



# Celtic Interconnector

## Volume 4 – Appendix 16A

### Marine archaeology and cultural heritage technical report

June 2021



Le réseau  
de transport  
d'électricité



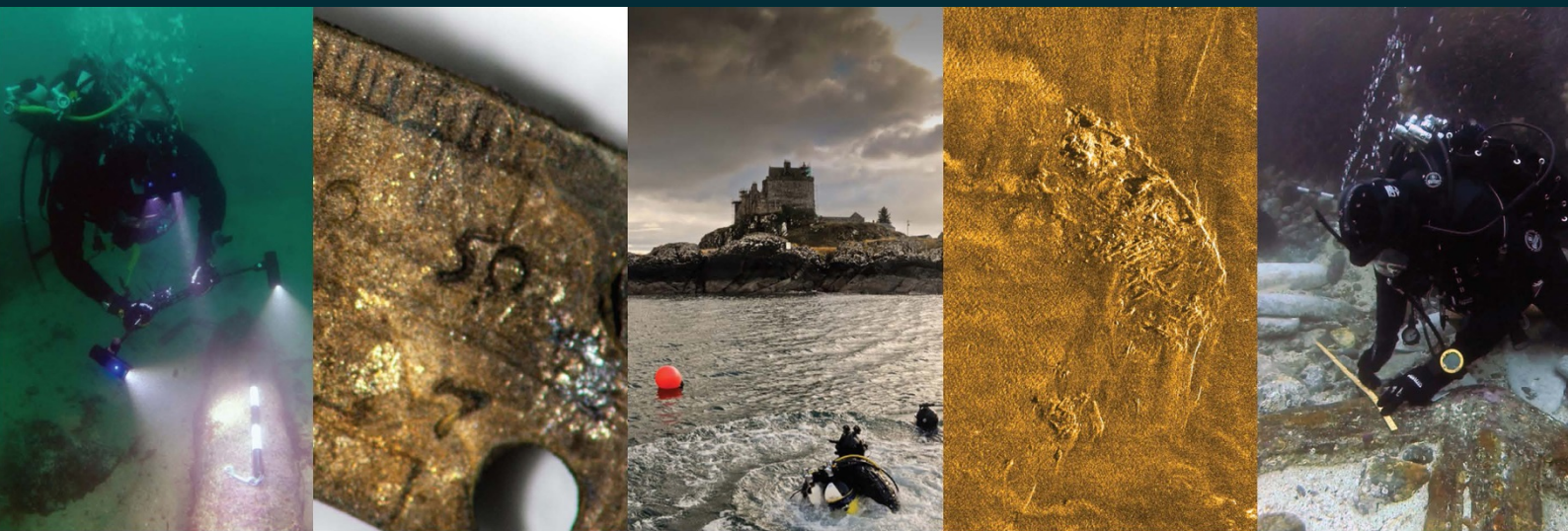
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## Celtic Interconnector Project

*Marine archaeology and cultural heritage technical report*



for  
EirGrid plc

CA Project: 770617

CA Report: 770617\_01

July 2019



# Celtic Interconnector Project

## *Marine archaeology and cultural heritage technical report*

CA project: 770617

CA report: 770617\_01

prepared by	
date	May 2019
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## SUMMARY

### **Project name: Celtic Interconnector project**

Cotswold Archaeology (CA) was commissioned by EirGrid plc in 2017 to provide marine archaeological support for the Celtic Interconnector project. The proposed project involves the installation of a submarine cable between Ireland and France. This report summarises all the previous archaeological assessments relating to the current proposed routes in Irish, English and French waters including those produced by Headland Archaeology (2014; 2015) and by Wessex Archaeology (2016).

These include archaeological desk-based assessments (DBAs) (Cotswold Archaeology 2017; Headland Archaeology 2014) foreshore and inter-tidal archaeological surveys, including walkover, metal detector and geophysical surveys (Cotswold Archaeology 2018a; Headland Archaeology 2015), archaeological assessments of marine geophysical survey data (Headland Archaeology 2015; Cotswold Archaeology 2018a), an underwater archaeology impact assessment (Cotswold Archaeology 2018b), a watching brief during foreshore geotechnical investigations (IAC Archaeology 2018), archaeological assessments of geotechnical data collected along the proposed route corridors (Cotswold Archaeology 2019a; Wessex Archaeology 2016); a hand auger survey at Claycastle beach to investigate exposed peats in the inter-tidal zone, and a geoarchaeological assessment of the results (Cotswold Archaeology 2019b;). These reports include assessments of archaeological potential in proximity to the cable study corridor (CSC).

An initial route, with two potential landfall locations in Ireland, at Ballycroneen beach and Ballinwilling Strand, was assessed by Headland Archaeology (2014; 2015). The route in Irish territorial waters (12 nautical miles (nm)) was subsequently revised and included two new potential landfall locations, at Claycastle and Redbarn beaches, in addition to Ballinwilling Strand. The route in the Irish exclusive economic zone (EEZ) beyond the 12nm limit has not changed substantially. Cotswold Archaeology was commissioned in 2017 to undertake archaeological assessments along these revised routes and at the two new landfall locations (Redbarn beach and Claycastle beach) as well as a reassessment of Ballinwilling Strand.

This technical report incorporates relevant information from all the archaeological assessments that have been completed to date. This report therefore summarises our current knowledge of the archaeology and the archaeological potential along the

route and at the preferred landfall locations of the Celtic Interconnector project. Wherever possible, data from redundant route and landfall options has been removed.

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## 1. INTRODUCTION

### **Outline**

- 1.1. Cotswold Archaeology (CA) was commissioned by EirGrid plc in 2017 to provide marine archaeological support for the Celtic Interconnector project. The proposed project involves the installation of a submarine cable between Ireland and France. This technical report collates all previous archaeological reports for the project into one overarching assessment. This report comprises the results of the desk-based assessments (Cotswold Archaeology 2017; Headland Archaeology 2014), and the archaeological assessment of marine and foreshore surveys (Cotswold Archaeology 2018a; 2019a; 2019b; Headland Archaeology 2014; 2015; Wessex Archaeology 2016; IAC Archaeology 2018). Where possible, any information relating to routes that are no longer under consideration has been removed.

### **Proposed development**

- 1.2. The project aims to install a 700+ MW HVDC interconnector, which will include two HVDC converter stations, subsea cabling, and onshore lines/cables as appropriate. The cable route, including revisions, runs for c. 600km between Ireland and France passing to the west of the Isles of Scilly, just beyond UK territorial limits. Three landfall options are currently under consideration in Co. Cork (Ballinwilling Strand, Claycastle beach and Redbarn beach) and two options on the coast of Brittany (Pontusval and Moguériec) (Fig. 1, Fig. 2 and Fig. 3).
- 1.3. Initially the route included two options within Irish territorial waters (12 nautical miles (nm)), with proposed landfalls at Ballycraheen beach or at Ballinwilling Strand. These route options and landfall locations were assessed by Headland Archaeology (2014; 2015). Subsequent route revisions in Irish territorial waters have included two new potential landfall locations, at Redbarn and Claycastle beaches, as well as one previously considered location (Ballinwilling Strand), and two revised routes and a spur in Irish territorial waters; These revised routes/landfalls were assessed by Cotswold Archaeology (2017; 2018a; 2018b). The route beyond Irish territorial waters has not altered substantively since the initial assessments.

### **Project background**

- 1.4. In 2013, two national electricity transmission system operators, EirGrid plc in Ireland and Réseau de Transport d'Electricité (RTE) in France, signed a Memorandum of Understanding. The agreement was to commission further preliminary studies on

the feasibility of installing a submarine electricity interconnector between the south coast of Ireland and the north-west coast of France, a distance of some 600km. EirGrid and RTE then conducted studies which indicated that an interconnector between Ireland and France could be beneficial for electricity customers in both countries.

- 1.5. EirGrid holds licences as independent electricity Transmission System Operator (TSO) and Market Operator (MO) in the wholesale trading system in Ireland and is the owner of the System Operator Northern Ireland (SONI Ltd), the licensed TSO and MO in Northern Ireland. The EirGrid Group includes EirGrid plc, SEMO JV, EirGrid Interconnector Ltd, and EirGrid Telecoms Ltd.
- 1.6. RTE, an independent subsidiary of EDF, is a public service company responsible for operating, maintaining and developing the high and extra high voltage network in France. It guarantees the reliability and proper operation of the power network.
- 1.7. In 2013, EirGrid and RTE undertook the exploratory phase of this interconnector project with initial studies focused on desk-based analysis of the seabed to identify potential route corridors. Between 2014 and 2015 EirGrid completed a feasibility study of the potential marine routes between Ireland and France, including geophysical and geotechnical / environmental marine surveys along the corridor between East Cork in Ireland and Brittany in France as well as investigations at two potential landfall sites in Ireland.

### ***Archaeological assessments***

- 1.8. Archaeological assessments of the entire route were undertaken by Headland Archaeology (2014; 2015) including a DBA, and assessment of marine geophysical survey data for the entire route and the two landfall locations in Ireland. A geoarchaeological assessment of vibrocore logs was also conducted (Wessex Archaeology 2016). These assessments include sectors of the route that are no longer under consideration so, wherever possible, the information from these redundant routes has been removed from this report.

