



LLŶR

LLŶR FLOATING OFFSHORE WIND PROJECT

Llŷr 1 Floating Offshore Wind Farm

Environmental Statement

Volume 6: Appendix 24A – Marine archaeological desk-based assessment

August 2024





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Summary

Coracle Archaeology was commissioned by Llŷr Floating Wind Ltd to undertake marine archaeological assessments, including this desk-based assessment, for the Llŷr Floating Offshore Wind Project. This is a test and demonstration wind farm development, located in Welsh waters in the Celtic Sea. The array area will include up to 10 floating wind turbine generators, with an operational life of 30 years.

This desk-based assessment of marine and coastal cultural heritage assesses the Llŷr Offshore Development Area from mean high water springs at Freshwater West, Pembrokeshire, as well as a wider study area extending around the Offshore Development Area. The proposed Project above mean high water springs at the landfall location is beyond the remit of this report.

This desk-based assessment provides a baseline assessment of known sites and features of cultural heritage significance within the wider study area, extending c. 1km around the Array Area, and 500m either side of the Offshore Export Cable Corridor (OfECC) as it funnels towards the Pembrokeshire coast. This is wider than the Offshore Development Area, thus facilitating an assessment of the density of marine heritage assets in the vicinity. This in turn provides an indication of the potential to encounter unknown and unexpected archaeological sites and features while undertaking project-specific activities. This assessment will be used:

- To assess the nature of the cultural heritage resource within the area;
- To outline the archaeological potential of the marine environment; and
- To aid in the identification of seabed anomalies that may have been detected during the marine geophysical surveys.

This assessment has established that there are 53 cultural heritage assets located within the wider study area, including 28 wrecks, two aircraft, four sites, five findspots, one monument, six features, one maritime named location, three obstructions, two geophysical anomalies and one landscape. Of these, 41 are recorded in the Offshore Development Area. None of the wrecks are designated or protected, and none of the monuments are scheduled.

Many of these recorded wrecks are reports of losses, and either do not have reliable locational information, or should not be seen as indicative of the presence (or otherwise) of physical remains. These records are included to highlight the potential for encountering wrecks that have been reported in the past, but for which there is presently no material evidence to substantiate their existence. The confirmation of the existence or otherwise of many of these sites would require further investigation, including the archaeological assessment of marine geophysical survey data.

Although the recorded losses are relatively high, the paucity of substantiated records within the Offshore Development Area and wider study area suggests that the potential to encounter unexpected cultural remains is moderate. This will be reassessed following the archaeological review of project-specific marine geophysics.



Acronyms and Abbreviations

Acronym / Abbreviation	Definition	Acronym / Abbreviation	Definition
ADS	Archaeology Data Service	MHWM	Mean high water mark
BIIS	British-Irish ice sheet	MIS	Marine isotope stage
BGS	British Geological Survey	MW	Megawatt
BP	Before present	nm	Nautical miles
CA	Coracle Archaeology	NMW	National Museum of Wales
CIfA	Chartered Institute for Archaeologists	NMRW	National Monument Record of Wales
DAT	Dyfed Archaeological Trust	NPRN	National primary reference number
DBA	Desk-based assessment	nT	nanoTesla
EEZ	Exclusive economic zone	OfECC	Offshore export cable corridor
EMODnet	European Marine Observation and Data Network	OSGB	Ordnance Survey Great Britain
EPSG	European Petroleum Survey Group	PaMELA	Palaeolithic and Mesolithic artefact database
GIA	Global isostatic adjustment	PRN	Primary reference number
GIS	Geographic Information System	RCAHMW	Royal Commission on the Ancient and Historical Monuments of Wales
GPS	Global Positioning System	RSL	Relative sea level
grt	Gross registered tonnage	SEA	Strategic Environmental Assessment
HER	Historic Environment Record	SLIP	Sea-level index point
ka	Kilo annum	SSSI	Site of special scientific interest
LAT	Lowest astronomical tide	UKHO	United Kingdom Hydrographic Office
LGM	Last glacial maximum	UTM	Universal Transverse Mercator
MBES	Multibeam echosounder	WGS	World Geodetic System
MCA	Maritime and Coastguard Agency	WSA	Wider study area
MEDIN	Marine Environment Data Information Network	WTG	Wind turbine generator
MHWS	Mean high water springs		



