

Appendix 5-10

Marine Archaeological

Management Plan





ORIEL WIND FARM PROJECT

Environmental Impact Assessment Report
Appendix 5-10: Marine Archaeological Management Plan

MDR1520B
EIAR – Appendix 5-10
A1 C01
May 2024

ORIEL WIND FARM PROJECT – MARINE ARCHAEOLOGICAL MANAGEMENT PLAN

Contents

Acronyms.....	iv
1 INTRODUCTION.....	1
1.1 Purpose.....	1
1.1.1 Scope.....	1
1.2 Project Background and Consents.....	1
1.2.1 Project Characteristics.....	1
1.2.2 Consents.....	2
1.3 Aims.....	4
1.4 Policy and Guidance.....	4
1.5 Implementation of the AMP.....	5
1.5.1 Roles and Responsibilities.....	5
1.5.2 Reviewing the AMP.....	6
1.5.3 Compliance with the AMP.....	7
1.5.4 Health and Safety.....	7
1.6 Marine Archaeology Baseline.....	7
1.6.1 Submerged Prehistoric Archaeology.....	8
1.6.2 Maritime and Aviation Archaeology.....	9
1.6.3 Results of the Desktop Study.....	11
1.6.4 Results of the Geophysical Survey.....	13
1.7 Potential Impacts.....	15
1.8 Measures included in the Project.....	16
1.8.1 Archaeological Exclusion Zones (AEZs).....	16
1.8.2 Monitoring and Watching Briefs.....	19
1.8.3 Preservation by Record.....	19
1.9 Methodology for Archaeological Work.....	20
1.9.1 Surveys.....	20
1.9.2 Planning.....	20
1.9.3 Geophysical Survey.....	20
1.9.4 Geotechnical Survey.....	21
1.9.5 Diver/ROV Survey.....	22
1.9.6 Finds and Conservation.....	23
1.10 Reporting and Archiving.....	24
1.10.1 Reporting.....	24
1.10.2 Publication.....	24
1.11 References.....	25

Tables

Table 1.1: The Project consents.....	2
Table 1.2: Key Contacts for the AMP.....	6
Table 1.3: Potential Impacts.....	15
Table 1.4: AEZs within the Project area.....	17

Figures

Figure 1.1: The Marine Archaeology Study Area.....	3
Figure 1.2: Marine archaeology identified in the desktop data.....	12
Figure 1.3: Marine archaeology identified in the 2019 geophysical survey.....	14
Figure 1.4: AEZs within the Project Area.....	18

Appendices

A.1 Gazetteer of Known Wreck sites and anomalies within Marine Archaeology Study Area

ORIEL WIND FARM PROJECT – MARINE ARCHAEOLOGICAL MANAGEMENT PLAN

Acronyms

Term	Meaning
ABP	An Bord Pleanála
ADCO	The Archaeological Diving Company Ltd
AEZ	Archaeological Exclusion Zone
AMP	Archaeological Management Plan
CIfA	Chartered Institute for Archaeologists
DAHGI	Department of Arts, Heritage, Gaeltacht and the Islands
DHLGH	Department of Housing, Local Government and Heritage
EIAR	Environmental Impact Assessment Report
EPA	Environmental Protection Agency
GIS	Geographical Information System
HWM	High Water Mark
ICON	Institute for Conservation
JNAPC	Joint Nautical Archaeology Policy Committee
LA	Licensed Archaeologist
LWM	Low Water Mark
MS	Method Statement
NMS	National Monuments Service
OSS	Offshore Substation
OWL	Oriel Windfarm Limited
ROV	Remotely Operated Vehicle
SCAUM	Standing Conference of Archaeological Unit Managers
SI	Site Investigations
TAEZ	Temporary Archaeological Exclusion Zone
UXO	Unexploded Ordnance
WIID	Wreck Inventory of Ireland Database
WISMB	Western Irish Sea Mud Belt
WTG	Wind Turbine Generator

1 INTRODUCTION

1.1 Purpose

This Marine Archaeological Management Plan (Marine AMP) has been prepared by RPS on behalf of Oriel Windfarm Limited (the Applicant, hereinafter referred to as the Developer) to support the Environmental Impact Assessment Report (EIAR) for the Oriel Wind Farm Project (hereinafter referred to as 'the Project').

The purpose of the Marine AMP is to provide the over-arching framework by which the Developer will manage potential risks to marine archaeological features from the Project throughout its lifetime.

It should be noted that this plan will be updated and finalised pre-construction following development of the final project design and in consultation with the NMS, regulatory bodies and stakeholders on the content of this plan. Should relevant guidelines become available in Ireland, this plan will be updated to ensure the measures from such guidelines are incorporated into this plan.

This document will be subject to ongoing updates during the lifetime of the Project to ensure any changes in responsibilities or contractors is reflected in the document and that the relevant team members and contractors are kept informed of the requirements set out within.

The AMP establishes the mitigation procedures that must be followed in order to avoid, damage to cultural heritage assets and targets of archaeological potential. These assets and targets were identified during the preparation of the EIAR for the Project.

The main objectives of this Marine AMP are to:

- Set out the respective responsibilities of the Developer, Contractors employed by the Developer and the Archaeological Consultant prior to and during all phases of the Project, and formal lines of communication between these parties and the relevant authorities including the NMS;
- Establish mitigation procedures to seek to avoid damage to cultural heritage assets and anomalies of archaeological potential;
- Propose measures for mitigating effects upon archaeological material that may be encountered during the Project;
- Ensure that, in the event that unexpected archaeological discoveries are made, archaeological advice is sought and the discovery is subject to archaeological input, review, recording and sampling; and
- Establish the reporting, publication, conservation and archiving requirements for the archaeological works undertaken during the course of the Project.

The primary mitigation strategy for the protection of archaeological and cultural heritage assets and targets *in situ* is through avoidance, by implementing site-specific Archaeological Exclusion Zones (AEZs).

Oriel Windfarm Limited (OWL) is responsible for the implementation of its obligations under this Marine AMP as well as contractually obliging other parties to implement theirs.

1.1.1 Scope

The remit of the Marine AMP is for the Project activities taking place seaward of the Low Water Mark (LWM). The Marine AMP is applicable to all Developer personnel, contractors and subcontractors carrying out activities that impact the seabed associated with the Project.

1.2 Project Background and Consents

1.2.1 Project Characteristics

The Project is an offshore wind farm is located off the coast of County Louth to the east of Dundalk Bay, approximately 22 km east of Dundalk town centre, 18 km east of Blackrock, 6 km south of the Cooley Peninsula and 10 km north-east of Dunany Point. The closest wind turbine will be approximately 6 km from the closest shore on the Cooley Peninsula.

ORIEL WIND FARM PROJECT – MARINE ARCHAEOLOGICAL MANAGEMENT PLAN

The offshore wind farm area covers approximately 27.7 km² and is broadly hexagonal in shape with a length of approximately 5.3 km west to east and 6.6 km north to south (see Figure 1.1). One offshore cable will be installed within a corridor (the offshore cable corridor) that connects the offshore wind farm area with a landfall approximately 700 m south of Dunany Point. The offshore cable corridor is contiguous to the High Water Mark (HWM) at the landfall and to the south western boundary of the offshore wind farm area. The offshore cable corridor is approximately 11 km in length and covers an area of approximately 25 km².

The Project will consist of the following key components within the offshore environment:

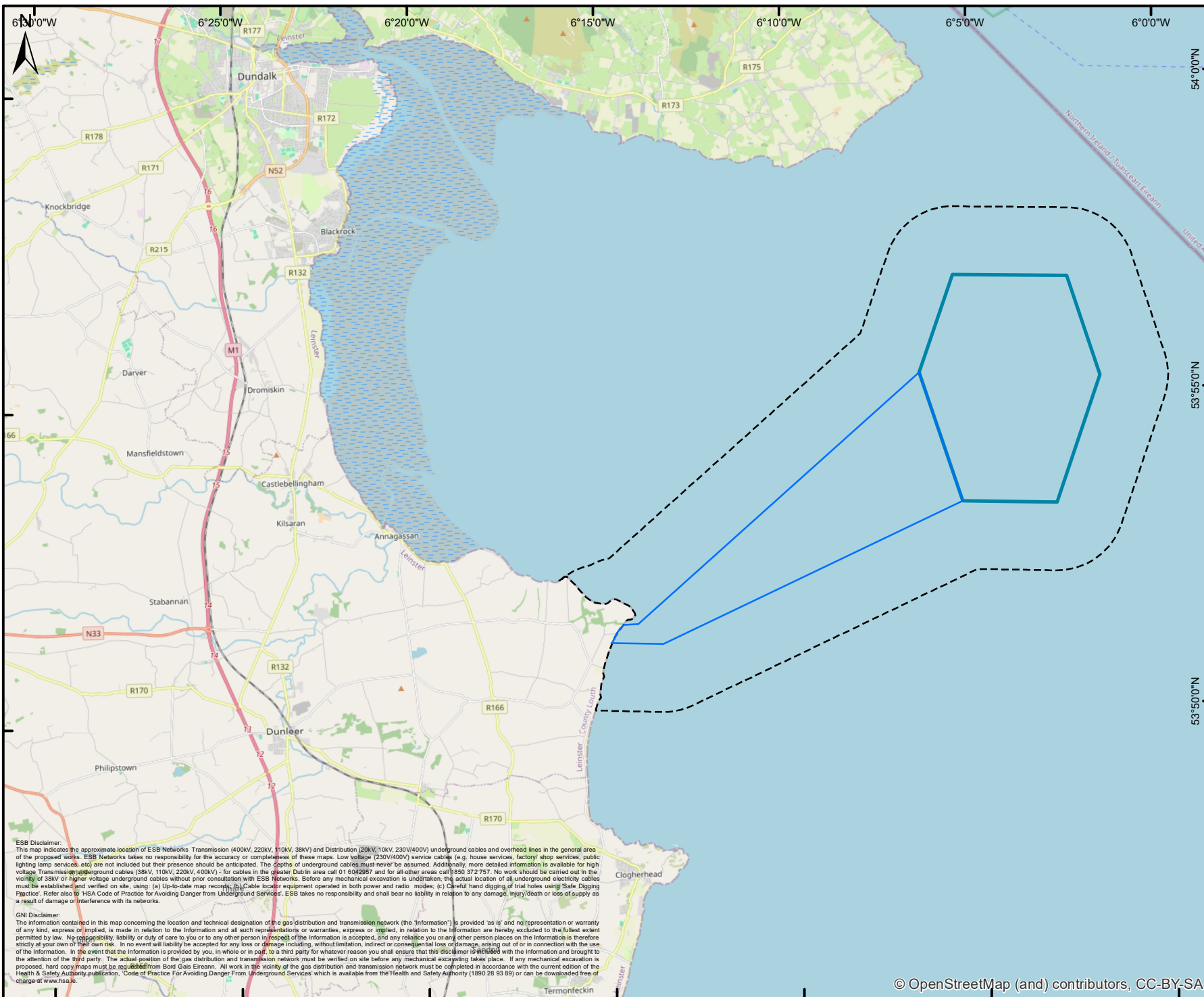
- 25 Wind Turbine Generators (WTG) on monopile foundations;
- One Offshore Substation (OSS) on a monopile foundation;
- 41 km of 66kV subsea inter-array cables;
- 16 km of 220kV offshore export cable; and
- Cable protection which may include rock placement and/or concrete/steel mattresses.

1.2.2 Consents

The Project will be subject to the consents shown in Table 1.1. Table 1.1 will be completed once full details are available and is provided here for illustrative purposes.

Table 1.1: The Project consents.

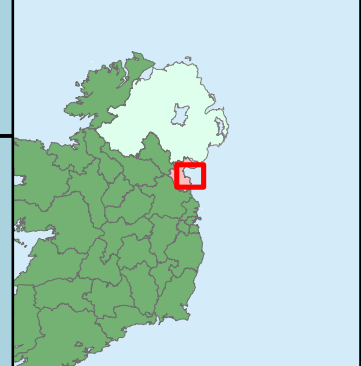
Consent	Legislation	Consenting authority	Date
Planning	Planning and Development Act 2000, as amended.	An Bord Pleanála (ABP)	To be applied for
Dumping at Sea Permit	Dumping at Sea Act 1996 (as amended)	Environmental Protection Agency (EPA)	To be applied for



Legend

- Offshore Wind Farm Area
- Offshore Cable Corridor
- Marine Archaeology Study Area

Data Sources: Client



Client

Project
Oriel Wind Farm Project

Title **Figure 1-1
The Marine Archaeology Study Area**

West Pier Business Campus,
Dun Laoghaire,
Co Dublin,
Ireland.