### ***Current assessments***

- 1.9. CA was commissioned by EirGrid plc in 2017 to undertake further archaeological assessments on the new / revised routes. These included a DBA, assessment of marine geophysical survey data, non-intrusive foreshore surveys including walkover, hand-held metal detector, and geophysical (electrical conductivity)

surveys at two new locations (Claycastle & Redbarn), and a walkover survey at Ballinwilling Strand that had been assessed previously (Headland Archaeology 2015). The aim was to assess and to map the extent of archaeological remains at these three potential landfall locations.

- 1.10. The archaeological assessment of marine geophysical data for the revised routes in Irish territorial waters was undertaken for Cotswold by Coastal and Offshore Archaeological Research Services (COARS), University of Southampton in 2018. The aim was to identify, locate and characterise features with possible archaeological potential, and to assess the sub-bottom profiler (SBP) data in order to establish the archaeological and palaeo-environmental potential of the sub-surface sediments that may be encountered (Cotswold Archaeology 2018a).
- 1.11. In advance of geotechnical site investigations, which used intrusive techniques such as vibrocores, boreholes and test pits, an underwater archaeology impact assessment was undertaken at the landfall locations. This mapped features of archaeological potential at each of the landfall locations, including the exposed peat deposits at Claycastle beach, highlighting their palaeo-environmental potential. It then suggested mitigation in the form of archaeological exclusion zones to avoid any impact to these sites (Cotswold Archaeology 2018b). The impact assessment has not been included in this report as the details contained therein are addressed in other assessments.

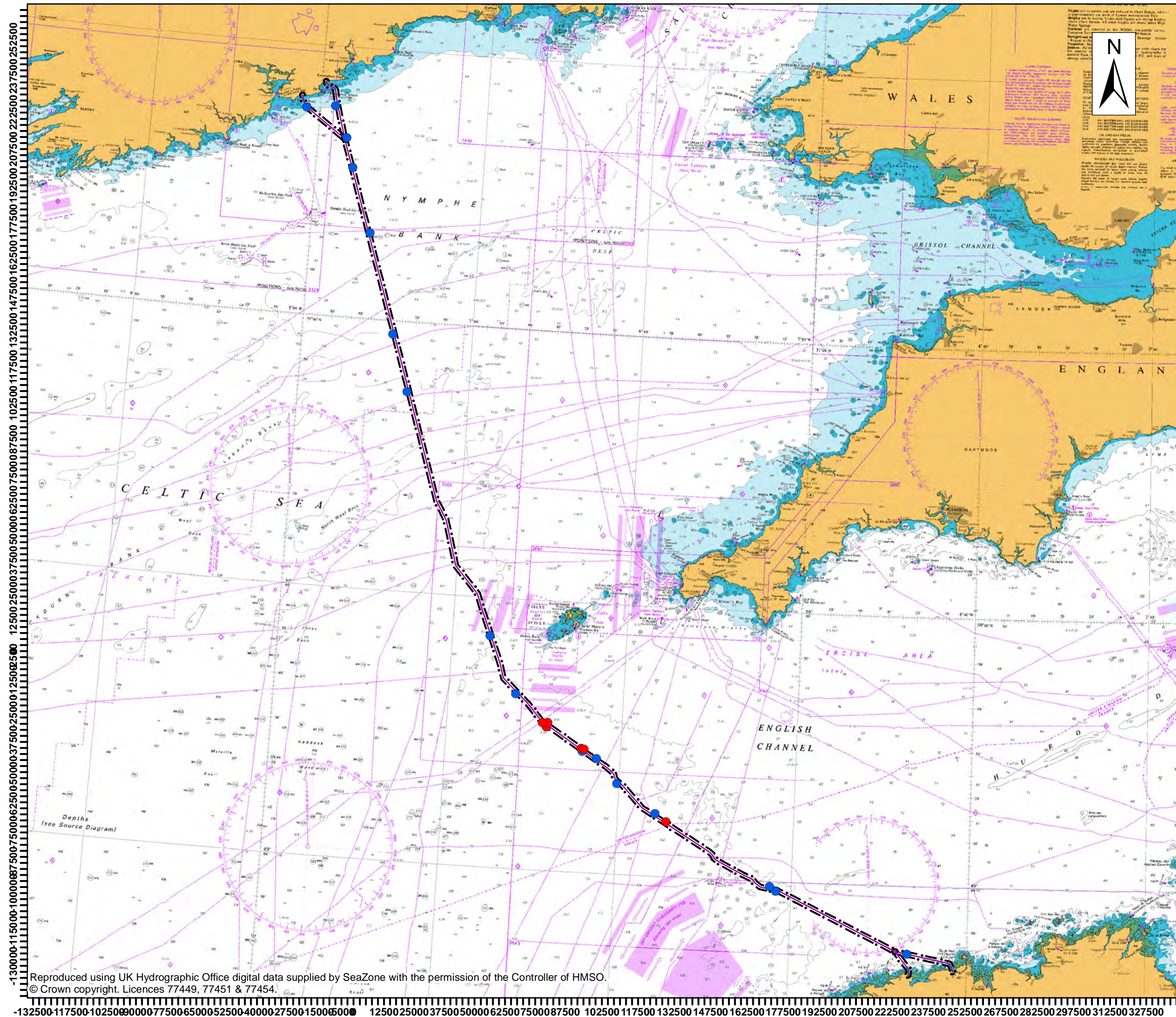
In addition to the original site investigations along the original proposed cable route (Wessex Archaeology 2016), further site investigations were undertaken in 2018 along the revised routes in Irish territorial waters. These comprised test pits and boreholes on the landfall and nearshore locations, and vibrocores in deeper water (Cotswold Archaeology 2019a). A watching brief (or 'archaeological monitoring') was conducted during the site investigations on the foreshore and in the intertidal zone (IAC Archaeology 2018).

- 1.12. The peat deposits found exposed in the inter-tidal zone at Claycastle beach were further investigated using a hand auger and hand-dug test pits. A geoarchaeological assessment was then undertaken of the results of these investigations. This assessment was undertaken to understand the nature and extent of the buried peat deposits, to recover any material which might be of archaeological significance, and

to enhance our understanding of the nature of the deposit (Cotswold Archaeology 2019).

### ***Aims and objectives***

- 1.13. The aim of this technical report is to present our current understanding of the marine archaeology and cultural heritage in the vicinity of the proposed development.
- 1.14. The objectives of this report are:
- To synthesise all the project-specific archaeological assessments that have been completed to date; and
  - To include only information relevant to the current proposed development. All other information relating to routes that are no longer under consideration has been removed.



**Key**

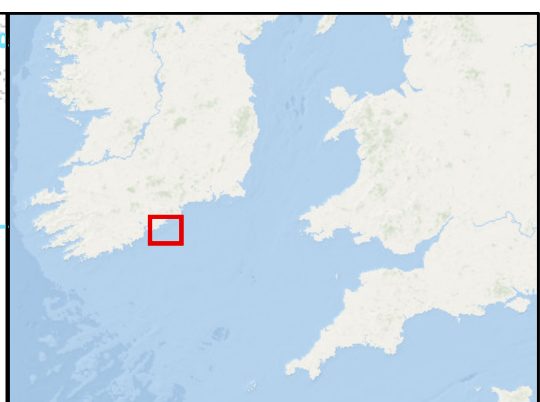
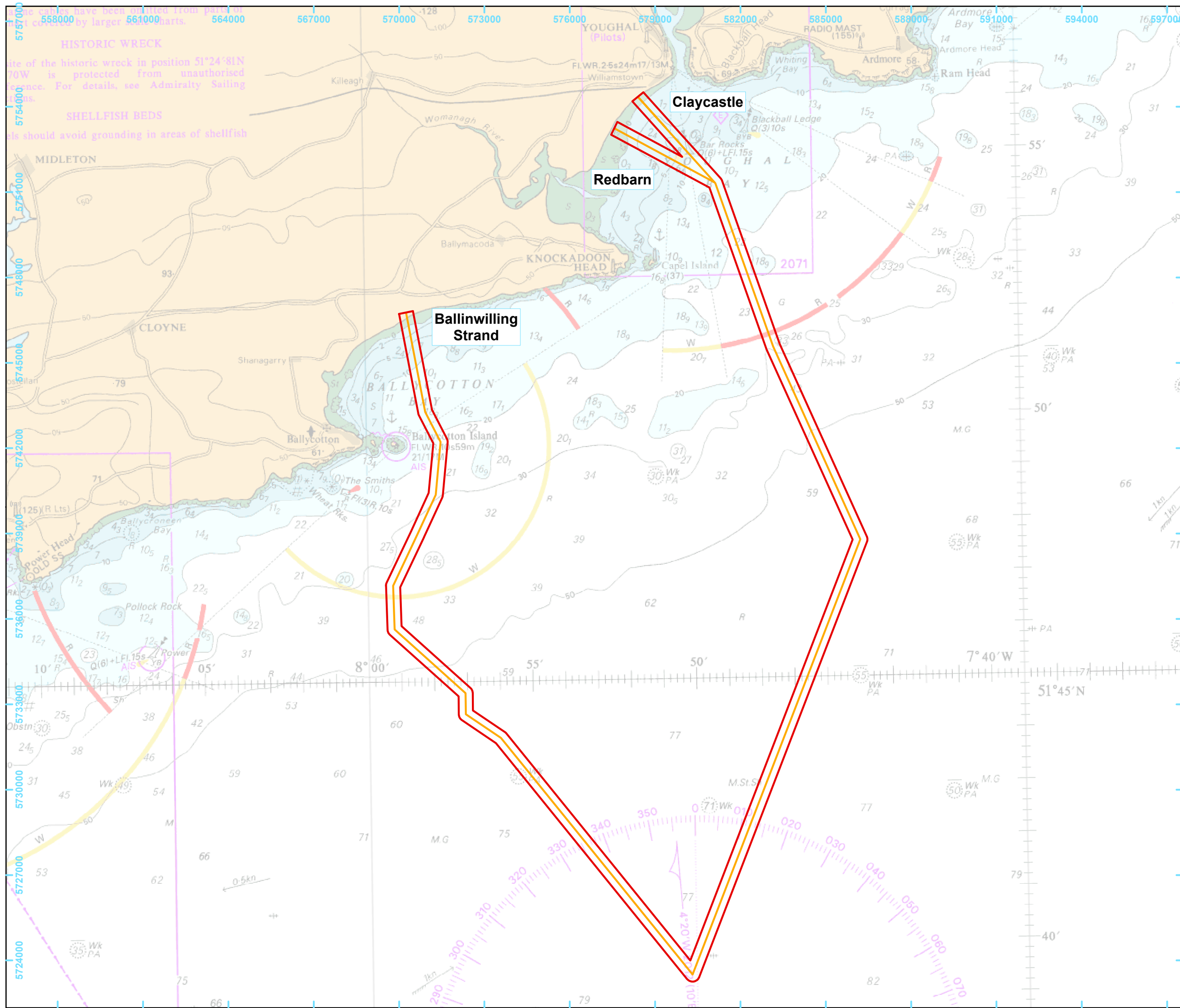
- Obstruction
- Wreck
- Marine Survey Route
- ⬡ Inner Search Area

