfolk Boreas Issue Specific Hearing (ISH) 4 - Offshore Effects including the draft Development Consent Order.

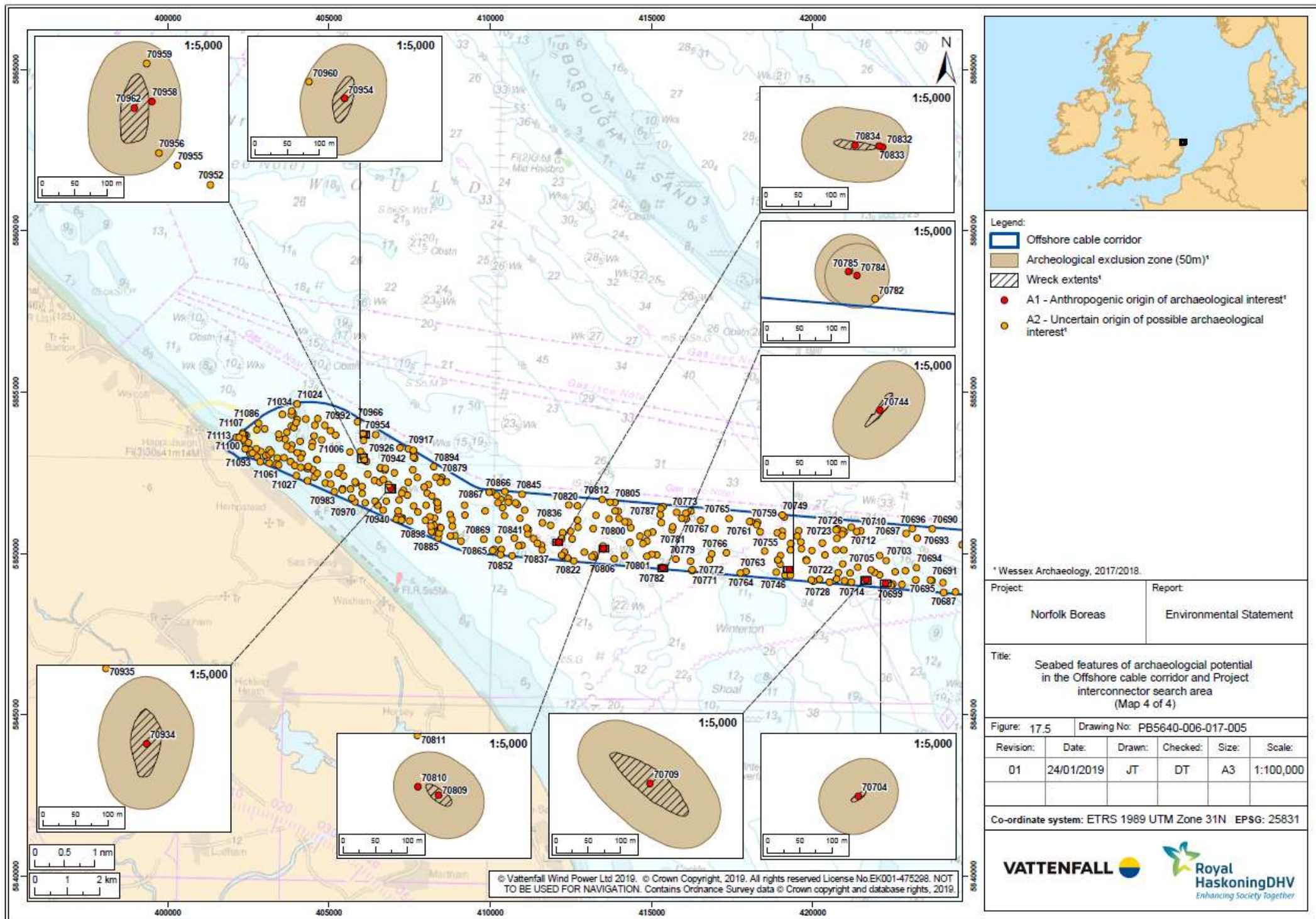
Action Point 1:

“Submit clarification note on procedures and sequencing for postconsent surveys of the landfall site below MLW with regard to managing risks and opportunities for archaeological assets on and below seabed and implications (if any) of selection of horizontal drill method.”

