codling wind park

Environmental Impact Assessment Report

Volume 3

Chapter 14 Marine Archaeology & Cultural Heritage


codling
wind park

Table of contents

List of tables

List of figures

Abbreviations

Abbreviation	Term in Full
ABP	An Bord Pleanála
AEZ	Archaeological Exclusion Zone
BGS	British Geological Survey
CEMP	Construction Environmental Management Plan
CIfA	Chartered Institute for Archaeologists
CWP	Codling Wind Park
CWPL	Codling Wind Park Limited
EPA	Environmental Protection Agency
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
IACs	Inter-array cables
IAM	Impact Assessment Matrix
IPPEMP	In Principal Project Environmental Monitoring Plan
JNAPC	Joint Nautical Archaeology Policy Committee
JUV	Jack-up vessel
LoD	Limit of Deviation
MAC	Maritime Area Consent
MAP	Maritime Area Planning
MARA	Maritime Area Regulatory Authority
MBES	Multibeam Echo Sounder
mBSB	Metres Below Seabed
MHWS	Mean High Water Springs
MSDA	Marine Safety Demarcation Area
NIS	Natura Impact Statement
NMI	National Museum of Ireland
NMPF	National Marine Planning Framework
NMS	National Monuments Service
nT	nanotesla
OECC	Offshore export cable corridor
OSS	Offshore substation structure
PAD	Protocol for Archaeological Discoveries

Abbreviation	Term in Full
PLGR	Pre-lay grapnel run
RMP	Record of Monuments and Places
ROV	Remotely Operated Vehicle
SAR	Search and Rescue
SBP	Sub-bottom Profiler
SMR	Sites and Monuments Record
SSC	Suspended sediment concentrations
SSS	Sidescan Sonar
TJB	Transition join bay
UAIA	Underwater Archaeology Impact Assessment
UAU	Underwater Archaeology Unit
UKHO	United Kingdom Hydrographic Office
UXO	Unexploded Ordnance
WIID	Wreck Inventory of Ireland Database
WTG	Wind turbine generator
ZoI	Zone of Influence

Definitions

Glossary	Meaning
the Applicant	The developer, Codling Wind Park Limited (CWPL).
archaeological exclusion zone	An area around a heritage asset in which construction activities and anchoring are prohibited in order to avoid impacts to the asset.
archaeological interest	There will be archaeological interest in a heritage asset if it holds, or potentially may hold, evidence of past human activity worthy of expert investigation at some point. Heritage assets with archaeological interest are the primary source of evidence about the substance and evolution of places, and of the people and cultures that made them.
array site	The red-line boundary area within which the wind turbine generators (WTGs), inter-array cables (IACs) and the Offshore Substation Structures (OSSs) are proposed.
Codling Wind Park (CWP) Project	The proposed development as a whole is referred to as the Codling Wind Park (CWP) Project, comprising of the offshore infrastructure, the onshore infrastructure and any associated temporary works.
Codling Wind Park Limited (CWPL)	A joint venture between Fred. Olsen Seawind (FOS) and Électricité de France (EDF) Renewables, established to develop the CWP Project.
designated heritage asset	A World Heritage Site, National Monument, Protected Wreck Site, designated under the relevant legislation.
Dun Laoghaire Harbour	The historic harbour of Dun Laoghaire on the southern shore of Dublin Bay with limits defined as the areas contained within and including the East and West piers of Dún Laoghaire Harbour and within 600 metres of the entrance to that harbour, together with any adjoining land, banks, inlets and havens vested in Dún Laoghaire Harbour Company and the docks, piers, jetties, quays and other works vested in that company.
Environmental Impact Assessment (EIA)	A systematic means of assessing the likely significant effects of a proposed project, undertaken in accordance with the EIA Directive and the relevant Irish legislation.
Environmental Impact Assessment Report (EIAR)	The report prepared by the Applicant to describe the findings of the EIA for the CWP Project.
export cables	The cables, both onshore and offshore, that connect the offshore substations with the onshore substation.
heritage asset	A building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its heritage interest. Heritage asset includes designated heritage assets and assets.
high water mark (HWM)	The line of high water of ordinary or medium tides of the sea or tidal river or estuary.
historic environment	All aspects of the environment resulting from the interaction between people and places through time, including all surviving physical

Glossary	Meaning
	remains of past human activity, whether visible, buried or submerged, and landscaped and planted or managed flora.
historic environment record	Information services that seek to provide access to comprehensive and dynamic resources relating to the historic environment of a defined geographic area for public benefit and use.
landfall	The point at which the offshore export cables are brought onshore and connected to the onshore export cables via the transition joint bays (TJB). For the CWP Project The landfall works include the installation of the offshore export cables within Dublin Bay out to approximately 4 km offshore, where water depths that are too shallow for conventional cable lay vessels to operate.
limit of deviation (LoD)	Locational flexibility of permanent and temporary infrastructure is described as a LoD from a specific point or alignment.
Maritime Area Consent (MAC)	A Maritime Area Consent provides State authorisation for a prospective developer to undertake a maritime usage and occupy a specified part of the maritime area. A MAC is required to be in place before development permission can be sought.
Maritime Area Planning (MAP) Act 2021	An Act to regulate the maritime area, to achieve such regulation by means of a National Marine Planning Framework, maritime area consents for the occupation of the maritime area for the purposes of maritime usages that will be undertaken for undefined or relatively long periods of time (including any such usages which also require development permission under the Planning and Development Act 2000) and licences for the occupation of the maritime area for maritime usages that are minor or that will be undertaken for relatively short periods of time
offshore export cable corridor (OECC)	The area between the array site and the landfall, within which the offshore export cables cable will be installed along with cable protection and other temporary works for construction.
planning application boundary	The area subject to the application for development permission, including all permanent and temporary works for the CWP Project.
significance (for heritage policy)	The value of a heritage asset to this and future generations because of its heritage interest. That interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting.
zone of Influence (ZoI)	Spatial extent of potential impacts resulting from the project.

14 MARINE ARCHAEOLOGY & CULTURAL HERITAGE

14.1 Introduction

1. Codling Wind Park Limited (hereafter 'the Applicant') is proposing to develop the Codling Wind Park (CWP) Project, which is located in the Irish sea approximately 13–22 km off the east coast of Ireland, at County Wicklow.

2. This chapter forms part of the Environmental Impact Assessment Report (EIAR) for the CWP Project. The purpose of the EIAR is to provide the decision-maker, stakeholders, and all interested parties with the environmental information required to develop an informed view of any likely significant effects resulting from the CWP Project, as required by the European Union (EU) Directive 2011/92/EU (as amended by Directive 2014/52/EU) (the EIA Directive), and as implemented by the Planning and Development Act 2000, as amended, and the Planning and Development Regulations 2001, as amended.

3. This EIAR chapter describes the potential impacts of the CWP Project's offshore infrastructure on marine archaeology and cultural heritage during the construction, operation and maintenance, and decommissioning phases.

4. In summary, this EIAR chapter:

   - Details the EIA scoping and consultation process undertaken and sets out the scope of the impact assessment for marine archaeology and cultural heritage;
   - Identifies the key legislation and guidance relevant to marine archaeology and cultural heritage, with reference to the latest updates in guidance and approaches;
   - Confirms the study area for the assessment and presents the impact assessment methodology for marine archaeology and cultural heritage;
   - Describes and characterises the baseline environment for marine archaeology and cultural heritage, established from desk studies, project survey data and consultation;
   - Defines the project design parameters for the impact assessment and describes any embedded mitigation measures relevant to the marine archaeology and cultural heritage assessment;
   - Presents the assessment of potential impacts on marine archaeology and cultural heritage and identifies any assumptions and limitations encountered in compiling the impact assessment; and
   - Details any additional mitigation and / or monitoring necessary to prevent, minimise, reduce or offset potentially significant effects identified in the impact assessment.

5. The assessment should be read in conjunction with **Appendix 14.1 Cumulative Effects Assessment**, which considers other plans, projects and activities that may act cumulatively with the CWP Project and provides an assessment of the potential cumulative impacts on marine archaeology and cultural heritage.

6. A summary of the CEA for marine archaeology and cultural heritage is presented in **Section 14.11**.

7. Additional information to support the assessment includes:

   - **Appendix 14.2 Representative Scenario and Limit of Deviation (LoD) assessment**
   - **Appendix 14.3 Marine Archaeological Technical Report**

14.2 Consultation

8. Consultation with statutory and non-statutory organisations is a key part of the EIA process. Consultation with regard to marine archaeology and cultural heritage has been undertaken to inform the approach to and scope of the assessment.

9. The key elements to date have included EIA scoping, consultation events, and ongoing topic-specific meetings with key stakeholders, particularly the Underwater Archaeology Unit (UAU) of the National Monuments Service (NMS). The feedback received throughout this process has been considered in preparing the EIAR. EIA consultation is described further in **Chapter 5 EIA Methodology,** the **Planning Documents** and in the **Public and Stakeholder Consultation Report**, which has been submitted as part of the development permission application.

10. **Table 14-1** provides a summary of the key issues raised during the consultation process relevant to marine archaeology and cultural heritage and details how these issues have been considered in the production of this EIAR chapter.

Table 14-1 Consultation responses relevant to marine archaeology and cultural heritage

Consultee	Comment	How issues have been addressed
Scoping responses		
Development Applications Unit (DAU) on behalf of NMS 27 April 2021	Archaeological monitoring (licenced under the National Monuments Acts 1930–2004) of all seabed disturbance works should be included as a mitigation measure to ensure that archaeological heritage is not impacted. This shall be included as part of the mitigation strategy [including] the initial archaeological assessment of the survey data to identify potential archaeological receptors and the post-consent production of a Protocol for Archaeological Discoveries (PAD) to be implemented by contractors during construction works.	These mitigation strategies have been adopted and are discussed further in **Section 14.9**.
	Considerations relating to documented and undocumented losses yet to be located are noted. The baseline will be informed by the archaeologically assessed geophysical survey datasets which may lead to previously unrecorded / unlocated wrecks being identified. These datasets will be enhanced by historic / documentary sources including the United Kingdom Hydrographic Office (UKHO); Wreck Viewer & Wreck Inventory of Ireland Database; Record of Monuments and Places (RMPs). As part of the archaeological assessment, a gazetteer of all the records will be populated describing and detailing information for	The baseline has been informed by the specified datasets, and a gazetteer has been populated with all relevant records. The baseline is discussed in **Section 14.6**, and the gazetteer is presented in Annexes 3–10 of the Marine Archaeological Technical Report (**Appendix 14.3**).

Consultee	Comment	How issues have been addressed
	each record, this will be presented as an appendix in the EIAR.	
	Archaeological intertidal walkover surveys will be undertaken by a suitably qualified archaeologist at the selected landfall sites, accompanied by metal detection survey. The latter survey area will need to be refined based on the chosen landfall zones. These surveys shall be licenced under the National Monuments Acts 1930–2004 and the findings will inform the EIAR.	Intertidal walkover surveys have been undertaken and their results have informed the baseline discussed in **Section 14.6**
	The archaeological baseline will be derived from newly acquired geophysical survey data (captured during 2021) which will cover the offshore array site and export cable route options. These surveys shall be licenced under the National Monuments Acts 1930–2004. The geophysical data will be assessed and interpreted by an appropriately qualified archaeologist and used to inform the EIAR.	The geophysical survey data have been assessed and the results of this assessment inform the baseline discussed in **Section 14.6**.
	Terrestrial sites are beyond the scope of the Offshore EIAR and as such will not be included as part of the intertidal zone. Any terrestrial sites will be included in the Onshore EIAR.	Noted, terrestrial sites have not been included as part of the intertidal zone. Terrestrial archaeology and cultural heritage are incorporated into **Chapter 23 Onshore Archaeology, Architecture and Cultural Heritage.**
	Topographical files of the National Museum of Ireland will be consulted to inform the baseline of the EIAR.	Topographical files have been consulted from the townlands of Sandymount.
Topic specific meetings		
Meeting with UAU 25 October 2022	CWP should also consider the potential for submerged landscapes. This should include reference to a paper by Peter Woodman which includes an analysis of sea level change in the Dublin Bay area.	Available borehole logs have been used to supplement sub-bottom profiler (SBP) data from the geophysical surveys. These have been used to form an understanding of the geoarchaeology and submerged prehistory potential and have been incorporated into the baseline characterisation in **Section 14.6**. Geoarchaeological assessments of marine boreholes from the array site, and immediate vicinity of the

Consultee	Comment	How issues have been addressed
		substation at “Pigeon Park” have been incorporated into the baseline. Citation noted and consulted: Westley K & Woodman P, 2020, Ireland: Submerged prehistoric sites and landscapes in Bailey G., Galanidou N., Peeters H., Jöns H. and Mennenga M. (eds.) “The Archaeology of Europe’s Drowned Landscapes”. Coastal Research Library, vol 35. Cham, Switzerland: Springer International Publishing AG, pp. 221–248. doi: 10.1007/978-3-030-37367-2_11.
	Could radiocarbon dating be undertaken for boreholes within the intertidal area?	If sediment sequences contain suitable materials, e.g., peat deposits or other sediments preserving *in situ* organic material, then further assessment, such as radiocarbon dating, would be considered if appropriate for achieving archaeological objectives.
	Any data gaps are to be highlighted in the reports.	Data gaps are highlighted in **Section 14.5** of this Chapter, and any supporting reports.

14.3 Legislation, policy and guidance

14.3.1 Legislation

11. The legislation that is applicable to the assessment of maritime cultural heritage is summarised below. Further detail is provided in **Chapter 2 Policy and Legislative Context**.

14.3.1. The National Monuments Act 1930 and the National Monuments (Amendments) Act 1954 to 2004

12. These acts provide a specific legislative basis for the protection of archaeological monuments and areas and archaeological objects. The Minister of Arts, Heritage, Gaeltacht and the Islands is required to establish and maintain both a ‘Register of Monuments and Places’ and ‘Record of Historic Monuments’ under the terms of the 1987 and 1994 Amendments Acts, respectively. Section 1 of the same 1987 Act states that all monuments dating to before AD 1700 and any monument meeting specific criteria of interest are automatically defined as ‘historic monuments’. Section 3 of the same 1987 Act states that wrecks greater than 100 years old and archaeological objects found underwater are protected. The Act also allows the imposition of an Underwater Heritage Order to protect sites of historical, archaeological or artistic importance. This can include wrecks less than 100 years old.