Glossary of Project Terms

Term	Definition
The Applicant	The developer of the Project, Llŷr Floating Wind Limited
Array	All wind turbine generators, inter array cables, mooring lines, floating sub-structures and supporting subsea infrastructure within the Array Area, as defined, when considered collectively, excluding the offshore export cable(s).
Array Area	The area within which the wind turbine generators, inter array cables, mooring lines, floating sub-structures and supporting subsea infrastructure will be located
Floventis Energy	A joint venture company between Cierco Ltd and SBM Offshore Ltd of which Llŷr Floating Wind Limited is a wholly owned subsidiary.
Landfall	The location where the offshore export cable(s) from the Array Area, as defined, are brought onshore and connected to the onshore export cables (as defined) via the transition joint bays (TJB).
Llŷr 1	The proposed Project, for which the Applicant is applying for Section 36 and Marine Licence consents. Including all offshore and onshore infrastructure and activities, and all project phases.
Marine Licence	A licence required under the Marine and Coastal Access Act 2009 for marine works which is administered by Natural Resources Wales (NRW) Marine Licensing Team (MLT) on behalf of the Welsh Ministers.
Offshore Development Area	The footprint of the offshore infrastructure and associated temporary works, comprised of the Array Area and the Offshore Export Cable Corridor, as defined, that forms the offshore boundary for the S36 Consent and Marine Licence application
Offshore Export Cable	The cable(s) that transmit electricity produced by the WTGs to landfall.
Offshore Export Cable Corridor (OfECC)	The area within which the offshore export cable circuit(s) will be located, from the Array Area to the Landfall.
Onshore Development Area	The footprint of the onshore infrastructure and associated temporary works, comprised of the Onshore Export Cable Corridor and the Onshore Substation, as defined, and including new access routes and visibility splays, that forms the onshore boundary for the planning application.
Onshore Export Cable(s)	The cable(s) that transmit electricity from the landfall to the onshore substation
Onshore Export Cable Corridor (OnECC)	The area within which the onshore export cable circuit(s) will be located.
Project	All aspects of the Llŷr development (i.e. the onshore and offshore components of both Llŷr 1 and Llŷr 2).
Onshore Substation	Located within the Onshore Development Area, converts high voltage generated electricity into low voltage electricity that can be used for the grid and domestic consumption.
Section 36 consent	Consent to construct and operate an offshore generating station, under Section 36 (S.36) of the Electricity Act 1989. This includes deemed planning permission for onshore works.



Contents

24.	Marine archaeological desk-based assessment	7
24.1	Introduction.....	7
24.1.1.	Outline	7
24.1.2.	Project background	7
24.1.3.	Aims and Objectives	7
24.2	Legislative Framework and Guidance	8
24.3	Methods and Data Sources	9
24.3.4.	Geographical scope	9
24.3.5.	Sources	9
24.3.6.	Consultation with statutory bodies.....	10
24.4	Baseline Environment.....	10
24.4.7.	Palaeo-environment.....	10
24.4.8.	Freshwater West	13
24.4.9.	Recorded Maritime Cultural Heritage	15
	Limitations of data.....	15
24.4.10.	Sites of cultural heritage interest within the Offshore Development Area and WSA.....	16
	Overview and impact of route revisions	16
	Sites of cultural heritage interest within the Llŷr Offshore Development Area	17
	Sites of cultural heritage interest within the Wider Study Area	24
24.5	Conclusions.....	26
24.6	References.....	27

List of Figures

Figure 24A-12	The Willemoes of Thuro (or 'upside-down wreck') when it was exposed during the storms of February 2014 (www.pemcoastphotos.com/_photo_12563415.html)	21
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List of Tables

Table 24A-1	Summary of consultations with statutory bodies	10
Table 24A-2.	Description of sediments recorded at the outermost submerged forest (after Leach 1913, Wainwright 1961; 1963).....	14
Table 24A-3.	Cultural heritage assets by general type within the Llŷr Offshore Development Area and WSA	17
Table 24A-4.	Llŷr floating offshore wind project Offshore Development Area gazetteer entries	18
Table 24A-5.	Llŷr floating offshore wind project WSA gazetteer entries.....	25



24. MARINE ARCHAEOLOGICAL DESK-BASED ASSESSMENT

24.1 Introduction

24.1.1. Outline

1. Coracle Archaeology (CA) was commissioned by Llŷr Floating Wind Limited (hereafter referred to as 'the Applicant') in March 2023 to undertake marine archaeological environmental assessments, including this desk-based assessment (DBA) for the Llŷr Floating Offshore Wind Project (henceforth 'the proposed Project'). This consists of a test and demonstration offshore wind farm development, located in Welsh waters in the Celtic Sea. The array area will consist of up to ten floating wind turbine generators (WTGs) with an operational life of 30 years. This report includes an assessment of marine and coastal cultural heritage assets within the Offshore Development Area, up to mean high water springs (MHWS) at the proposed landfall.
2. This DBA follows appropriate professional guidance published by the Chartered Institute for Archaeologists (CIfA; 2014). It records known sites and features of cultural heritage significance within, and in proximity to, the Offshore Development Area that have the potential to be affected by the proposed Project. The significance of each asset, and the potential impact of the proposed Project upon them, is evaluated more fully in the archaeological assessment of marine geophysical and landfall survey results (Coracle Archaeology 2024a) and in the project-specific marine archaeological written scheme of investigation (WSI).

24.1.2. Project background

3. The proposed Project is located in the north-east of the Celtic Sea, within Welsh waters (**Volume 5: Figure 24A-1**). The Llŷr 1 Array Area is located c. 35km from the Welsh coastline, and c. 55km from Lundy Island. The offshore export cables are expected to make landfall at Freshwater West, Pembrokeshire (**Volume 5: Figure 24A-2**) before connecting into Pembroke Dock and the national grid network.
4. This DBA assesses all offshore elements of the proposed Project, encapsulated within the Offshore Development Area. This includes both the Array Area and the offshore export cable corridor (OfECC; **Volume 5: Figure 24A-1**). Works related to the proposed Project above MHWS (including construction, maintenance and decommissioning) are beyond the remit of this report.