Tel: +353 (0) 1 4882900
Email: ireland@rpsgroup.com
Web Page: rpsgroup.com/ireland

Issue Details

Drawn By: NG	Project No. EOR0822 (MDR1520B)
Checked By: NG	File Ref:
Approved By: AOS	EOR0822_MAR_T_1461_FINAL
Scale: 1:150,000 @A4	Projection: ITM (IRENET95)
Date: 12/03/2024	Geographic Co-ordinates: ETRS89

NOTE: 1. This drawing is the property of RPS Group Ltd. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent.
2. All levels are referred to Ordnance Datum, Mean Head.
3. Ordnance Survey Ireland Licence EN 0005019 ©Copyright Government of Ireland.

ESB Disclaimer:
This map indicates the approximate location of ESB Networks Transmission (400kV, 220kV, 110kV, 38kV) and Distribution (20kV, 10kV, 230V/400V) underground cables and overhead lines in the general area of the proposed works. ESB Networks takes no responsibility for the accuracy or completeness of these maps. Low voltage (230V/400V) service cables (e.g. house services, factory/shop services, public lighting lamp services, etc) are not included but their presence should be anticipated. The depths of underground cables must never be assumed. Additionally, more detailed information is available for high voltage Transmission underground cables (38kV, 110kV, 220kV, 400kV) - for cables in the greater Dublin area call 01 6062957 and for all other areas call 1850 372 757. No work should be carried out in the vicinity of 38kV or higher voltage underground cables without prior consultation with ESB Networks. Before any mechanical excavation is undertaken, the actual location of all underground electric cables must be established and verified on site, using: (a) Up-to-date map records; (b) Cable locator equipment operated in both power and radio modes; (c) Careful hand digging of trial holes using 'Safe Digging Practice'. Refer also to HSA Code of Practice For Avoiding Danger From Underground Services. ESB takes no responsibility and shall bear no liability in relation to any damage, injury or death or loss of supply as a result of damage or interference with its networks.

GNI Disclaimer:
The information contained in this map concerning the location and technical designation of the gas distribution and transmission network (the 'Information') is provided 'as is' and no representation or warranty of any kind, express or implied, is made in relation to the information and all such representations or warranties, express or implied, in relation to the information are hereby excluded to the fullest extent permitted by law. No responsibility, liability or duty of care is owed to you or to any other person in respect of the information is accepted, and any reliance you or any other person places on the information is therefore strictly at your own or their own risk. In no event will liability be accepted for any loss or damage including, without limitation, indirect or consequential loss or damage, arising out of or in connection with the use of the information. In the event that the information is provided by you, in whole or in part, to a third party for whatever reason you shall ensure that this disclaimer is included with the information and brought to the attention of the third party. The actual position of the gas distribution and transmission network must be verified on site before any mechanical excavation takes place. If any mechanical excavation is proposed, hard copy maps must be requested from Bord Gáis Éireann. All work in the vicinity of the gas distribution and transmission network must be completed in accordance with the current edition of the Health & Safety Authority publication 'Code of Practice For Avoiding Danger From Underground Services' which is available from the Health and Safety Authority (1890 28 93 89) or can be downloaded free of charge at www.hsa.ie.

ORIEL WIND FARM PROJECT – MARINE ARCHAEOLOGICAL MANAGEMENT PLAN

1.3 Aims

This Marine AMP sets out the procedures that must be followed in order to protect marine archaeology and cultural heritage receptors throughout all phases of the Project. The archaeology mitigation strategy is based on appendix 15-1: Marine Archaeology Technical Report of the EIAR (volume 2B) and is compliant with relevant legislation including Part 3 of the Historic and Archaeological Heritage and Miscellaneous Provisions Act 2023 (Irish Government, 2023).

The aim of this Marine AMP is to present the archaeological mitigation measures to be undertaken by the Developer prior to and throughout the construction, operational and maintenance, and decommissioning phases of the Project. The Marine AMP is informed by pre-application consultation with the National Monuments Service (NMS) and the baseline review of known and potential archaeology within the marine archaeology study area (Figure 1.1) as outlined in 1.6 and presented within appendix 15-1: Marine Archaeology Technical Report of the EIAR.

The objectives of this Marine AMP are as follows:

- Set out the roles and respective responsibilities of the Developer, contractors, and Licensed Archaeologist (LA) and Archaeological Contractor(s) and formal lines of communication between these parties and the NMS (section 1.5);
- Outline the known and potential archaeological receptors that could be impacted by the Project (section 1.6);
- Outline the agreed measures included in the Project and requirements for archaeological work to be undertaken in various circumstances (section 1.8); and
- Provide methodologies for the required archaeological work, to be employed in the post-consent period (section 1.9).

1.4 Policy and Guidance

This Marine AMP has been produced in line with best practice guidance available in Ireland and the UK, including:

- Archaeology and Flood Relief Schemes: Guidelines (NMS, DHLGH, 2023);
- Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment (DHLGH, 2018);
- National Marine Planning Framework (DHLGH, 2021);
- Cultural heritage guidelines for electricity transmission projects EirGrid (2006) - Available at: <http://www.eirgridgroup.com/site-files/library/EirGrid/Cultural-Heritage-Guidance-for-Electricity-Transmission-Projects.pdf>;
- Framework and Principles for the Protection of the Archaeological Heritage (Department of Arts, Heritage, Gaeltacht and the Islands (DAHGI), 1999);
- Code of Conduct (Chartered Institute for Archaeologists (CIfA), 2014 (updated 2022));
- COWRIE Historic Environment Guidance for the Offshore Renewable Energy Sector (Wessex Archaeology 2007);
- Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (Gribble and Leather 2011);
- Marine Geophysics Data Acquisition, Processing and Interpretation, Guidance Notes (English Heritage 2013);
- Identifying and Protecting Palaeolithic Remains (English Heritage 1998);
- Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects (The Crown Estate 2021); and
- Code of Practice for Seabed Development (Joint Nautical Archaeology Policy Committee 2006).

1.5 Implementation of the AMP

1.5.1 Roles and Responsibilities

The Developer

The Developer will directly engage with the appointed construction contractor and the Licensed Archaeologist (LA) (see below), as necessary. The responsibility for implementing the AMP rests with the Developer and its appointed representatives. Following the grant of development consent, the Developer will provide the LA with the programme of construction.

The Developer or their representatives will submit the archaeological Method Statements (MS) or reports to the NMS for approval.

Licensed Archaeologist

The Developer will employ the services of a suitably qualified and experienced marine archaeologist (the LA) to ensure the effective implementation of the Marine AMP and other relevant commitments in relation to archaeology.

Prior to the submission of the Project planning application to ABP, RPS (supported by ADCO) have been acting in the role of the LA.

In relation to the implementation of the Marine AMP, the LA will report to the Developer or their named representative. Interaction with the Developer's construction team will be administered by the Developer or their appointed representative and advised by the LA.

The responsibilities of the LA will include:

- Maintaining, reviewing and updating the AMP as required;
- Advising the Developer's construction team on those elements of the Project that require archaeological involvement;
- Ensuring the scope of work specifications for the Project to meet archaeological requirements;
- Liaising with the Developer's construction team or other construction contractors regarding timescales of completion of site investigations (SI) to ensure sufficient time is available to complete all archaeological work in accordance with the AMP;
- Advising the Project Manager for the Project on the layout of infrastructure;
- Advising, preparing and issuing Method Statements (MSs) to the NMS for approval;
- Implementing and monitoring of the Marine AMP;
- Providing advice to vessel staff/Unexploded Ordnance (UXO) specialists in the event of a discovery of high archaeological interest;
- Monitoring the work of and liaising with the Archaeological Contractor(s) where this is not the LA;
- Monitoring the preparation and submission of Archaeological Reports as appropriate and making them available to the NMS for approval;
- Preparing provisions for the management of the Project archives in consultation with the National Museum of Ireland; and
- Advising the Developer and the NMS on final arrangements for the analysis, archive deposition, publication and popular dissemination of the results of the archaeological works.

Archaeological Contractors

Archaeological Contractors may be employed by the Developer or the LA. Suitably qualified Archaeological Contractors may be contracted to provide a range of services relating to specialised archaeological provisions (e.g. divers, the piloting of Remotely Operated Vehicles (ROVs), geotechnical analysis etc.). All contractors will have the necessary licenses and permits to complete the surveys.

ORIEL WIND FARM PROJECT – MARINE ARCHAEOLOGICAL MANAGEMENT PLAN

Construction Contractors

All Construction Contractors engaged in the construction, operational and maintenance and decommissioning of the Project will:

- Familiarise themselves with the requirements of the AMP and make them available to their staff;
- Obey legal obligations in respect of 'wreck' under the Historic and Archaeological Heritage and Miscellaneous Provisions Act 2023;
- Respect constraint maps and AEZs;
- Notify the LA prior to any diving/ROV investigation;
- Notify the LA in advance of any construction works that warrant archaeological mitigation;
- Assist and afford access to archaeologists employed by the Developer;
- Inform the LA of any environmental constraint or matter relating to health, safety and welfare of which they are aware that is relevant to the archaeologist's activities; and
- Suspend work in areas where objects have been identified as being of potential archaeological interest and contact the LA in the event of an archaeological discovery.

NMS

The NMS play a key role in the protection of archaeological heritage in Ireland and are the public body responsible for the care and protection of Ireland's historic environment, which includes marine archaeology within Irish territorial waters.

Method Statements (MSs), assessment reports or other deliverables will be submitted by the Developer to the NMS for approval. Timescales for approval of reports and other deliverable will be agreed with the NMS in advance of works.

To encourage timely decisions relating to archaeological mitigation and avoid disruptions to the Project programme, the NMS will be consulted as soon as practicable on discoveries made during the programme of works and regarding the management and removal of AEZs or Temporary AEZs.

Contacts

The relevant contacts for the purposes of the AMP will be provided in Table 1.2 below. The details on the key contacts will be completed prior to finalisation of this plan.

Table 1.2: Key Contacts for the AMP.

Contact	Address	Email	Phone
The NMS			
Receiver of Wreck			

1.5.2 Reviewing the AMP

Provision will be made for the AMP to be revised and MSs appended as appropriate should elements of the Project change or particular archaeological issues be encountered. The AMP will be reviewed and updated throughout the post-consent process to ensure the AMP is appropriate for the final design. At each stage of the Project, the LA will advise as to the potential requirements of the specific archaeological investigations as outlined in this document. Appropriate MSs will be prepared as required for each element, in line with the requirements of the AMP, and these will be submitted to the NMS for approval. Revisions will be prepared by the LA and submitted to the Developer who will ensure submission to and approval by the NMS, in addition to other relevant licencing and consenting bodies in consultation with the NMS.

ORIEL WIND FARM PROJECT – MARINE ARCHAEOLOGICAL MANAGEMENT PLAN

1.5.3 Compliance with the AMP

Compliance with this AMP will be ensured by regular meetings between the LA and the Developer. The regularity of meetings may alter during different phases of the Project. However, regular contact will be maintained to ensure compliance with the AMP. These meetings will ensure compliance through agendas which will include discussions of the construction programme and any upcoming work which may require archaeological input, as per the stipulations of this AMP. The LA will also advise the Developer of the scope of any necessary works and plans these works at the meetings and other meetings as required.

Following this advice, appropriate MSs will be prepared as required for each element of the Project which requires archaeological involvement, in line with the requirements of the AMP. These will be submitted to the NMS for approval. Timescales for approval of reports and other deliverable will be agreed with the NMS in advance of works, The LA will ensure compliance with these MSs during the subsequent works, thereby also ensuring compliance with the AMP.

The performance of the AMP will also be monitored through the provision of archaeological reports, prepared to inform on the results of various activities undertaken under its auspices. These include a review of new geophysical, geotechnical and environmental data; and the presence of an archaeologist onboard all vessels engaged in seabed construction activities including geotechnical drilling, foundation construction and cable installation vessels. This is to ensure the recording and reporting finds of archaeological interest during all works associated with the Project. These reports will be submitted to the Developer who will ensure their dissemination to the NMS.

During any site evaluation/investigation or construction work that has the potential to affect any archaeological receptors, the LA will advise the Developer who will liaise directly with the NMS with regard to site monitoring and reporting. The Developer will be kept informed of any contact between the LA and the NMS. A programme of monitoring visits (if deemed appropriate) by the NMS and the Developer will be agreed in advance of the commencement of work on site.

1.5.4 Health and Safety

The LA will ensure that any MSs prepared to meet the requirements of the AMP are compliant with the requirements of the Developer's Health and Safety Plans for the Project.

Health and Safety considerations will be of paramount importance in conducting all fieldwork. Safe working practices will override archaeological considerations at all times.