14.3.1. Historical and Archaeological Heritage and Miscellaneous Provisions Act 2023

13. The Act repeals and replaces the National Monuments Acts. The Act introduces new measures to protect archaeological structures and sites, including the establishment of a single Register of Monuments, a statutory reporting scheme for newly discovered monuments and provisions to prevent the illicit import and possession of stolen cultural property. The Act incorporates historic wrecks and underwater cultural archaeological objects into the new scheme for monument protection.

14.3.1. Maritime Area Planning Act 2021

14. This Act was established to regulate the maritime area, achieved by means of a National Marine Planning Framework (2021), providing maritime area consents and licences for the occupation of the maritime area for maritime usages and to establish a Maritime Area Regulatory Authority (MARA) to grant, revoke and suspend such consents and licences. Responsibility for heritage within the planning system falls with the Minister for Housing, Local Government and Heritage.

14.3.2 Policy

15. The overarching planning policy relevant to the CWP Project is described in EIAR **Chapter 2 Policy and Legislative Context**.

16. The assessment of the CWP Project against relevant planning policy is provided in the **Planning Report**. This includes planning policy relevant to marine archaeology and cultural heritage.

14.3.3 Guidance

17. The principal guidance and best practice documents used to inform the assessment of potential impacts on marine archaeology and cultural heritage are summarised below. Where specific guidance is not available for Ireland, best practice guidance documents from other jurisdictions have been referred to. The guidance specific to Ireland is as follows:

- Framework and Principles for the Protection of the Archaeological Heritage (Department of Arts, Heritage, Gaeltacht and the Islands, 1999); and
- Conserving Ireland's Maritime Heritage, Proposing Policies and Priorities for the National Heritage (The Heritage Council, 2006).

18. Best-practice guidance consulted from other jurisdictions includes:

- Managing Lithic Scatters: Archaeological Guidance for planning authorities and developers (English Heritage (now Historic England), 2000);
- Military Aircraft Crash Sites: Guidance on their significance and future management (English Heritage (now Historic England), 2002);
- The Code of Practice for Seabed Developers (Joint Nautical Archaeology Policy Committee and The Crown Estate, 2006);
- Historic Environment Guidance for the Offshore Renewable Energy Sector (Wessex Archaeology 2007);
- Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment (English Heritage (now Historic England), 2008);
- Environmental Archaeology: A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation (second edition) (English Heritage (now Historic England), 2011);

- Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (Gribble & Leather, 2011);
- Ships and Boats: Prehistory to Present: Designation Selection Guide (English Heritage (now Historic England), 2012);
- Standard and Guidance for Historic Environment Desk-based Assessment (Chartered Institute for Archaeologists (CIfA), 2014, updated 2017);
- Marine Geophysics Data Acquisition, Processing and Interpretation Guidance Notes (English Heritage (now Historic England), 2013);
- Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record (Historic England, 2015); and
- Curating the Palaeolithic (Historic England, 2023).

14.4 Impact assessment methodology

19. **Chapter 5 EIA Methodology** provides a summary of the general impact assessment methodology applied to the CWP Project, which includes the approach to the assessment of transboundary and inter-related effects. The approach to the assessment of cumulative impacts is provided in **Chapter 5, Appendix 5.1 CEA Methodology**.

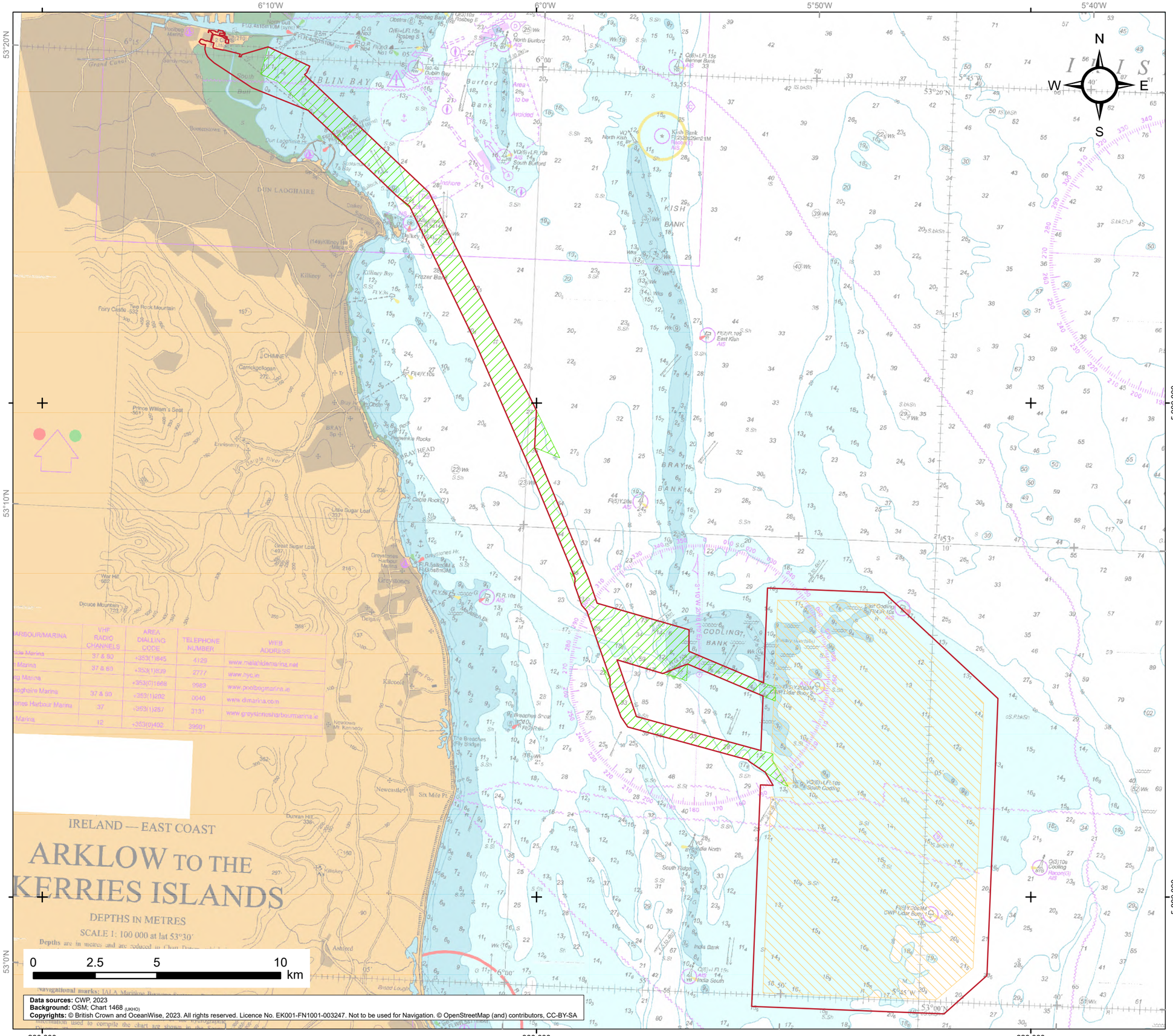
20. The following sections confirm the methodology used to assess the potential impacts on marine cultural heritage.

14.4.1 Study area

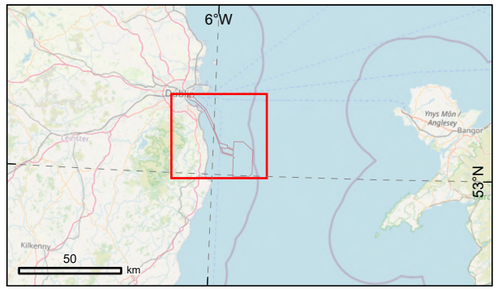
21. The study area has been defined through reference to the offshore development area, as this represents the area in which construction and operation of the development will take place, with the Marine Safety Demarcation Area being used only for short-term navigation safety activities, such as the deployment of buoyage.

22. The study area for the marine cultural heritage assessment has been defined on the basis of the area over which potential direct and indirect effects of the CWP Project are predicted to occur on marine heritage receptors during construction, operation and maintenance, and decommissioning phases.

23. This comprises the array site and Offshore Export Cable Corridor (OECC) of the CWP Project, including the intertidal area to the high water mark (HWM) (**Figure 14-1**) and reclaimed area known as Pigeon Park. In order to capture heritage receptors that may be close to, or partly within, the offshore development area, a wider search area of 500 m around the array site and OECC was applied. The assessed study area also considered an appropriate and adequate zone of influence (ZoI) with regards to potential impacts (direct and indirect impacts) on marine archaeology and cultural heritage.



HARBOUR/MARINA	VHF RADIO CHANNELS	AREA DIALLING CODE	TELEPHONE NUMBER	WEB ADDRESS
...ula Marina	37 & 80	+353(1)845	4129	www.malahidmarina.net
...Marina	37 & 80	+353(1)809	2777	www.nyc.ie
...ig Marina		+353(0)1668	9583	www.poolbegmarina.ie
...eghaire Marina	37 & 80	+353(1)202	0040	www.dmarina.com
...nes Harbour Marina	37	+353(1)287	3131	www.greystonesharbourmarina.ie
...Marina	12	+353(0)402	39001	



Legend

- Planning application boundary
- CWP Array site geophysical data coverage
- CWP OECC geophysical data coverage

codling wind park

Project: Codling Wind Park

Contractor: Wessex Archaeology
Website: www.wessexarch.co.uk

Figure 14.1
Study Area

CWP doc. number: CWP-WEX-ENG-08-01-MAP-0993

Internal descriptive code: WE - PAB..WF.S.PLGN..OECC.PB.S.PLGN - EIAR.FIG.14.01

Size: A3

Scale: 1:150,000

CRS: EPSG 25830

Rev.	Description	Date	By	Chk'd	App'd
A	First issue	2023/01/31	KF	RM	AB
B	Second revision	2024/02/07	KF	SS	AB
C	Third revision	2024/03/21	KF	SS	AB
D	Final version	2024/04/24	KF	SS	AB

14.4.2 Data and information sources

24. At the point of application, the data sources below remain valid and appropriate for characterising the baseline environment for marine archaeology and culture heritage.

Site-specific surveys

25. In order to provide site-specific and up-to-date information on which to base the impact assessment, an intertidal walkover survey was conducted in South Dublin Bay on 30 August 2021. This survey has been used to inform the baseline assessment in this EIAR chapter. A metal detection survey was also undertaken in advance of geotechnical works in South Dublin Bay in March 2022 (Wessex Archaeology 2022).

26. As part of the onshore substation works of the CWP Project, a geophysical survey was undertaken in Dublin Port by Hydromaster Ltd, with advice from ADCO (Hydromaster 2022). This aimed to identify seabed features within four defined zones and recommend further work on sites of archaeological potential. No archaeological sites were identified; however, ground truthing (via diving) was undertaken on seventeen of the identified anomalies (ADCO 2023). No targets of archaeological or historical interest were encountered.

Desk study

27. In addition to the site-specific surveys, a comprehensive desk-based review was undertaken to inform the baseline for maritime cultural heritage. Key data sources used to inform the assessment are set out in **Table 14-2**.

Table 14-2 Data sources

Data	Source	Date	Notes
Wreck and obstructions database	United Kingdom Hydrographic Office (UKHO)	13 January 2023	Data used to inform receptor gazetteer
Wreck Inventory of Ireland Database (WIID)	National Monuments Service	13 January 2023	Data used to inform receptor gazetteer
Sites and Monuments Record (SMR)	Archaeological Survey of Ireland, National Monuments Service	23 February 2023	No relevant data
Topographical files	National Museum of Ireland	23 February 2023	Data used to inform receptor gazetteer

Geophysical assessment

28. A number of data sources were consulted during this assessment, including:

- Geophysical survey datasets acquired by MMT in 2021 (MMT 2021a–c), comprising SBP, Side Scan Sonar (SSS), Multibeam Echo Sounder (MBES) and Magnetometer data;
- Geophysical survey datasets acquired by GTEC in 2021 (G-tec 2021a–c), comprising SBP, SSS, MBES and Magnetometer data;

- The results of an assessment of 2013 magnetometer data undertaken by Osiris (provided by CWPL);
- Recorded wreck and obstruction data acquired via the United Kingdom Hydrographic Office (UKHO);
- Relevant background mapping from the area (British Geological Survey (BGS) 1989, admiralty charts received from UKHO); and
- Supplied survey reports (MMT 2021a–c , G-tec 2021a–c), Hydromaster 2022.

14.4.3 Impact Assessment

29. The significance of potential effects has been evaluated using a systematic approach, based upon identification of the importance / value of receptors and their sensitivity to the project activity, together with the predicted magnitude of the impact.

30. The terms used to define receptor sensitivity and magnitude of impact are based on a range of sources, particularly Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment (English Heritage (now Historic England) 2008) and Ships and Boats: Prehistory to Present – Designation Selection Guide (English Heritage (now Historic England) 2012), as there is currently no equivalent Irish guidance available. These criteria have been adopted in order to implement a specific methodology for marine archaeology and cultural heritage.

Sensitivity of receptor

31. For each effect, the assessment identifies receptors sensitive to that effect and implements a systematic approach to understanding the impact pathways and the level of impacts on given receptors.

32. Receptor sensitivity is determined by considering a combination of value, tolerance, adaptability and recoverability.

33. Cultural heritage and marine archaeology receptors cannot typically adapt, tolerate, or recover from physical impacts resulting in material damage or loss caused by development activities.

34. Consequently, the sensitivity of each receptor is predominantly quantified only by its value.

35. Within this EIAR, value is weighed by consideration of the potential for the receptor to demonstrate the following value criteria:

- Evidential value – deriving from the potential of a place to yield evidence about past human activity;
- Historical value – deriving from the ways in which past people, events and aspects of life can be connected through a place to the present. It tends to be illustrative or associative;
- Aesthetic value – deriving from the ways in which people draw sensory and intellectual stimulation from a place; and,
- Communal value – deriving from the meanings of a place for the people who relate to it, or for whom it figures in their collective experience or memory. Communal values are closely bound up with historical (particularly associative) and aesthetic values but tend to have additional and specific aspects.

36. With regards to assessing the value of shipwrecks, the following criteria can also be used to assess a receptor in terms of its value (English Heritage (now Historic England) 2012):

- Period;
- Rarity;
- Documentation;
- Group value;

- Survival / condition; and
- Potential.

