



# **SOFIA** **OFFSHORE** **WIND FARM**

## **INVESTIGATION OF ANOMALY 7266 AT TURBINE LOCATION T15**

**ARCHAEOLOGICAL SURVEY REPORT AND  
MITIGATION STRATEGY**

**Date** 25 May 2021

**Document reference** 004002469

**Revision** 01

<b>Project</b>	Sofia Offshore Wind Farm
<b>Sub-Project or Package</b>	Consents
<b>Document Title</b>	Investigation of anomaly 7266 at turbine location T15: Archaeological survey report and mitigation strategy
<b>Document Reference</b>	004002469
<b>Revision</b>	01
<b>Supplier Reference No</b>	N/A

This document and any information therein are confidential property of Sofia Offshore Wind Farm Limited and without infringement neither the whole nor any extract may be disclosed, loaned, copied or used for manufacturing, provision of services or other purposes whatsoever without prior written consent of Sofia Offshore Wind Farm Limited, and no liability is accepted for loss or damage from any cause whatsoever from the use of the document. Sofia Offshore Wind Farm Limited retains the right to alter the document at any time unless a written statement to the contrary has been appended.

Revision	Date	Status/Reason for Issue	Originator	Checked	Approved
01	25 May 2021	Issued to MMO and Historic England	P.Meredith	C. Davies, M.Brown	K. Gauld-Clark

# Contents

1. Overview .....	4
1.1 Project Introduction.....	4
1.2 Survey Background .....	4
2. Survey design.....	4
2.1 Survey Objectives.....	4
2.2 Survey methodology .....	5
3. Results .....	5
3.1 Operations summary .....	5
3.2 Description and interpretation .....	6
4. Mitigation .....	6

## Tables

No table of figures entries found.

## Figures

Figure 2 Map showing the recommended AEZ around the wreck and the micrositing of turbine location T15. ....

# 1. OVERVIEW

## 1.1 PROJECT INTRODUCTION

- 1.1.1 Sofia Offshore Wind Farm (“SOWF”) was developed and consented by the Forewind Limited Consortium and previously known as Dogger Bank Teesside B (“Teesside B”). The Dogger Bank Teesside A and B Offshore Wind Farm Order 2015 (“the DCO”) was granted on 4 August 2015 and came into force on 26th August 2015. The Forewind Limited consortium disbanded and since August 2017, Innogy Renewables UK Limited (“innogy”), now RWE Renewables, has held 100% ownership of SOWF under a new subsidiary, Sofia Offshore Wind Farm Limited (“SOWFL”).
- 1.1.2 The SOWF site is located approximately 165 km offshore on the shallow central area of the North Sea known as the Dogger Bank with the export cable landfall in an area between Redcar and Marske-by-the-Sea. Water depths in the array area are between 21 m and 37 m.

## 1.2 SURVEY BACKGROUND

- 1.2.1 In 2020, SOWFL completed a full geophysical and geotechnical offshore site investigation. During the review of data by the Project Retained Archaeologist, a geophysical anomaly (identification number 7266; hereafter ‘the Anomaly’) was identified within the SOWF array area, as was approximately 14 m west-south-west of the centre point of the proposed turbine T15 base location at turbine location at 465989, 6093527 (WGS84, UTM31N).
- 1.2.2 Although it was believed to be anthropogenic, prior to the investigation, the Anomaly was not identified or archaeologically characterised.
- 1.2.3 The Anomaly was observed in sidescan sonar (SSS) and multibeam echosounder (MBES) datasets as a mound-like feature 19.0 m x 13.5 m x 0.3 m high, with a magnetic amplitude of 154 nT. Local seabed conditions suggested that the Anomaly may have been partially buried.
- 1.2.4 The Project Retained Archaeologist advised that an archaeological investigation of the Anomaly was completed for it to be identified and archaeologically characterised and the investigation was designed to inform the mitigation strategy for the Anomaly given its proximity to turbine location T15.