Kilometers  
0 50  
1:1,550,000



**Ireland-France Celtic  
Interconnector  
[EIFI13]**

DRAFT

**Figure 1: Overview of the  
cable study corridors  
(CSCs) for the entire route  
of the Celtic Interconnector**



### Legend

-  500m wide CSC
-  Cable Route



0 5km

Coordinate System: WGS 1984 UTM Zone 29N  
Projection: Transverse Mercator  
Datum: WGS 1984  
False Easting: 500,000.0000  
False Northing: 0.0000  
Central Meridian: -9.0000  
Scale Factor: 0.9996  
Latitude Of Origin: 0.0000  
Units: Meter

Service Layer Credits: Esri, Garmin, GEBCO, NOAA NGDC, and other contributors  
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Cirencester 01285 771022  
Exeter 01392 826185  
Milton Keynes 01908 564660  
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### PROJECT TITLE

Celtic Interconnector

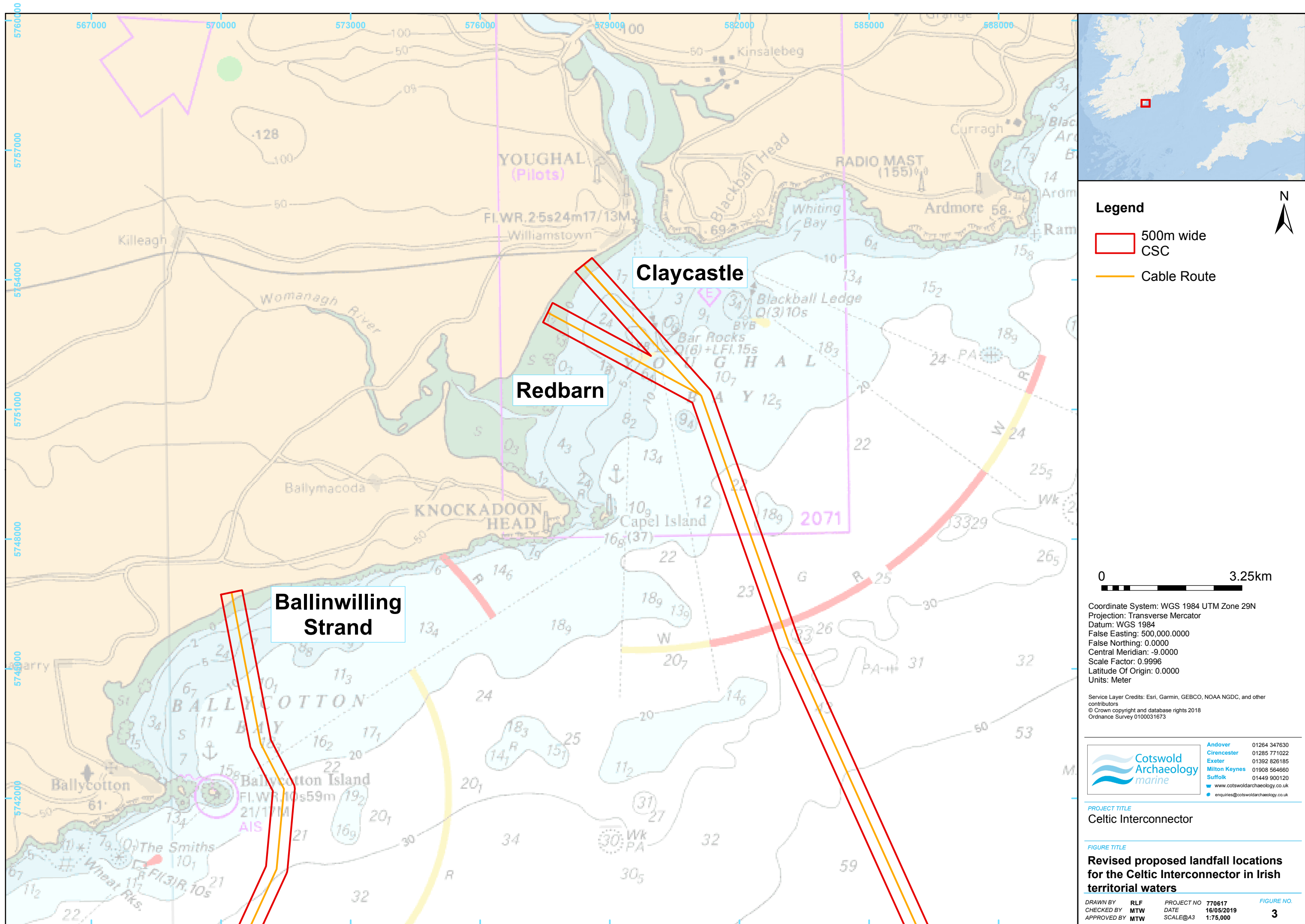
### FIGURE TITLE

**Close up of the CSC in Irish territorial waters**

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CHECKED BY MTW  
APPROVED BY MTW

PROJECT NO 770617  
DATE 16/05/2019  
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FIGURE NO.  
**2**



## 2. LEGISLATIVE FRAMEWORK AND GUIDANCE

- 2.1. As the project is located within Irish and French territorial waters and within the continental shelves of Ireland, France and the UK (adjacent to England within the UK Exclusive Economic Zone (EEZ)), all assessments considered the following national and international legislative procedures and guidelines:

### Republic of Ireland

- National Monuments Acts (1930-2004);
- Heritage Act (Ireland, 1995); and
- Framework and Principles for the Protection of the Archaeological Heritage (Department of Culture, Heritage and the Gaeltacht 1999).

### France

- *Code du Patrimoine* (France, 2004).

### UK

- Protection of Wrecks Act 1973;
- Protection of Military Remains Act 1986;
- Merchant Shipping Act 1995; and
- Burial Act 1857.

### General

- European Convention on the Protection of the Archaeological Heritage (Valetta) 1992;
- UNESCO Convention on the Protection of the Underwater Cultural Heritage (2001);
- International Council of Monuments and Sites (ICOMOS) Charter on the Protection and Management of Underwater Cultural Heritage (1996) (the Sofia Charter); and

- United Nations Convention on the Law of the Sea (UNCLOS) 1982.

2.2. All assessments have been compiled in line with industry best practice and the relevant offshore renewables and marine historic environment guidance. These include:

#### Republic of Ireland

- Institute of Archaeologists of Ireland code of conduct for archaeological assessment excavation (2006).

#### UK

- Chartered Institute for Archaeologists (CIfA) guidelines: Standard & guidance for archaeological desk-based assessment (2014);
- Joint Nautical Archaeology Policy Committee (JNAPC) code of practice for seabed development (2008);
- COWRIE Historic environment guidance for the offshore renewable energy sector (2007);
- COWRIE Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore renewable Energy (2008);
- COWRIE Guidance for offshore geotechnical investigations and historic environment analysis: guidance for the renewable energy sector (2011);
- The Crown Estate (2014). Offshore renewables protocol for archaeological discoveries; and
- The Crown Estate (2010). Round 3 offshore renewables projects model clauses for archaeological written schemes of investigation.

#### General

- EIA Directive 85/337/EEC as amended by 97/11/EC and 2003/35/EC.

### 3. METHODS AND DATA SOURCES

- 3.1. The following section sets out the methods used for the assessment of the proposed CSC, including the sources used for collation of data and the relevant legislative framework and guidance.