37. The definitions of receptor sensitivity for the purpose of the marine cultural heritage assessment are provided in **Table 14-3.**

Table 14-3 Criteria for determination of receptor sensitivity

Sensitivity	Criteria
High	Best known, only example or above-average example and / or significant or high potential to contribute to knowledge and understanding and / or outreach. Receptors with a demonstrable international or national dimension to their importance are likely to fall within this category; Wrecked ships and aircraft with an international dimension to their importance and any wreck protected by national law (i.e., all wrecks over 100 years old); and Known submerged prehistoric sites and landscapes with the confirmed presence of largely *in situ* artefactual material or palaeogeographic features with demonstrable potential to include artefactual and / or palaeoenvironmental material, possibly as part of a prehistoric site or landscape.
Medium	Average example and / or moderate potential to contribute to knowledge and understanding and / or community engagement; • Includes wrecks of ships and aircraft that have moderate potential based on a formal assessment of their importance in terms of build, use, loss, survival, and investigation; and • Prehistoric deposits with moderate potential to contribute to an understanding of the palaeoenvironment.
Low	Below-average example and / or low potential to contribute to knowledge and understanding and / or community engagement; • Includes wrecks of ships and aircraft that have low potential based on a formal assessment of their importance in terms of build, use, loss, survival, and investigation; and • Prehistoric deposits with low potential to contribute to an understanding of the palaeoenvironment.
Very low	Poor example and / or little or no potential to contribute to knowledge and understanding and / or community engagement. Receptor with little or no surviving archaeological interest.

Magnitude of impact

38. The scale or magnitude of potential impacts (both beneficial and adverse) depends on the degree and extent to which the CWP Project activities may change the environment, which usually varies according to project phase (i.e., construction, operation, maintenance, and decommissioning).

39. Factors that have been considered to determine the magnitude of potential impacts include:

- Area of influence / spatial extent;
- Level of deviation from baseline conditions;
- Frequency of impact;

- Duration of impact; and
- Reversibility of impact.

40. The criteria for defining magnitude of impact for the purpose of the marine archaeology and cultural heritage assessment are provided in **Table 14-4**.

Table 14-4 Criteria for determination of magnitude of impact

Magnitude	Criteria
High	Complete or comprehensive physical damage or changes to the character of the receptor
Medium	Considerable changes that affect the character of the receptor, resulting in considerable physical damage
Low	Minor change that partially affects the character of the receptor, resulting in some physical damage
Negligible	Very low or negligible change to the character of the receptor, with no or negligible physical damage leading to an imperceptible change to the baseline

Significance of effect

41. As set out in **Chapter 5 EIA Methodology**, an Impact Assessment Matrix (IAM) is used to determine the significance of an effect. In basic terms, the potential significance of an effect is a function of the sensitivity of the receptor and the magnitude of the impact, as shown in **Table 14-5**.

42. The matrix provides a framework for the consistent and transparent assessment of predicted effects across all technical chapters; however, it is important to note that individual assessments are based on relevant guidance and the application of professional judgement.

43. The matrix provides levels of effect significance ranging from Imperceptible to Profound, as defined in the Environmental Protection Agency (EPA) (2022) EIAR Guidelines. For the purposes of this assessment, potential effects identified to be of 'Moderate' significance or above are considered to be significant in EIA terms, and additional mitigation will be required. Effects identified as less than moderate significance are generally considered to be not significant in EIA terms.

Table 14-5 Impact assessment matrix for determination of significance of effect

Sensitivity of Receptor	Magnitude of Impact			
	High	Medium	Low	Negligible
High	Profound	Significant	Moderate / Slight	Slight
Medium	Significant	Moderate	Slight	Not Significant
Low	Moderate / Slight	Slight	Not Significant	Not Significant
Very Low	Slight	Not Significant	Not Significant	Imperceptible

14.5 Assumptions and limitations

44. The assessment has been undertaken based on the following assumptions:

- Data used to compile this report include secondary information derived from a variety of sources, as detailed in **Section 14.4** of this Chapter, only some of which have been directly examined for the purposes of this assessment. The assumption is made that the secondary data, as well as those derived from other secondary sources, are adequately accurate for the purposes of EIA;
- The records held by the UKHO, NMS, and the other sources used in this assessment are not a record of all surviving cultural heritage receptors, but rather a record of the discovery of a wide range of archaeological and historical components of the marine historic environment. The information held within these is assumed to be incomplete and does not preclude the subsequent discovery of further elements of the historic environment that are, at present, unknown. This relates to currently unknown buried archaeological receptors; and
- Data obtained from topographic files, held by the NMI, were used for a Remote Topographical Files Search. Records for the townlands of Sandymount were provided without spatial data. For further details to be obtained, in-person appointments need to be made to consult the relevant topographical files at the NMI.

14.6 Existing environment

45. The following sections provide a description of the baseline conditions for marine archaeology and cultural heritage. The baseline resource of marine archaeology and cultural heritage, which includes known wrecks and obstructions, and which identified geophysical receptors, the potential for further maritime and aviation archaeological receptors, potential seabed prehistory and intertidal heritage receptors, is presented in **Appendix 14.3 Marine Archaeology Technical Report** to this EIAR. The full baseline of anomalies is presented in Annexes 3–10 and illustrated in Figures 1–15 and Sheet 1 of Appendix 14.3. The section below presents a summary of the baseline as presented in the Underwater Archaeology Impact Assessment (UAIA) as part of the Foreshore Licence Application (Wessex Archaeology 2023) and which the UAU of the NMS have confirmed is appropriate.

14.6.1 Palaeogeography

46. The appraisal of geophysical data within the study area resulted in the identification of 32 features of palaeogeographical interest. Full details can be found in Annexes 3–6 and illustrated in Figures 3–6 of **Appendix 14.3 Marine Archaeological Technical Report**.

47. These are summarised as follows and listed in **Table 14-6**:

- Twelve marine borehole logs from across the array site, and a further five marine borehole logs (provided by DPC from the 3FM project site investigations) adjacent to the proposed substation site (Pigeon Park), were geoarchaeologically assessed, and sediment sequences recovered were concluded to possess low archaeological potential – primarily glacial and glacio-fluvial sediments or relatively recent, disturbed Holocene sequences. No further work was recommended on these borehole locations (Figures 3–4 of Appendix 14.3).
- However, six channels (including one complex channel) and one fine-grained deposit were assigned a P1 archaeological rating (feature of probable archaeological interest, either because of its palaeogeography or likelihood for producing palaeoenvironmental material), all of which were within the array site; and
- Twenty-five cut and fills were assigned a P2 archaeological rating (feature of possible archaeological interest), of which 21 were within the array site, and four were within the OECC.

Table 14-6 Palaeogeographic features within the study area

ID number	Classification	Depth Range (mBSB)		Archaeological Discrimination	Location
		From	To		
75000	Cut and fill	0.4	7.9	P2	Array
75001	Cut and fill	0.2	3.1	P2	Array
75002	Cut and fill	0.2	8.0	P2	Array
75003	Cut and fill	0.2	3.2	P2	Array
75004	Cut and fill	0.2	3.4	P2	Array
75005	Cut and fill	0.3	8.8	P2	Array
75006	Cut and fill	0.2	6.0	P2	Array
75007	Cut and fill	0.3	4.0	P2	Array
75008	Cut and fill	0.3	4.9	P2	Array
75009	Cut and fill	0.2	6.5	P2	Array
75010	Cut and fill	0.4	3.6	P2	Array
75011	Channel	0.2	8.1	P1	Array
75012	Cut and fill	0.3	3.0	P2	Array
75013	Cut and fill	1.3	8.0	P2	Array
75014	Complex channel	0.2	15.7	P1	Array
75015	Fine-grained deposit	1.0	6.7	P1	Array
75016	Channel	0.2	10.5	P1	Array
75017	Cut and fill	0.3	4.9	P2	Array
75018	Cut and fill	0.3	2.4	P2	Array
75019	Cut and fill	0.4	3.6	P2	Array
75020	Channel	0.4	8.7	P1	Array
75021	Channel	0.2	9.5	P1	Array
75022	Cut and fill	0.5	7.4	P2	Array
75023	Cut and fill	0.3	7.7	P2	Array
75024	Cut and fill	0.6	2.6	P2	Array
75025	Channel	0.3	8.6	P1	Array
75026	Cut and fill	0.5	5.2	P2	Array
75027	Cut and fill	0.4	4.2	P2	Array
75028	Cut and fill	0.2	4.9	P2	OECC
75028	Cut and fill	0.4	2.5	P2	OECC

ID number	Classification	Depth Range (mBSB)		Archaeological Discrimination	Location
		From	To		
75029	Cut and fill	0.3	2.7	P2	OECC
75031	Cut and fill	0.3	7.4	P2	OECC

48. The assessment of SBP data shows that the older sediment types (Unit 1 and 2a, 2b and 2c) are considered of relatively low archaeological potential; however, the overlying Holocene Unit 3 contains a number of channel features, some of which are associated with sediments of palaeoenvironmental interest and are likely to be of high archaeological potential. The more recent Units 4a and 4b are thought to comprise possible intertidal to marine sediments of sands, silts, and clays, and although not considered of archaeological potential in themselves, they have the potential to contain buried archaeological sites.

49. **Table 14-7** summarises the potential for seabed prehistory assets and their respective value based on the criteria described in **Table 14-3.**

Table 14-7 Value of seabed prehistory assets

Asset Type	Definition	Value
Potential *in situ* prehistoric sites	Primary context features and associated artefacts and their physical setting (if found).	High
	Known submerged prehistoric sites and landscape features with the demonstrable potential to include artefactual material.	
Potential submerged landscape features	Other known submerged palaeolandscape features and deposits likely to date to periods of prehistoric archaeological interest with the potential to contain *in situ* material.	High
Potential derived prehistoric finds	Isolated discoveries of prehistoric archaeological material discovered within secondary contexts.	Medium
Potential palaeoenvironmental evidence	Isolated examples of palaeoenvironmental material.	Low
	Palaeoenvironmental material associated with specific palaeolandscape features or archaeological material.	High

14.6.2 Seabed Features: Maritime (array site)

50. Currently, no sites within the array site are subject to statutory protection.

51. A total of 194 features have been identified as being of possible archaeological potential within the array site, designated as follows:

- One A1 anomaly (anthropogenic origin of archaeological interest);
- 36 A2_h anomalies (anomaly of likely anthropogenic origin but of unknown date; may be of archaeological interest or a modern feature); and
- 157 A2_l anomalies (anomaly of possible anthropogenic origin but interpretation is uncertain; may be anthropogenic or a natural feature).

52. Full details can be found in Annex 7 and illustrated in Figures 7–8 of **Appendix 14.3 Marine Archaeological Technical Report**.

53. Anomaly 70040 located within the array site has been designated as A1 (i.e., of anthropogenic origin of archaeological interest). This anomaly has been classified as a debris field; an area of numerous debris items with no coherent structure. This debris field was identified in the SSS data as an area (measuring 23.5 x 18.5 x 0.6 m) of multiple small, angular dark reflectors with the largest measuring 3.3 x 0.3 x 0.2 m. It was also identified in the MBES data as a distinct irregular mound. This feature has an associated large magnetic anomaly of 389 nT, indicating that a significant amount of ferrous material is present. No coherent structure is present, so this feature has not been classified as a wreck but is interpreted as an area of ferrous debris.

14.6.3 Seabed Features: Maritime (OECC)

54. Currently, one designated maritime site within the OECC is subject to statutory protection under Irish legislation. This is the wreck of HMS *Guide Me II* (70366), a British fishing vessel, which was converted to an armed patrol vessel in 1915 and sunk following a collision in 1918.

55. A total of 260 features have been identified as being of possible archaeological potential within the OECC, designated as follows:

- One A1 anomaly (anthropogenic origin of archaeological interest);
- 109 A2_h anomalies (anomaly of likely anthropogenic origin but of unknown date; may be of archaeological interest or a modern feature);
- 148 A2_l anomalies (anomaly of possible anthropogenic origin but interpretation is uncertain; may be anthropogenic or a natural feature); and
- Two A3 items (historic record of possible archaeological interest with no corresponding geophysical anomaly), consisting of a recorded wreck and recorded obstruction.

56. Full details can be found in Annex 8 and illustrated in Figures 9–10 of **Appendix 14.3 Marine Archaeological Technical Report**.

57. The wreck of HMS *Guide Me II* (70366) has been designated as A1 (i.e. of anthropogenic origin of archaeological interest). The site was identified in the SSS data as a distinct elliptical dark reflector measuring 31.5 x 7.1 x 3.2 m, demarking the outline of an interpreted generally intact hull. A more pointed end at the south-east indicates this may be the bow and the more angular north-west end is interpreted as the stern. Some internal angular dark reflectors are visible, which suggest outlines of the internal structure, and a taller more central shadow may indicate that the vessel is standing upright.

58. This wreck is charted by the UKHO (6943) and has an associated NMS record (W01482), which report the wreck as being identified by divers as HMS *Guide Me II*. A naval gun and the ship's bell have since been recovered. It has been recorded as a generally intact and upright wreck with collision damage visible on the port side (refer to Sheet 1 of **Appendix 14.3 Marine Archaeological Technical Report**).

59. The two A3 records consist of record 70463 and record 70352. The former is the reported position of a wooden wreck through the NMS (W01544) database, discovered by a Dutch dredging company in 1989 during works for the installation of a sewerage pipe. This wreck was reburied once the pipe was laid. There is potential for associated debris to be present within the vicinity. Record 70352 is classified as a recorded obstruction. This is the recorded position of an anchor identified on the seabed in both the UKHO (6971) and NMS (W10597) databases. This obstruction was first identified in 1991 and last surveyed in 2009. No anomalous features were identified in the geophysical data at this location.

14.6.4 Marine Recorded Losses

60. Recorded Losses can be considered as an indication of the potential for archaeological maritime remains to exist within the study area and the type and number of wrecks that could be present. These records relate to vessels reportedly lost for which no physical wreck remains have ever been identified. **Table 14-8** shows the distribution of these documented losses according to the date of loss for those records whose position fall within the study area. Details of these losses are present in Annex 9 of **Appendix 14.3 Marine Archaeological Technical Report**.