All work will be carried out in accordance with the Safety, Health and Welfare at Work Act, 2005, the SCAUM (Standing Conference of Archaeological Unit Managers) health and safety manual Health and Safety in Field Archaeology (SCAUM, 2007) and all other relevant Health and Safety legislation, regulations and codes of practice in force at the time.

1.6 Marine Archaeology Baseline

A baseline assessment including desktop study and archaeological assessment of geophysical and geotechnical survey data has been undertaken in support of the EIAR. The methodology and results of this assessment are set out in detail within, appendix 15-1: Marine Archaeology Technical Report of the EIAR (volume 2B). This section presents a summary of this assessment. The Marine Archaeology Study Area is shown in Figure 1.1.

1.6.1 Submerged Prehistoric Archaeology

1.6.1.1 Seabed Topography

The Marine Archaeology Study Area occupies part of the Irish seabed which comprises shallow Quaternary deposits some distance from the Western Trough, identified as a potential former glacial lake (Flemming, 2005) (see appendix 15-1: Marine Archaeology Technical Report, Figure 4-3). Pleistocene outcrops, infilled channels and ridges recorded in the Irish Sea suggest relict periglacial conditions during periods when the seabed was potentially exposed (Flemming, 2005). The Quaternary deposits comprise glacial tills, clay, pebbles and mud etc. Due to shallow waters and tidal currents much of the seabed is covered in recent sediment and gravel furrows from the Holocene as confirmed by the 2007 survey results (ADCO, 2007).

The sediment characteristics within the offshore wind farm area and offshore cable corridor have been obtained from chapter 7: Marine Processes of the EIAR (volume 2B). The Marine Archaeology Study Area lies within the western Irish Sea Mud Belt (WISMB), a palaeo-glacial basin filled with marine Holocene sediment. While there is no indication of exposed bedrock, the seabed substrate within the Marine Archaeology Study Area includes a band of rocks and boulders on the north and eastern part of the offshore wind farm area while coarse sediments, sand and mud occupy much of the central area of the offshore wind farm area. Coarse sediments and mud also occupy much of the offshore cable corridor.

The side scan sonar survey undertaken within the offshore wind farm area in 2007 (ADCO, 2007) recorded the seabed as predominantly covered in sand and gravel. No significant areas of rock outcropping were identified, and the area was characterised as having soft sediment mobility. Sand ripples and gravel ripples were recorded and rock whilst recorded in places was not considered a predominant feature. This picture is in keeping with expectations as the offshore wind farm area lies to the east of the shallow and sediment-rich Dundalk Bay. The bathymetry surveys undertaken in 2007 and 2019 (ADCO, 2007, 2021) recorded three main seabed topographic types, presented in full in the Marine Archaeology Technical Report (appendix 15-1, volume 2B). Post-glacial seabed erosion has taken place to some extent across parts of the offshore wind farm area. Where greater depths of modern sediment survive, the greater the chance for preservation of former palaeolandscapes at significant depth.

The sediment characteristics within the offshore wind farm area and offshore cable corridor have been obtained from chapter 7: Marine Processes (volume 2B). The Marine Archaeology Study Area lies within the western Irish Sea Mud Belt (WISMB), a palaeo-glacial basin filled with marine Holocene sediment. While there is no indication of exposed bedrock, the seabed substrate within the Marine Archaeology Study Area includes a band of rocks and boulders on the north and eastern part of the offshore wind farm area while coarse sediments, sand and mud occupy much of the central area of the offshore wind farm area. Coarse sediments and mud also occupy much of the offshore cable corridor.

1.6.1.2 Results of the Geotechnical Investigations

A programme of geotechnical investigations was conducted in 2019, including 13 boreholes within the Project area.

None of the borehole logs report the observation of anthropogenic features such as timber, metal or ceramic, and none record peat or related organic strata that might indicate the presence of submerged palaeo-landscapes.

The results of the geotechnical investigations undertaken to date suggest that the potential for submerged palaeo-landscapes within the limits of the Project is low.

1.6.1.3 Submerged Prehistoric Archaeological Potential

During the Pleistocene the Irish Sea most likely either formed dry land (inter-glacial) as part of the land mass that connected Ireland with Britain and mainland Europe or was covered in an ice sheet (glaciation). During periods of glaciation the seabed of the Irish Sea would have been uninhabitable but during inter-glacial periods there is a potential for periglacial occupation during periods when the seabed would have formed dry land. However, the effects of repeated glaciations, marine transgressions and associated fluvial activity mean that the potential for the survival of any archaeology from this period within the Marine Archaeology Study Area is unlikely.

ORIEL WIND FARM PROJECT – MARINE ARCHAEOLOGICAL MANAGEMENT PLAN

The last glaciation, the Devensian (c. 20,000 BP), covered most of Ireland in ice, including the Marine Archaeology Study Area, although part of southwest Ireland remained ice free during this epoch. The subsequent phases of ice melt and the rise in sea level meant that by c. 18,000 BP the Western Trough appears as periglacial lake (Flemming, 2005; Appendix 15-1: Marine Archaeology Technical Report, see Figure 4-3). Considering the maps derived from analysis of sediment deposits on the seabed of the Irish Sea used by Fleming (Appendix 15-1: Marine Archaeology Technical Report, Figure 4-3), the Marine Archaeology Study Area became free of ice c. 14,000 BP and formed dry land close to the shore of a possible glacial lake. By 12,000 BP sea level rose and inundated most of the Marine Archaeology Study Area apart from its western extent which was eventually submerged by c. 7,000 BP. As the Marine Archaeology Study Area was exposed as dry land it could have been occupied by hominids exploiting the shoreline of the glacial lake. As it was submerged there is a potential for early Mesolithic occupation of the still exposed shoreline in the western extent of the Marine Archaeology Study Area up until c. 7,000 BP. More recent studies (Westley and Henry, 2015) suggest that sea level rise following the retreat of the ice meant that by c. 16,000 BP Ireland was completely cut off from mainland Europe and Britain.

There is currently no evidence of human occupation of Ireland during the Palaeolithic (Wessex Archaeology, 2005). During the periods of glaciation most of Ireland would have been uninhabitable and therefore it is not surprising that evidence of Palaeolithic occupation is limited.

1.6.2 Maritime and Aviation Archaeology

1.6.2.1 Early Prehistoric (Palaeolithic to Mesolithic)

The potential for survival of evidence of early prehistoric maritime activity in Ireland is low and there is currently no known evidence of watercraft that pre-date the Mesolithic in Western Europe. The discovery of isolated Palaeolithic artefacts dating to a period when Ireland was cut off from Britain and Europe suggests that any occupation dating to this period may have been facilitated by sea travel perhaps using simple watercraft, log boats or rafts, used for coastal journeys and fishing (McGrail, 1987 and Dunkley 2016), however, no evidence of Palaeolithic seafaring craft is known from the Irish record.

Several sites have been identified along the east coast of Ireland. These largely comprise of shell midden sites, such as those discovered at Rockmarshall, Co. Louth and Sutton, Co. Dublin, and these were discovered with assemblages of worked flints. As Ireland had been cut off from Britain by this period, colonisation of Ireland would not have been possible without the use of sea craft (Smith, 1992). These will likely have been log rafts, simple skin boats or dugout canoes (McGrail, 1997, 2001).

Watercraft may have been used in the rivers and estuaries in Ireland, for coastal journeys, fishing expeditions and possibly longer journeys in favourable weather. They are likely to have become increasingly important to the Mesolithic inhabitants with rising sea levels. However due to the paucity of evidence and fluvial activity across the Marine Archaeology Study Area the potential for the survival of any archaeology associated with the maritime environment from the Mesolithic period is low.

1.6.2.2 Neolithic and Bronze Age

No evidence of Neolithic or Bronze Age maritime activity has been recorded in the Marine Archaeology Study Area. A small number of dugout canoes/log boats have been identified and recovered from coastal locations along the east coast of Ireland. These include two from Ballylig in Larne Lough, Co. Antrim (O'Sullivan and Breen, 2007) and the Greyabbey Bay log boat found in Co. Down. A further log boat was found at Gormanstown, County Meath under 2 m of sand during offshore trenching (Brady, 2002). This discovery confirmed the potential for offshore preservation as the site was 1 km from the shoreline. Based on the available evidence and professional judgement there is therefore a low to moderate potential for remains of such vessels to be present within the Marine Archaeology Study Area.

The Bronze Age was a period of technological innovation and of expansion of trade and exchange networks, facilitated by the introduction of new forms of boats both for ocean and coastal/riverine trade. Clear advances occurred in maritime technology during this period and an increasingly substantial maritime archaeological record allows a less speculative understanding of maritime culture than for earlier periods.

ORIEL WIND FARM PROJECT – MARINE ARCHAEOLOGICAL MANAGEMENT PLAN

1.6.2.3 Iron Age and Roman

No evidence of Iron Age or Roman maritime activity has been recorded within the Marine Archaeology Study Area although seafaring and the spread of trade and ideas continued through these periods. Although Ireland was never occupied by the Romans, the trade link in material culture between the Iron Age Irish and the Romans are evident along the east coast of Ireland. Seafaring and the spread of trade and ideas continued through these periods. A hoard of gold objects found in Broughter, Co Derry in 1896 contained a small model of a boat generally thought to be of a hide covered vessel and as such the earliest example of one found within Ireland (Breen and Forsythe, 2004) and would have been suitable for crossing the Irish Sea.

Together with the evidence for substantial commercial trade this suggests that Iron Age and Roman maritime traffic may have passed through the Marine Archaeology Study Area. It is also likely that many more vessels of this period were lost than the available archaeological evidence suggests, increasing the potential that remains from this period are present within the limits of the Marine Archaeology Study Area.

1.6.2.4 Early Medieval and Medieval

Most of the major towns and cities along the eastern Irish coast, including Dublin, were developed by the Danish and Norse Vikings who frequently navigated the Irish Sea. Remains of Viking vessels have been found in construction of waterfronts, quays etc in Dublin and other cities along the east coast. Log boats dating to this period have been found in lakes and rivers and could also be found in a maritime context.

The Anglo-Norman invasion of Ireland began in 1169 AD and involved large numbers of seafaring vessels crossing the Irish Sea. During the Medieval period an increase in population led to an increase in trade. Customs accounts from the 15th century provide evidence of a thriving import and export industry across the Irish Sea (Sherbourne, 1987). The level of Medieval maritime activity suggests that the potential presence of Medieval period shipwrecks in the Marine Archaeology Study Area is moderate to good, particularly where anaerobic sediments, which aid shipwreck preservation, characterise the seabed.

1.6.2.5 Post Medieval and Modern

The growth of commercial maritime travel beginning in the Late Medieval period continued and expanded in the Post-Medieval period. This resulted in an increase in importance of the Irish Sea as a major sea lane, both between Britain and Ireland and the length of the British and Irish Isles. In addition, military campaigns in the 18th century saw French attempts to invade Ireland and several vessels were lost off the east coast. This led to an almost permanent presence by the British Navy in Irish coastal waters.

The loss of shipping through wrecking starts to be recorded systematically after c. 1750, which represents the birth of pre-modern navigation. There are 172 historic wrecking events associated with Dundalk Bay, which is a significant number for a bay only 14 km long (between Cooley Point in the North and Dunany Point in the South) and 11 km wide. This includes 163 recorded wrecks whose specific locations are not known and nine known wreck-site locations, two of which occur within the proposed offshore cable corridor.

From the 18th century onwards, records were kept of ship losses, with records becoming more detailed from the 19th century. There are a number of recorded wrecking events attributed to a known topographic reference point (e.g. 53 events attributed broadly to Dundalk Bay), while 14 events are particular to Annagassan. In relation to the Project area it is to be noted that Dunany Point is the topographic location for 16 recorded shipwreck events. The Dunany reefs present a key navigation hazard in this area and the reefs are mentioned in several of the records for wrecking at Dunany (appendix 15-1, A.2). There is one eighteenth-century loss, which is that of the *Mary Ann*; a vessel of New York that was *en route* to Liverpool with a cargo of rum, tobacco and slaves (W00209)¹. The *Mary Ann* became stranded on a beach opposite the house of Robert Subthorpe. Almost a century later, in 1880, the *Parkside* was a wooden brigantine or brig of Whitehaven that weighed 132 tons (W00224)¹. The *Parkside* was *en route* from Newport to Dundalk with six crew and a cargo of coal when the vessel became stranded in a SE force 8 gale and was totally wrecked at Dunany. Additional identified wrecks include the *Empire of Peace* (W00149) a Liverpool Barque

ORIEL WIND FARM PROJECT – MARINE ARCHAEOLOGICAL MANAGEMENT PLAN

lost in 1881 located off the coast of Sea Bank and the *Topaz* (W00248), which was a three masted Glasgow Schooner lost in 1891. The wreck site of the *Topaz* is recorded to lie within the offshore cable corridor (Figure 1.3).