#### ***Desk-based assessment methodology***

- 3.2. The DBA consisted of a documentary and cartographic search, utilising a variety of sources, in order to locate all known cultural heritage assets and to identify the archaeological potential within the CSC (Cotswold Archaeology 2017).
- 3.3. Sources consulted for this assessment include, where relevant:

#### Republic of Ireland

- Information held by the Underwater Archaeology Unit (UAU) of the Department of Culture, Heritage and the Gaeltacht (DCHG);
- Information held by Heritage Ireland on protected wrecks;
- Information held by Integrated Mapping for the Sustainable Development of Ireland's Marine Resources (INFOMAR);
- National Museum of Ireland archives;
- National Library of Ireland (for historic charts and maps only); and
- Geological Survey Ireland.

#### France

- Information held by *Le Département des Recherches Archéologiques Subaquatiques et Sous-Marines* (DRASSM);
- Information held by *Le Service Régional de l'Archéologie* (Brittany); and
- *Service Hydrographique et Océanographique de la Marine* (SHOM), - the French hydrographic office, for records of wrecks.

#### UK

- Information held by Historic England on designated wrecks and the National Monuments record (NMR – maritime section);

- United Kingdom Hydrographic Office (UKHO) Wrecks and Obstructions Database (SeaZone);
- UKHO review of cartography, historic charts and sailing directions;
- Ministry of Defence (military remains only);
- Receiver of Wreck (RoW);
- Records held with the Archaeology Data Service (ADS); and
- Marine Environment Data Information Network (MEDIN).

#### General

- Readily accessible published sources and grey literature (e.g. results from previous studies);
- Relevant external marine historic environment specialists;
- British Geological Survey regional guide and previous work in the area;
- Relevant dive groups and local interest groups;
- Relevant external marine historic environment specialists (eg palaeo-environmental); and
- Relevant Strategic Environmental Assessment (SEA) reports (eg UK Continental Shelf SEA archaeological baseline) and Coastal Survey Assessment reports.

#### *Consultation with statutory bodies*

3.4. For this assessment, the following statutory bodies and stakeholders were consulted, including:

- Underwater Archaeology Unit (UAU) of the National Monuments Service, Department of Culture, Heritage and the Gaeltacht (DCHG); and
- INFOMAR.

3.5. In addition, the following statutory bodies and stakeholders were consulted as part of the assessment produced by Headland Archaeology in 2014:

- Heritage Ireland;
- Historic England;
- Ministry of Defence (military remains only);
- Receiver of Wreck (UK Maritime Coastguard Agency); and
- *Centre départemental d'archéologie Conseil General de Finistere.*

*Limitations of data*

3.6. One of the greatest limitations when researching known and potential offshore cultural heritage is the difficulty of locating recorded maritime losses. For many losses the location of the sinking of the vessel can be in the form of a general area description, as in 'SW and W from southern Ireland' or '30 miles north of Ushant', which is not useful practically for accurate assessment, except to show the potential exists to encounter lost cultural remains (Cotswold Archaeology 2017).

3.7. Many wrecks have been identified through sonar survey, but this too presents difficulties as many of these wrecks have been located using GPS, which until relatively recently was only accurate to 100m (Baird 2009; see also Satchell 2012); or by DECCA which can give locations accurate to only one kilometre. In addition, recorded maritime losses are heavily biased towards the 19th and 20th centuries when more comprehensive records of losses began to be compiled by the UKHO.

3.8. To prevent a large error range in sonar measurements due to tidal range varying across bays and coastlines during the recent INFOMAR surveys, onshore and offshore tidal gauges were installed to ensure accurate tide height data.

3.9. The details for specific offshore cultural heritage assets within this study area were acquired from the three main sources cited above. Other sources, also cited above, were consulted by Headland Archaeology for the feasibility phase of this project in 2014. All these databases are each derived, in turn, from a variety of sources including various published lists of marine losses and marine surveys. Consequently, there are considerable overlaps and discrepancies between the datasets.

- 3.10. Wrecks discussed below are generally referred to as either 'live', 'dead' or 'lifted'. 'Live' wrecks are those for which there is a known location which has been verified by recent surveys. 'Dead' refers to sites or reports of incidents that have been recorded in a certain location, but which have not been detected by repeated or the most recent surveys. Whilst there is no recorded evidence of any lifted wrecks within the study areas, this refers to wrecks that have been removed from the seabed.
- 3.11. Where a live wreck has been identified this information is provided in Tables 2 and 3; a wreck in a known location that has not been identified is referred to as unidentified. Where the status of a wreck is given as 'unknown', this means that it is not recorded whether the wreck is live, dead or lifted.
- 3.12. The assets listed in this report relate to the current route options and cover all UAU, INFOMAR, UKHO entries (as held by SeaZone), DRASSM and *Le Service Régional de l'Archéologie* within the study areas including dead entries. Dead entries are included because although wrecks may not have been detected in recent surveys the recorded locations may still contain remains of cultural heritage interest. Given locational discrepancies (Satchell 2012) the possibility that wrecks lie outside previous search areas cannot be discounted.
- 3.13. All relevant data held by the UAU, INFOMAR, UKHO / SeaZone, DRASSM and *Le Service Régional de l'Archéologie* – the primary historic data repositories for this assessment - were considered, and for completeness, listed and cross-referenced. The data supplied by the UAU appears to include multiple entries which refer to the same site, such as an unidentified wreck recorded in the same position, or same place of loss (i.e. latitude and longitude). Whilst the data has been recorded as individual entries by the UAU, and usually relates to separate UKHO entries, in this report multiple entries recorded in the same location have been listed as one wreck. These sites have been indicated in Tables 2 & 3 with the addition of an asterisk (i.e. CA1\*). Each wreck is discussed in more detail below (Cotswold Archaeology 2017).

#### ***Foreshore survey methodology***

- 3.14. The landfall surveys, conducted on the foreshore and in the inter-tidal zone, comprised walkover, hand-held metal detector, and geophysical (electro-magnetic conductivity) surveys. The aim of the surveys was to assess and map the extent of

any archaeological remains within the proposed development (Cotswold Archaeology 2018a).

- 3.15. The surveys were conducted in during Spring tides to achieve full overlap with the offshore marine surveys. All surveys were positioned using the geodetic datum WGS 1984, with projection in the Universal Transverse Mercator Zone 29 North (UTM 29N).

*Walkover survey*

- 3.16. A walkover survey was undertaken at all potential landfall locations which entailed the identification of physical features relating to the historic environment. The locations of identified features were recorded using a hand-held Garmin GPS unit, and were recorded photographically together with a brief descriptive record.

*Metal detector*

- 3.17. Hand-held metal detectors were used to conduct surveys at all potential landfall sites. The survey followed 5m wide traverses in accordance with the geophysical surveys. The detector was set to detect all metal and the sensitivity was adjusted to compensate for the high salt content of the beach sand.
- 3.18. As this was a non-intrusive survey, where possible the numeric values displayed on the detector were recorded to assist potentially in the identification of the type of metal detected. A higher value is more likely to indicate a non-ferrous metal (Minelab 2017:11); no finds spots were excavated. All finds spots were recorded using a hand-held Garmin GPS and were plotted using ArcGIS.

*Geophysics*

- 3.19. The most recent foreshore geophysical surveys used a Geonics EM31 electromagnetic conductivity meter to perform a terrain electrical conductivity survey, similar to those conducted previously. The instrument is a non-intrusive frequency-domain electrical conductivity measuring device that records the spatial variations of apparent ground conductivity of the earth in units of milliSiemens/metre (mS/m). The 'siemen' is the international (SI) unit of measurement for volume electrical conductance and is the equivalent to an ampere/volt. Differences in deposits, principally variations in thickness between deposits with different conductivities, can produce spatial variations in conductivity readings.

- 3.20. The system provides two measurements, quadrature (apparent conductivity) and in-phase (metallic response) data. The system has, subject to the vagaries of differing soil conditions, an effective operation depth of approx. 6m.
- 3.21. The instrument has various environmental applications and its data can be used to map landfills, to locate buried metal objects, to detect shallow groundwater contamination and to measure soil thicknesses.
- 3.22. A survey grid was set out at the required locations and subdivided into 5m transects, using a GPS system utilising the Irish Transverse Mercator Grid (UTM) with an accuracy of 0.5m or greater.
- 3.23. The primary focus of the survey was to identify buried metal objects on the beach that might relate to heritage assets. In addition, some success was gained at mapping variations in silting patterns within the foreshore area. Variations in response might occur where timber structures have influenced the deposition of sediments and could therefore be used to identify the presence of wooden material which could be indicative of wreck material or other wooden structures buried in the sand.
- 3.24. In addition, as ground conductivity is influenced by soil moisture content, an electromagnetic conductivity survey can be used to differentiate between areas of solid substrata and sand. This could help to define the former physical topography of the survey area by identifying former channels or basins in the sub-strata. Identification of these features could help to define areas of archaeological potential within the survey area.
- 3.25. The data was digitally recorded and periodically downloaded to a field computer for quality assurance and preliminary interpretation.
- 3.26. At the end of the survey, the Geonics EM31 data was interpreted and mapped using Terrasurveyor V3.0.32.4 software (DWConsulting), a surface mapping software that allows topographic data to be contoured and presented in a manner that allows for the interpretation of sub-surface features (Cotswold Archaeology 2018a).