Table 14-8 Recorded Losses – summary by date

Date	Number of records of ships
Pre-1500 AD	1
1500 to 1799	535
1800 to 1899	853
1900 to 1945	123
Post-1946	1
Unknown	5
Total	**1518**

14.6.5 Seabed Features: Aviation

61. No known aircraft crash sites are recorded within the study area. Nonetheless, there is the potential for aircraft or aircraft-related debris to exist on the seafloor within the study area. Given the identified potential of the area for military aircraft crashes, particularly relating to the First World War, the likelihood would be for any aircraft crash to be of military origin, which would be automatically protected under the National Monuments Acts and the Historical and Archaeological Heritage and Miscellaneous Provisions Act 2023 (when commenced) if considered 'a wreck 100 or more years old', and therefore would be of high value. This would include both Allied and Axis aircraft and would relate to both complete aircraft wrecks and debris scatters.

62. One Recorded Loss was identified within the study area, as recorded in the WIID for the area. As this is a Recorded Loss, the positional data are unreliable and serve only to provide an indication of the types of aircraft that flew over this coastline. In many cases the location is only a set of general coordinates, a general distance and bearing from a landmark, or the location of the crew's dinghy or recovered remains.

14.6.6 Seabed Features: South Bank of River Liffey

63. A diver-truthing survey was undertaken on 17 targets identified from SSS survey data from Dublin Port by Hydromaster Ltd (ADCO 2023). No targets of archaeological or historical interest were observed. Targets largely consisted of modern debris, loose worked timbers relating to jetty / wharf structure and two modern boats, one made of fiberglass and the other being a motorboat.

14.6.7 Intertidal Heritage Receptors

64. There are six records relating to archaeological sites, artefacts, material and standing remains within the intertidal zone (to MHWS) of the study area. These consist of a known site and archaeological material identified during an archaeological walkover survey.

65. These are the Ringsend wreck (1020–1024) and the wreck material discovered during the walkover survey (1001–1003), both of which are considered to be of high value due to their potential. Similarly, as the value of potential wrecks cannot be evaluated until they are discovered, potential wrecks of all periods should be expected to be of high value.

66. The other two findspots consist of truncated pine timber (1004), and a possible weir (1005), both are considered as low value.

67. A metal detection survey along the landfall area identified a further 14 anomalies (1006–1019), all of unknown value.

68. The potential for further material to be exposed along the intertidal zone is highlighted by the records from Dublin South City, as identified within topographical files curated by the National Museum of Ireland. Further details of these records are in Annex 10 and illustrated in Figures 11–15 of **Appendix 14.3 Marine Archaeological Technical Report**.

14.6.8 Climate change and natural trends

69. Impacts of climate change on marine archaeology and cultural heritage could result from a relative sea level rise, increased seawater temperature, ocean acidification and changes in ocean circulation. As part of Ireland's Climate Action Plan 2024, which focuses on climate mitigation and climate adaptation, Action No. AD/24/21 highlights the requirement to 'Conduct risk and vulnerability assessments for climate-change impacts on heritage'. This is due to the projected increases in sea levels and storm surge, which could result in increased frequency of coastal flooding and erosion, with significant impacts on coastal and heritage sites situated in proximity to the coast and on estuaries (DECC, 2024: 412).

14.6.9 Predicted future baseline

70. In the absence of the CWP Project there would be no change to known and potential marine heritage receptors beyond those caused by natural physical processes, natural deterioration, and climate change, as noted above. Physical effects on marine receptors are considered below in terms of likely impacts and effects.

14.7 Scope of the assessment

71. An EIA Scoping Report for the Offshore Infrastructure was published on 6 January 2021. The Scoping Report was uploaded to the CWP Project website and shared with regulators, prescribed bodies and other relevant consultees, inviting them to provide relevant information and to comment on the proposed approach being adopted by the Applicant in relation to the offshore elements of the EIA.

72. Based on responses to the Scoping Report, further consultation and refinement of the CWP Project design, potential impacts on marine cultural heritage scoped into the assessment are listed below in **Table 14-9.**

Table 14-9 Potential impacts scoped into the assessment

Impact No.	Description of impact	Notes
Construction		
Impact 1	Direct physical impact on known and potential marine cultural heritage receptors	The installation of the foundations for the WTGs and cables, potential scour protection, non-burial protection measures, geotechnical survey, and trenching installation at landfall have the potential to cause direct disturbance and damage to known and undiscovered artefacts of marine archaeological significance. Dependent upon the design of installed features, there may be a requirement for seabed preparation prior to installation, which also has the potential to cause direct disturbance. Similar impacts may occur on surficial and shallow archaeology as a result of anchoring and jack-up activities associated with the construction works.
Impact 2	Indirect physical impact to known and potential marine cultural heritage receptors	Changes to local hydrodynamics due to dispersal of suspended sediment, potentially resulting in changed sediment transport regimes. Additionally, scour may increase due to disturbance from construction activities and structures.
Operation and Maintenance		
Impact 1	Direct physical impact to known and potential marine cultural heritage receptors	Direct impacts during operation could occur as a result of routine or exceptional maintenance activities if these disturb the seabed beyond the construction phase footprint.
Impact 2	Indirect physical impact to known and potential marine cultural heritage receptors	Changes in sediment transport or localised scour.
Decommissioning		
Impact 1	Direct physical impact to known and potential marine cultural heritage receptors	Direct impacts from the activities on site to remove structures beyond the construction phase footprint.
Impact 2	Indirect physical impact to know and potential marine cultural heritage receptors	Changes to local hydrodynamics due to dispersal of suspended sediment potentially resulting in changed sediment transport regimes.

14.8 Assessment parameters

14.8.1 General approach

73. Complex, large-scale infrastructure projects with a terrestrial and marine interface, such as the CWP Project, are consented and constructed over extended timeframes. The ability to adapt to changing supply chains, policy or environmental conditions and to make use of the best available information to feed into project design, promotes environmentally sound and sustainable development. This

ultimately reduces project development costs and therefore electricity costs for consumers and reduces CO_2 emissions.

74. In this regard, the approach to the design development of the CWP Project has sought to introduce flexibility where required, among other things, to enable the best available technology to be constructed and to respond to dynamic maritime conditions, whilst at the same time specifying project boundaries, project components, and project parameters wherever possible, whilst having regard for known environmental constraints.

75. **Chapter 4 Project Description** describes the design approach that has been taken for each component of the CWP Project. Wherever possible, the location and detailed parameters of the CWP Project components are identified and described in full within the EIAR. However, for the reasons outlined above, certain design decisions and installation methods will be confirmed post-consent, requiring a degree of flexibility in the development permission.

76. Where necessary, flexibility is sought in terms of:

- Up to two options for certain permanent infrastructure details and layouts, such as the WTG layouts.
- Dimensional flexibility; described as a limited parameter range, i.e., upper and lower values for a given detail such as cable length.
- Locational flexibility of permanent infrastructure; described as the limit of deviation (LoD) from a specific point or alignment.

77. The CWP Project had to procure an opinion from An Bord Pleanála to confirm that it was appropriate that this application be made and determined before certain details of the development were confirmed. An Bord Pleanála issued that opinion on 25 March 2024 (as amended in May 2024) and it confirms that the CWP Project could make an application for permission before the details of certain permanent infrastructure, described in Section 4.3 of **Chapter 4 Project Description**, are confirmed.

78. In addition, the application for permission relies on the standard flexibility for the final choice of installation methods and O&M activities.

79. Notwithstanding the flexibility in design and methods, the EIAR identifies, describes, and assesses all of the likely significant impacts of the CWP Project on the environment.

14.8.1. Options and dimensional flexibility

80. Where the application for permission seeks options or dimensional flexibility for infrastructure or installation methods, the impacts on the environment are assessed using a representative scenario approach. A 'representative scenario' is a combination of options and dimensional flexibility that has been selected in this EIAR chapter to represent all of the likely significant effects of the project on the environment. Sometimes, several representative scenarios will have to be considered to ensure all impacts are identified, described and assessed.

81. For marine archaeology and cultural heritage, this analysis is presented in **Appendix 14.2**. This identifies one or more representative scenarios for each impact with supporting text to demonstrate that no other scenarios would give rise to new or materially different effects, taking into consideration the potential impact of other scenarios on the magnitude of the impact or the sensitivity of the receptor(s) that is being considered.

82. **Table 14-10** below presents a summarised version of **Appendix 14.2** and describe the representative scenarios on which the construction and O&M phase for marine archaeology and cultural heritage assessment has been based. Where options exist, for each receptor and potential impact, the table identifies the representative scenario and provides a justification for this.

14.8.2 Limit of Deviation (LoD)

83. Where the application for permission seeks locational flexibility for infrastructure, the impacts on the environment are assessed using a LoD. The LoD is the furthest distance at which a specified element of the CWP Project can be constructed.

84. This chapter assesses the specific preferred location for permanent infrastructure. However, **Appendix 14.2** provides further analysis to determine if the proposed LoD for the permanent infrastructure may give rise to any new or materially different effects, taking into consideration the potential impact of the proposed LoD on the magnitude of the impact.

85. For marine archaeology and cultural heritage, this analysis is summarised in **Table 14-11**.

86. Where the potential for the LoD to cause a new or materially different effect is identified, this is noted in **Table 14-11** and is considered in more detail within **Section 14.6** of this chapter.

Table 14-10 Marine archaeology and cultural heritage representative scenario assessment

Impact	Representative scenario details	Value	Notes / Assumptions
Construction			
Impact 1: Direct physical impact on known and potential marine cultural heritage receptors	**Generating station**		
	Permanent infrastructure		Direct physical impacts relate to seabed preparation for foundations and cables, jack up and anchoring operations, and cable installation. It should be noted that where boulder clearance overlaps with sand wave clearance, the boulder clearance footprint will be within the sand wave clearance footprint. WTG Option A forms the representative scenario as this represents the greatest area of impact, and therefore WTG Option A forms the basis of the assessment for Impact 1: Direct physical impacts in this chapter.
	WTG monopile foundations	75	
	OSSs monopile foundations	3	
	Scour protection: array site seabed area (m^2)	273,000	
	IACs linking the WTGs to the OSSs: length on the seabed (km)	120–139	
	IACs and interconnector cables trench depth (m)	1.5	
	Cable protection for the IACs: seabed covered by cable protection (m^2)	208,600	
	Installation methods and effects		
	Boulder clearance: array site seabed clearance area (m^2)	2,556,000–2,934,000	
	Sand wave clearance: array site seabed clearance area (m^2)	205,250–259,250	
	Pre-lay grapnel run (PLGR): array site seabed disturbance width (m)	3	
	Removal of existing out-of-service cables (OOS): array site length of OOS cable removal (km)	18	

Impact	Representative scenario details	Value	Notes / Assumptions
	IAC and interconnector cable installation: Total seabed disturbed (m^2)	1,911,000–2,214,000	
	Jack-up vessel (JUV) operations total seabed impact area (m^2)	240,000	
	WTGs and OSS anchoring operations total seabed impact area (m^2)	280,800	
	IAC and interconnector cable anchoring operations total seabed impact area (m^2)	371,520	
	Total area of disturbed sediment for offshore construction activities (m^2)	**6,781,170**	
	Offshore export cables		
	Permanent infrastructure		
	Number of export cables	3	
	OECC seabed clearance corridor width per export cable (m)	20	
	Trench depth per export cable (m)	2 (except cable buried within the zone of greater burial depth adjacent to DL Harbour which will have a trench depth of 3 m)	
	Cable protection: seabed covered by export cable protection (m^2)	105,000	

Impact	Representative scenario details	Value	Notes / Assumptions
	Installation methods and effects		
	Boulder clearance: OECC seabed clearance area (m^2)	2,220,000–2,616,000	
	Sand wave clearance: OECC seabed clearance area (m^2)	198,550	
	PLGR: OECC seabed disturbance width (m)	3	
	OECC installation: Total seabed disturbed (m^2)	1,890,000–2,187,000	
	OECC anchoring operations total seabed impact area (m^2)	630,720	
	Total area of disturbed sediment for offshore construction activities (m^2)	**5,737,270**	
	Landfall		
	Permanent infrastructure		
	Offshore export cables	3	
	Depth of open cut cable duct trenches (m)	3	
	Temporary infrastructure		
	Dimensions of temporary access ramp (including route from main compound) (L x W) (m)	60 x 10	
	Temporary cofferdam made of steel sheet piles: seabed disturbance (m^2)	6,100	
	Installation methods and effects		

Impact	Representative scenario details	Value	Notes / Assumptions
	Offshore export cable duct installation across intertidal area: total seabed disturbance (m^2)	36,000	
	Total area of seabed in transition zone affected by support structures (m^2)	6,900	
	Total area of seabed in transition zone affected by installation of cables using either open cut trenching or a shallow water trenching tool (m^2)	108,000	
	Total area of disturbed sediment for landfall construction activities (m^2)	**157,000**	
	Onshore substation		
	Area of reclaimed land from Liffey (m^2)	1,800	
	Onshore substation: length of combi-wall below the HWM (requiring marine piling) (m)	150	
	Onshore substation: Total length of new revetments (m)	150	
	Length of tubular piles and infill sheet piles (m)	40	
Impact 2: Indirect physical impact to known and potential marine cultural heritage receptors	**Array Site and Offshore Export Cable Corridor**		
	Permanent infrastructure		Indirect disturbance caused by changes to the hydrodynamic and sedimentary regimes due to spoil removal and sediment redistribution. WTG Option A forms the representative scenario as this represents the greatest area of impact, and therefore WTG Option A forms the basis of the assessment for Impact 2: Indirect physical
	Cable protection for the IACs: seabed covered by cable protection (m^2)	208,600	
	OECC cable protection: seabed covered by export cable protection (m^2)	105,000	
	Installation methods and effects		

Impact	Representative scenario details	Value	Notes / Assumptions
	Sand wave clearance: Array site seabed clearance area (m^2)	205,250–259,250	impacts in this chapter. WTG Option B, or any other scenario resulting in a lower level of disturbance would not introduce new or different impacts and would not result in an effect of materially different significance.
	Sand wave clearance: OECC seabed clearance area (m^2)	198,550	
	IAC and interconnector cable installation: total seabed disturbed (m^2)	1,911,000–2,214,000	
	OECC installation: total seabed disturbed (m^2	1,890,000–2,187,000	
Operation and Maintenance			
	Array site and Offshore Export Cable Corridor		
Impact 1: Direct physical impact to known and potential marine cultural heritage receptors	O&M vessels		
	Jack-up Vessels (JUVs) Peak vessel numbers	2	A single assessment scenario has been adopted for Impact 1, as the number of vessels required for maintenance are the same under WTG Option A and WTG Option B.
	Service Operation Vessel (SOV) Peak vessel numbers	1	
	Crew Transfer Vessel (CTV) Peak vessel numbers	6	
	Cable maintenance vessel Peak vessel numbers	2	
	Auxiliary vessel Peak vessel numbers	3	
	Jack-up Vessels (JUVs) Annual round trips	3	

Impact	Representative scenario details	Value	Notes / Assumptions
	Service Operation Vessel (SOV) Annual round trips	26	
	Crew Transfer Vessel (CTV) Annual round trips	1152	
	Cable maintenance vessel Annual round trips	1	
	Auxiliary vessel Annual round trips	27	
Impact 2: Indirect physical impact to known and potential marine cultural heritage receptors	**Array Site and Offshore Export Cable Corridor**		
	Permanent infrastructure		Indirect disturbance caused by changes in local scouring and sedimentation patterns. WTG Option A forms the representative scenario as this represents the greatest area of impact, and therefore WTG Option A forms the basis of the assessment for Impact 2: Indirect physical impacts in this chapter. Option B, or any other scenario resulting in a lower level of disturbance would not introduce new or different impacts and would not result in an effect of materially different significance.
	Cable protection for IACs and interconnector cables: seabed covered by cable protection (m^2)	208,600	
	OECC cable protection: seabed covered by export cable protection (m^2)	105,000	
Decommissioning			
Impact 1: Intertidal – Direct physical impact to known and potential marine cultural	It is recognised that legislation and industry best practice change over time. However, for the purposes of the EIA, at the end of the operational lifetime of the CWP Project, it is assumed that all infrastructure will be completely removed. Closer to the time of decommissioning, it may be decided that removal of infrastructure, such as the onshore export cables, would lead to a greater environmental impact than leaving some components *in situ*. In this case it may be proposed that export cables, cable ducts, and landfall infrastructure are to remain *in situ* where appropriate and any requirements for decommissioning at the landfall will be agreed with statutory consultees.		