During the First World War, HMS *Cullist* (W00485), a 1.030-ton British decoy ship was torpedoed and sank approximately 24 miles off the coast of Clogherhead. During the First and Second World War, submarine activity was prevalent in the Irish Sea and the remains of a number of U boats have been found though none from within the Marine Archaeology Study Area.

1.6.3 Results of the Desktop Study

13 records within the NMS data relate to geophysical anomalies that were identified in the 2007 geophysical survey, all of these were archaeologically assessed as geological at the time, the positions of these are shown in Figure 1.2. Two known wrecks sites and one possible wreck site have been identified within the desktop data, W00248, the *Topaz*, W00276 and W00529 (Figure 1.2) and it is considered possible that these wrecks are located at the positions given due to their location within a portion of the offshore cable corridor that has a substrate primarily determined to be mud. However, the geophysical survey (section 1.6.4) has not identified any evidence of these wrecks existing on the seabed and therefore further investigation would be recommended to establish whether or not archaeological material is present.

UKHO 5787 is recorded as live, it was recorded in 2003 as both wreck and notable debris measuring 5 m in length and corresponds with the recorded position of NMS record W11435 and therefore suggest that material may be present at this location.

Should these wrecks exist at this location they would be protected under the Historic and Archaeological Heritage Act 2023. Further information on the results of the desktops study is listed in appendix A.1.

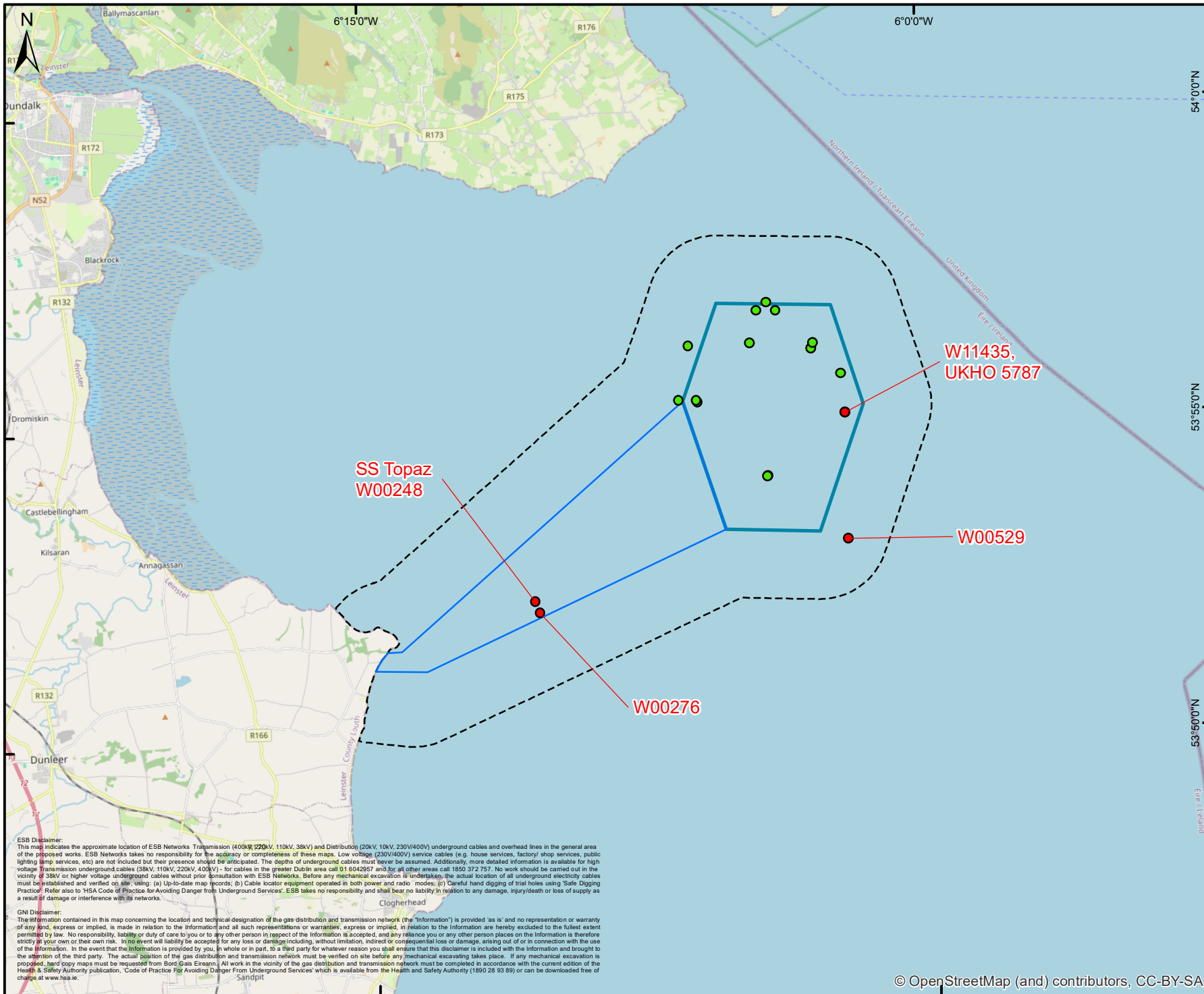
Recorded Losses

Data for known shipwrecks and recorded shipping losses within the Marine Archaeology Study Area were obtained as appropriate from the NMS Wreck Inventory of Ireland Database (WIID) and the baseline studies undertaken in 2007 and 2021 (see appendices A.1 and A.2 of appendix 15-1 (EIAR volume 2B)). These datasets provide a general picture of maritime casualties in the Marine Archaeology Study Area in the last 150 to 200 years but should not be viewed as representing the totality of even the more recent potential maritime archaeological remains in the area.

The desktop data obtained in 2024 does not contain any records of loss attributed to coordinates within the Marine Archaeology Study Area, but the wider area of Dunkalk Bay has a high volume of recorded loss attributed to it.

Recorded losses represent maritime and aviation losses that are known to have occurred in the vicinity but to which no specific location can be attributed. Recorded losses are often grouped with reference to a geographic, hydrographic or other point of reference, making the positional data of these records unreliable. However, they do provide information on the historical marine traffic of the general region and therefore the archaeological potential. Recorded losses may be attributed to unknown anomalies identified by the geophysical survey or they may be positioned outside the Marine Archaeology Study Area.

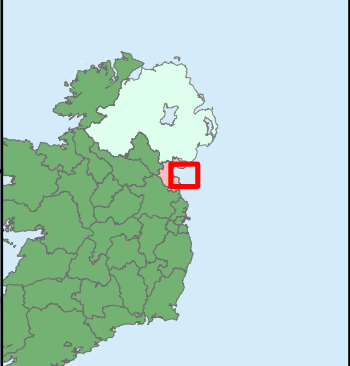
The rocky environment of Dunany reefs presents a harsh seabed for the preservation of wreckage, particularly timber wreckage, where the shallow water depths and the exposed nature of the reefs would ensure that any vessel running aground there would be broken up quickly or would be pushed off the reefs into calmer waters.



Legend

- Offshore Wind Farm Area
- - - Offshore Cable Corridor
- Marine Archaeology Study Area
- Desktop Data
- Geological Anomalies

Data Sources: Client



Client

Project

Oriel Wind Farm Project

Title **Figure 1-2
Maritime Archaeology Identified in the
Desktop Data**

West Pier Business Campus,
Dun Laoghaire,
Co Dublin,
Ireland.

Tel: +353 (0) 1 4882900
Email: ireland@rpsgroup.com
Web Page: rpsgroup.com/ireland

Issue Details	
Drawn By: NG	Project No. EOR0822 (MDR1520B)
Checked By: NG	File Ref:
Approved By: AOS	EOR0822_MAR_T_1463_FINAL
Scale: 1:150,000 @A4	Projection: ITM (IRENET95)
Date: 15/03/2024	Geographic Co-ordinates: ETRS89

NOTE: 1. This drawing is the property of RPS Group Ltd. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent.
2. All levels are referred to Ordnance Datum, Mean Head.
3. Ordnance Survey Ireland Licence EN 0005019 ©Copyright Government of Ireland.

ESB Disclaimer:
This map indicates the approximate location of ESB Networks Transmission (400kV, 220kV, 110kV, 38kV) and Distribution (20kV, 10kV, 230V/400V) underground cables and overhead lines in the general area of the proposed works. ESB Networks takes no responsibility for the accuracy or completeness of these maps. Low voltage (230V/400V) service cables (e.g. house services, factory/shop services, public lighting lamp services, etc) are not included but their presence should be anticipated. The depths of underground cables must never be assumed. Additionally, more detailed information is available for high voltage Transmission underground cables (38kV, 110kV, 220kV, 400kV) - for cables in the greater Dublin area call 01 6042957 and for all other areas call 1850 372 757. No work should be carried out in the vicinity of 38kV or higher voltage underground cables without prior consultation with ESB Networks. Before any mechanical excavation is undertaken, the actual location of all underground electricity cables must be established and verified on site using: (a) Up-to-date map records; (b) Cable locator equipment operated in both power and radio modes; (c) Careful hand digging of trial holes using 'Safe Digging Practice'. Refer also to HSA Code of Practice for Avoiding Danger from Underground Services. ESB takes no responsibility and shall bear no liability in relation to any damage, injury/death or loss of supply as a result of damage or interference with its networks.

GNI Disclaimer:
The information contained in this map concerning the location and technical designation of the gas distribution and transmission network (the "Information") is provided 'as is' and no representation or warranty of any kind, express or implied, is made in relation to the Information and all such representations or warranties, express or implied, in relation to the Information are hereby excluded to the fullest extent permitted by law. No responsibility, liability or duty of care to you or to any other person in respect of the Information is accepted, and any reliance you or any other person places on the Information is therefore strictly at your own or their own risk. In no event will liability be accepted for any loss or damage including, without limitation, indirect or consequential loss or damage, arising out of or in connection with the use of the Information. In the event that the Information is provided by you, in whole or in part, to a third party for whatever reason you shall ensure that this disclaimer is included with the Information and brought to the attention of the third party. The actual position of the gas distribution and transmission network must be verified on site before any mechanical excavating takes place. If any mechanical excavation is proposed, hard copy maps must be requested from Bord Gáis Éireann. All work in the vicinity of the gas distribution and transmission network must be completed in accordance with the current edition of the Health & Safety Authority publication 'Code of Practice for Avoiding Danger From Underground Services' which is available from the Health and Safety Authority (1890 28 93 89) or can be downloaded free of charge at www.hsa.ie.