24.1.3. Aims and Objectives

5. The aim of this DBA is to identify known and potential cultural heritage receptors within the Offshore Development Area. It also assesses a wider study area (WSA) which extends a further 1 km either side of the Array Area and 500m either side of the OfECC as it funnels towards the Pembrokeshire coast (**Volume 5: Figure 24A-3**). The objectives of this assessment are:
 - to set out the statutory, planning and policy contexts relating to the historic environment for Welsh waters. It is important to note that the remit of the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW) extends beyond the 12 nautical mile (nm) limit, to the edge of the UK exclusive economic zone (EEZ);
 - to provide an overview of the historic environment within the WSA, based on existing archaeological records and secondary sources; and
 - to highlight known maritime sites that may be impacted by the proposed project, with particular reference to:
 - shipwrecks, crashed aircraft and wreck material;



- submerged prehistoric landscapes and artefacts; and
- areas of archaeological potential.

24.2 Legislative Framework and Guidance

6. As the scope of this DBA is located in Welsh waters, this assessment takes account of the following national and international legislative procedures and guidelines (for summaries of legislation please refer to the marine archaeology technical report; Coracle Archaeology 2024b):
 - Wales
 - Historic Environment (Wales) Act 2016;
 - The Planning (Listed Buildings and Conservation Areas; Wales) Regulations 2012;
 - Planning Policy Wales (2017); and
 - Welsh National Marine Plan 2019 (especially Objective 7; policies SOC_05-07).
 - UK
 - Protection of Wrecks Act 1973;
 - Protection of Military Remains Act 1986;
 - National Heritage Act 2002;
 - Marine and Coastal Access Act 2009;
 - Merchant Shipping Act 1995;
 - Burial Act 1857;
 - Ancient Monuments and Archaeological Areas Act 1979; and
 - UK Marine Policy Statement (HM Government 2011).
 - International
 - European Convention on the Protection of the Archaeological Heritage (Valetta) 1992;
 - UNESCO Convention on the Protection of the Underwater Cultural Heritage (2001);
 - United Nations Convention on the Law of the Sea (UNCLOS) 1982;
 - International Council of Monuments and Sites (ICOMOS) Charter on the Protection and Management of Underwater Cultural Heritage (1996) (the Sofia Charter);
 - The European Convention of the Archaeological Heritage of Europe (Revised) 1992; and
 - The World Heritage Convention.
7. This DBA has been compiled in accordance with industry best practice and the relevant offshore renewables and marine historic environment guidance. These include:
 - Chartered Institute for Archaeologists (CIfA) guidelines: Standard & guidance for archaeological desk-based assessment (2014);
 - Managing the marine historic environment of Wales, Cadw (2020);
 - Technical Advice Note 24: the historic environment, Welsh government (2017);
 - The marine historic and natural environment marine area statement, Natural Resources Wales (NRW) and the RCAHMW (2022);



- Heritage impact assessment in Wales, Cadw (2017a);
- Setting of historic assets in Wales, Cadw (2017b);
- Conservation principles for the sustainable management of the historic environment in Wales, Cadw (2011);
- Joint Nautical Archaeology Policy Committee (JNAPC) Code of practice for seabed development (1998);
- COWRIE Historic environment guidance for the offshore renewable energy sector (2007);
- COWRIE Guidance for assessment of cumulative Impacts on the historic environment from offshore renewable Energy (2008);
- COWRIE Guidance for offshore geotechnical investigations and historic environment analysis: guidance for the renewable energy sector (2011);
- Offshore renewables protocol for archaeological discoveries, the Crown Estate and Wessex Archaeology (2014); and
- Archaeological written schemes of investigation for offshore wind Farm projects, the Crown Estate and Wessex Archaeology (2021).

24.3 Methods and Data Sources

8. The following section sets out the methods followed for this DBA, including the geographical scope and the sources utilised for the collation of data.

24.3.4. Geographical scope

9. This DBA assesses the Offshore Development Area, including the Array Area and the OfECC, up to MHWS at the proposed landfall location at Freshwater West. It also assesses a WSA which extends a further 1km beyond the proposed Array Area and 500m either side of the OfECC (**Volume 5: Figure 24-3**). The WSA enables an assessment of the archaeological potential of the area, whilst highlighting notable sites in the vicinity of the proposed Project. The purpose of this DBA is to identify known and potential sites within the Offshore Development Area that may be affected by the proposed Project.