Impact	Representative scenario details	Value	Notes / Assumptions
heritage receptors.	The activities and methodology for decommissioning are likely to include: • Dismantling and removal of electrical equipment; Removal of ducting and cabling, and where required leaving *in situ*; • Removal and demolition of buildings, fences, and services equipment; and • Reinstatement and landscaping works. It is anticipated that for the purposes of a representative scenario, the impacts will be no greater than those identified for the construction phase.		
Impact 2: Offshore – Direct physical impact to known and potential marine cultural heritage receptors; and Indirect physical impact to known and potential marine cultural heritage receptors	It is recognised that legislation and industry best practice change over time. However, for the purposes of the EIA, at the end of the operational lifetime of the CWP Project, it is assumed that all offshore infrastructure will be removed where practical to do so. In this regard, for the purposes of a representative scenario for decommissioning impacts, the following assumptions have been made: • The WTGs and OSS topsides shall be completely removed. Following WTG and OSS topside decommissioning and removal, the monopile foundations will be cut below the seabed level, to a depth that will ensure the remaining foundation is unlikely to become exposed. This is likely to be approximately one metre below the seabed, although the exact depth will depend upon the seabed conditions and site characteristics at the time of decommissioning. • All cables and associated cable protection in the offshore environment shall be wholly removed. It is likely that equipment similar to that which is used to install the cables may be used to reverse the burial process and expose them. Therefore, the area of seabed impacted during the removal of the cables is anticipated to be the same as the area impacted during the installation of the cables. • Generally, decommissioning is anticipated to be a reverse of the construction and installation process for the CWP Project and the assumptions around the number of vessel on site, and vessel round trips is therefore the same as described for the construction phase of the offshore components. Given the above it is anticipated that for the purposes of a representative scenario, the impacts will be no greater than those identified for the construction phase.		

Table 14-11 Limits of Deviation

Project component	Limit of deviation	Conclusion from Appendix 14.2
WTGs / OSSs (inc. monopile locations and scour protection)	100 m from the centre point of each WTG and OSS location is proposed to allow for small adjustments to be made to the structure locations.	No potential for new or materially different effects
IACs / interconnector cables	100 m either side of the preferred alignment of each IAC and interconnector cable is proposed to allow for small adjustments to be made to the cable alignments. 200 m from the centre point of each WTG location.	No potential for new or materially different effects
Offshore export cables	250 m either side of the preferred alignment within the array site. The OECC outside of the array site.	No potential for new or materially different effects
Landfall - TJB	0.5 m on either side (i.e., east / west) of the preferred TJB location.	No potential for new or materially different effects
Landfall - Intertidal cable ducts and offshore export cables (including non-ducted cables)	The OECC	No potential for new or materially different effects
Location of onshore substation revetment perimeter structure	Defined LoD boundary	No potential for new or materially different effects.

14.9 Primary mitigation measures

87. Throughout the development of the CWP Project, measures have been adopted as part of the evolution of the project design and approach to construction to avoid or otherwise reduce adverse impacts on the environment. These mitigation measures are referred to as 'primary mitigation'. They are an inherent part of the CWP Project and are effectively 'built in' to the impact assessment.

88. Primary mitigation measures relevant to the assessment of marine archaeology and cultural heritage are set out in **Table 14-12**. Where additional mitigation measures are proposed, these are detailed in the impact assessment (**Section 14.10**). Additional mitigation includes measures that are not incorporated into the design of the CWP Project and require further activity to secure the required outcome of avoiding or reducing impact significance.

Table 14-12 Primary mitigation measures

Project Element	Description
Construction and operational activities	A Construction Environmental Management Plan (CEMP) has been prepared to provide a management framework and to ensure that appropriate controls are in place to manage environmental risks associated with the construction of the CWP Project. It outlines environmental procedures that require consideration throughout the construction process, in accordance with legislative requirements and industry best practice. In summary, the CEMP includes details of: The Environmental Management Framework for the CWP Project including environmental roles and responsibilities (i.e., ecological clerk of works) and contractor requirements (i.e., method statements for specific construction activities); • Mitigation measures and commitments made within the EIAR, Natura Impact Statement (NIS) and supporting documentation for the CWP Project. • Measures proposed to ensure effective handling of chemicals, oils, and fuels including compliance with the MARPOL convention; • A Marine Pollution Prevention and Contingency Plan to address the procedures to be followed in the event of a marine pollution incident originating from the operations of the CWP Project; • An Emergency Response Plan adhered to in the event of discovering unexploded ordnance; • Offshore biosecurity and invasive species management detailing how the risk of introduction and spread of invasive non-native species will be minimised; and • Offshore waste management and disposal arrangements. The CEMP will be implemented by the Applicant and its appointed contractor(s) and will be secured by the conditions of the development permission. It will be a live document which will be updated and submitted to the relevant authority prior to the start of construction.
Construction and operational activities	Positions of WTGs and OSSs have been informed by a wide range of site-specific data, including metocean data (e.g., wind

Project Element	Description
	speed and direction), geophysical and geotechnical survey data (e.g., bathymetry), environmental data (e.g., benthic surveys and archaeological assessment) and stakeholder consultation. Designing and optimising the layout of the WTGs has considered multiple constraints identified from analysis of these datasets, alongside the consideration of layout principles taken from relevant guidance on the design of OWFs. A summary of the key actions taken to avoid or otherwise reduce impacts is provided below: • The WTG layout options include Search and Rescue (SAR) access lanes to allow a SAR resource to fly on the same orientation continuously through the array site. This is provided to minimise risks to surface vessels and / or SAR resource transiting through the array site. • Archaeological exclusion zones (AEZs) around known features of archaeological interest have been avoided. No works that impact the seabed will be undertaken within the extent of an AEZ during the construction, operational, or decommissioning phases. • The locations of offshore infrastructure have been developed to avoid known sensitive ecological habitats, including areas with suitable conditions for *Sabellaria spinulosa*, which can form reefs under some circumstances. Whilst reefs were not identified during the characterisation surveys, as an ephemeral feature it will be necessary to validate the results in advance of construction. A pre-construction geophysical survey will therefore be undertaken to facilitate the micrositing around sensitive habitats, such as *Sabellaria spinulosa*. • The WTG layout options have been developed to avoid or minimise interaction with known areas of high fishing density, where possible. As avoidance is not always possible, the layouts have also been developed to increase the potential for coexistence. • A paleochannel (the remnants of a river or stream channel that flowed in the past) in the centre west of the array site has been avoided.
Construction	Bedform clearance operations will be undertaken only where necessary, thereby minimising sediment disturbance and alteration to seabed morphology.
Construction and operational activities	In general, the CWP Project has sought to specify the location, scale and extents of permanent and temporary offshore infrastructure; however, in some cases, a degree of locational flexibility is required. Locational flexibility of permanent and temporary infrastructure is described as a limit of deviation (LoD) from a specific point or alignment. LoDs, described in **Chapter 4 Project Description**, are required to: • Take account of additional ground conditions, data acquired during pre-construction geotechnical surveys, and results from pre-construction offshore UXO surveys.

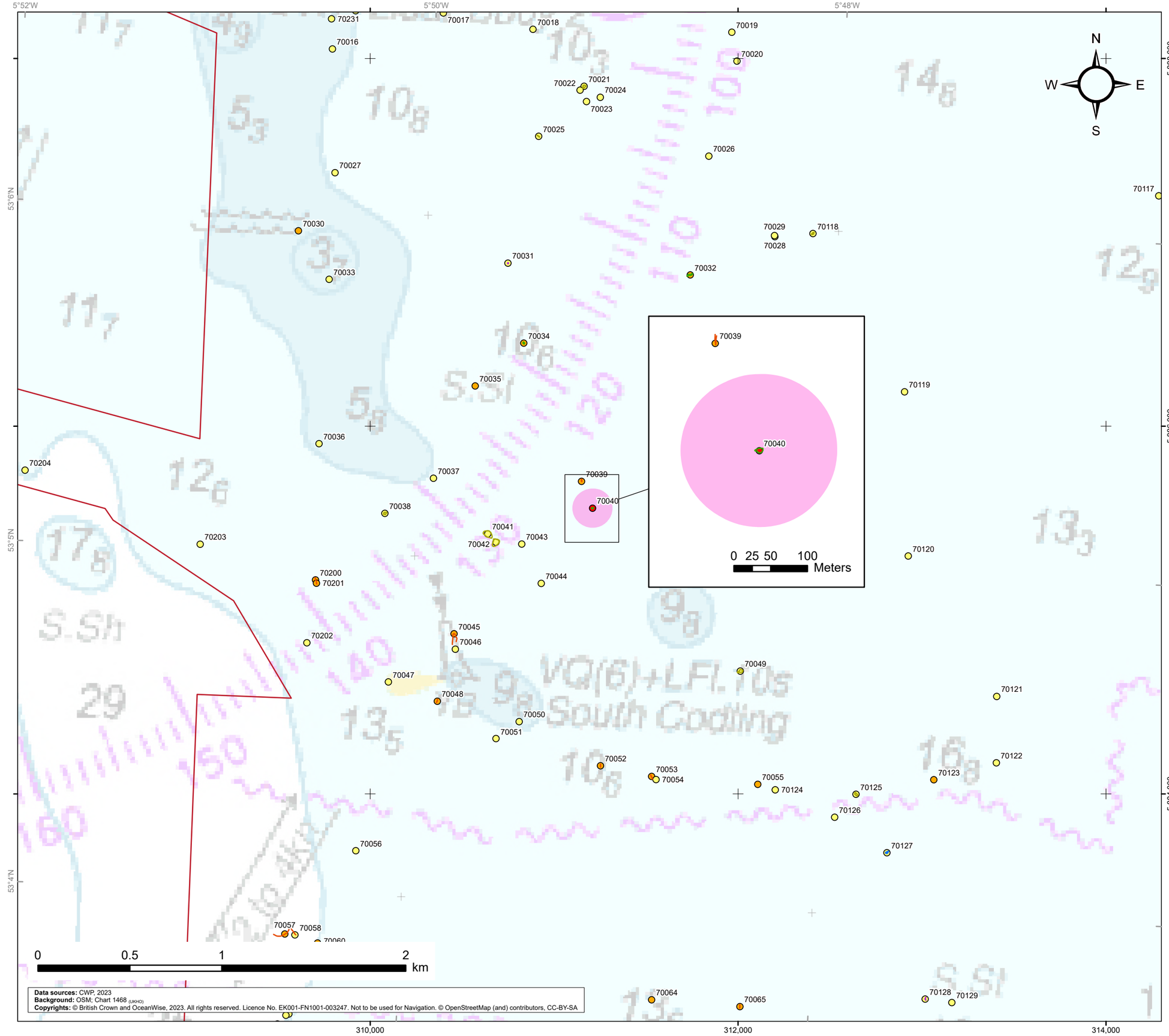
Project Element	Description
	• Avoid and minimise adverse impacts on offshore ephemeral benthic habitats, such as *Sabellaria spinulosa* reefs, identified during pre-construction surveys; and • Take account of the confirmed position of existing subsea infrastructure and archaeological features.
Construction	Positions of WTGs and OSSs have been informed by a wide range of site-specific data, including geophysical and geotechnical survey data, used to identify potential archaeological receptors within the offshore development area. Consequently, AEZs around known features of archaeological interest have been avoided. No works that impact the seabed will be undertaken within the extent of an AEZ during the construction, operational, or decommissioning phases. For features assigned A2 archaeological discrimination rating (potential seabed features), no AEZs are recommended; however, these features have been avoided, where possible. Where this has not been possible, further appraisal is proposed prior to construction. For example, where geophysical surveys may be undertaken in advance of the development, or during a UXO survey, it is recommended that the data will be assessed by a suitably qualified archaeological contractor. This will confirm the presence of ferrous material at the location of features identified during the initial assessment, as well as helping to identify any additional ferrous features of archaeological potential within the offshore development area. Further investigations mean that anomalies can either have their archaeological value removed if they prove to be of non-anthropogenic nature or to be modern, or their value as archaeological assets confirmed. If their value is confirmed, mitigation in the form of either avoidance (which may be enacted by the implementation of an AEZ) or through remedying or offsetting measures, including a Protocol for Archaeological Discoveries (PAD), is recommended.
Decommissioning	A rehabilitation schedule is provided as part of the planning application. This has been prepared in accordance with the MAP Act (as amended by the Maritime and Valuation (Amendment) Act 2022) to provide preliminary information on the approaches to decommissioning the offshore and onshore components of the CWP Project. A final rehabilitation schedule will require approval from the statutory consultees prior to undertaking decommissioning works. This will reflect discussions held with stakeholders and regulators to determine the exact methodology for decommissioning, taking into account available methods, best practice, and likely environmental effects.