1.6.4 Results of the Geophysical Survey

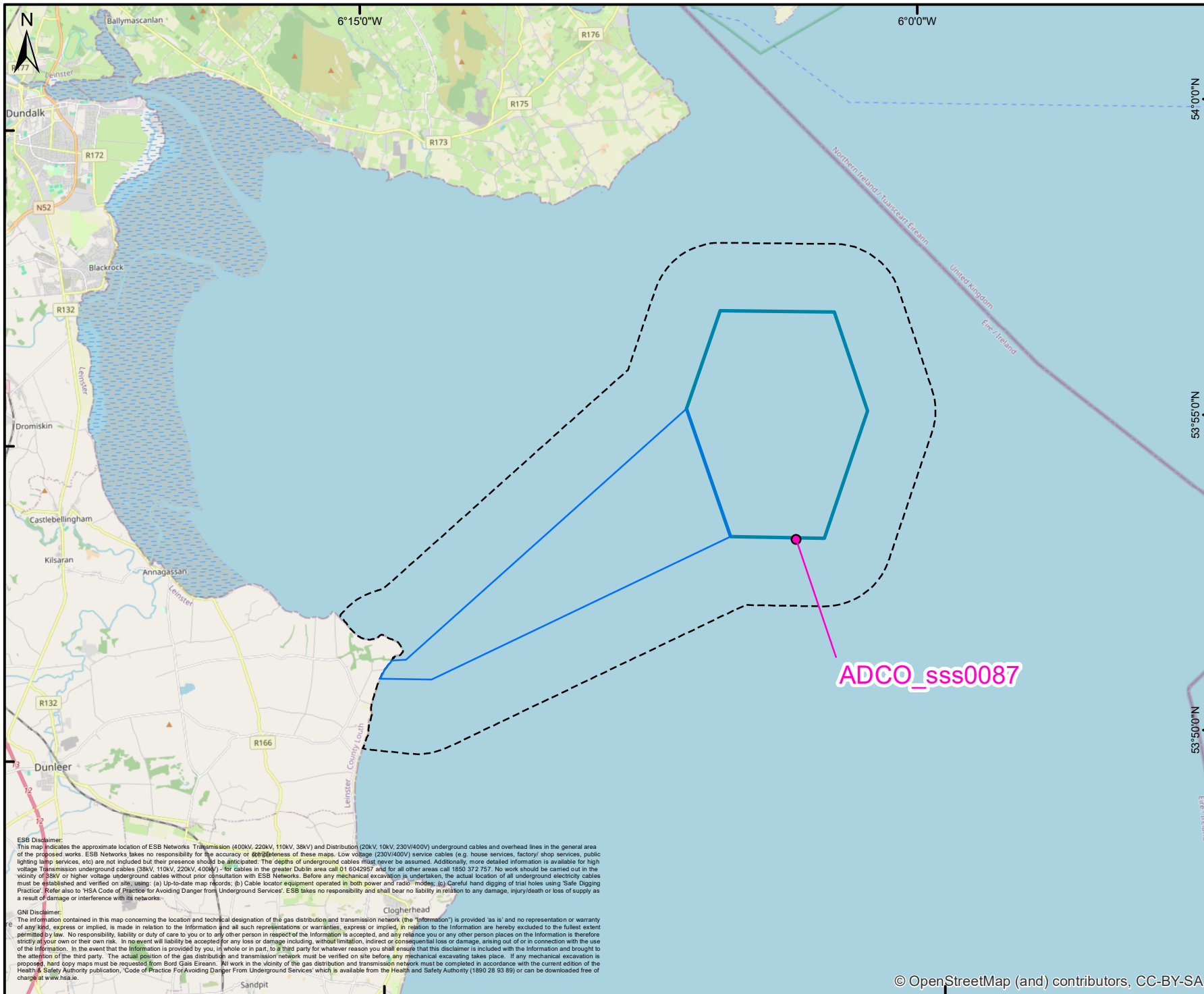
1.6.4.1 The 2007 Geophysical Survey

Wrecks W00248 and W00276 are the only known wreck sites within the Project area. There are a series of features identified on side-scan sonar traces from the 2007 survey of the development area that the NMS has registered as features in the Historic Shipwreck Inventory and these suggest the presence of wreck sites within the Project area. However, the report that identified those features concluded that they are ‘probably not archaeological in nature’ (ADCO 2007). The features identified comprise isolated rock or boulders (W11148, W11149, W11150, W11154) SS1-3, 8) and concentrations of cobbles or other possible snag points (W11144, W11145, W11146, W11147, W11148, W11153, W11155, W11156, W11157). Snag-point locations were highlighted because they can represent areas where material appears to be entrapped. Entrapment can occur naturally, where lighter materials are deposited around a rock outcrop or boulder feature. Entrapment can also occur around debris associated with a shipwreck. Some level of qualification is possible to assess whether the snag is natural or manmade in origin, by cross-referencing the magnetometer data for the same location. Anomalies identified in the archaeological assessment of data as likely geological or snag points are considered to have low potential for the presence of archaeological material.

1.6.4.2 The 2019 Geophysical Survey

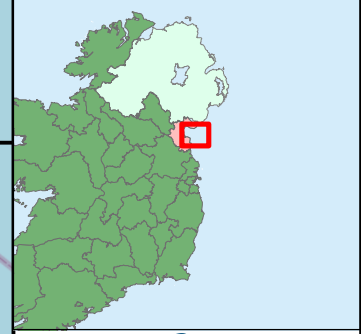
The 2019 survey identified 88 geophysical contacts, all but one of which are interpreted as boulders. This is in keeping with the results of the 2007 survey. The exception is 2019 survey target sss087, which is identified as a piece of debris that measures 3.3 m in length. The feature is located on the southern border of the Project area (Figure 1.3). There was no observation of features that might be associated with archaeological material.

Further information on the results of the 2019 geophysical study is listed in appendix A.1.



- Legend**
- Offshore Wind Farm Area
 - Offshore Cable Corridor
 - SSS Target
 - Marine Archaeology Study Area

Data Sources: Client



Project
Oriel Wind Farm Project

Title **Figure 1-3
Results of the 2019 Geophysical Survey**

rps
A TERA TECH COMPANY

West Pier Business Campus,
Dun Laoghaire,
Co Dublin,
Ireland.

Tel: +353 (0) 1 4882900
Email: ireland@psgroup.com
Web Page: rpsgroup.com/ireland

Issue Details

Drawn By: NG	Project No. EOR0822 (MDR1520B)
Checked By: NG	File Ref:
Approved By: AOS	EOR0822_MAR_T_1464_FINAL
Scale: 1:150,000 @A4	Projection: ITM (IRENET95)
Date: 12/03/2024	Geographic Co-ordinates: ETRS89

NOTE: 1. This drawing is the property of RPS Group Ltd. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent.
2. All levels are referred to Ordnance Datum, Malin Head.
3. Ordnance Survey Ireland Licence EN 0005019 ©Copyright Government of Ireland.

ESB Disclaimer:
This map indicates the approximate location of ESB Networks Transmission (400kV, 220kV, 110kV, 38kV) and Distribution (20kV, 10kV, 230V/400V) underground cables and overhead lines in the general area of the proposed works. ESB Networks takes no responsibility for the accuracy or completeness of these maps. Low voltage (230V/400V) service cables (e.g. house services, factory/shop services, public lighting lamp services, etc) are not included but their presence should be anticipated. The depths of underground cables must never be assumed. Additionally, more detailed information is available for high voltage Transmission underground cables (38kV, 110kV, 220kV, 400kV) - for cables in the greater Dublin area call 01 6042957 and for all other areas call 1850 372 757. No work should be carried out in the vicinity of 38kV or higher voltage underground cables without prior consultation with ESB Networks. Before any mechanical excavation is undertaken, the actual location of all underground electricities cables must be established and verified on site, using: (a) Up-to-date map records; (b) Cable locator equipment operated in both power and radio modes; (c) Careful hand digging of trial holes using 'Safe Digging Practice' (Refer also to HSA Code of Practice for Avoiding Danger from Underground Services'. ESB takes no responsibility and shall bear no liability in relation to any damage, injury/death or loss of supply as a result of damage or interference with its networks.

GNI Disclaimer:
The information contained in this map concerning the location and technical designation of the gas distribution and transmission network (the "Information") is provided 'as is' and no representation or warranty of any kind, express or implied, is made in relation to the information and all such representations or warranties, express or implied, in relation to the information are hereby excluded to the fullest extent permitted by law. No responsibility, liability or duty of care to you or to any other person in respect of the information is accepted, and any reliance you or any other person places on the information is therefore strictly at your own or their own risk. In no event will liability be accepted for any loss or damage including, without limitation, indirect or consequential loss or damage, arising out of or in connection with the use of the information. In the event that the information is provided by you, in whole or in part, to a third party for whatever reason you shall ensure that this disclaimer is included with the information and brought to the attention of the third party. The actual position of the gas distribution and transmission network must be verified on site before any mechanical excavation takes place. If any mechanical excavation is proposed, hard copy maps must be requested from Bord Gáis Éireann. All work in the vicinity of the gas distribution and transmission network must be completed in accordance with the current edition of the Health & Safety Authority publication, 'Code of Practice For Avoiding Danger From Underground Services' which is available from the Health and Safety Authority (1890 28 93 89) or can be downloaded free of charge at www.hsa.ie.

ORIEL WIND FARM PROJECT – MARINE ARCHAEOLOGICAL MANAGEMENT PLAN

1.7 Potential Impacts

The impacts of the construction, operational and maintenance, and decommissioning phases of the Project on marine archaeology have been assessed. The potential impacts arising from the construction, operational and maintenance and decommissioning phases of the Project are listed in Table 1.3.

Table 1.3: Potential Impacts.

Potential impact	Phase			Oriel Wind Farm Project Activities	Measures included in the Project
	C	O	D		
Removal or disturbance of seabed sediments leading to effects on prehistoric land surfaces, wreck sites and artefacts.	✓	✓	✓	<p>Construction Phase</p> <p>Sand wave clearance for 10% of 41 km of inter-array cables, 10% of 16 km of offshore cable and 26 monopile foundations.</p> <p>Installation of 41 km inter-array cables and 16 km of offshore cable.</p> <p>Installation of 25 Wind Turbine Generators (WTG) and one Offshore Substation (OSS) on monopile foundations with a diameter of 9.6m, drilled to a depth of 35m.</p> <p>Use of jack-up vessel during foundation installation, with two jack-up events at each of the 25 WTGs and four jack-up events for the one OSS.</p> <p>Operational and Maintenance Phase</p> <p>Component replacement activities using jack-up vessel associated with 25 WTGs (average of 2 major component replacements per year).</p> <p>Inter-array cables: seven repair events and seven reburial events over the lifetime of the Project.</p> <p>Offshore cable: three subtidal repair events and three subtidal reburial events over the lifetime of the Project.</p> <p>All activities for an operation phase of 40 years.</p> <p>Decommissioning Phase</p> <p>Activities for the decommissioning phase are assumed to be the same as for the construction phase but without the seabed preparation activities for monopile foundations.</p>	<p>Archaeological Exclusion Zones (AEZs) and Temporary Archaeological Exclusion Zones (TAEZs) (section 1.8.1).</p> <p>Monitoring and watching briefs (section 1.8.2).</p> <p>Preservation by record (section 1.8.3).</p>
	✓	✗	✗	<p>Construction Phase</p> <p>Installation of 26 (25 WTGs and one OSS) monopile foundations to a depth of 35 m.</p>	<p>AEZs and TAEZs (section 1.8.1).</p> <p>Monitoring and watching briefs (section 1.8.2).</p> <p>Preservation by record (section 1.8.3).</p>
	✓	✓	✓	<p>Construction Phase</p> <p>Installation of 26 monopile foundations, 41 km of inter-array cables and 16 km of offshore cable.</p> <p>Installation over a 15 month period.</p> <p>Operational and Maintenance Phase</p> <p>Inter-array and cable repair/reburial activities.</p> <p>Operational phase up to 40 years.</p> <p>Decommissioning Phase</p> <p>Cutting and removal of monopile foundations to approximately 2 m below seabed.</p>	<p>Monitoring and watching briefs (section 1.8.2).</p> <p>Preservation by record (section 1.8.3).</p>

ORIEL WIND FARM PROJECT – MARINE ARCHAEOLOGICAL MANAGEMENT PLAN

Potential impact	Phase			Oriel Wind Farm Project Activities	Measures included in the Project
	C	O	D		
				Removal of inter-array and offshore cables.	
Alteration of sediment transport regimes.	x	✓	x	<p>Operational and Maintenance Phase</p> <p>WTGs and OSS installed on monopile foundations:</p> <ul style="list-style-type: none"> • Presence of 25 WTG foundations and 1 OSS foundation of 9.6 m diameter throughout the water column; • Minimum spacing 944 m; • Inclusion of scour protection for each foundation with a radius of 24 m (from the centre of the foundations); and • Operational phase of 40 years. 	<p>AEZs and TAEZs (section 1.8.1).</p> <p>Monitoring and watching briefs (section 1.8.2).</p> <p>Preservation by record (section 1.8.3).</p>

1.8 Measures included in the Project

A number of measures have been embedded as part of the Project to reduce the potential for impacts on marine archaeology.

1.8.1 Archaeological Exclusion Zones (AEZs)

Best practice favours the preservation *in situ* of archaeological remains, therefore the ideal preferred mitigation for archaeological remains is avoidance. For the Project, AEZs and TAEZs have been proposed that prohibit development-related activities within their extents, which vary depending upon the nature of the site. The final Project design has taken into account these preliminary zones, which may evolve or be removed (with the agreement of the NMS) as the Project progresses, subject to additional archaeological work that may be required.

The appropriateness and effectiveness of the AEZs and condition of the archaeological assets will be monitored through the acquisition of survey data during the lifetime of the Project. Data relating to the marine archaeology assets will be archived with the NMS at the outset of the Project and as it is collected through its lifetime.

All AEZs agreed with the NMS, will be marked on the final Design Plan of the EIAR. If impacts cannot be avoided, measures to reduce, remedy or offset disturbance will be agreed.

In view of their potential archaeological significance, AEZs will be placed around the two wreck locations; (W00248 (*Topaz*) and W00276) that have been identified in the desktop data and the piece of debris recorded in the 2019 survey (sss0087). These anomalies have been recommended AEZs based on their potential to be archaeologically significant, their recorded location within areas of soft sediment and the potential impact of the Project and the seabed dynamics within the area.