## **Marine geophysical survey methodology**

### *Irish territorial waters*

#### Bathymetric and geophysical survey specification and data acquisition

- 3.27. The bathymetric and marine geophysical surveys in Irish territorial waters were conducted by Next GeoSolutions in 2017. The archaeological assessment of this survey data was undertaken for Cotswold Archaeology by of COARS (Cotswold Archaeology 2018a).
- 3.28. Bathymetric data were acquired using a dual head R2Sonic 2024 (200-400 kHz) multibeam echo sounder (MBES).
- 3.29. Side scan sonar (SSS) survey was undertaken using an Edgetech 2200 Series dual frequency (410 and 125 kHz), set to 50m range to provide a total swath of 100m. The magnetometer survey was conducted using a Geometrics G882 magnetometer.
- 3.30. The SBP seismic data were acquired by means of a combined SSS/SBP Edgetech 2200 Series with a SBP DW216 operating at 2-12 kHz at 20ms with a 4Hz ping rate.
- 3.31. The Sparker data were acquired by means of a Multi-tip Sparker System Geo Marine Survey Systems Geo-Source / Geo-Spark 200. Positioning was acquired using a Teledyne PDS2000/ PosMv system.

#### Geodetic and projection parameters and vertical datum

- 3.32. Vertical datum was referred to the required vertical reference level, lowest astronomical tide (LAT), referred to Ordnance Survey Ireland (OSi) datum in the nearshore sector, and Vertical Offshore Reference Frames (VORF) vertical reference for the Irish offshore sector.

#### Assessment methodology

- 3.33. Geophysical assessment was undertaken using the programs Coda Octopus Survey Engine 4.3 and ArcGIS 10.5. SBP data were analysed using the former with the positions of sub-surface anomalies exported in shapefiles to be uploaded into ArcGIS 10.5 alongside processed magnetometer data provided by Next

GeoSolutions, following the professional guidelines of Plets *et al.* (2013). The geophysical data was assessed for archaeological potential, based on the presence of multiple lines of evidence (confirming datasets) (Cotswold Archaeology 2018a).

*Irish territorial limit out to the Irish / UK median line*

Assessment methodology

- 3.34. The bathymetric and marine geophysical surveys from Irish territorial limit out to the Irish / UK median line were conducted by Osiris Projects in 2015 (Osiris 2015). The archaeological assessment of the marine survey data was undertaken by Headland Archaeology by (2015).
- 3.35. Bathymetric data were acquired using a multibeam echo sounder (MBES). The data were visualized using the Fledermaus 7.3.3 suite; DMagic was used to produce a digital terrain model (DTM) gridded at 1 m and shadow and geographic information objects were then assembled. These were exported for interpretation into Fledermaus with a 32 step colour map overlaid to aid interpretation and later into ArcGIS 10.2.1.
- 3.36. Side scan sonar (SSS) survey data, from Irish territorial limits out to the Irish / UK median line, were received as navigation-corrected and post-processed .cod files which were associated with accompanying CODA Octopus software projects; coverage was provided in Coda Octopus SurveyEngine 4.2 format.
- 3.37. The SBP seismic data were provided by Osiris Projects as CODA SurveyEngine 4.2 projects for all cable route sections.
- 3.38. Magnetic data were reviewed using the Geometrics MagPick. The raw xyz profile files were imported and individually assessed. Correlation between magnetic targets and other datasets was based on a 50m buffer owing to the problems inherent in accurately positioning magnetic targets by their detectable magnetic field. Concentrated clusters of magnetic anomalies are usually associated with coherent ferrous structure of post-medieval and later origin. Isolated features may correspond to debris, anchorage material, or unexploded ordnance. All such features are cross-referenced with the available geophysical data and are graded in terms of archaeological potential where possible. These anomalies may be subject

to archaeological exclusion zones where high magnetic returns (> 100nT) are consistent across multiple records.

### ***Geotechnical investigations methodology***

#### *Marine and foreshore geotechnical investigations*

Irish territorial waters and landfall options

- 3.39. A total of 85 geotechnical site investigations were undertaken in Irish territorial waters in 2018, ranging in elevation height from 11m to -83m LAT (Fig. 4).
- 3.40. Archaeological monitoring was undertaken on the foreshore at Ballinwilling Strand, Redbarn beach and Claycastle beach at the 12 locations where geotechnical investigations, comprising boreholes and test pits, were conducted (IAC Archaeology 2018) (Table 1).
- 3.41. Following excavation, the test pits were backfilled using only native materials while the boreholes were backfilled using pellet bentonite (compactonite).
- 3.42. The equipment used included:
- Borehole – PSM-8G hydraulic drilling rig
  - Test Pit – 21 tonne tracked excavator
  - Metal detector – Garret EuroAce
- 3.43. Marine and foreshore geotechnical samples were collected to inform the engineering design, with recording and laboratory-testing undertaken by Next GeoSolutions. All samples were split longitudinally and photographed prior to recording of the deposits by the geotechnical specialists, prior to sub-sampling with respect to both the stratigraphy encountered and the testing scheduled. The destructive laboratory testing included:
- Moisture content – at least 50g (fine grained soil), 3kg (coarse grained);
  - Atterberg Limits – at least 600g passing 425µm sieve;
  - Particle size distribution – at least 500g (for samples with grain sizes <10mm), 35kg (for samples with grain sizes <50mm);



- Minimum/maximum density – at least 6kg (sand), 16kg (gravelly soil);
- Oedometer – undisturbed sample at least 1 x diameter in length;
- Unconsolidated undrained triaxial – undisturbed sample at least 2 x diameter in length; and
- Consolidated triaxial – undisturbed sample at least 2 x diameter in length.

3.44. Core sections not subjected to destructive testing were retained by Next GeoSolutions and were made available to Cotswold Archaeology. Core photographs and descriptions were provided to enable Cotswold to undertake an assessment of the geo-archaeological potential of the samples.

#### Geoarchaeological recording method

3.45. The geoarchaeological assessment followed Historic England (2015) guidelines, with descriptions according to Hodgson (1997) including sediment type, depositional structure, texture and colour. Interpretations regarding mode of deposition, formation processes, likely environments represented, and potential for palaeo-environmental analysis were also noted. As all the samples had been sub-sampled, there was little information available regarding sedimentary structures (bedding, laminations, etc) or stratigraphic boundaries. A photographic record of the samples, including key stratigraphic features, was made to supplement the sedimentary descriptions.

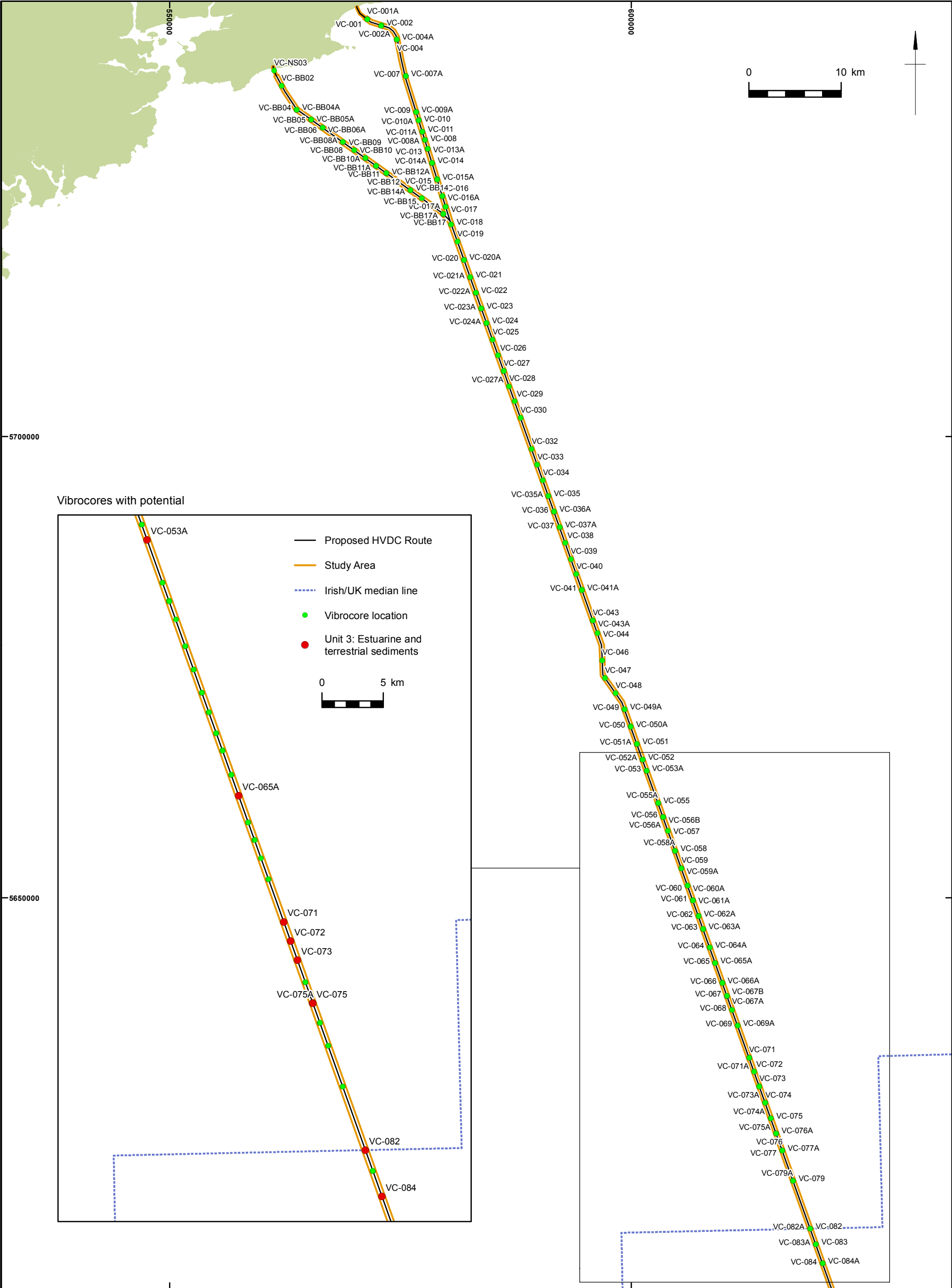
**Table 1 Borehole and test pits monitored at Ballinwilling Strand, Redbarn beach and Claycastle beach**