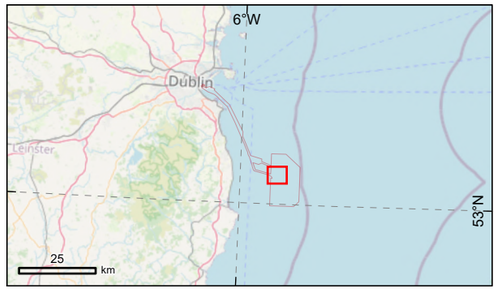
89. Archaeological Exclusion Zones have been recommended for these anomalies within the study area (**Table 14-13**) and are illustrated in **Figure 14-2** and **Figure 14-3**. These are as follows:

- For all anomalies assigned an A1 discrimination rating, an AEZ of 100 m is recommended, either around the central location or the feature extents;
- For all anomalies assigned an A3 archaeological discrimination rating, an AEZ of 100 m is recommended centred on the reported position.

Table 14-13: Recommended AEZs within the study area

ID Number	Classification	Position (WGS84 UTM31N)		Status	Exclusion Zone
		Easting	Northing		
70040	Debris field	311209	5885554	New	100 m buffer around current feature extent
70366	Wreck	296334	5906890	New	100 m buffer around current feature extent
70463	Recorded wreck	289033	5913188	New	100 m around recorded position
70352	Recorded obstruction	298325	5902495	New	100 m around recorded position





Legend

- Planning application boundary

Seabed features of archaeological potential

- A1 – Anthropogenic origin of archaeological interest
- A2_h – Uncertain origin of possible archaeological interest (high priority)
- A2_l – Uncertain origin of possible archaeological interest (low priority)

Linear seabed features

- Dark reflector
- Rope/chain

Seabed feature boundaries

- Dark reflector
- Debris field
- Depression
- Seabed disturbance

Recommended archaeological exclusion zones

- 100 m

codling wind park

Project: Codling Wind Park

Contractor: Wessex Archaeology
Website: www.wessexarch.co.uk

Figure 14.2
Recommended AEZ within the array site

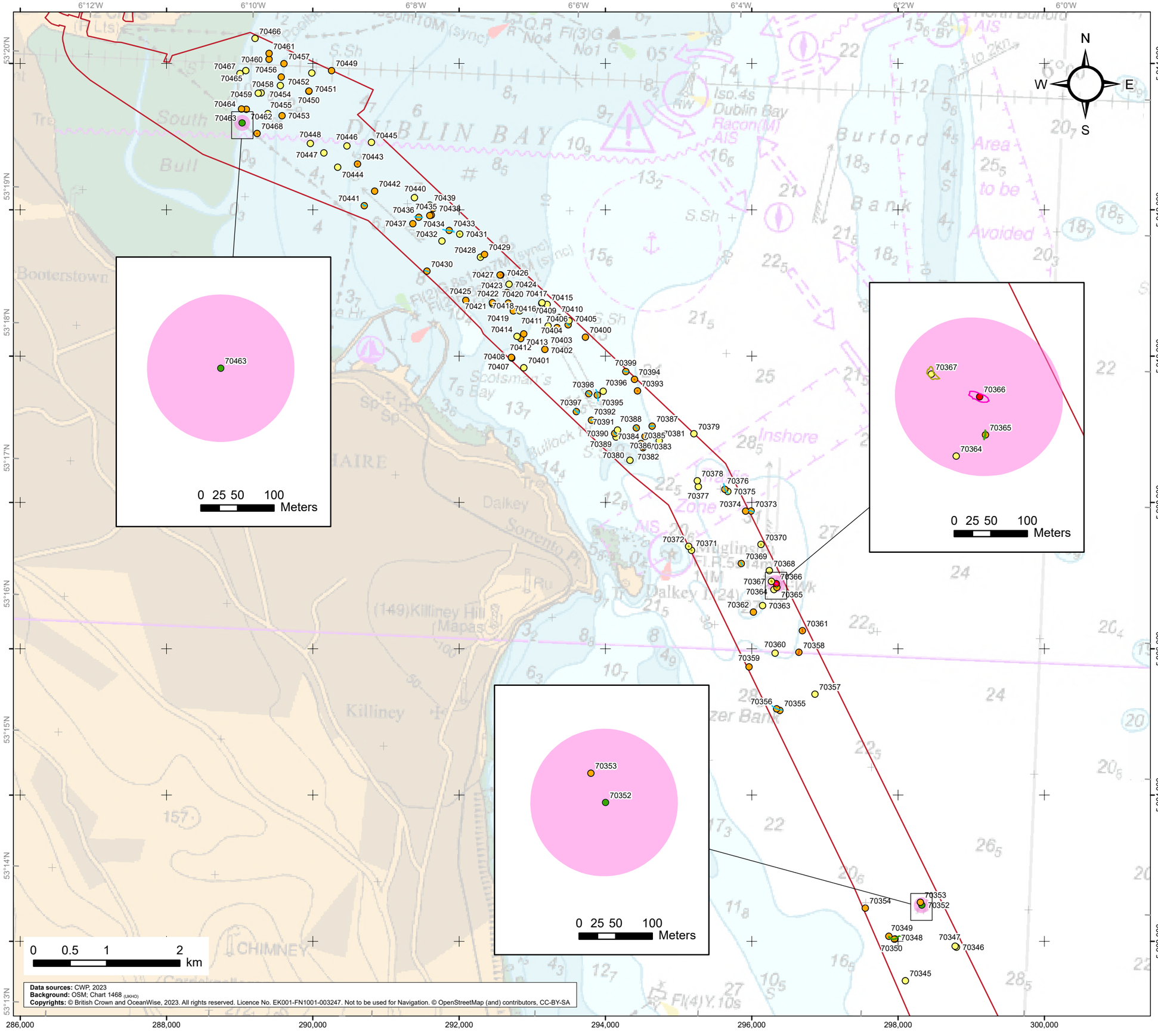
CWP doc. number: CWP-WEX-ENG-08-01-MAP-0994

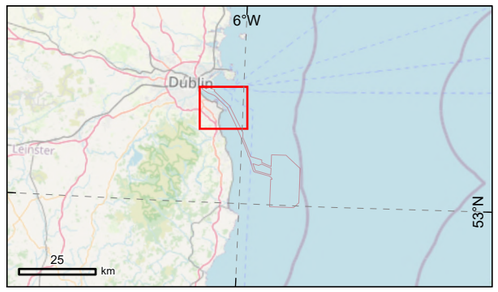
Internal descriptive code: WE - PAB..WF.S.PLGN..OECC.PB.S.PLGN - EIAR.FIG.14.02

Size: A3
Scale: 1:20,000

CRS: EPSG 25830

Rev.	Description	Date	By	Chk'd	App'd
A	First issue	2023/01/31	KF	RM	AB
B	Second revision	2024/02/07	KF	SS	AB
C	Third revision	2024/03/21	KF	SS	AB
D	Final version	2024/04/24	KF	SS	AB





Legend

- Planning application boundary

Seabed features of archaeological potential

- A1 – Anthropogenic origin of archaeological interest
- A2_h – Uncertain origin of possible archaeological interest (high priority)
- A2_l – Uncertain origin of possible archaeological interest (low priority)
- A3 – Historic record of possible archaeological interest with no corresponding geophysical anomaly

Linear seabed features

- Dark reflector
- Linear debris
- Rope/chain
- Seabed disturbance

Seabed feature boundaries

- Debris field
- Seabed disturbance
- Wreck

Recommended archaeological exclusion zones

- 100 m

codling wind park

Project: Codling Wind Park

Contractor: Wessex Archaeology
Website: www.wessexarch.co.uk

Figure 14.3
Recommended AEZs within the OECC

CWP doc. number: CWP-WEX-ENG-08-01-MAP-0995

Internal descriptive code: WE - PAB..WF.S.PLGN..OECC.PB.S.PLGN - EIAR.FIG.14.03

Size: A3
Scale: 1:50,000

CRS: EPSG 25830

Rev.	Description	Date	By	Chk'd	App'd
A	First issue	2023/01/31	KF	RM	AB
B	Second revision	2024/02/07	KF	SS	AB
C	Third revision	2024/03/21	KF	SS	AB
D	Final version	2024/04/24	KF	SS	AB

14.10 Impact assessment

14.10.1 Construction phase

90. The potential environmental impacts arising from the construction of the CWP Project are listed in **Table 14-9** along with the parameters against which each construction phase impact has been assessed. A description of the potential effect on marine archaeology and cultural heritage receptors caused by each identified impact is given below.

Impact 1: Direct physical disturbance

91. If direct impacts were to occur upon the archaeological receptors that have been identified in **Section 14.6** of this chapter and any potential archaeology within the study area, these are most likely to occur during the construction phase of the CWP Project. Impacts resulting in negative effects upon archaeological assets as part of the construction phase are those involving contact with the seabed and / or the removal of seabed sediments. Marine archaeological receptors of height, such as shipwrecks, may also be impacted by activities that occur within the water column, including pre-installation activities and cable installation activities. Installation activities that may lead to direct physical impacts include:

- Seabed preparation and sand wave clearance prior to foundation installation and cable laying (methods include pre-lay grapnel run, trailing suction hopper dredger or mass flow excavation);
- Survey and clearance of unexploded ordnance (UXO);
- Installation of turbine monopile foundations;
- Placing of scour protection around turbine locations;
- Installation of offshore substation structure;
- Laying of inter-array, inter-connector and export cables (methods may include jet trenching, mechanical trenching and ploughing);
- Backfilling of cable trenches and protection / stabilisation of surface-laid marine cables (consisting of rock placement, with the exception of cable crossings which will be protected by concrete mattresses);
- Landfall installation activities; including marine piling works supporting the development of the proposed substation area on the South River Liffey, and open cut trenches and cofferdam, and cable installation on the OECC approach to landfall; and
- Seabed contact by the jack-up vessel, and / or anchors on vessels associated with the installation, maintenance, and decommissioning phases of the CWP Project.

92. Following the application of primary mitigation, as outlined in **Section 14.9**, consisting of the implementation of AEZs around high-value anomalies, direct impacts to known archaeological receptors would not occur. Unavoidable direct impacts to potential archaeological receptors, not yet identified, may occur at any point where development and related activities disturb the seafloor.

Receptor sensitivity

93. All seabed assets have the potential to be damaged or destroyed if they are directly impacted during the construction phase of the CWP Project. Furthermore, all damage to archaeological sites or material is permanent and recovery is limited to stabilisation or re-burial so as to limit further impact. There is no potential for the recoverability of any seabed assets if they are affected following a direct impact. As such, all wrecks, aircraft, associated material and debris, and seabed prehistory should be regarded as having high sensitivity.

94. Seven features of palaeogeographic interest have been ascribed a P1 archaeological rating, located between depths of 0.2 and 15.7 mBSB (see **Table 14-6**). A total of 25 features have been ascribed a P2 archaeological rating, located between depths of 0.2 and 8.8 mBSB (see **Table 14-6**). As highlighted in **Table 14-7** the potential for seabed prehistory assets and their respective value varies from high to low, depending on the asset type.

95. All A1 receptors and currently unknown archaeological sites are considered as high sensitivity receptors.

96. For all A2 anomalies, there is insufficient data to assess the value of each individual anomaly at this point. As such, all A2 anomalies must be considered to potentially have archaeological value, to a greater or lesser degree and, in accordance with the precautionary principle, are considered as high-value assets.

97. For the two wreck sites located within the intertidal zone (see Paragraph 65), these have been ascribed as being of high value, due to the potential for further material to be discovered within the vicinity, but also their potential significance as shipwrecks. However, for the two isolated findspots, a low value has been assigned as these are likely to be out-of-context findspots.

Magnitude of impact

98. All direct impacts to marine archaeology and cultural heritage are permanent. Once archaeological deposits and material, and the relationships between deposits and material and their wider surroundings, have been damaged or disturbed, it is not possible to reinstate or reverse those changes.

99. Impacts on known and potential palaeogeography receptors, such as potential *in situ* prehistoric sites and submerged landscape features, could result in major effects, as these are considered as high-value assets. For the array site, turbine burial depths are anticipated to be down to a maximum of 36.5 m (see **Table 4-8** in **Chapter 4 Project Description**). IACs and interconnector cables will have a trench depth of 1.5 m, whilst for cable burial along the OECC this is anticipated to be down to 2.0 m, except in areas adjacent to Dun Laoghaire Harbour, which will have a trench depth of 3 m (see **Table 4-26** and **Table 4-34** in **Chapter 4 Project Description**). Therefore, should potential palaeogeographic features be impacted, the footprint will vary between the array site and OECC, and the magnitude of direct impacts on such resources would range from high to medium.

100. The application of primary mitigation, described in **Section 14.9**, including the implementation of AEZs around high-value receptors (A1s)**,** means that all direct impacts on known maritime and aviation receptors would be avoided and, hence, the magnitude of impact is negligible.

101. For features assigned an A2 archaeological discrimination rating, the application of primary mitigation, including avoidance through implementation of LoD and / or further appraisal to ascertain the nature of the feature, will reduce the significance of direct impact to negligible.

102. The magnitude of direct impacts on potential maritime and aviation receptors, and potential seabed features as part of construction activities, if they were to occur, would be high.

103. Impacts on known intertidal heritage receptors vary from high to low. The Ringsend wreck falls within the fringes of the CWP Project and is therefore unlikely to be impacted by any activity. The site has been excavated in the past and therefore limited material is likely to be present *in situ*. For the newly discovered wreck (1001–1003), if impacts were to occur during construction, these would be high as the site falls within the proximity of the proposed cable routes, and further material could potentially be buried in the vicinity.

Significance of the effect

104. Significant impacts have been evaluated according to defined parameters, expressed as a matrix in **Table 14-5**.

105. The sensitivity of known and recorded maritime and aviation receptors (including A1 and A2 receptors) in the study area is considered to be high and the magnitude of impact on these receptors is assessed as negligible. Therefore (as per the matrix in **Table 14-5**), an effect of slight adverse significance on A1 and A2 receptors is predicted, which is not significant in EIA terms. Where flexibility in the proposed design exists, there is no other scenario which would lead to a more significant effect.