2 Archaeological Interests

4. It is recognised that the landfall is located in proximity to previously investigated archaeological sites at Happisburgh and that finds and palaeoenvironmental evidence discovered within the Cromer Forest Bed Formation here are of international importance for studies of the Palaeolithic.
5. As part of the Environmental Impact Assessment (EIA) early consultation was carried out with Historic England and with members of the Ancient Human Occupation of Britain (AHOB) and Pathways to Ancient Britain (PAB) projects (who were responsible for the excavation and ongoing research regarding the Palaeolithic sites at Happisburgh) in respect to the proposed landfall. This early consultation revealed agreement that potential data acquired from the project at the landfall (geophysical and geotechnical) would provide an opportunity for further study which, dependent upon the execution of survey and archaeological assessment, would outweigh any risk to the (pre)historic environment.
6. No deposits resembling the Cromer Forest Bed Formation were encountered at the landfall during onshore ground investigations undertaken by the Norfolk Vanguard Project (and used to inform the Norfolk Boreas project). Furthermore, the geoarchaeological assessment of the onshore cores concludes that if Cromer Forest Beds do survive, they are likely to be found at significant depth (>20 metres below ground level) and below the planned depth for HDD.

7. In addition to considerations of prehistoric archaeology at the landfall, there are also a number of marine geophysical anomalies within the offshore cable route which are interpreted as being of anthropogenic origin, and uncertain archaeological interest within the nearshore area ('A2' anomalies). These anomalies have the potential to be of archaeological interest (i.e. of maritime or aviation origin) but may also represent modern debris or natural features. Anomalies classified as 'A1' are those which are of interpreted anthropogenic origin or archaeological interest (i.e. wrecks or anomalies of high potential to be wrecks or crashed aircraft, for example). The distribution of these features in the section of the cable route closest to the landfall is shown in Figure 1.



© Vattenfall Wind Power Ltd 2019. © Crown Copyright, 2019. All rights reserved License No EK001-475298. NOT TO BE USED FOR NAVIGATION. Contains Ordnance Survey data © Crown copyright and database rights, 2019.

VATTENFALL

Royal HaskoningDHV
Enhancing Society Together

3 Approach to Installation below Mean Low Water at the Landfall

8. As set out in the Applicant's DCO submission, the offshore wind farm would be connected to the shore by offshore export cables installed within the offshore cable corridor from the wind farm to a landfall point at Happisburgh South, Norfolk. From there, onshore cables would transport power over approximately 60km to the onshore project substation at Necton, Norfolk.
9. A key commitment in the DCO application was to use long HDD at the landfall in order to avoid any works or need for vehicular access on the beach and cliff. The HDD will pass under the cliffs and exit at an offshore location beyond 5.5m below LAT (Lowest Astronomical Tide) with approximately 1000m drill length, classified as a 'long HDD'. The maximum target depth of drill is 20m (above the anticipated depth of Cromer Forest Bed) and the minimum is 10m (below the intertidal deposits which may contain archaeological material).
10. For this reason, regardless of the selection of HDD method, impacts to sub-surface deposits of archaeological potential are not anticipated to occur at the target depths for penetration.
11. Offshore, the cable will exit at c. 1km offshore. The maximum area of seabed impacted as a result of the exit point would be due to the placement of cable protection which may be required. This could entail one mattress (6m length x 3m width x 0.3m height) or rock dumping (5m length x 5m width x 0.5m height) at each exit point (up to two cable pairs), which would equate to a maximum total footprint of 36m². This is a relatively small area of impacted seabed which can easily be microsited to avoid archaeological assets as required.