The proposed AEZs are listed in Table 1.4 and shown in Figure 1.4. Scope is allowed for their amendment in light of further evidence and with the involvement of consultees. AEZs can be different sizes depending on the size of the archaeological anomaly and the extent to which there is associated debris present on the seabed.

The AEZs identified for the Project have been compiled from the results of the archaeological assessments of geophysical and hydrographic data. These have been reviewed against desk based and site-specific data.

Further TAEZs and AEZs may be assigned during the course of the Project as anomalies that have been identified in the data do not necessarily represent all of the marine archaeological material that is on the seafloor. For example, wooden wrecks can be buried under the seabed and may not appear in the data. If previously unidentified material of cultural significance is identified, it would require an AEZ.

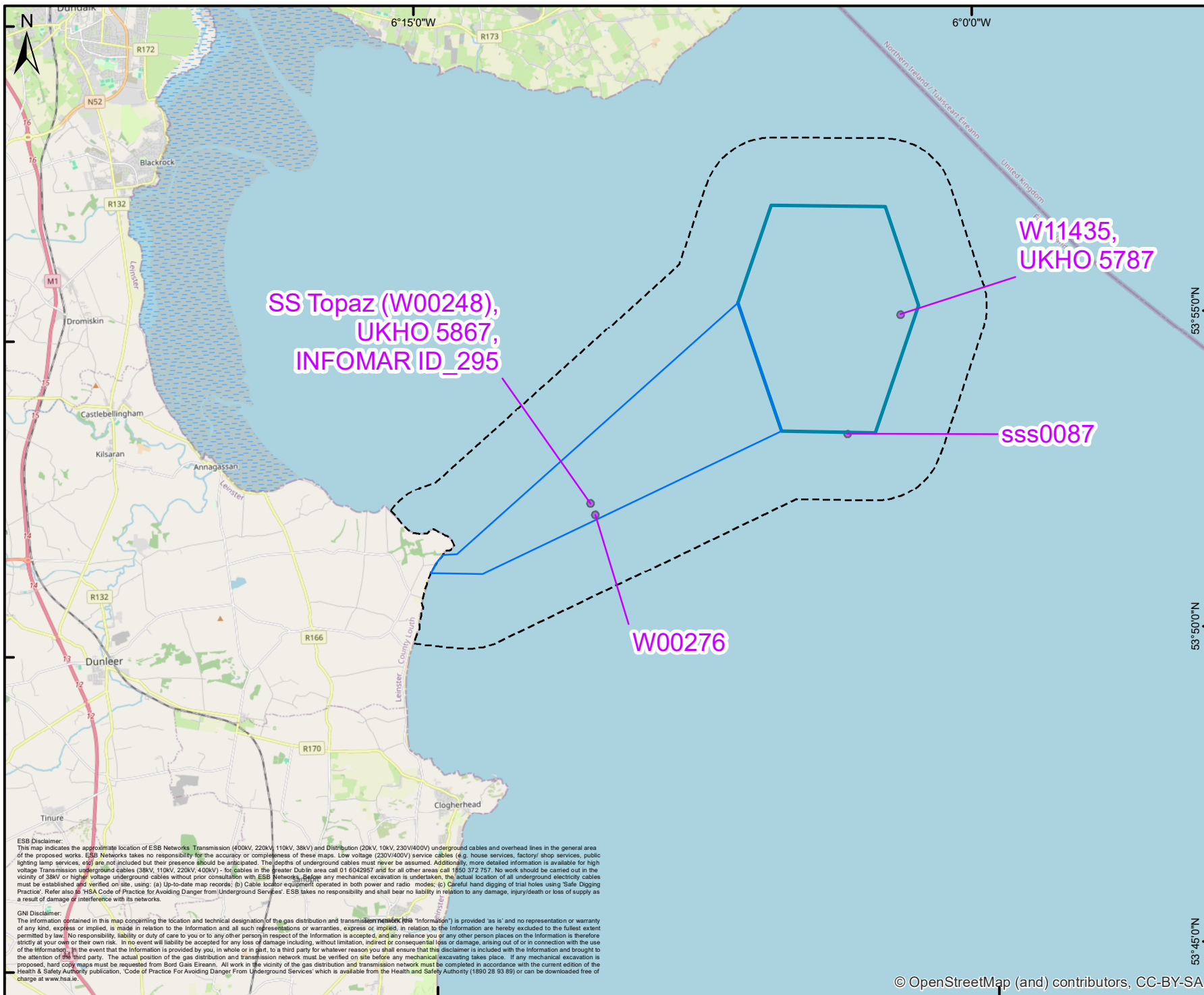
ORIEL WIND FARM PROJECT – MARINE ARCHAEOLOGICAL MANAGEMENT PLAN

Where further survey work has, as one of its objectives, the investigation of previously identified sites and / or anomalies in order to alter or remove an AEZ, the Developer will make provision for a suitably qualified Archaeological Geophysical Contractor (which may be the LA) to be available to provide advice and input into the survey and as the survey is ongoing. In some cases, this may include the presence of the LA on the vessel alongside the vessel crew, or, in most cases, this advice may be given remotely.

Anomalies classed as having a low potential for the presence of archaeological material are not provided AEZs or TAEZs but should be considered for future SI. These anomalies have also been considered in the final Project Design and all infrastructure has been designed to avoid these anomalies by a minimum of 100 m as a precautionary measure.

Table 1.4: AEZs within the Project area.

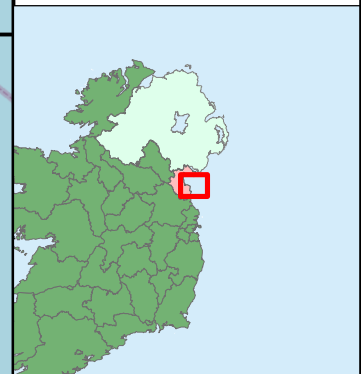
ID	Description	Latitude	Longitude	Easting	Northing	AEZ (m)
W00248	The recorded location of the <i>Topaz</i> .	53.8702	-6.1764	-	-	100
W00276	Recorded location of an unnamed wreck site identified in the desktop data.	53.86722	-6.17444	-	-	100
W11435	Notable debris measuring 5m in length which corresponds with live UKHO record 5867.	53.91814	-6.03577	-	-	100
sss087	A piece of debris that measures 3.3 m in length	-	-	693154	5974937	100



Legend

- Offshore Wind Farm Area
- Offshore Cable Corridor
- Marine Archaeology Study Area
- Archaeological Exclusion Zone (AEZ)

Data Sources: Client



Client

Project
Oriel Wind Farm Project

Title
**Figure 1-4
Proposed AEZs within the
Project area**

West Pier Business Campus,
Dun Laoghaire,
Co Dublin,
Ireland.

Tel: +353 (0) 1 4882900
Email: ireland@rpsgroup.com
Web Page: rpsgroup.com/ireland

Issue Details	
Drawn By: NG	Project No. EOR0822 (MDR1520B)
Checked By: NG	File Ref:
Approved By: AOS	EOR0822_MAR_T_1465_FINAL
Scale: 1:150,000 @A4	Projection: ITM (IRENET95)
Date: 15/03/2024	Geographic Co-ordinates: ETRS89

NOTE: 1. This drawing is the property of RPS Group Ltd. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent.
2. All levels are referred to Ordnance Datum, Mean Head.
3. Ordnance Survey Ireland Licence EN 0005019
©Copyright Government of Ireland.

ESB Disclaimer:
This map indicates the approximate location of ESB Networks Transmission (400kV, 220kV, 110kV, 38kV) and Distribution (20kV, 10kV, 230V/400V) underground cables and overhead lines in the general area of the proposed works. ESB Networks takes no responsibility for the accuracy or completeness of these maps. Low voltage (230V/400V) service cables (e.g. house services, factory/shop services, public lighting lamp services, etc) are not included but their presence should be anticipated. The depths of underground cables must never be assumed. Additionally, more detailed information is available for high voltage Transmission underground cables (38kV, 110kV, 220kV, 400kV) - for cables in the Greater Dublin area call 01 6042957 and for all other areas call 1850 372 757. No work should be carried out in the vicinity of 38kV or higher voltage underground cables without prior consultation with ESB Networks. Before any mechanical excavation is undertaken, the actual location of all underground electricity cables must be established and verified on site, using: (a) Up-to-date map records; (b) Cable locator equipment operated in both power and radio modes; (c) Careful hand digging of trial holes using 'Safe Digging Practice'. Refer also to HSA Code of Practice for Avoiding Danger from Underground Services'. ESB takes no responsibility and shall bear no liability in relation to any damage, injury/death or loss of supply as a result of damage or interference with its networks.

GNI Disclaimer:
The information contained in this map concerning the location and technical designation of the gas distribution and transmission network (the "Information") is provided 'as is' and no representation or warranty of any kind, express or implied, is made in relation to the information and all such representations or warranties, express or implied, in relation to the information are hereby excluded to the fullest extent permitted by law. No responsibility, liability or duty of care to you or to any other person in respect of the information is accepted, and any reliance you or any other person places on the information is therefore strictly at your own or their own risk. In no event will liability be accepted for any loss of damage including, without limitation, indirect or consequential loss or damage, arising out of or in connection with the use of the information. In the event that the information is provided by you, in whole or in part, to a third party for whatever reason you shall ensure that this disclaimer is included with the information and brought to the attention of the third party. The actual position of the gas distribution and transmission network must be verified on site before any mechanical excavation takes place. If any mechanical excavation is proposed, hard copy maps must be requested from Bord Gais Eireann. All work in the vicinity of the gas distribution and transmission network must be completed in accordance with the current edition of the Health & Safety Authority publication, 'Code of Practice For Avoiding Danger From Underground Services' which is available from the Health and Safety Authority (1890 28 93 89) or can be downloaded free of charge at www.hsa.ie.

ORIEL WIND FARM PROJECT – MARINE ARCHAEOLOGICAL MANAGEMENT PLAN

1.8.2 Monitoring and Watching Briefs

In addition to the ongoing monitoring of AEZs, measures included in the Project include:

- Archaeological input into specifications for, and archaeological analysis of, any further geophysical and geotechnical surveys;
- Project archaeologists to be consulted in the preparation of any pre-construction ROV/diver surveys and, if appropriate, in monitoring/checking of data;
- Project archaeologists to be consulted in the preparation of pre-construction cable route clearance or other pre-construction clearance operation and, if appropriate, to carry out archaeological monitoring of such work;
- The presence of a licensed archaeologist onboard construction vessels engaged in activities impacting on the seabed including geotechnical investigation, foundation installation and cable laying. This is to undertake watching briefs of any works associated with the project that may result in seabed disturbance.

During the course of seabed preparation, construction and future activities associated with the Project, archaeological finds and deposits may be encountered, and records may need to be produced. This situation may arise under a number of different circumstances, for example during watching brief activities.

Finds of archaeological interest will be recorded and reported to NMS during all activities relating to construction, operational and maintenance and decommissioning. It will address the reporting of unexpected finds of archaeological material, recovered from the sea during these activities.

All finds of archaeological material will be reported by the LA who will inform the Developer and then the NMS. If the find is 'wreck' within the meaning of the Merchant Shipping (Salvage and Wreck) Act 1993 then the LA will also make a report to the Receiver of Wreck. Full contact details for all relevant parties will be included in the AMP.

The response to reported finds will be implemented through the measures set out in the AMP, including further surveys or establishment of new AEZs if appropriate.

At the end of the construction phase, the LA will prepare a report on the results of the watching briefs. The results will be included in the final archaeological report in the section covering maritime sites and finds within the area affected by the Project.

Marine watching briefs will be conducted by a suitably qualified and experienced marine archaeologist, in line with advice from the NMS. A detailed MS will also be produced and approved by the NMS before any watching brief activities are undertaken.

If significant archaeological or palaeoenvironmental evidence are encountered then the Developer, in consultation with the NMS, will make provision for the Archaeological Contractor to undertake a programme of investigation commensurate with the evidence discovered.

1.8.3 Preservation by Record

Where preservation *in situ* is not practicable, disturbance of archaeological sites or material will be offset by appropriate and satisfactory measures, also known as 'preservation by record'. In these circumstances, the effects of the Project will be offset by carrying out excavation and recording prior to the impact occurring.

Archaeological monitoring is deemed as appropriate where project works will cause seabed disturbance and seabed material is brought to the surface. These proposals may be refined on the basis of the results of any further marine geophysical, geotechnical or diver/ROV+ surveys (section 1.9).