24.3.5. Sources

10. This DBA includes a documentary and cartographic search utilising a variety of sources to locate all known cultural heritage assets within the Offshore Development Area, and to identify the archaeological potential of the area. Sources utilised for this assessment include:
 - Wales
 - RCAHMW National Monuments Record of Wales (NMRW);
 - Dyfed Archaeological Trust (DAT) Historic Environment Record (HER);
 - Cadw's Register of Historic Landscapes;
 - records held by the National Museum of Wales (NMW); and
 - geophysical survey data held by the integrated marine data and information system (iMarDIS), University of Bangor.
 - UK-wide
 - Records of wrecks and obstructions as held by the United Kingdom Hydrographic Office (UKHO) Admiralty Marine Data Portal;
 - UKHO review of cartography, historic charts and sailing directions;



- historic maps and charts as held by the National Library of Scotland (NLS);
 - records held by the Archaeology Data Service (ADS);
 - Marine Environment Data Information Network (MEDIN);
 - British Geological Survey (BGS) regional guide and previous work in the area;
 - readily accessible published sources and grey literature (e.g. results from previous studies); and
 - relevant strategic environmental assessment (SEA) reports (e.g. UK Continental Shelf SEA archaeological baseline) and coastal survey assessment reports.
- International
 - European Marine Observation and Data Network (EMODnet); and
 - Wrecksite.eu website.
11. This DBA includes all known and potential maritime cultural heritage assets, identified during this assessment as detailed in the tables and figures below. Records located within the Offshore Development Area and WSA have been assigned a unique Coracle Archaeology (CA) number for ease of identification (in the format **CA00**).
12. This DBA assesses the latest iteration of the route of the proposed Project, issued in April 2024. It therefore represents a substantial revision of earlier drafts of the document, which assessed areas of the Offshore Development Area no longer included in the proposed Project. As a result, a number of assets identified in earlier drafts are no longer located in either the Offshore Development Area or the WSA; these will not be considered here. Any omissions are clearly stated below.

24.3.6. Consultation with statutory bodies

13. For this assessment, the primary statutory bodies consulted were the RCAHMW and DAT. This included online meetings with the RCAHMW and telephone and email conversations with DAT. These are summarised in **Table 24A-1**.

Table 24A-1 Summary of consultations with statutory bodies

Consultee	Date of consultation	Consultation type
RCAHMW	July 2022	Screening and scoping opinion
RCAHMW	March 2023	Online meeting with representatives of RCAHMW, Floventis Energy Limited and Coracle Archaeology
RCAHMW	March 2023, November 2023, January 2024	Telephone and email
RCAHMW	April 2024	Online meeting
DAT	March-April 2023	Telephone and email

24.4 Baseline Environment

14. The following sections outline the nature of the existing environment of the study area, including a discussion of the palaeo-environment and recorded maritime cultural heritage.

24.4.7. Palaeo-environment

15. Throughout the Late Devensian period (c. 60 to 11.5 kilo annum (ka)), the British-Irish Ice Sheet (BIIS) was the dominant feature determining the palaeo-climate and depositional history of



the study area (Clark *et al.* 2012; Chiverrell *et al.* 2013; Scourse *et al.* 2019). The ice sheet reached its maximum extent within the Celtic Sea at c. 24.3-23 ka, extending to a position west of the Isles of Scilly, though it is noteworthy that southern Pembrokeshire is believed to have remained ice-free (Chiverrell *et al.* 2013; John 2019).

16. Following this maximum extension, the BIIS began to regress towards the northern Irish Sea Basin; the retreat was rapid and driven by climatic warming, sea-level rise, mega-tidal amplitudes and reactivation of meridional circulation in the North Atlantic. The extension and retreat of the BIIS along St George's Channel and into the Celtic Sea resulted in the deposition of thick glacial deposits (Blundell *et al.* 1968; Garrad 1977), typically associated with the Cardigan Bay Formation.
17. The BIIS was but the last in a series of major glaciations which took place throughout the Pleistocene (c. 2.5 million years ago to 12 ka). There remains, however, considerable uncertainty regarding the extent of Pleistocene ice sheets within the area of the proposed Project. It was suggested by both Stephens (1966) and Mitchell (1968) that the geomorphology of the island of Lundy may be a product of glacial processes, modified by periglacial and post-glacial surface processes. This included widespread smoothing and lineation of granite bedrock surfaces, potentially indicative of sub-glacial ice moulding, dry channels interpreted as subglacial meltwater channels, and the presence of large areas of erratic gravels and cobbles, typically seen as representative of transport by ice. It was argued therefore by Mitchell (1968; 1972) that the last glaciation over Lundy occurred during either the Anglian glaciation (Marine Isotope Stage [MIS] 12; c. 478-424 ka), or the Wolstonian (MIS 10 to 6; c. 352- 130 ka).
18. Recent investigations (e.g. Rolfe *et al.* 2012; 2014; Rolfe 2015) have challenged this assumption. Utilising $^{26}\text{Al}/^{10}\text{Be}$ cosmogenic exposure dating of the glaciated bedrock surfaces, it is suggested that the last glaciation of Lundy occurred at c. 40-35 ka, or during MIS 4-3. This too has been challenged by Carr *et al.* (2017), based on a revised interpretation of the geomorphological and cosmogenic exposure data. It is argued that Lundy remained ice-free during the Devensian glaciation, with the cosmogenic dates relating to surface lowering during a prolonged period of subaerial granite weathering. Ongoing investigations at Lundy nevertheless continue to support a MIS 4 glaciation, with deglaciation in MIS 3.
19. Offshore, glacial deposits from the north-east of Lundy were evaluated by Gibbard *et al.* (2017), using borehole data collected for the Atlantic Array offshore wind farm, c. 26km east of the proposed Project, supplemented with coarse-resolution bathymetric data (based on the EMODnet DTM at $1/8 \times 1/8$ minutes resolution). It was suggested that glacial till deposits were present below marine deposits, lending credence to the hypothesis that these deposits might be associated with the Upper Till Member of the Cardigan Bay Formation (see for example Tappin *et al.* 1994). Detailed analysis of the offshore borehole deposits has, however, yet to occur (Carr *et al.* 2017), and the interpretation of the glacial sediments remains unsubstantiated. It is notable that the seabed south of Lundy does not contain any visible gorge-like features or moraine deposits, potentially indicative of grounded ice. Rather, bedrock is incised by an east-west palaeo-channel network, likely associated with lowstand drainage from the Taw-Torridge valleys in north Devon.
20. It is nevertheless suggested by Gibbard *et al.* (2017) that the north-east Celtic Sea witnessed at least three phases of glaciation – one related to the southern limits of a Late Devensian MIS 2 Welsh Ice Cap, an earlier Devensian glaciation (MIS 4–3, associated with the BIIS), and a third, older glaciation associated with ice that filled both the eastern Celtic Sea and the outer and central Bristol Channel.