# 2. SURVEY DESIGN

## 2.1 SURVEY OBJECTIVES

- 2.1.1 The objectives of the investigation were set out in an Archaeological Method Statement (MS) (Wessex Archaeology 2021; document no. 003888927-02, para 2.1.5) as follows:
- ✦ Visually inspect the Anomaly and record its observable extent through appropriate means;
  - ✦ Archaeologically characterise the Anomaly;

- 🌀 Develop further mitigation and investigating measures as necessary; and
- 🌀 Disseminate and archive the results.

## 2.2 SURVEY METHODOLOGY

- 1.1.1 The MS and investigation plan were drafted by the Project Retained Archaeologist and the break down of the survey stages are detailed in the Archaeological Report (Wessex Archaeology 2021; document no. 003996031-01, para 4.1.2).
- 1.1.2 The investigation was carried out using a Seaeye Leopard electric work class Remotely Operated Vehicle (ROV) provided and operated by Rovco from the Dynamic Positioning (DP) 2 support vessel *Glomar Wave*. The ROV was equipped with a colour HD camera, black and white low light camera and a Tritech Gemini imaging sonar. The ROV was tracked acoustically using a Sonardyne Ranger 2 USBL system. Calibration results indicate that this system had an accuracy of approximately 1 m. Additional equipment mobilised with the ROV to be fitted as required included a Rovco SUBSLAM stereo camera system, water jetting system and dredge skim. Positioning, camera and sonar data was recorded by ROVCO and provided to the Project Retained Archaeologists before departure from the vessel.

## 3. RESULTS

### 3.1 OPERATIONS SUMMARY

- 3.1.1 The operation was mobilised out of the Port of Blyth. On-site investigations were carried out within SOWF offshore generation assets (non-OFTO) on 20-21 April 2021, after ultra-short baseline (USBL) calibration and DP trials. The operation was demobilised at Great Yarmouth.
- 3.1.2 The Project Retained Archaeologists, Wessex Archaeology, provided a highly experienced onboard maritime archaeologist to direct the investigation on site. This representative was also responsible for taking go/no-go decisions in consultation with SOWF and their on-site representatives, Ocean Ecology Ltd.
- 3.1.3 The USBL track of the ROV during General Visual Inspection (GVI) and the USBL waypoints recorded anomaly features of archaeological interest and selected operational events are detailed in the Archaeology Report (Wessex Archaeology 2021; document no. 003996031-01, Section 5.1 and Appendix 1).
- 3.1.4 Technical issues with the ROV and its equipment meant that diving was not continuous and the ROV spent significantly more time on deck than had been anticipated.
- 3.1.5 Extremely poor underwater visibility of approximately of less than 0.75 m caused by particulates in the water column was experienced throughout the operation. Visibility was often only just beyond the distance between the camera and the feature being inspected, even when the ROV was landed and positioned so that the current was taking disturbed sediment away from the field of view. This meant that the planned 3D modelling of the Anomaly using the SUBSLAM system or photogrammetry was not possible however this was compensated for by greater use of the sonar.

- 3.1.6 The marine licence obtained for the work permitted excavation using a waterjet attached to one of the ROV manipulators. Three test pits were excavated but the effective depth limit of the jetting tool in the seabed type encountered did not provide for the recovery of finds.

## **3.2 DESCRIPTION AND INTERPRETATION**

- 3.2.1 The Anomaly was found to be the wreck of an unidentified wooden ship built in the 19th or early 20th century, probably after 1819. Loss date was probably within the same date range. The surviving remains, probably only a small part of the original ship, include at least two fragments of hull, iron knees, copper alloy hull fasteners, possible studded chain and other debris that is almost certainly associated with the ship.
- 3.2.2 The identity and function of the vessel is unknown. No evidence of armament was found and the location of the anomaly on the Dogger Bank suggests that a connection with the fishing industry or with short sea trade across the North Sea is most likely.
- 3.2.3 The results of the investigation suggest that the extent of the wreck roughly corresponds with the extent of Anomaly 7266 as previously defined by the SSS and MBES data. No evidence was found for significant buried archaeological deposits outside of this area.
- 3.2.4 The closest USBL waypoint for wreck material was WP15, 14 m west-south-west of the centre of the T15 location and there is confidence that the wreck material does not extend any closer to the T15 location.
- 3.2.5 Images of archaeological features photographed at ROV waypoints are interpreted in the Archaeological Report (Wessex Archaeology 2021; document no. 003996031-01, Appendix 1).
- 3.2.6 A report has been issued to the Receiver of Wreck by the Project Retained Archaeologist.
- 3.2.7 The Project Retained Archaeologist will prepare a full archive and submit an OASIS report in accordance with the existing provisions in accordance with the approved Written Scheme of Investigation (WSI) (document reference: 003034372-08).