4 Post-consent surveys

12. The overarching approach to post-consent survey and investigation below MLW, including consideration of HDD, is presented in the Outline Written Scheme of Investigation (WSI) for offshore archaeology [APP-697]. The Outline WSI (Offshore) also includes consideration of the intertidal zone above MLW but below Mean High Water (MHW).
13. Prior to consent being granted for Norfolk Boreas, Norfolk Vanguard are proposing a geotechnical survey of the onshore cable route landfall area, including the beach and inter-tidal zone in summer 2020 and a separate geophysical and geotechnical survey of the offshore area including shallow subtidal. Both onshore and offshore site investigations will be subject to survey specific WSIs which are currently in preparation by the archaeological contractor for Norfolk Vanguard (Wessex Archaeology) in accordance with the Outline WSI (Onshore and Offshore) for that

- project (Norfolk Vanguard DCO Document 8.5, REP8-012 and Document 8.6, REP9-012).
14. The intertidal site investigations are subject to archaeological involvement in their planning and execution in accordance with the Outline WSI (offshore). This will include further engagement with a steering group comprising members of the AHOB and PAB project teams as well as Historic England and the projects (geo)archaeological contractor.
 15. All data collected as part of these Norfolk Vanguard surveys will be used to inform the scope of any surveys undertaken as part of the Norfolk Boreas project and will also be used to help microsite HDD exit locations and export cable routes to avoid features of Archaeological interest.
 16. Additional site investigations for the Norfolk Boreas project below MLW are not currently planned although, similarly, all investigations planned post-consent will be undertaken in accordance with the Norfolk Boreas Outline WSI (offshore) [currently APP-697, but due to be updated at deadline 5]. As stated above, options for HDD at the landfall have been considered against understanding of the sub-surface deposits to provide confidence that any HDD technique would avoid impacts to deposits of potential Palaeolithic interest. The relationship between the Cromer Forest Bed onshore and sub-seabed deposits in the nearshore and offshore environments are uncertain. However, the results of further ground investigations within the project boundary, planned post consent in consultation with the steering group including Historic England will contribute to a greater understanding of the deposits within the wider study area.
 17. In addition to considerations of prehistoric archaeology, the approach to embedded mitigation [as set out in the Outline WSI, APP-697] also includes provision for the implementation of Archaeological Exclusion Zones (AEZs) in order to avoid impacts to heritage assets (for example, those classified as A1 anomalies) as well as the avoidance of A2 anomalies through micrositing the design, where possible. Where avoidance is not possible then further investigation and measures to mitigate any potential impacts would be required.
 18. Although a programme or schedule for such surveys will not be known until the post-consent stage, it is anticipated that surveys within the offshore cable route (incorporating the HDD exit point) will commence with marine geophysical and geotechnical surveys. The results of these surveys will inform the design of further investigations, such as ground-truthing through Remote Operated Vehicle (ROV) or diver survey, to be agreed in consultation with stakeholders. Any further requirements for mitigation would be agreed in consultation with Historic England on a case by case/ area by area basis.

5 Summary

19. Archaeological interests at the landfall below MLW comprise potential prehistoric sub-surface deposits of palaeoenvironmental interest and potential archaeological material, such as the remains of wrecks or crashed aircraft, including those interpreted from marine geophysical data. Potential heritage assets within the project boundary were considered in detail as part of the DCO application and the 'worst case scenario' approach to assessment will ensure that, regardless of the HDD method selected for construction, impacts will be no greater than those considered in detail in the Environmental Statement.
20. The overarching approach to post-consent survey and investigation below MLW, including consideration of HDD, is presented in the Outline WSI for offshore archaeology [APP-697]. This includes provision for further mitigation in the event that impacts to potential heritage assets cannot be avoided. With the application of the approach to further investigation and mitigation, no significant impacts upon heritage assets were predicted, including within the location of the HDD exit point.
21. In conclusion, the planned approach to survey by both Norfolk Vanguard and the Applicant and investigation below MLW presents an opportunity to gather additional data on both the prehistoric environment (specifically with respect to the relationship between the Cromer Forest Bed onshore and equivalent deposits offshore) and the remains of wrecks and aircraft, and associated maritime and aviation activities. The realisation of potential benefits from this data will depend upon the completion of data acquisition and investigation to the highest quality standards possible, including reporting, publication, conservation and archiving requirements for archaeological works undertaken in the course of the scheme.