Further provision will be made for the implementation of TAEZs around areas of possible archaeological interest, for prompt archaeological advice and, if necessary, for archaeological inspection of important features prior to further construction, maintenance or decommissioning activities in the vicinity. It complies with the Merchant Shipping (Salvage and Wreck) Act 1993; including notification to the Receiver of Wreck, in accordance with the Code of Practice for Seabed Developers (Joint Nautical Archaeology Policy Committee (JNAPC) 2006).

1.9 Methodology for Archaeological Work

Archaeological involvement in further work is a key component in the ongoing process of assessing known and potential archaeological remains within the Project area, to ensure robust and proportionate mitigation for archaeological assets which may be impacted by the Project.

A detailed MS will be produced by the LA, for agreement with and approval by the Developer, and the NMS in advance of each archaeological element discussed below.

1.9.1 Surveys

Any surveys conducted as part of the Project that may yield additional information on the marine archaeology of the area should be carried out to a single datum and coordinate system, preferably the ETRS 89 UTM Zone 29N for the offshore elements of the scheme.

Surveys that will require archaeological involvement include:

- Geophysical survey will require an archaeological assessment of the survey data;
- Diver/ROV obstruction surveys will require an archaeological assessment of the survey data (video and positional data);
- Geotechnical investigations if required will be subject to geoarchaeological assessment and, where necessary, analysis following the staged approach set out below.

Should archaeological material be encountered during any of these surveys, sufficient time and resources will be made available to ensure the archaeological assessment of such material. In areas where there are to be further impacts, no impacts will take place until the assessment has been conducted and mitigation actions agreed and implemented. The scope of any further assessment will be agreed with the NMS and, where necessary, further suitable mitigation measures will be instigated in agreement with the NMS.

1.9.2 Planning

When planning geophysical and geotechnical surveys, the Developer will advise the LA well in advance and seek their input into the scope of work. Archaeological input will take the form of advice from the LA on measures to optimise archaeological results from the planned geotechnical, geophysical and other surveys or work (such as benthic grabs, for example). Areas to be considered will include:

- The available details on previously identified sites and/or anomalies and areas of heightened archaeological potential;
- The archaeological potential of areas where no existing sites and/or anomalies are yet known;
- The equipment, equipment settings, survey methodology(s) and data collection points that will optimise the recovery of archaeological information; and
- The requirements for data analysis, interpretation and archiving.

The required response to elements of archaeological input may include:

- Altering vibrocore/borehole positions in order to maximise the potential for the collection of archaeological data;
- 'Boxing' wreck sites in order to provide the best possible images and positional data; and
- Altering grab sample positions in order to maximise the potential for the collection of archaeological data.

1.9.3 Geophysical Survey

Any future geophysical survey data acquired for the Project will be archaeologically assessed and recommendations for mitigation, including any necessary AEZs, will be made.

Additionally, new marine geophysical data that covers areas of development impact and AEZs will be subject to analysis by a suitably qualified Archaeological Geophysical Contractor (the LA, if suitable). Any such

ORIEL WIND FARM PROJECT – MARINE ARCHAEOLOGICAL MANAGEMENT PLAN

assessment will be preceded by a MS which will set out in detail the methods to be used, along with the aims and objectives of the work. The MS will be submitted to the NMS prior to the work being conducted.

In order to maximise the potential benefits of any geophysical survey, the Developer will seek archaeological input at the planning stage of any such works.

Surveys will be carried out to a single datum and co-ordinate system. All survey data, including navigation (position, heading and velocity) will be acquired digitally in industry-standard formats. Care will be taken to maintain the orientation and altitude of sensors online. Track plots will be corrected for layback (including catenary effects) and made available in digital (geographical information system (GIS)) form.

Once the surveys have been processed to meet their primary objectives, the survey data, together with factual reports, will be made available in digital formats to the Developer's LA, or a suitably qualified Archaeological Contractor for archaeological analysis and interpretation.

Archaeological interpretation may include:

- Examination of side scan sonar, magnetometer, multi-beam and seismic data, where acquired, for areas within the vicinity of known wreck sites and previously identified geophysical anomalies;
- Examination of side scan sonar, magnetometer, multi-beam and seismic data, where acquired, within areas that will be subject to development to identify any as yet unknown wreck remains; and
- The assessment of seismic data and the Geotechnical Interpretative Report (GIR) in order to plot the general trend of the subsurface sediments with archaeological potential.

The archaeological interpretation or results of any further geophysical surveys will be compiled as a report by the Archaeological Contractor and will include likely requirements (if any) for further work or any required changes to mitigation including the addition, removal or alteration of AEZs. The report will be submitted to the Developer by the LA and to the NMS. The scope of any further work will be agreed by the Developer and the NMS.

1.9.4 Geotechnical Survey

Any archaeological assessment of geotechnical data will follow the guidance as set out within COWRIE's Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (Gribble and Leather 2011):

- 'Investigate the deposition sequence of sediments within the area represented by the cores to identify, as far as possible, the environments within which this deposition took place;
- Evaluate the potential for past human exploitation and occupation of these past environments;
- Produce an overview of the geological stratigraphy to provide an indication of the prehistoric archaeological potential for the area; and
- Comment on the archaeological importance of the identified deposits, within the context of the wider palaeoenvironmental history of the region'.

In accordance with this guidance, future geotechnical surveys will be subject to archaeological input. Following best practice guidance this input should begin prior to core collection, and should proceed to a staged process of assessment and analysis).

Early input should seek to determine methods and specifications for geotechnical sampling (e.g. vibrocores, boreholes etc.) and engagement with the Developer and their geotechnical team should aim to find ways to ensure archaeological aims and sampling can be conducted alongside any other requirements. Following these discussions a MS for Core Collection, Transport, Retention and Storage should be produced, ensuring that cores are stored in a way which facilitates later assessment or analysis, if required. This MS may also include methods for the Stage 1 and 2 geoarchaeological assessment (see below).

Early input should also include recommendations on core locations from a geoarchaeologist. Typically, this process involves close collaboration with the SI team. Archaeological input into geotechnical core locations can allow for the greatest insights into the palaeolandscapes potential. Round-table discussions and the review of seismic profiles tends to be a conducive method of allowing engineering and archaeological requirements to be taken into consideration when micro-siting geotechnical cores.

ORIEL WIND FARM PROJECT – MARINE ARCHAEOLOGICAL MANAGEMENT PLAN

Following the collection of geotechnical cores, it is recommended that they undergo a staged programme of geoarchaeological assessment and analysis as required. This is the primary means of ground-truthing the potential identified in this report, and of mitigating impacts to remains. The requirement for each stage of geoarchaeological assessment is determined by the results of the previous stage. In brief the process is as follows:

- **Stage 1: Geoarchaeological review of core logs:** This stage involves a desk-based assessment of the geotechnical core logs performed by a professional geoarchaeologist in order to determine which cores may be of interest. The selected cores will then be recommended for further study (Stage 2). Stage 1 assessment requires all cores to be recorded such that sediments that may be of archaeological interest can be identified. The scope of any further work will be agreed by the Developer and the NMS before proceeding to the next stage of assessment. If no further work is recommended a final report will be produced by the Archaeological Contractor.
- **Stage 2: Geoarchaeological recording:** This stage involves further study of the cores that may be of archaeological interest identified in Stage 1 in order to identify archaeological potential. The cores will be physically assessed by a geoarchaeologist who will confirm the sediments present within the cores and determine their archaeological potential and make recommendations for any suitable cores to be assessed further (Stage 3). At this point a report will be produced presenting the results of the Stage 1 and 2 analyses, recommending further study if necessary, and methodologies for any further work. The scope of further work will be agreed by the Developer and the NMS. If no further work is recommended, a final report will be produced by the Archaeological Contractor.
- **Stage 3: Geoarchaeological assessment:** This stage involves taking samples from the cores with archaeological potential identified in Stage 2. The samples will be analysed to determine the age and the value surviving palaeoenvironmental material contained within the samples. The aims for the palaeoenvironmental analysis included establishing the preservation, diversity, and quantity of palaeoenvironmental material for the purpose of better characterising its origin environment. Any suitable material can be recommended for further study (Stage 4) if necessary. A report for the results of the Stage 3 analysis will be produced, it will also outline whether further analysis is necessary or will state if no further work is recommended.
- **Stage 4 and 5: Geoarchaeological analysis and publication:** This stage involves further, more detailed analysis of core samples. A report will be produced after this Stage including the results of all previous work, core location maps, sediment sequences, 2D and 3D images of the cores where necessary. The report will discuss the interpretation of palaeoenvironments in detail based on analysis of the cores and present all relevant information gathered during the desk-based assessments. The work will be undertaken to publication standard. The report will be forwarded to the LA, who will submit it to the Developer and the NMS.

This work should be undertaken by a trained geoarchaeologist. Each stage should inform the scope of the next, and work may cease at any point where no recommendations for further work are made. This would be the case if, for example, cores were determined to hold no geoarchaeological potential at the end of Stage 2.

This geoarchaeological assessment and analysis should aim to deliver conclusions on the prehistoric archaeological and palaeoenvironmental remains within the area. Further mitigation may be required based on the results of this assessment. The geoarchaeological work should follow guidance set out within Gribble and Leather 2011.

The use of an appropriate PAD also provides mitigation for prehistoric and palaeoenvironmental remains.

1.9.5 Diver/ROV Survey

Seabed photography and video footage will be subject to archaeological assessment and analysis by a suitably qualified Archaeological Contractor. Any such assessment will be preceded by a MS which will set out in detail the methods to be used, along with the aims and objectives of the work. The MS will be submitted to the NMS prior to the work being conducted.

Archaeological input will take the form of advice from the LA on measures to optimise archaeological results from the planned survey. Advice will include:

- The available details of sites and/or anomalies identified in the desk-based assessment;
- The archaeological potential of areas where no existing sites and/or anomalies are yet known;

ORIEL WIND FARM PROJECT – MARINE ARCHAEOLOGICAL MANAGEMENT PLAN

- The type and level of diver/ROV positioning, voice recording and video/still recording to be utilised;
- The provision of clear guidance on the types of sites and finds that are to be reported and recorded;
- Wherever possible input into the scope of works to include potential archaeological sites/AEZs where more detailed mitigation planning is required; and
- Other specific advice will be given depending on the nature and purpose of the investigations. All such areas would be outlined within the MS for the work.

Consideration will be given to having an Archaeological Contractor during any diver or ROV surveys, either as an observer(s) or participating diver(s) to optimise archaeological results and thereby reduce the need for repeat survey. However, operational constraints as well as the relevance and scope of the operation, will have to be taken into account when trying to accommodate archaeologists aboard. Any dive survey shall be accompanied by a hand-held detection survey.

Following the completion of the diver/ROV survey all data, including video footage, will be reviewed by the Archaeological Contractor. This review will identify any anomalies or sites that are potentially of archaeological interest. A report will identify those sites and/or geophysical anomalies that are of sufficient archaeological interest to warrant further investigation and/or mitigation. It will also identify those sites that are no longer of archaeological interest, and hence may be removed from the list of AEZs.

The archaeological results of any diver/ROV survey will be compiled in a report by the Archaeological Contractor. The report will include a statement of the likely requirements (if any) for further archaeological work and mitigation.

The report will be forwarded to the LA, who will submit it to the Developer and the NMS for a decision on the scope of any further work where required.

1.9.6 Finds and Conservation

Material of anthropogenic origin that may be identified in the course of the Project will be recovered by the Archaeological Contractor or, where recovery is impracticable, recorded. All finds will be recorded and significant objects ('special finds') in three dimensions using a sequence of unique numbers.

Finds and other items of archaeological interest recovered offshore in the course of investigation are the property of the State as per the Historic and Archaeological Heritage and Miscellaneous Provisions Act 2023. The Developer will seek permission from the State to donate finds to an appropriate Museums Service prior to depositing the archive.

Subject to legal requirements and to the agreement reached with the Museum regarding selection, retention and disposal of material, the Archaeological Contractor will retain all recovered objects unless they are undoubtedly of modern or recent origin. The presence of modern objects will, however, be noted.

Any finds and environmental samples will be processed according to professional standards for finds analysis, environmental sampling and archive preparation, and in accordance with requirements specified by the NMS.

Finds will be primarily conserved, bagged and boxed. In consultation with the Developer and the NMS, the LA will advise on the implementation of passive conservation for smaller objects pending more detailed conservation strategies. The Developer will also make provision for a professional conservator to undertake a conservation assessment of assemblages, including recommendations and timescales for the conservation of the object.

Specialist work approved by the Developer and the NMS on metalwork, bone (including worked bone, human remains and other organic remains), industrial waste, ceramic material, glass and lithic material will be carried out by suitable Archaeological Contractors, monitored by the LA.