## **4. MITIGATION**

- 4.1.1 The Retained Archaeologist is confident that the anomaly confirmed as a wreck site of an unnamed vessel, and do not recommend any further investigation of the feature. The mitigation strategy outlined below is in-line with the overarching mitigation principles as detailed within the approved WSI and has been designed to allow construction and operation activities to continue without impacting the feature.
- 4.1.2 The Retained Archaeologists recommends an Archeological Exclusion Zone (AEZ) of 15m around the feature to mitigate the potential impacts of construction and operational activities, in addition turbine T15 will be microsited 50m away from the eastern extent of the feature (ie. moving closer to the Project boundary) (Figure 2).



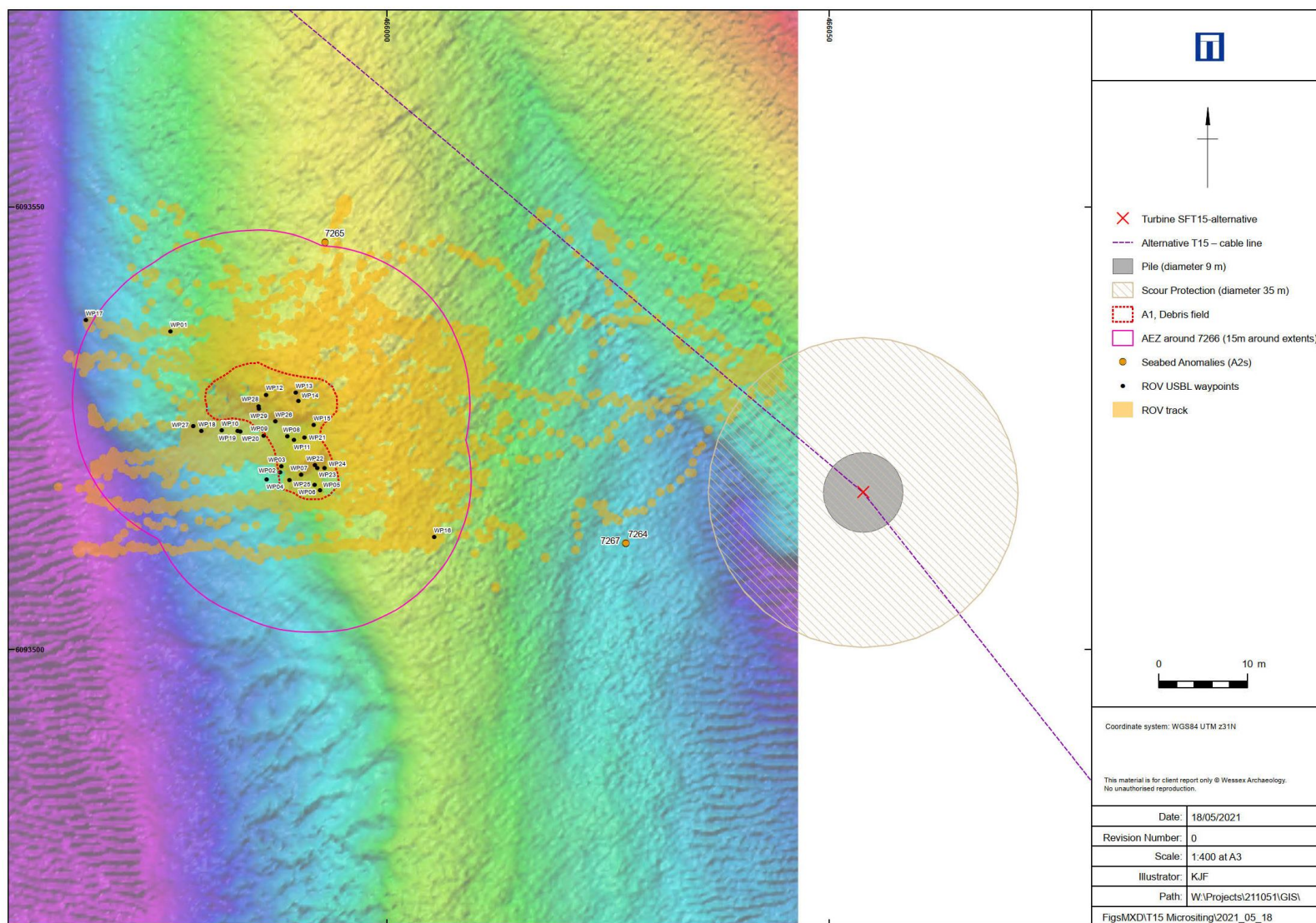


Figure 1 Map showing the recommended AEZ around the wreck and the micrositing of turbine location T15.

- 4.1.3 In discussion with Project engineers, installation managers and operation managers, the Project Retained Archaeologist has recommended an AEZ which ensures impacts to the feature are mitigated whilst still enabling the required flexibility to the Project during the installation and operation of the wind turbine foundations, array cables and scour protection.
- 4.1.4 Scour protection will be installed around the turbine location prior to foundation installation and is expected to be a maximum diameter of circa 35m around the foundation. The extent of the scour protection will not enter the recommended AEZ.
- 4.1.5 All offshore installation operations shall be carried out in accordance with pre-planned safe systems of work (SSoW) which shall comply with relevant requirements presented in the Offshore Archaeological Written Scheme of Investigation. For activities involving installation vessels the SSoW shall include location specific heading/installation drawings which will position the vessel such that it does not interact with the AEZ.