106. The sensitivity of potential maritime and aviation receptors in the study area is considered to be high and the magnitude of impact on these potential receptors is assessed as high. Therefore (as per the matrix in **Table 14-5**), an effect of profound adverse significance on these potential receptors is predicted, which is significant in EIA terms. Where flexibility in the proposed design exists, there is no other scenario which would lead to a more significant effect.

107. The sensitivity of known and potential palaeogeographic receptors in the study area is considered to be low to high, and the magnitude of impact on these palaeogeographic receptors is assessed as medium to high. Therefore (as per the matrix in **Table 14-5**), an effect of slight to significant and, slight to profound adverse significance on these palaeogeographic receptors is predicted, which is significant in EIA terms. Where flexibility in the proposed design exists, there is no other scenario which would lead to a more significant effect.

108. The sensitivity of the known intertidal heritage receptor wreck (1001-1003) located in the study area is considered to be high and the magnitude of impact on this receptor is assessed as high. Therefore (as per the matrix in **Table 14-5**), an effect of profound adverse significance on this receptor is predicted, which is significant in EIA terms. Where flexibility in the proposed design exists, there is no other scenario which would lead to a more significant effect.

109. Therefore, additional mitigation is required for potential seabed features, potential maritime and aviation sites, and intertidal heritage receptors.

Additional mitigation

- Palaeogeography

110. As terrestrial features interpreted as being deposited during periods of known human occupation of Britain and Ireland, those features given a P1 archaeological rating are considered of high archaeological potential. Those features with a P2 discrimination rating are considered of medium archaeological potential, partly due to the uncertainty of feature formation and fill. Although there is adequate information to inform the EIA and therefore the EIA conclusions, targeted geoarchaeological work may aid in refining the interpretation of these features, and therefore help determine the archaeological potential of the area.

111. Should further ground investigation work be undertaken within the study area to inform the final alignment, it is recommended that the archaeological contractor be consulted to advise on potential samples to be acquired for archaeological purposes, particularly from the fine-grained deposits 75015, and other identified units of archaeological interest identified within the data. It is also recommended that any geotechnical logs from within the study area be made available for geoarchaeological assessment by a suitably qualified archaeological contractor.

112. Furthermore, it is recommended that any samples acquired containing material of archaeological potential, particularly those within the channel features 75011, 75014, 75016, 75020, 75021, and 75025 or fine-grained deposit 75015, be made available for geoarchaeological assessment.

- Protocol for Archaeological Discoveries (PAD)

113. A Protocol for Archaeological Discoveries (PAD) will be in place for the CWP Project. A PAD is proposed for reporting and investigating unexpected archaeological discoveries encountered during the different phases of the CWP Project, with a retained archaeologist providing guidance and advising industry staff on the implementation of the PAD. The PAD also makes provision for the implementation of temporary exclusion zones around areas of possible archaeological interest, for prompt archaeological advice, and, if necessary, for archaeological inspection of important features prior to further activities in the vicinity. The PAD provides a mechanism to comply with the Irish legislation, including notification of the UAU / NMS, and accords with the Code of Practice for Seabed Developers (JNAPC, 2006).

- Intertidal Heritage Assets

114. With regards to intertidal heritage assets, a targeted archaeological walkover survey shall be undertaken along the final offshore export cable alignments within the OECC. This will enable the identification of any further cultural heritage receptors with surface expression along the proposed cable routes leading up to the landfall.

115. Furthermore, a metal detection survey, including excavation of identified targets, is recommended to identify any material of archaeological potential located along the proposed cable alignments.

116. For the one known intertidal heritage receptor (1001–1003), it is recommended that the site is re-established to verify the feature and an archaeological recording is undertaken prior to construction works. This would entail a photographic record, drawing record and assessment, following current best practice and guidance, outlined in the Framework and Principles for the Protection of the Archaeological Heritage (1999) and Policy and Guidelines on Archaeological Excavation (1999).

117. Mitigation in the form of avoidance (which may be enacted by the implementation of an AEZ) shall be prioritised for all material of archaeological potential within the intertidal area.

Residual effect

118. With the adoption of the additional mitigation measures, the magnitude of effect will be reduced to negligible. The significance of the residual effect is therefore predicted to be not significant in EIA terms.

119. It should be noted that the level of mitigation would be determined by the importance of the archaeological receptor, for example, a medieval wooden shipwreck may require full excavation, whereas an A2 anomaly confirmed through further survey to be modern debris, such as rebar, would require no further mitigation.

120. In some cases, the application of appropriate mitigation, such as an archaeological investigation of seabed anomalies prior to impact or reported through a PAD, could lead to effects of slight to moderate beneficial significance, which is a significant beneficial effect in EIA terms. For example, discovering a wreck of interest and being able to share information (via virtual reality / publications / outreach events etc.) with the wider public would be moderate beneficial.

121. Similarly, undertaking archaeological investigation of borehole logs and vibrocores prior to impact could lead to effects of significant beneficial significance, which is a significant beneficial effect in EIA terms. For example, providing details about the prehistoric landscape and being able to share it with the wider public would be significant beneficial.

122. In instances where there is increased sediment burial of known or potential archaeological receptors due to installation activities, this could lead to effects of slight beneficial significance, which is not significant in EIA terms.

Impact 2: Indirect physical disturbance

123. The indirect effects upon the known and potential marine archaeological assets considered here are those which occur as a result of changes to hydrodynamic and sediment transport regimes, where these changes have occurred as a consequence of activities and structures associated with the construction activities. These effects may occur subsequent to the clearance of areas of sand waves during route preparation but may also occur through sediment dispersal / deposition or the placement of non-burial cable protection on the seabed. Construction activities that could potentially create indirect physical impacts include:

- Clearance of areas where sand waves are present, potentially resulting in changes to local hydrodynamics;
- Dispersal of suspended sediment (during installation of cables) potentially resulting in increased suspended sediment concentrations (SSC) and deposition; and
- Scour associated with the disturbance from construction activities and structures.

Receptor sensitivity

124. Indirect impacts may affect marine archaeological baseline conditions where they result in the increased exposure or burial of marine archaeological assets. The increased exposure of marine archaeological assets has the potential to cause erosion and deterioration to the assets. Conversely, should assets be subject to increased sedimentation and burial, they may, in turn, benefit from conditions which afford higher levels of preservation. **Chapter 06 Marine Geology, Sediment and Coastal Processes** suggests that the general regime of sediment accumulation would continue as previously and so the sensitivity of the receptors to continued sediment deposition is very low, as it is in effect protecting receptors as presently or to a greater extent.

Magnitude of impact

125. The magnitude of effect of indirect impacts on marine archaeological assets during installation is expected to be low.

126. Following an appraisal of the local hydrodynamic and SSC, a review of data available from similar / nearby projects and preliminary calculations, **Chapter 06 Marine Geology, Sediment and Coastal Processes** concludes that the significance of the indirect effects on the local morphology and bedform features from route clearance and installation activities will be low. This is because seabed disturbance will be temporary and localised, and furthermore, it is anticipated that the seabed will recover via natural sediment transport processes.

127. For nearshore installation activities at landfall, the worst-case scenario assessed within **Chapter 06 Marine Geology, Sediment and Coastal Processes** is excavation of reception pit(s), cable installation activities, and anchor deployment. The results of the assessment indicated that seabed disturbance due to excavated pits will impact a relatively small area and therefore the significance of impact is assessed to be negligible. For works along the south bank of the River Liffey, including temporary sheet piling for land reclamation works, the dynamic nature of the sediment transport regime driven naturally by the River Liffey will evenly disperse any suspended sediment and return the seabed to equilibrium conditions. Cable installation activities nearshore will be temporary and localised, and it is anticipated that the seabed will recover via natural sediment transport processes. Similarly, impacts from vessel anchoring are anticipated to be short term and highly localised. Therefore, the impact is considered to be low.

Significance of the effect

128. Significant impacts have been evaluated according to defined parameters expressed as a matrix in **Table 14-5**.

129. The very low sensitivity to continued sediment deposition and low magnitude of indirect impacts on archaeological receptors would result in not significant effects in EIA terms. No further mitigation is recommended, and the significance of the residual effect is not significant. Where flexibility in the proposed design exists, there is no other scenario which would lead to a more significant effect.

14.10.2 Operation and maintenance

Impact 1: Direct physical disturbance

130. Activities undertaken as part of the operation and maintenance phase have the potential to impact marine archaeology directly and indirectly, located on or under the seabed, resulting in their loss or the disruption of relationships between receptors and their wider surroundings.

131. Operational effects will be limited to those arising from cable repair / replacement, cable protection repair / replacement, maintenance or any monitoring that may be required. Potential direct impacts on marine archaeology during operation of the Project may arise from:

- Re-burial of cables;
- Repair / replacement of cables;
- Placement of additional cable protection; and
- Anchors being used for any maintenance activities (although these are likely to be minimal).

132. As a result of the proposed mitigation measures, which remain applicable during both the construction phase and operation and maintenance phases (see **Section 14.9**), direct impacts on known archaeological receptors would not occur. Unavoidable direct impacts on potential archaeological receptors may occur at any point where maintenance activities disturb the seafloor, subject to the implementation of additional mitigation.

Receptor sensitivity

133. Although the operation of the proposed project, and associated maintenance works, is anticipated to occur within areas already disturbed during the construction phase, seabed assets have the potential to be damaged or destroyed if they are directly impacted during the operation phase of the CWP Project. Furthermore, all damage to archaeological sites or material is permanent and recovery is limited to stabilisation or re-burial so as to limit further impact. There is no potential for the recoverability of any seabed assets if they are affected following a direct impact. As such, all wrecks, aircraft, associated material and debris, and seabed prehistory should be regarded as having high sensitivity.

Magnitude of impact

134. The magnitude of direct impacts on potential maritime and aviation receptors, and potential seabed features as part of operation activities, if they were to occur, would be high. Any impact upon marine archaeology, including any unknown archaeology, would be permanent and irreversible.

135. In areas where impact has already occurred during the construction phase, there is unlikely to be further effect.

136. However, in areas that have not yet been impacted, without mitigation, the effects on marine archaeology could be profound adverse effects.

Significance of effect

137. Significant impacts have been evaluated according to defined parameters, expressed as a matrix in **Table 14-5**.

138. The sensitivity of known and potential marine archaeology receptors in the study area is considered to be high, and the magnitude of impact on these receptors is also assessed to be high. Therefore (as per the matrix in **Table 14-5**), an effect is predicted of profound adverse significance on marine archaeology from unavoidable direct impacts during maintenance activities that disturb the seafloor, and in areas that have not yet been impacted, , which is significant in EIA terms. Where flexibility in the proposed design exists, there is no other scenario which would lead to a more significant effect.

139. Therefore, additional mitigation is required for potential seabed features, and potential maritime and aviation sites.

Additional mitigation

A PAD will be in place for the CWP Project. A PAD is proposed for reporting and investigating unexpected archaeological discoveries encountered during the different phases of the project, with a retained archaeologist providing guidance and advising industry staff on the implementation of the PAD. The PAD also makes provision for the implementation of temporary exclusion zones around areas of possible archaeological interest, for prompt archaeological advice, and, if necessary, for archaeological inspection of important features prior to further activities in the vicinity. The PAD provides a mechanism to comply with the Irish legislation, including notification to the UAU, and accords with the Code of Practice for Seabed Developers (JNAPC, 2006).

Residual effect

140. With the adoption of the additional mitigation measures the magnitude of effect will be reduced to negligible. The significance of the residual effect is therefore predicted to be slight and not significant in EIA terms.

141. In some cases, the application of appropriate mitigation, such as archaeological investigation of seabed anomalies prior to impact, could lead to effects of moderate beneficial significance, which is a significant beneficial effect in EIA terms. For example, discovering a wreck of interest and being able to share it with the wider public would be moderate beneficial.

Impact 2: Indirect physical disturbance

142. The effects upon known and potential marine archaeological assets considered here are those which occur as a result of changes to hydrodynamic and suspended sediment concentrations (SSC), where these changes have occurred as a result of the presence of the WTG foundations, IAC, and export cables, and the associated protection measures. Such impacts cause effects which afford increased protection or deterioration of archaeological receptors. These include:

- Changes to suspended sediment concentrations and deposition, as a result of installation structures; and
- Scour associated with installation structures.

Receptor sensitivity

143. Indirect impacts may affect marine archaeological baseline conditions where they result in the increased exposure or burial of marine archaeological assets. The increased exposure of marine archaeological assets has the potential to cause erosion and deterioration of the assets. Conversely, should assets be subject to increased sedimentation and burial, they may, in turn, benefit from conditions which afford higher levels of preservation. **Chapter 06 Marine Geology, Sediment and Coastal Processes** suggests that the general regime of sediment accumulation would continue as previously and so the sensitivity of the receptors to continued sediment deposition is very low, as it is in effect protecting receptors as presently or is affording protection to a greater extent.

Magnitude of impact

144. The magnitude of effect of indirect impacts on marine archaeological assets during installation is expected to be low.

145. Following an appraisal of the local hydrodynamic and SSC, a review of data available from similar / nearby projects and preliminary calculations, **Chapter 06 Marine Geology, Sediment and Coastal Processes** concludes that the significance of the effects on the prevailing hydrodynamic, wave, and sediment transport regimes and coastal processes from scour and cable protection will be low. This is because the presence of partially installed structures on the seabed is anticipated to be short term and highly localised. Therefore, the impact is considered to be low.

Significance of effect

146. Significant impacts have been evaluated according to defined parameters, expressed as a matrix in **Table 14-5**.

147. The very low sensitivity to continued sediment accumulation and low magnitude of indirect impacts on archaeological receptors would result not significant effects in EIA terms. No further mitigation is recommended, and the significance of the residual effect is not significant. Where flexibility in the proposed design exists, there is no other scenario which would lead to a more significant effect.

14.10.3 Decommissioning phase

Impact 1: Direct physical disturbance

148. As with the construction phase, decommissioning activities have the potential to affect archaeological assets either directly or indirectly. The MAC is for a set term (45 years), and the operational lifetime of the CWP Project is expected to be 25 years. All infrastructure within the maritime area will be rehabilitated. The methodology for doing so will be based upon best regulations / practices and available technology, as described in **Chapter 4 Project Description**.