SI Code	Location	ITM Eastings	ITM Northings	Max. Width	Max. Length	Max. Depth
BW2-BH1	Ballinwilling	570265	<b>5746647</b>	165mm	165mm	21m
BW2-BH2	Ballinwilling	570282	<b>5746588</b>	165mm	165mm	20m
BW2-TP1	Ballinwilling	570276	<b>5746622</b>	3m	5.5m	2m
BW2-TP2	Ballinwilling	570308	<b>5746478</b>	3.5m	4.5m	1.9m
RB-BH1	Redbarn	<b>577581</b>	<b>5753228</b>	165mm	165mm	20m
RB-BH2	Redbarn	<b>577683</b>	<b>5753162</b>	165mm	165mm	20m

SI Code	Location	ITM Eastings	ITM Northings	Max. Width	Max. Length	Max. Depth
RB-TP1	Redbarn	577557	5753240	2m	5m	3m
RB-TP2	Redbarn	577621	5753202	2m	5m	3m
CL-BH1	Claycastle	578396	5754300	165mm	165mm	20m
CL-BH2	Claycastle	578440	5754248	165mm	165mm	20m
CL-TP1	Claycastle	578387	5754308	2.5m	5m	3m
CL-TP2	Claycastle	578432	5754258	2m	5m	3.6m

#### *Irish territorial limits out to Irish / UK median line*

- 3.46. The logs of 148 vibrocores acquired by Osiris in 2015 out to the Irish / UK median line (Osiris 2015) were reviewed by Wessex Archaeology (2016) (see Fig. 5). However, 48 of these cores relate to redundant routes in Irish territorial waters and have therefore been removed and will not be considered further; only the 100 logs that are located from the Irish territorial limit out to the Irish / UK median line will be discussed. The vibrocore logs were sampled along the route to 3m below the mudline with retests performed where recovery or penetration was less than 2m (Osiris 2015).
- 3.47. Two vessels were utilised for the geotechnical survey, owing to the variable water depth along the route. RRS Ernest Shackleton was employed for the offshore section, while SV Bibby Tethra was used nearshore. Both vessels were equipped with marine piezocone cone penetrometer (CPT) and vibrocoreing systems. The vibrocore locations up to the Irish/UK median line were all recorded in WGS84 UTM29N.
- 3.48. Each log has been reviewed and interpreted based on comparison with each other and to the known sequence recorded by BGS (Evans et al 1990; Tappin et al 1994). Data from the logs were input manually into Rockworks 17™ software creating a geospatial database including coordinates, vibrocore identification number, depth, recovery and date acquired.
- 3.49. The lithologies have been grouped with regard given to geoarchaeological and palaeo-environmental deposits of interest to derive an overall stratigraphic interpretation of the logs.




 <div><b>Company Name:</b> Wessex Archaeology <b>Client Name:</b> EirGrid plc <b>Project:</b> Celtic Interconnector - Feasibility Study <b>Drawing Title:</b> Location of vibrocores <b>Drawing Number:</b> 112110_Fig02.mxd</div>	<div><div>—</div> Proposed HVDC Route</div> <div><div>—</div> Study Area</div> <div><div>-----</div> Irish/UK median line</div> <div><div>●</div> Vibrocore location</div>	This data is Copyright 2012 OpenStreetMap contributors. It is available under the Open Database License (ODbL). For more information see <a href="http://www.openstreetmap.org/copyright">http://www.openstreetmap.org/copyright</a> . This material is for client report only © Wessex Archaeology. No unauthorised reproduction.			
		Date:	17/02/2016	Revision Number:	1
		Scale:	1:400,000 & 1:300,000 (A3)	Illustrator:	KJF
		Path:	X:\PROJECTS\112110\GIS\FigsMXD\Geoarch\2016_02_04		

Figure 5 Original map of the location of vibrocores provided by Wessex Archaeology (2016). No alterations have been made regarding route revisions.

- 3.50. The SBP data were assessed at targeted locations where palaeo-channels had been identified in a previous archaeological assessment (Headland Archaeology 2015). The geophysical data were also re-assessed over the locations of a selection of logs in which organic remains were identified. SBP data were processed using Coda Seismic+ software.

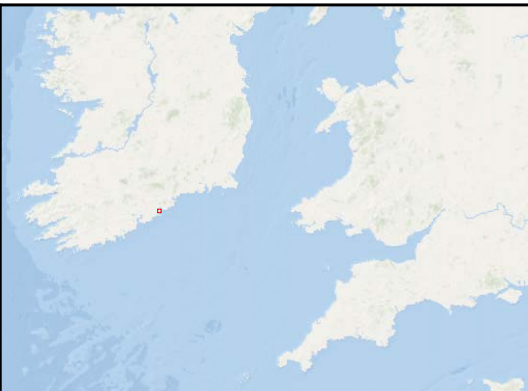
*Foreshore geotechnical investigations at Claycastle beach*

- 3.51. 20 locations (four locations along five transects running landward to seaward) were proposed for a hand auger survey (Cotswold Archaeology 2018a). Owing to the specific nature of the intertidal zone (very loose sand / gravel sediments), the proposed auger locations had to be adapted in order to obtain suitable locations for the survey.
- 3.52. To establish the extent of the peat deposits, 20 additional test pits (TPs) were dug in randomly-chosen locations between the previously proposed transects. Most of the TPs were situated c. 10m to the north-west of the area of exposed peat to establish the presence of the peat deposits under the beach sand (Cotswold Archaeology 2019b). The auger and test pit locations are illustrated in Figure 6.

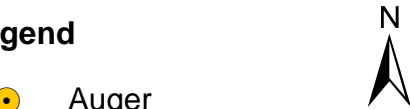
The auger survey was conducted using a standard hand-operated Dutch auger with 1m long extension rods. Hand auguring was conducted in eight locations (**CL4001**, **CL4002**, **CL4003**, **CL4005**, **CL4007**, **CL4011**, **CL4012**, and **CL4024**). Unsuccessful attempts were made in numerous other locations but were aborted owing to the instability of the sand. The sediment recovered was laid out and recorded following standard procedures (Cotswold Archaeology 2017; Munsell 2018; Tucker 2011).

- 3.53. Augers **CL4002**, **CL4003** and **CL4011** were drilled in areas where the peat was exposed in order to provide a full sedimentary sequence. Three environmental bulk samples were taken from the top, middle and bottom of the peat in each of these auger cores (nine samples in total). All samples were placed inside sealable plastic bags and labelled using CA's standard procedures (Cotswold Archaeology 2017).
- 3.54. 31 small TPs (**CL4004**, **CL4006**, **CL4007** to **CL4010**, **CL4013**, **CL4014**, **CL4016** to **CL4023**, and **CL4025** to **CL4040**) were dug by hand in locations where unstable sediments prevented the use of the hand auger. The TPs were recorded following standard procedures as above. All TPs were backfilled as soon as recording had been completed.

- 3.55. At the time of the survey, the local authority (Cork County Council) was undertaking groundworks just to the front of the boardwalk on the beach. The opportunity was therefore taken to examine the excavation. This TP was mechanically excavated through drier sand to a depth of c. 2.7m.



- Legend**
- Auger
  - Test pit
  - Test pit and auger
  - Machine test pit
  - Youghal Strand Core 2002
  - Exposed peat
  - Cable Route
  - 500m wide CSC



Coordinate System: WGS 1984 UTM Zone 29N  
Projection: Transverse Mercator  
Datum: WGS 1984  
False Easting: 500,000.0000  
False Northing: 0.0000  
Central Meridian: -9.0000  
Scale Factor: 0.9996  
Latitude Of Origin: 0.0000  
Units: Meter

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar  
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Ordnance Survey 0100031673

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PROJECT TITLE  
Celtic Interconnector

FIGURE TITLE  
Auger and test pit locations

## 4. RESULTS

### ***Desk-based assessment***

#### ***Baseline environment***

- 4.1. The aim of this section is to provide a brief assessment of the palaeo-environmental potential of sediments potentially impacted by the proposed cable routes and three potential landfall locations. This assessment will provide data that will assist in identifying potential sediments of palaeo-environmental and archaeological interest. The specific objectives of this palaeo-environmental assessment are to review available data in respect of seabed and sub-seabed deposits to identify those likely to be of palaeo-environmental and archaeological interest.
- 4.2. A number of radiocarbon dates are referred to in the text below. The uncalibrated dates are conventional radiocarbon ages. The radiocarbon ages were calibrated using the University of Oxford Radiocarbon Accelerator Unit calibration programme OxCal v4.3.2 (2017) (Bronk Ramsey 2009) using the IntCal13 curve (Reimer *et al* 2013). All radiocarbon dates in this report are to 95.4% probability.
- 4.3. This baseline environmental assessment considers previous work done in the areas of the proposed revised cable routes in order to place project-specific investigations into the wider context of the palaeo-environment of the three areas potentially affected.