21. The latter is attributed typically to the Caernarfon Bay Formation, and likely associated with onshore deposits recorded at Fremington, north Devon. This is refuted by Carr *et al.* (2017), who prefer instead the existing model of the extent, dynamics and timing of the BIIS, highlighted by both McCarroll *et al.* (2010) and Clark *et al.* (2012). This model places the BIIS significantly to the west of Lundy, and not extending beyond the Celtic Sea or reaching the northern coastline of Cornwall and Devon.
22. Using this model, the proposed Project lies at the eastern extent of the MIS 2 glacial limit, though a revision by Chiverrell *et al.* (2013) places this limit c. 15km east of the Array Area (**Volume 5: Figure 24A-4**). It is possible, therefore, that an ice sheet may have extended to the east of Lundy during the mid- to late-Devensian period, into the OfECC.
23. The retreat of the BIIS and the concomitant rise in relative sea level (RSL) resulted in the submersion of coastal areas surrounding the Celtic Sea. Perceptions of the rate of RSL change have been constrained by studies using sea-level index points (SLIPs). The most recent review of SLIPs for the British Isles was presented by Shennan *et al.* (2018) and which highlights only one SLIP for south Wales (Pembrokeshire), derived from the submerged forest deposits at Freshwater West.
24. To supplement the radiocarbon-dated SLIPs, glacial isostatic adjustment (GIA) models have been used to predict broad patterns of RSL change over longer periods of time. GIA models predict sea levels of c. 30m below mean sea-level (MSL) at the start of the Holocene (11.7 ka), rapidly rising to c. 8m below MSL at Freshwater West by c. 7-8 ka, with a subsequent reduced rate of RSL rise to the present day.
25. Further offshore, in St George's Channel, RSL has been modelled and combined with tidal amplitude data for sectors of the BIIS since the Last Glacial Maximum (LGM) at c. 22 ka (Scourse *et al.* 2018). At the approximate position of the glacial limit, Scourse *et al.* (2018) suggest that RSL was c. 60m below MSL between 20 to 14 ka, rising to c. 40m below MSL at the end of the last glaciation, before following the Holocene RSL curves predicted for Pembrokeshire. The modelled RSL suggests that the land bridge between Wales and Ireland in St George's Channel disappeared with the retreat of the BIIS.
26. The RSL history of the area (based on Scourse *et al.* 2018) suggests that the proposed Array Area would have been inundated during MIS 2 (**Volume 5: Figure 24A-4**). Following the models for the BIIS proposed by both Gibbard *et al.* (2017) and Chiverrell *et al.* (2013), it is likely to have been beneath ice, further reducing the potential of the proposed Project area to reveal any evidence for submerged palaeo-landscapes suitable for human occupation.
27. The survival potential for palaeo-environmental material associated with submerged palaeo-landscapes in the general area of the Celtic Sea has also been regarded as relatively low, owing to high-energy conditions, such as strong tidal currents which sweep through St. George's Channel to the northwest of the proposed Project. Such conditions are reflected on the seabed by lag gravel deposits or scoured bedrock, and result in minimal preservation of former landscapes. Exceptions can occur, however, in the form of infilled depressions (including palaeo-channels) which may have collected and protected material (Westley and Edwards 2017).
28. This conflicts somewhat with assessments of potential late Pleistocene and Holocene submerged palaeo-landscapes in the general area, undertaken as part of the West Coast Palaeo-landscapes Survey (Fitch and Gaffney 2011). Though focused primarily to the east of the proposed Project, their study area does cover some areas of the Celtic Sea, including a partial overlap with the Offshore Development Area. For this study, Fitch and Gaffney (2011) utilised available 2D seismic and bathymetry data to identify palaeo-landscape features



including channels, floodplain deposits and possible peats, sediment-filled basins and potential glacial lake deposits. This model was used to produce an interpolated map of potential palaeo-landscape features in parts of the Celtic Sea and Bristol Channel (**Volume 5: Figure 24A-5**), though one that its authors accept should not be seen as wholly accurate:

'[due to] the lack of absolute data, these features are considered to have a certainty of zero. They are 'guesstimates' and as such, are likely to be refined when more detailed data becomes available' (Fitch & Gaffney 2011:54).