149. If the CWP Project structures are left *in situ* any likely significant effects from decommissioning will be avoided. If the CWP Project structures are to be removed at decommissioning, this appraisal assumes that impacts from decommissioning activities are of a similar nature to construction activities and would be of a similar or lesser scale, and therefore not likely to be significant. As such, impacts on archaeological receptors would have not significant effects in EIA terms.

Impact 2: Indirect physical disturbance

150. The options for decommissioning will likely include the removal of the WTG superstructure, removal of substructures and foundations (including OSS foundations), removal of inter-array cabling, and removal of the entire cable or removal of sections of the cable.

151. Similar to those impacts assessed during the construction phase, during decommissioning, impacts may occur as a result of changes to hydrodynamic and sediment transport regimes, where these changes have occurred as a consequence of activities and removal of structures associated with decommissioning activities.

152. This appraisal assumes that impacts from decommissioning activities are of similar nature to construction activities and would be of a similar or lesser scale, and therefore not likely to be significant. As such, impacts on archaeological receptors would have not significant effects in EIA terms.

14.11 Cumulative Impacts

153. A fundamental component of the EIA is to consider and assess the potential for cumulative effects of the CWP Project with other projects, plans and activities (hereafter referred to as 'other development').

154. **Appendix 14.1** presents the findings of the Cumulative Effects Assessment (CEA) for marine archaeology and cultural heritage, which considers the residual effects presented in **Section 14.10** alongside the potential effects of proposed and reasonably foreseeable other development.

155. In summary, the CEA for marine archaeology and cultural heritage does not identify any potential for significant cumulative effects resulting from the CWP Project alongside other development. As such, cumulative effects on archaeological receptors would result in not significant effects in EIA terms.

14.12 Transboundary Impacts

156. There are no transboundary impacts with regard to marine cultural heritage as the offshore development area would not be sited in proximity to any international boundaries. Transboundary impacts are therefore scoped out of this assessment and are not considered further.

14.13 Inter-relationships

157. The inter-related effects assessment considers the potential for all relevant effects across multiple topics to interact, spatially and temporally, to create inter-related effects on a receptor group. The inter-related effects assessment incorporates the findings of the individual assessment chapters to describe potential additional effects that may be of greater significance when compared to individual effects acting on a receptor group.

158. The term 'receptor group' is used to highlight the fact that the proposed approach to the inter-relationships assessment has not assessed every individual receptor considered in this chapter, but instead focuses on groups of receptors that may be sensitive to inter-related effects.

159. **Chapter 5 EIA Methodology** provides a matrix to show at a broad level where, across the EIAR, interactions between effects on different receptor groups have been identified.

160. The potential inter-related effects that could arise in relation to marine cultural heritage are presented in **Table 14-14**. If there are additional effects, these are considered additively and qualitatively using expert judgement.

Table 14-14 Inter-related effects (phase) assessment for marine archaeology and cultural heritage

Impact / Receptor	Related Chapter	Phase Assessment
Indirect physical impact on known and potential marine cultural heritage receptors due to: Scour-induced effects on sediment transport and deposition; • Changes to the sediment transport regime; and • Loss of seabed and changes to seabed morphology.	**Chapter 6 Marine Geology, Sediments and Coastal Processes**	The effects resulting from these impacts are assessed in detail in **Section 14.10** of this Chapter.

14.14 Potential monitoring requirements

161. Monitoring requirements for the CWP Project will be described in the **In Principle Project Environmental Monitoring Plan** (IPPEMP), submitted alongside the EIAR and further developed and agreed with stakeholders prior to construction.

162. The assessment of impacts on marine archaeology and cultural heritage as a result of the construction, operation and maintenance, and decommissioning phases of the CWP Project are predicted to be not significant in EIA terms. Based on the predicted impacts, it is concluded that no specific monitoring is required; however, in accordance with the PAD, surveys undertaken for the project will be subject to archaeological review, the outcomes of which will be reported to the relevant authority.

14.15 Impact assessment summary

163. This chapter of the EIAR has assessed the potential environmental impacts on marine archaeology and cultural heritage from the construction, operation and maintenance, and decommissioning phases of the CWP Project. Where significant impacts have been identified, additional mitigation has been considered and incorporated into the assessment.

164. This section, including **Table 14-15**, summarises the impact assessment undertaken and confirms the significance of any residual effects, following the application of additional mitigation.

165. In summary, this EIAR chapter:

- Details the EIA scoping and consultation process undertaken and sets out the scope of the impact assessment for marine archaeology and cultural heritage.
- Identifies the key legislation, policy and guidance relevant to the assessment of marine archaeology and cultural heritage with reference to the latest updates in guidance and approaches.
- Confirms the study area for the assessment and presents the impact assessment methodology for marine cultural heritage.
- Describes and characterises the baseline environment for marine archaeology and cultural heritage established from desk studies, project survey data, and consultation.

- Defines the project design parameters for the impact assessment and describes any embedded mitigation measures relevant to the assessment of marine archaeology and cultural heritage.
- Presents the assessment of potential impacts on marine archaeology and cultural heritage and identifies any assumptions and limitations encountered in compiling the impact assessment; and
- Details any additional mitigation and / or monitoring necessary to prevent, minimise or reduce potentially significant effects identified in the impact assessment.

166. Consultation with statutory and non-statutory organisations is a key part of the EIA process. Consultation with regard to marine archaeology and cultural heritage has been undertaken to inform the approach to, and scope, of the assessment. To date, no significant issues have been raised during the consultation process relevant to marine cultural heritage.

167. Marine archaeology and cultural heritage cover a range of receptors and are characterised by a number of pathways. Marine archaeology and cultural heritage encapsulate the following aspects: known wrecks and obstructions, identified geophysical receptors, the potential for further maritime and aviation archaeological receptors, known and potential palaeogeography, and intertidal heritage receptors. The baseline characteristics specific to marine cultural heritage were characterised following a desk-based review of publicly available data. This was supplemented by site-specific surveys, which included collection of geophysical and geotechnical survey data.

168. Within the study area, the following elements have been identified:

- Six channels and one fine-grained deposit were assigned a P1 archaeological rating, which is defined as a feature of probable archaeological interest, either because of its palaeogeography or likelihood for producing palaeoenvironmental material;
- 25 cut and fills were assigned a P2 archaeological rating, and are features of possible archaeological interest;
- Two anomalies were assigned an A1 archaeological rating; anthropogenic origin of archaeological interest;
- 145 anomalies were assigned an A2_h archaeological rating; anomaly of likely anthropogenic origin but of unknown date; may be of archaeological interest or a modern feature;
- 308 anomalies were assigned an A2_l archaeological rating; anomaly of possible anthropogenic origin but interpretation is uncertain; may be anthropogenic or a natural feature;
- Two records were assigned an A3 archaeological rating; historic record of possible archaeological interest with no corresponding geophysical anomaly; and
- Six records relating to archaeological sites, artefacts, material and standing remains within the intertidal zone (to MHWS).

169. With the application of the primary mitigation, consisting of the implementation of AEZs around high-value anomalies, implementation of the LoD for features assigned an A2 archaeological discrimination rating, and recommended additional mitigation measures in place, consisting of further ground investigation work for palaeogeographic features, a PAD for reporting unexpected archaeological discoveries, and a targeted archaeological walkover survey along the proposed cable routes leading up to the landfall, the significance of the residual effect is predicted to be not significant in EIA terms. Where flexibility in the proposed design exists, there is no other scenario which would lead to a more significant effect.

Table 14-15 Summary of potential Impacts and residual effects

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of Impact	Significance of effect	Additional Mitigation	Residual effect
Construction						
Impact 1: Direct disturbance to seabed causing damage to receptors	Known and potential palaeogeography receptors	Low–High	Medium–High	Slight to Significant, Slight to Profound adverse (significant)	Further investigation by means of geoarchaeological assessment of geotechnical samples, for any geotechnical survey campaigns	Profound beneficial (as long as samples are retained, analysed and reported on by a qualified geoarchaeologist) **(not significant)**
	Known and recorded maritime and aviation receptors (A1s)	High	Negligible	Slight adverse (not significant)	No additional mitigation is required in addition to the primary mitigation measures as resulting impact is not significant	N/A **(not significant)**
	Geophysical anomalies of possible anthropogenic origin (A2s)	High	Negligible	Slight adverse (not significant)	No additional mitigation is required in addition to the primary mitigation measures as resulting impact is not significant	N/A **(not significant)**
	Currently unknown archaeological sites and artefacts	High	High	Profound adverse (significant)	Targeted archaeological walkover survey at landfall; any supporting activity-specific archaeological Method Statements; and PAD	Moderate beneficial **(not significant)**

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of Impact	Significance of effect	Additional Mitigation	Residual effect
Impact 2: Indirect disturbance to receptors caused by changes to the hydrodynamic and SSC due to spoil removal and suspended sediment redistribution	Known and potential palaeogeography, maritime and aviation receptors	Very low	Low	Not significant	No further mitigation is recommended as resulting impact resulted in not significant effect	N/A **(not significant)**
Operation and Maintenance						
Impact 1: Direct disturbance to previously not impacted seabed causing damage to receptors	Known and potential palaeogeography, maritime and aviation receptors	High	High	Profound adverse (significant)	Implementation of AEZs; any supporting activity-specific archaeological method statements; and PAD	Moderate beneficial **(not significant)**
Impact 2: Indirect disturbance to receptors caused by changes SSC and scour associated with installation structures	Known and potential palaeogeography, maritime and aviation receptors	Very low	Low	Not significant	No further mitigation is recommended as resulting impact resulted in not significant effect	N/A **(not significant)**
Decommissioning						
Potential effect of decommissioning would be the same as Construction phase if CWP Project was to be removed.						

14.16 References

170. Chartered Institute for Archaeologists (CIfA) (2014). Standard and guidance for historic environment desk-based assessment. Reading, CIfA (updated 2020).

171. Department of Arts, Heritage, Gaeltacht and the Islands (1999). Framework and Principles for the Protection of the Archaeological Heritage. Dublin.

172. Department of the Environment, Climate and Communications (2024). Climate Action Plan 2024. Government of Ireland. Online (https://www.gov.ie/pdf/?file=https://assets.gov.ie/279555/25df7bb5-1488-4ba1-9711-e058d578371b.pdf#page=null)

173. English Heritage (now Historic England) (2000). Managing Lithic Scatters: Archaeological Guidance for planning authorities and developers. London, English Heritage.

174. English Heritage (now Historic England) (2002). Military Aircraft Crash Sites: archaeological guidance on their significance and future management. London, English Heritage.

175. English Heritage (now Historic England) (2008). Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment.

176. English Heritage (now Historic England) (2011). Environmental Archaeology: A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation (second edition).

177. English Heritage (now Historic England) (2012). Ships and Boats: Prehistory to Present: Designation Selection Guide. London, English Heritage.

178. English Heritage (now Historic England) (2013). Marine Geophysics Data Acquisition, Processing and Interpretation Guidance Notes.

179. Environment Protection Agency (2022). Guidelines on the information to be contained in Environmental Impact Assessment Reports. CAAS Ltd.

180. 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).

181. G-tec 2021a, CWP Geophysical Campaign for Export Cable Routes. Interpretative Report – Priority 1, unpublished report ref. CWP-GTC-ENG-07-03-01-02-01-01-REP-0002.

182. G-tec 2021b, CWP Geophysical Campaign for Export Cable Routes. Interpretative Report – Priority 2 Unpublished report ref. CWP-GTC-ENG-07-03-01-02-01-02-REP-0002.

183. G-tec 2021c, CWP Geophysical Campaign for Export Cable Routes. Interpretative Report – Priority 3, unpublished report ref. CWP-GTC-ENG-07-03-01-02-01-03-REP-0002.

184. Heritage Council, The (2006). Conserving Ireland's Maritime Heritage; Proposing Policies and Priorities for the National Heritage. The Heritage Council of Ireland Series.

185. Historic England (2015). Geoarchaeology – Using earth sciences to understand the archaeological record.

186. Historic England (2023). Curating the Palaeolithic. Historic England, Swindon.

187. Hydromaster Ltd (2022). Dublin Port 3FM, Archaeo-geophysical survey report, October & November 2022. Commissioned by Dublin Port Company.

188. JNAPC (2006). Code of Practice for Seabed Development. York, Joint Nautical Archaeology Policy Committee.

189. MMT (2021a). Codling Wind Park Geophysical & 2D UHRS Survey Marine Survey Report, Revision C May 2022, ref.103710-CWP-MMT-SUR-REP-SURVEYRE.

190. MMT (2021b). Codling Wind Park Geophysical & 2D UHRS Survey: Operations Report M/V Roman Rebel, Rev03, May 2022, ref.103710-CWP-MMT-SUR-REP-OPERATRR.

191. MMT (2021c). Codling Wind Park Geophysical & 2D UHRS Survey: Operations Report M/V Relume, Rev04, May 2022, ref.103710-CWP-MMT-SUR-REP-OPERATRE.

192. Sustainable Energy Authority of Ireland (2023). Offshore Renewable Energy Development Plan II: Strategic Environmental Assessment Report. Published by ClearLead Consulting Limited on behalf of SEAI.

193. The Archaeological Diving Company (ADCO) Ltd. (2023). Underwater Archaeological Impact Assessment (UAIA) ADCO Areas 1-4, River Liffey, Dublin Port. Dublin Port 3FM Project. Project Reference CP1770_021. 23D0037, 23R0148.

194. Wessex Archaeology (2007). Historic Environment Guidance for the Offshore Renewable Energy Sector. Commissioned by COWRIE Ltd (project reference ARCH-11-05).

195. Wessex Archaeology (2022). Codling Wind Park, Dublin Bay – Ground Investigations: Archaeological Metal Detection Survey Report (Unpublished). Report ref. 260890.3.

196. Wessex Archaeology (2023). Codling Wind Park, Underwater Archaeological Impact Assessment (Unpublished). Report ref. 260890.04.

197. Westley K & Woodman P, (2020). Ireland: Submerged prehistoric sites and landscapes' in Bailey G., Galanidou N., Peeters H., Jöns H. and Mennenga M. (eds.) The Archaeology of Europe's Drowned Landscapes. Springer International Publishing AG. pp. 221–248.