#### ***Ballinwilling Strand, Redbarn Beach and Claycastle Beach, Co. Cork, Ireland***

- 4.4. There is a paucity of relative sea-level (RSL) information for the south of Ireland; research that has been undertaken has been documented by Brooks and Edwards (2006) and provides a key insight into the impact of RSL change at both national and regional levels.
- 4.5. Although there are no RSL studies specifically relating to Ballinwilling Strand, Redbarn beach and Claycastle Beach, RSL data are available for the southwest of Ireland and in particular for Co. Cork. These can be used to interpret how RSL has changed in this area since the last glacial period. RSL index points from areas closest to the proposed landfall sites have been generated from Dungarvan Bay, Co. Waterford (Sinnott 1999), c. 25km northeast of Claycastle Beach, and from Ballycotton Bay, Co. Cork (Carter *et al* 1989), c. 3km south of Ballinwilling Strand.

- 4.6. A conjectural RSL curve was produced for the southwest of Ireland by Taylor *et al* (1986), which suggested that RSL in this area stood at c. 5m below ordnance datum (OD) at 15,000 years before present (BP) and fell to 10m below OD around 9,500 BP. RSL then began to rise steeply to attain its current level at approximately 3,500 BP. The curve produced by Taylor *et al* (1986) suggests that submerged landscapes of Mesolithic and Neolithic date may be present around the coast of southwest Ireland.
- 4.7. These models have been updated by Brooks *et al* (2008) suggesting that for the areas of east Cork, west Cork and south Wexford, RSL rose sharply from c. 80m below OD to c. 50m below OD (west Cork) and to c. 40m below OD (south Wexford) between 15,000 to 14,000 BP before the rate of rise slowed down to c. 40m below OD to c. 35m below OD by 11,500 BP. Following this more gradual rate of rise, RSL rose steeply once more to reach c. 1m below OD by c. 6,000 BP before slowly rising to its current level. The new models by Brooks *et al* (2008) concur with those proposed by Taylor *et al* (1986) in the potential for submerged landscapes to be present from the Mesolithic to at least the Neolithic period.
- 4.8. These submerged landscapes have also been signalled by intertidal peats which have been recorded in the area just south of Ballinwilling Strand at Ballycotton Bay, where it has been estimated that land has receded by c. 6-6.5m per year since 1840 (Carter *et al* 1989). Not all land recession along this coastline, however, is due to sea level rise. At Youghal, for example, c. 2km northeast of Claycastle beach, dredging for marine aggregates in the 19th century led to major coastal changes. An estimated 270,000m<sup>3</sup> yr<sup>-1</sup> of gravel was removed from inshore shoals over the period 1850 to 1900, leading to beach lowering and shoreline recession (Carter *et al* 1989).
- 4.9. Remains of submerged forest (remnant woodland) have been recorded in the peats at Ballycotton Bay, with pollen analysis indicating that this woodland may have consisted of oak (*Quercus* sp.), hazel (*Corylus avellana*) and alder (*Alnus glutinosa*), which was later replaced by sedge (*Carex* sp.) and reed (*Phragmites australis*) swamp (Carter *et al* 1989). The woodland is estimated to have been present at around 5,000 BP, indicating a Mesolithic date (Carter *et al* 1989). Intertidal peats, containing wood and monocotyledon fragments (indicating good preservation of organic material), have also been recorded at 0.5 to 0.8m below OD at Lakeland Strand, Cork Harbour (Devoy 1984). These peats were radiocarbon

dated and seem to have accumulated between 2350±45 BP (736–239 cal BC; Q-2382) and 1810±40 BP (87–332 cal AD; Q-2381), when they were replaced by saltmarsh, which indicates that terrestrial surfaces were present until the Iron Age (Carter *et al* 1989).

- 4.10. Beyond Co. Cork intertidal peats have been located at other locations along the southern Irish coastline (predominantly in estuarine locations) (e.g. Devoy *et al* 2006; Timpany 2008; Brooks & Edwards 2006) which further indicate the potential for these deposits to occur. For example, in Dungarvan Bay carr peats were identified at Killingongford and Ballinacourty by Sinnott (1999). At the former a basal reedswamp peat, dated 4205±70 (2922–2577 cal BC; Q-2876), is overlain by a carr peat straddling modern data dated between 3470±70 (1964–1620 cal BC; Q-2875) and 780±50 (1157–1295 cal AD; Q-2874). At Ballinacourty the carr peat, below modern datum, accumulated between 3515±70 (2029–1665 cal BC; Q-2873) and 2630±70 (972–541 cal BC; Q-2872).
- 4.11. In addition to intertidal peats, offshore peats have also been recorded in marine waters outside Cork harbour, such as at Curlane Bank (W794633). Here a wood and monocotyledon peat containing remains of oak, hazel, pine (*Pinus* sp.), common reed (*Phragmites australis*) and sedges (*Cyperaceae*) signals the presence of previous fen woodland in the area. The formation of this peat sequence has been dated between 8200±75 BP (7455–7057; Q-2379) and 7840±75 BP (7028–6503 cal BC; Q-2378) indicating terrestrial woodland was in existence during the Mesolithic period (Carter *et al* 1989).
- 4.12. From these studies it seems most likely that at the three potential landfall sites, RSL rose gradually from the early Mesolithic, peaking sometime in the Iron Age. There is, therefore, the potential for previously terrestrial deposits (e.g. peats) and cultural materials from the early Mesolithic to the Iron Age to be present in submerged and intertidal areas around these locations.
- 4.13. In addition to the Holocene-age deposits associated with bays and estuaries, there have also been older Pleistocene deposits encountered, such as the Pleistocene interglacial estuarine deposits found at depth beneath glacial diamicton in Cork Harbour (Dowling *et al* 1998). Although the age of these deposits is unclear, with contradicting dates from marine isotope stage (MIS) 9 to 5e, they do demonstrate that evidence of earlier Pleistocene warm periods can be found along the coastline.

- 4.14. The first arrival of humans in Ireland has been traditionally suggested as being soon after 10,000 BP (Woodman 2012; 2015), although recent evidence from Co. Clare has suggested that Ireland might have been populated as early as 12,500 BP during the late Upper Palaeolithic (Dowd & Carden 2016). Evidence for the presence of early Mesolithic peoples in the Cork area prior to 8,000 BP, is confirmed by the presence of lithic finds and radiocarbon dating (Woodman 1985), with later Mesolithic materials having also been recorded (Andersen 1993). This suggests habitation of this area throughout the Mesolithic.
- 4.15. Proxy-evidence for the presence of Mesolithic peoples in the southwest of Ireland has also been recovered from pollen evidence taken from peatlands (e.g. Mitchell 1990; Mighall *et al* 2008; Mitchell *et al* 2013). This indicates that people were mobile and impacting the landscape during this period, which further highlights the information that may be attained from intertidal and submerged peats. Co. Cork has a rich archaeological heritage; in addition to Mesolithic cultural materials there is evidence of settlement and activity from the Neolithic onwards (e.g. Twohig & Ronayne 1993) which indicates the potential for archaeological finds from the Mesolithic onwards. Evidence of such activity is supported by the isolated find of a retouched flint blade (leaf shaped, abrupt retouch on both lateral edges and butt-trimmed - a so-called 'Bann' flake), dating from c. 3,000BC. The retouched flint blade was found in 1967 (NMI acc. no. 1972: 354; **CA25**), in a *fulacht fiadh*, on the edge of Ballycrenane beach (see Fig. 7) (Cotswold Archaeology 2017).

*Pontusval & Moguériec, Brittany, France*

- 4.16. In comparison to the UK there is relatively little information on Holocene RSL changes for this part of the North Atlantic coast (Leorri *et al.* 2012; Goslin *et al.* 2013) and there are no studies available specific to the sites of Pontusval and Moguériec. In order to interpret potential RSL change for this area, therefore, studies around Brittany have been considered together with palaeo-geographic models and other RSL studies from locations along the North Atlantic coast.
- 4.17. Studies of RSL change in the Atlantic coastal area of France (e.g. Ters 1986) have suggested that at around 20,000 to 18,000 BP, RSL was approximately 100m below present levels, with a main period of RSL rise occurring between 15,000 and 6,000 BP. Following this period of rise RSL change then stabilized near to its present level (Lambeck 1997). Palaeogeographic models of RSL change produced by Lambeck (1997) indicate that in the region of Ploudalmézeau, close to Brest and

to the two sites of Pontusval and Moguériec, RSL change appears to follow this general trend.