29. Utilising more recent surveys, notably higher resolution bathymetric data collected by the Maritime and Coastguard Agency (MCA) as part of the civil hydrography programme and studies associated with the proposed Atlantic Array offshore wind farm, Grant *et al.* (2020) caution against the use of these interpolated maps to infer archaeological and palaeo-environmental potential. Following a review of the data, several interpolated features identified by Fitch and Gaffney (2011) were either not present on the seabed, or were deemed to be spatially imprecise (Grant *et al.* 2020). This is particularly true of the suggested passage of the palaeo-Severn channel, and the apparent absence of the proposed large glacial lake features. Many of the interpolated features appear to coincide with areas of exposed geology bedrock or thin veneers of mobile sediment, overlying solid geology. The predicted floodplain features identified by Fitch and Gaffney (2011) are therefore unlikely to be indicative of a submerged palaeo-landscape, but, if present, are likely to be derived from glaciomarine deposits.
30. It is however, important to recognise that though the Offshore Development Area is unlikely to contain evidence for submerged palaeo-landscapes, at least offshore, sedimentary sequences found within the area have the potential to test competing hypotheses over the presence and extent of Devensian glaciation. The archaeological significance of these deposits cannot, therefore, be discounted.

24.4.8. Freshwater West

31. The proposed landfall location at Freshwater West is an area of considerable archaeological and palaeo-environmental interest. The palaeo-environmental potential of this area was first established by Leach (1913), who identified a series of flint scatters associated with a 'soil drift' in the Little Furznp area, towards the southern end of the beach (**Volume 5: Figure 24A-6**). In March and August 1912, Leach also surveyed two areas of exposed submerged forest visible on the beach, near the mouth of Castlemartin Brook. Leach reported the presence of a number of flint flakes located beneath previously undisturbed peat deposits, along with pieces of hard, brittle charcoal. These were interpreted as the remains of a fire and flint 'chipping floor'. The stratigraphic recording of the sequence is summarised in **Table 24A-2**.
32. The most westerly (outermost) of the peat deposits was reinvestigated in the summer of 1960 by Wainwright (1961; 1963; **Volume 5: Figure 24A-6**), who also encountered one small tranche axe and a few flint flakes from the surface of the blue clay, sealed by the peat (Table 24A-2). Sampling of the peat at the low water mark by Godwin suggested that the pollen assemblage was dominated by *Quercus* (oak) and *Alnus glutinosa* (alder), with the latter also present in the macrofossil record along with a series of other aquatic / wetland plant species (in Wainwright 1961; 1963 Appendix II). The macrofossils indicated a transition from fen woodland at the base of the sequence to 'more muddy conditions' at the top. The lower wood peat was radiocarbon dated to 5210-4550 calibrated (cal) BC (Q-530; 5960±120 BP; Godwin & Switsur 1964).
33. The significance of the submerged forest exposures was further highlighted by the confirmation that the sediments were laterally continuous (Leach 1913; inset **Volume 5:**

Figure 24A-6), with ‘stoney rubble’ overlain by an organic horizon also present in exposed hillside sections several feet above the beach. Flints appeared to be contained only in the fine-grained clayey soil-drift, not in the coarse underlying rubble.

Table 24A-2. Description of sediments recorded at the outermost submerged forest (after Leach 1913, Wainwright 1961; 1963)

Leach 1913	Godwin in Wainwright (1961; 1963)
Peat 8 inches	Dark laminated coarse detritus mud with abundant twigs and some leaf fragments; some sand and silt and occasional pebbles of stone and clay. Dark brown wood peat with abundant wood fragments, compressed, and in situ.
Blue slime 4 to 6 inches, a tenacious blue clay	Peat clay contact at top; stiff grey blue clay with pebbles, some large rootlets penetrating from above Stiff silty clay with scattered. Small pebbles; largely blue grey but red brown at base
Stoney clay about 1ft, stiff gritty clay, full of pebbles and angular fragments of igneous rocks and local sandstones.	