In the event of the discovery of unexpected, unusual or extremely fragile and delicate objects and deposits, such as waterlogged wood, the LA, the Developer and the NMS will be notified immediately. Additional work required to recover, record, analyse, conserve and archive such objects and deposits will be agreed with the NMS.

The National Museum of Ireland (NMI) Advice notes for completing an application form for a Licence to Alter/Export an archaeological object April 2022 will be followed should archaeological objects require exportation. Protocols will be included for such events.

1.10 Reporting and Archiving

1.10.1 Reporting

Reports will be prepared in accordance with the guidance provided in Archaeology and Flood Relief Schemes: Guidelines (NMS. DHLGH, 2023) and with reference to any other activity or analysis specific guidance. Reports will also satisfy all requirements set out within the relevant MS covering the work package.

The timetable for depositing archives with the receiving institution after completion of the post-fieldwork programme will be set out in the relevant MS.

In the event that little of significance is found during the course of the scheme construction, a final report on the investigative work will be prepared by the Archaeological Contractor within six weeks of completion of all construction.

If significant archaeological sites and finds are recorded then this final report will be preceded by the submission to the LA by the Archaeological Contractor(s) of investigation reports following the completion of fieldwork.

The Archaeological Contractor will also be required to produce an assessment report which will establish the value of the recorded archaeology and provide a costing for the post-excavation analysis, publication and archiving (including deposition of archive).

Reports are expected to detail the work undertaken and the archaeological evidence encountered. They should discuss the importance of the results including their potential contribution to archaeological knowledge and understanding, including relevant research frameworks.

Reports will typically include:

- A non-technical summary;
- The aims and methods of the work;
- The results of the work including finds and environmental remains;
- A statement of the potential of the results;
- An explanation of how this work is relevant to the objectives and research agendas from applicable local and national archaeological research frameworks;
- Proposals for further analysis and publication; and
- Illustrations and appendices to support the report.

Where appropriate the report should provide recommendations for further assessment and/or analysis requirements.

The Developer will provide a digital (pdf) copy of each report to the NMS following survey completion.

Decisions regarding the level of post-excavation work, if required, will be taken following submission of investigation reports and consultation by the Developer and the LA with the NMS.

Following the production and acceptance of archaeological reports they will be deposited with the relevant repositories, including the NMS.

1.10.2 Publication

In consultation with the Developer and the NMS, the LA will ensure that the results of important archaeological investigations undertaken in connection with the project will be published in an integrated manner. Publication media and all publication matters will be discussed and agreed in advance with the developer and NMS.

ORIEL WIND FARM PROJECT – MARINE ARCHAEOLOGICAL MANAGEMENT PLAN

1.11 References

- ADCO (2007). Archaeological Assessment for Oriel Offshore Windfarm Development North-Western Irish Sea, Appendix VII, Archaeological Assessment within Oriel Windfarm Ltd, Offshore Wind Farm, Environmental Impact Statement, Appendices, Volume 3 of 3, Available at: <https://www.housing.gov.ie/planning/foreshore/applications/oriel-windfarm-ltd> [Accessed: 20/02/2020].
- ADCO (2019). Archaeological Assessment for Oriel Offshore Windfarm Development North-Western Irish Sea (Annex A.2 of appendix 15-1: Marine Archaeology Technical Report)
- ADCO (2021). Underwater Archaeological Impact Assessment Oriel Wind Farm, Dundalk Bay off Dunany, Co. Louth Offshore Wind Farm Area and Cable Routes
- Brady (2002). Archaeological Monitoring and Excavation: Gas 2025 Irish Subsea Interconnector Gormanstown Landfall, Co Louth – Interim Report.
- ClfA (2014a). Standard and Guidance for Archaeological Watching Briefs. Available at: <https://www.archaeologists.net/sites/default/files/ClfASGWatchingbrief.pdf>. Accessed September 2023.
- ClfA (2014b). Standard and guidance for the collection, documentation, conservation and research of archaeological materials. Available at: https://www.archaeologists.net/sites/default/files/ClfAS%26GFinds_2.pdf.
- DAHGI (1999). Framework and Principles for the Protection of the Archaeological Heritage. Available at: <https://www.opr.ie/wp-content/uploads/2022/10/framework-and-principles-for-protection-of-archaeological-heritage.pdf>. Accessed January 2024.
- DHLGH (2018). Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment. Available at: <https://www.opr.ie/wp-content/uploads/2019/08/2018-Environmental-Impact-Assessment-1.pdf>
- DHLGH (2021). National Marine Planning Framework. Available at: <https://www.gov.ie/en/publication/60e57-national-marine-planning-framework/>
- Dunkley, M. (2016). Ships and Boats: Prehistory to 1840 Historic England.
- EirGrid (2006). Cultural heritage guidelines for electricity transmission projects. Available at: <http://www.eirgridgroup.com/site-files/library/EirGrid/Cultural-Heritage-Guidance-for-Electricity-Transmission-Projects.pdf>
- Gribble, J. and Leather, S. (2011). Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector. Commissioned by COWRIE Ltd (project reference GEOARCH-09). Available at: <https://www.historicenvironment.scot/media/2376/2011-01-offshore-geotechnical-investigations-and-historic-environment-analysis-guidance-for-the-renewable-energy-sector.pdf>.
- Institute of Conservation (ICON) (1984). Environmental Guidelines for the Permanent Storage of Excavated Material from Archaeological Sites. Conservation Guidelines No. 3, ICON.
- Irish Government (2023). Historic and Archaeological Heritage and Miscellaneous Provisions Act 2023.
- Joint Nautical Archaeology Policy Committee (JNAPC) (2006). Code of Practice for Seabed Development.
- McGrail, S. (1987). Ancient Boats in North-West Europe, London, Longman.
- McGrail, S. (ed), (1990). Maritime Celts, Frisians, and Saxons: papers presented to a conference at Oxford in November 1988, Council for British Archaeology, London.
- McGrail, S. (2001). Boats of the World: From Stone Age to Medieval Times. Oxford: Oxford University Press.
- National Monuments Service. Department of Housing, Local Government and Heritage (NMS. DHLGH) (2023). Archaeology and Flood Relief Schemes: Guidelines. Available at: <https://www.archaeology.ie/sites/default/files/media/publications/archaeology-and-flood-relief-schemes-guidelines-nms-2023.pdf>
- O'Sullivan, Aidan & Breen, Colin (2007). Maritime Ireland. An Archaeology of Coastal Communities. Stroud: Tempus.
- Smith, C. (1992). Late Stone Age Hunters of the British Isles, Routledge.

ORIEL WIND FARM PROJECT – MARINE ARCHAEOLOGICAL MANAGEMENT PLAN

Standing Conference of Archaeological Unit Managers (SCAUM) (2007). Health and Safety in Field Archaeology: Manual, SCAUM/FAME.

Wessex Archaeology for The Crown Estate (2021). Archaeological Mitigation for Offshore Wind Farms: Model Clauses for Written Schemes of Investigation. Available:
<https://www.thecrownestate.co.uk/media/3917/guide-to-archaeological-requirements-for-offshore-wind.pdf>.

ORIEL WIND FARM PROJECT – MARINE ARCHAEOLOGICAL MANAGEMENT PLAN

A.1 Gazetteer of Known Wreck sites and anomalies within Marine Archaeology Study Area

ID	Name	Latitude	Longitude	Easting	Northing	Description
W00248, UKHO 5867, INFOMAR ID_295	SS <i>Topaz</i>	53.8702	-6.1764	-	-	The <i>Topaz</i> was a Glasgow registered iron steamship lost in 1891. The ship weighed 168/353 tons and measured 161 feet long and was en route from Workington to Dundalk, carrying a cargo of steel rails, with a crew of nine when it was lost in a west-southwest force 4 wind. The record reports that she struck a reef, drifted into deeper water and sank. The reef must have been Dunany reef. The crew took to their lifeboat and landed at Greenore, Co. Louth. The ship and cargo were insured, so Lloyds employed a diver called Rigden/Rizdon to salvage the steel rails during 1892–1893. The rails, engines and working gear were removed. The vessel's masts were also removed, and the area was buoyed. In 1977 the hull was still almost intact. The boiler and stern stand almost 3 m high off the seabed and the greatest depth recorded was 23 m.
W00276	Unknown	53.86722	-6.17444	-	-	Unidentified wreck located beside the wreck of the <i>Topaz</i> (W00248).
W00529	Unknown	53.88481	-6.03577	-	-	Possible wreck (INSS No. G 125) identified during the National Seabed Survey. Wreck measures L. 5m, W. 2m with a height of 3m off the seabed. It lies in a general sea depth of 29m.
W11435, UKHO 5867	Unknown	53.91814	-6.03577	-	-	UKHO 5787 is recorded as both wreck and notable debris measuring 5m in length and corresponds with the recorded position of NMS record W11435 and therefore suggest that material may be present at this location.

ORIEL WIND FARM PROJECT – MARINE ARCHAEOLOGICAL MANAGEMENT PLAN

ID	Name	Latitude	Longitude	Easting	Northing	Description
W11145	Geophysical anomaly	53.93526	-6.05036	-	-	Geophysical anomaly identified during the 2007 survey and since entered into the NMS Wreck Inventory. Interpreted as a localized anomaly creating gravel ripples to one side in larger area of gravel/soft sediment. Feature lies 40 m from centreline but scour area crosses survey window.
W11146	Geophysical anomaly	53.92183	-6.10168	-	-	Geophysical anomaly identified during the 2007 survey and since entered into the NMS Wreck Inventory. Interpreted as an oblong feature at centreline creating scour filled with ripples to one side.
W11147	Geophysical anomaly	53.93673	-6.10519	-	-	Geophysical anomaly identified during the 2007 survey and since entered into the NMS Wreck Inventory. Interpreted as an anomaly.
W11148	Geophysical anomaly	53.9019	-6.07094	-	-	Geophysical anomaly identified during the 2007 survey and since entered into the NMS Wreck Inventory. Interpreted as cobbles 30 m north of centreline
W11149	Geophysical anomaly	53.94543	-6.06564	-	-	Geophysical anomaly identified during the 2007 survey and since entered into the NMS Wreck Inventory. Interpreted as outlying rocks adjacent to boulder field, either side of centreline.
W11150	Geophysical anomaly	53.94555	-6.07429	-	-	Geophysical anomaly identified during the 2007 survey and since entered into the NMS Wreck Inventory. Interpreted as isolated rocks with acoustic shadows on rippled gravel bed.
W11151	Geophysical anomaly	53.92847	-6.0372	-	-	Geophysical anomaly identified during the 2007 survey and since entered into the NMS Wreck Inventory. Interpreted as outlying rock adjacent to

ORIEL WIND FARM PROJECT – MARINE ARCHAEOLOGICAL MANAGEMENT PLAN

ID	Name	Latitude	Longitude	Easting	Northing	Description
						cobbled area, approximately 25 m south of centreline.
W11152	Geophysical anomaly	53.93704	-6.07773	-	-	Geophysical anomaly identified during the 2007 survey and since entered into the NMS Wreck Inventory. Interpreted as irregularity, unclear image, but perhaps a boulder within a sand/silt hollow, 30-40 m south of centreline.
W11153	Geophysical anomaly	53.90179	-6.07125	-	-	Geophysical anomaly identified during the 2007 survey and since entered into the NMS Wreck Inventory. Interpreted as a concentration of cobbles in gravel area, suggesting a localized area of entrapment, 40 m from centreline.
W11154	Geophysical anomaly	53.94766	-6.06988	-	-	Geophysical anomaly identified during the 2007 survey and since entered into the NMS Wreck Inventory. Interpreted as a series of irregular features, probable rocks//boulders.
W11155	Geophysical anomaly	53.93673	-6.04953	-	-	Geophysical anomaly identified during the 2007 survey and since entered into the NMS Wreck Inventory. Interpreted as a feature creating localized irregularity at break of slope.
W11156	Geophysical anomaly	53.9224	-6.1101	-	-	Geophysical anomaly identified during the 2007 survey and since entered into the NMS Wreck Inventory. Interpreted as a single well defined isolated boulder 15 m north of centreline in sandy area.
W11157	Geophysical anomaly	53.92227	-6.10213	-	-	Geophysical anomaly identified during the 2007 survey and since entered into the NMS Wreck

ORIEL WIND FARM PROJECT – MARINE ARCHAEOLOGICAL MANAGEMENT PLAN

ID	Name	Latitude	Longitude	Easting	Northing	Description
						Inventory. Interpreted as a feature 40 m north of centreline, causing localized entrapment.
ADCO_sss0087	Unknown	-	-	693154	5974937	A single item of debris measuring 3.3 m in length and registered a slight magnetometry reading, suggesting a content of ferrous metal.