- 4.18. The predicted RSL curve constructed by Lambeck (1997) shows that RSL in this area rose steadily from 95m below OD to 85m below OD between 18,000 and 14,000 BP. There is then a sharp rise in sea-level with RSL rising to 10m below OD by around 6,000 BP. Following this period of rapid change, RSL continued to rise to its present level but at a more gradual rate. Similar changes in RSL during the Holocene have been recorded in the Bay of Biscay (Leorri *et al.* 2012) and Audierne Bay (Vliet-Lanoë *et al.* 2014) to the south, comparing well to those at Brittany (Lambeck 1997) and further strengthening this model.
- 4.19. From these studies it seems most likely that at Pontusval and Moguériec, RSL rose sharply from the end of the last glacial period c. 14,000 BP to 6,000 BP and then more gradually to its present level. There is, therefore, a potential for submerged terrestrial deposits from the early Mesolithic onwards in the offshore area. This potential has also been shown in the palaeogeographic maps produced by Lambeck (1997) and by Sturt *et al.* (2013) who have shown that the palaeo-shoreline of this area of France has changed considerably over the last 18,000 years and that it would have extended seaward, particularly during the Mesolithic period.
- 4.20. At a number of sites along the Atlantic coast of France (e.g. Ters 1986; Mariette 1971; Delibras & Guillier 1971; Frouin *et al.* 2007, 2009; Vliet-Lanoë *et al.* 2014a, 2014b) submerged and terrestrial peat deposits have been utilised to provide sea level index points (SLIPS) to reconstruct RSL change through the Holocene. Early peat deposits have been found at depths of up to 26.7m below OD at La Havre and 26.4m below OD at Becquet Bay, dating from as early as 9,900±300 BP (GIF-744) and 9,880±230 BP (GIFF-1023), respectively (Delibras & Guillier 1971).
- 4.21. The dates for the peats respect the RSL curve produced by Lambeck (1997) for the region of Ploudalmézeau with the age of the peat generally decreasing with increasing OD height for those peats dating to approximately 5,000 BP or more. Peats with dates from c. 5,000 to 600 BP show greater variation in OD height in relation to age and suggest that oscillations in RSL change occurred during this time. These oscillations have been confirmed, by recent studies in western Brittany and in the Bay of Biscay, as occurring between c. 7,000 to 3,000 BP (Allard *et al.*

2008; Goslin *et al.* 2013) indicating that RSL changed at different rates on a more regional scale than shown in the models by Lambeck (1997) and Leorri *et al.* (2012).

- 4.22. There is therefore good potential for buried peats to be present in the estuarine areas of Pontusval and Mogueérec, which would provide information on RSL change, landscape change and human activity from the Mesolithic to the Iron Age periods. The palaeo-environmental potential of such deposits has been realised from other estuarine sites in France such as at the Dives estuary, Normandy (Lespez *et al.* 2010).
- 4.23. The anaerobic nature of these sediments also indicates that they have good potential to contain cultural material such as wooden objects and structures. This potential is increased when taking into consideration the rich coastal and island archaeological heritage of Brittany, which includes fish traps of multiple periods, megalithic monuments, tombs and settlement sites (Scarre 2002; Daire 2009, Shi *et al.* 2012). Fish traps in particular have been recorded within the two areas under consideration here (Langouët & Daire 2009).
- 4.24. Palaeo-environmental and palaeo-climate information along the French coastline has also come from offshore cores (e.g. Naughton *et al.* 2007) indicating that there is potential for sediments in maritime locations to contain valuable palaeo-environmental and archaeological information.

#### ***Sites of cultural heritage interest within or in proximity to the CSC***

- 4.25. The datasets used in the compilation of the various baseline assessments (Headland Archaeology 2014; Cotswold Archaeology 2017) have been amalgamated with duplicate entries removed.
- 4.26. DBAs have been conducted over the entire route from the Irish to the French coasts (Headland Archaeology 2014), and more recently to address route revisions in Irish territorial waters (Cotswold Archaeology 2017). These assessments included a wider study area (WSA) of c. 5km which has now been refined to the current proposed CSC of c. 0.5km.

#### ***Irish territorial waters***

- 4.27. Two unidentified wrecks (**CA1 & CA8**; Table 2; Fig. 7), and one findspot on the foreshore of Ballinwilling Strand (**CA25**; Table 3; Fig. 7), were recorded within (the

findspot) or in proximity (the two wrecks) to the CSC (Fig. 7) in Irish territorial waters. As neither wreck has been identified they are protected under Section 3 of the National Monuments (Amendment) Act, 1987) until they have been assessed further; this protection is not an indication of archaeological potential.

4.28. An unidentified live wreck (**CA1**) includes two entries in the same location which are presumed to relate to the same site. The wreck was detected by sonar at a depth of 74.6m, c. 91.4m (300ft) by 7.3m (24ft) in height.

4.29. The second unidentified wreck, (**CA8**), is recorded at a depth of 72.98m.

Table 2 Wrecks and obstructions in proximity to the CSC in Irish territorial waters (\* = wrecks with multiple data entries)

CA no.	Name	Type	Date	Status	Latitude	Longitude	Source
CA1*	Unidentified	Wreck	Unknown	Live	51.72033	-7.92567	UKHO UAU
CA8	Unidentified	Wreck	Unknown	Unknown	51.661445	-7.827655	UKHO INFOMAR UAU

4.30. A retouched flint blade (leaf shaped, abrupt retouch on both lateral edges and butt-trimmed - a so-called 'Bann' flake), dating from c. 3,000BC, was found in 1967, in a *fulacht fiadh*, on the edge of Ballycrenane beach (NMI acc. no. 1972:354; **CA25**).

Table 3 DBA assets within the CSC

CA no.	Name	Type	Date	Status	Latitude	Longitude	Source
CA25	'Bann' flake	Retouched flint blade	c. 3000BC	Stored in National Museum of Ireland (NMI)	51.865834	-7.979895	NMI acc. no. 1972:354

4.31. The UAU has records of a number of wrecks that ran ashore in Ballycotton Bay (Cotswold Archaeology 2017: Table 3), mostly dating from the 18th and 19th centuries. No spatial data is recorded, but the project-specific geophysical survey (Cotswold Archaeology 2018a) did not detect any unknown wrecks so these will not be considered further.

***Irish territorial limit to the French coast***

- 4.32. Twenty wrecks, obstructions or sites were recorded in the CSC beyond Irish territorial waters (**HA1-HA5, HA7, HA9-HA22**; Table 4; Figs 8-11; Headland Archaeology 2014), including:
- Fourteen wrecks (**HA1-HA5, HA7, HA9-HA16**), ten of which are live and four of which are dead; and
  - Six obstructions (**HA17-HA22**), one of which is live and five of which are dead.
- 4.33. Wreck sites **HA1, HA2, HA5 & HA11** will not be considered further as no corresponding anomalies were detected by the project-specific geophysical surveys, so their locations remain unknown.
- 4.34. The *Alit* (**HA3**; Fig. 11) was a French merchant ship which sank close to the French coast on 22 October 1916, but details such as ship type and cause of sinking are not known. The location of this wreck has not been confirmed and therefore cannot be removed as there is no corresponding geophysical data to confirm or deny its existence as it lies beyond the Irish / UK median line.
- 4.35. The *Auguste Marie* (**HA4**; Fig. 11) was a French steam vessel sunk on 28 November 1916 by U-18 commanded by Claus Lafrenz. The wreck lies c. 48km north of Ushant.
- 4.36. HMS *Woodpecker* (**HA9**; Fig. 10) was a Royal Navy sloop of the Black Swan class which was torpedoed on 20 February 1944 by U-256 whilst on convoy duty. The explosion removed the stern of the ship and she sank seven days later whilst under tow. This is one of two possible locations for the wreck. Although the locations have not been confirmed they cannot be removed as there is no corresponding geophysical data to confirm or deny their existence as it lies beyond the Irish / UK median line.
- 4.37. The *Zane Spray* (**HA10**; Fig. 8) was a leisure yacht which sank on 4 July 1995 whose location has been confirmed.
- 4.38. There are five further unidentified wrecks (**HA12-16**; Figs 8-11) whose locations are known. **HA16** was classified as a rock (obstruction) by UKHO but has recently been

identified (by UAU) as a demasted brig of unknown date and origin and is therefore protected.

- 4.39. A further six assets are recorded as ‘obstructions’ (**HA17-22**), only one of which is live (**HA17**; Fig. 10), identified though a sonar contact as lying at 107m depth. The remaining five obstructions (**HA18-22**) are dead, so will not be considered further.

**Table 4 Wrecks and obstructions in proximity to the CSC from then Irish territorial limit out to the French coast**

HA no.	Name	Type	Date	Status	Latitude	Longitude	Source
3	<i>Atlit</i>	Wreck	22/10/1916	Live	48.74908	-4.3346	UKHO
4	<i>Auguste Marie</i>	Wreck	28/11/1916	Live	48.96567	-5.08483	UKHO
9	<i>HMS Woodpecker</i> (poss)	Wreck	27/02/1944	Live	49.85782	-6.78308	UKHO
10	<i>Zane Spray</i>	Wreck	04/07/1995	Live	51.31717	-7.64567	UKHO
11	<i>Honeydew</i>	Wreck	11/01/2007	Live	50.95	-7.46667	UKHO
12	Unknown	Wreck	Unknown	Live	48.98233	-5.11983	UKHO
13	Unknown	Wreck	Unknown	Live	51.6625	-7.82817	UKHO
14	Unknown	Wreck	Unknown	Live	49.33703	-6.01112	UKHO
15	Unknown	Wreck	Unknown	Live	49.23425	-5.78732	UKHO
16	Unknown	Wreck	Unknown	Live	50.74167	-7.35833	UKHO
17	Foul	Obstruction	Unknown	Live	49.53314	-6.43117	UKHO