34. The main excavation of this occupation surface was undertaken by Wainwright (1959; 1961), who investigated an old quarry within the Little Furznip area, c. 350m south of the submerged forest. The sediments associated with the artefact-rich horizon were investigated by Cornwall (in Wainwright 1961; 1963: Appendix I), who demonstrated that the red loam of the ‘soil drift’ was indicative of a buried land surface. The exact location of Wainwright’s excavations is, however, somewhat unclear: the description of the location varies between accounts, and historic mapping suggests that the quarries were likely to be found to the east of the beach itself.
35. It is noteworthy that geo-rectification of the map produced by Leach (1913: **Error! Reference source not found.; Volume 5: Figure 24A-6**), coupled with the site descriptions provided by Wainwright (1959; 1961; 1963), centres the outermost submerged forest exposure and occupation surface on OSGB grid reference SR 8805 9969 (WGS84 UTM 30N 357120 5724790), c. 350m west of the position of the forest recorded by the RCAHMW (National Primary Reference Number (NPRN) 524740). The inner submerged forest exposure is mapped by Leach (1913) on SR 8832 9973 (WGS84 UTM 30N 357390 5724840), c. 120m south of its recorded position (**Volume 5: Figure 24A-6**). This peat surface is often exposed on the beach following storm activity when the sand is temporarily stripped away, most recently in both 2016 and 2020 (Mountain Man 2023 [online]). In April 2021, a peat bed with tree remains and an underlying brown soil were also reported at SR 88370 99784 (WGS84 UTM 30N 357435 5724891), covering an area c. 20m x 50m. This peat surface is likely to be associated with the inner submerged forest exposure. This location is 90m south of the RCAHMW record and 60m northeast of the approximate position provided by Leach (1913), suggesting that the submerged forest is more laterally extensive than considered previously.
36. At Gravel Bay, at the northern end of the beach, a newly recorded submerged forest was also reported in March 2020 (Mountain Man 2023 [online]). This consisted of an undulating peat surface with abundant pools and occasional tree remains, extending over an area of c. 100 x 30m, centred on SN 8806 0047 (WGS84 UTM 30N 357116 5725573; **Volume 5: Figure 24A-6**). These peats are not recorded in the NMRW or HER datasets.



37. Leach also records small sharp flakes and chips from the sandy downwash on the side of Gravel Bay; these were mapped by Wainwright (1963) alongside a series of scatters located along the cliff line, to the north of the beach. Leach similarly reports flint flakes and implements, indistinguishable from those found at the 'chipping floor' sites, obtained near shell-heaps and shell-strewn spaces, although the location of these sites is unclear.
38. The Palaeolithic and Mesolithic Lithic Artefact database (PaMELA; Wessex Archaeology and Jacobi 2014) also includes a large number of locations with Mesolithic material in and around the beach at Freshwater West. Most of these records are spatially inaccurate and appear to relate to the submerged forest identified by Leach, or excavations by Wainwright in the Little Furznip / Guppton Burrows area. The PaMELA database does, however, cite a collection at the Ashmolean Museum recorded as derived from Broomhill Burrows, the dune sequence to the north of the Castlemartin Corse stream which enters the bay to the east of the submerged forest. It is possible that the 'soil drift' deposit may extend under the beach and into the Celtic Sea, though this is not visible in the iMarDIS MBES dataset, collected in 2017, which shows mainly undifferentiated seabed sand and bedrock outcrops. At present, no seismic data (sub-bottom profiler) is available for the intertidal and nearshore area that may give an indication of the lateral continuity of buried deposits.
39. The presence of a number of submerged forest deposits (including artefact-rich sediments), combined with flint scatters recorded on the beach, suggests that the proposed landfall at Freshwater West must be considered to be an area of considerable archaeological and palaeo-environmental interest. This will be assessed further following landfall surveys (Coracle Archaeology 2024a and b).

24.4.9. Recorded Maritime Cultural Heritage

Limitations of data

40. One of the greatest limitations when researching known and potential marine cultural heritage is the difficulty of locating recorded maritime losses. For many losses, the location of the sinking of the vessel comprises a general area description, such as 'lost near Milford Haven' or 'floundered 25 miles south by south-west of St Ann's Head', which is not useful practically for the purposes of accurate assessment, except to indicate that potential exists to encounter unrecorded cultural remains. This is particularly true of ships that ran aground on the foreshore, where salvage and poor survival of remains in such a high-energy environment makes locating losses especially problematic.
41. Recorded maritime losses are also heavily biased towards the 19th and 20th centuries, when more comprehensive records of losses began to be compiled. Many wrecks have also been identified through sonar survey, but this too presents difficulties as the location of many of these wrecks was recorded using GPS, which until relatively recently was accurate to only c. 100m (Baird 2009; Satchell 2012); or by DECCA which could provide accuracy to only one kilometre.
42. The details for specific offshore cultural heritage assets within the wider study area were acquired from the sources cited above. These databases are each derived, in turn, from a variety of sources including various published lists of marine losses and marine surveys. Consequently, there are both overlaps and discrepancies between the datasets.
43. The project GIS used World Geodetic System 1984 (WGS84) Universal Transverse Mercator (UTM) 30N (European Petroleum Survey Group [EPSG] projection 32630). Geospatial data for the Offshore Development Area were supplied by the client in WGS84 (ESPG projection 4326),



as were data from the UKHO Admiralty Marine Data Portal. Data from these two sources were projected into the GIS without transformation.