- 4.1.6 A jack-up vessel (JUV) shall be used for the foundation and Wind Turbine Generator (WTG) installations. The JUV which will position itself for jacking using dynamic positioning with a minimum Class 2 (DP2) classification (according to DNV Dynamic Positioning Vessel Design Philosophy Guidelines, DNV-RP-E306 Dynamic Position Systems or equivalent recognised standards). The DP2 (or greater) systems shall rely on a minimum of three positional reference systems including Differential Global Satellite Positioning (DGPS) resulting in a positional accuracy of the jack-up spud-cans of within 1m or less of its planned location, providing absolute confidence that the jack-up spud cans will not enter the AEZ. In addition to the accuracy, the DP2/DP3 classification ensures that a loss of position is extremely unlikely to occur due to the inherent redundancy required in the active components of the system.
- 4.1.7 Each time the vessel arrives into the field, it will carry out DP trials to ensure that the DP system is operating in accordance with its capability plots (i.e. the vessels station keeping ability under given environmental and operational conditions). The installation contractors are also obliged to provide post operation jack-up plots to SOWFL to verify the positional accuracy of the vessels and confirm adherence to the planned installation headings.
- 4.1.8 The vessel that will be used to install the array cables is positioned with DP2 and does not require jack-up or anchoring with the seabed. The cable installation equipment will only make contact with the seabed within the previously surveyed and cleared corridors which do not extend within the AEZ, therefore there is confidence that activities associated with array cable installation will also not impact upon the feature.
- 4.1.9 The micro-siting of WTG T15 is within tolerances previously agreed with Trinity House (TH) and the Maritime & Coastguard Agency (MCA), therefore there are no concerns regarding navigation or Search and Rescue (SAR). SOWFL will provide updated layouts to the MCA and TH. In addition SOWFL will submit an addendum to the Array Location and Layout Plan to the MMO with the micro-sited turbine T15 location.
- 4.1.10 The mitigation strategy will be updated as appropriate in consultation with Historic England and MMO and an update to the WSI will be submitted accordingly.





**Registered office**

Windmill Hill Business Park  
Whitehill Way, Swindon, Wiltshire, SN5 6PB

Registered in England & Wales, Company Number 07791964