44. For initial iterations of the OfECC, geospatial data from the RCAHMW NMRW and from the Dyfed HER were transformed from Ordnance Survey Great Britain 1936 (OSGB36; EPSG projection 27700) into WGS84 (EPSG projection 4326), using the transformation OSGB 1936 to WGS 1984 Petroleum (EPSG transformation 1314), which has a stated accuracy of $\pm 2\text{m}$. Transformed and projected data were then clipped using a 500m wide buffer around the OfECC, and a 1km buffer around the Array Area. The Offshore Development Area and WSA was clipped at MHWS.
45. Following the route revision in April 2024, the most recent publicly available version of the RCAHMW NMRW (January 2024) was obtained via the Datamap Wales portal. This dataset was supplied in WGS84 (EPSG 4326) and required no transformation for projection into the GIS. Supplemental records from the Dyfed HER were acquired via the Archwilio data portal and transformed from OSGB36 using the Ordnance Survey's online coordinate transformation tool. Newly and previously-acquired datasets for earlier route iterations were then clipped to the new Offshore Development Area and WSA, as appropriate. This resulted in the exclusion of a number of assets from this assessment, and the addition of others. Where necessary, omissions are highlighted below.
46. Wrecks and obstructions discussed below are generally referred to using the UKHO designations of 'live' or 'dead'. 'Live' refers to those where a location is known, which has been verified by recent surveys. 'Dead' refers to those that have been recorded as lost in a certain location, but which have not been detected by repeated, or the most recent, surveys.
47. The tables and discussion below include all HER, NMRW, NMW and UKHO entries. Records of dead wrecks and obstructions are also included; although they may not have been detected in recent non project-specific surveys, the recorded locations may still contain remains of cultural heritage interest. Given locational discrepancies, there is also a possibility that wrecks lie beyond previous search areas.
48. The old archaeological adage that absence of evidence is not evidence of absence is pertinent here. In other cases, however, it is clear from the details of an entry that there is no reason to believe that there are now or ever have been archaeological remains in a particular location. These entries have also been included in the text and illustrations and are discussed on a case-by-case basis below.
49. The various datasets used in the compilation of this DBA have been cross-referenced to remove duplicate entries and are presented in the tables below. For those mentioned in multiple datasets, the reference to each source is provided.

24.4.10. *Sites of cultural heritage interest within the Offshore Development Area and WSA*

Overview and impact of route revisions

50. A total of 53 cultural heritage have been identified within the present iteration of the Offshore Development Area and WSA. These can be divided into the following general asset categories: 28 wrecks, two aircraft, four sites, five findspots, one monument, six features, one maritime named location, three obstructions, two geophysical anomalies identified by previous surveys and one landscape (**Table 24A-3; Volume 5: Figure 24A-7**).
51. Twenty-one previously identified assets were located in older iterations of the Offshore Development Area and WSA but are now located beyond both the boundary of the proposed Project and the WSA. These comprise assets **CA3-5, CA35, CA40, CA44-45, CA48-CA55, CA57-59** and **CA61-63**; they will not be considered further in this report. One asset previously



located within an earlier iteration of Offshore Development Area is now located in the current WSA (**CA11**); two assets originally reported in the previous WSA are now included in the current Offshore Development Area (**CA60** and **CA64**). Two additional assets are identified in the latest iteration of the Offshore Development Area (**CA65-66**) along with eight additional assets within the latest WSA (**CA67-CA74**).

52. These route revisions also mean that CA numbers assigned to records in both the Offshore Development Area and WSA no longer run concurrently. For ease of reference, numbers **CA1-10**, **CA12-39**, **CA41-43**, **CA60** and **CA64-66** are located in the Offshore Development Area; numbers **CA11**, **CA46-47**, **CA56** and **CA67-74** fall within the WSA.

Table 24A-3. Cultural heritage assets by general type within the Llŷr Offshore Development Area and WSA

Type	Offshore Development Area	WSA	Total
Wreck	25	3	28
Aircraft	2	0	2
Obstruction	2	1	3
Maritime named location	1	0	1
Findspot	4	1	5
Sites	3	1	4
Monument	1	0	1
Features	2	4	6
Geophysical anomalies	1	1	2
Landscape	0	1	1
Total	41	12	53

Sites of cultural heritage interest within the Llŷr Offshore Development Area

53. A total of 41 cultural heritage assets are recorded within the revised iteration of the Offshore Development Area. These include 25 wrecks, two aircraft, two obstructions, one maritime named location, four findspots, three sites, one monument, two features and one geophysical anomaly identified by previous surveys in the area (**Table 24A-4; Volume 5: Figures 24A-8 to 24A-11**).
54. It is important to emphasise that many of the wrecks discussed below are reports of wreck events, and either do not have reliable locational information or should not be interpreted as indicative of the presence (or otherwise) of physical remains. These records are included to highlight the potential for encountering wrecks that have been reported in the past, but for which there is currently no material evidence to substantiate their existence.
55. The *Highland Home* was a British iron-hulled barque of 1371 gross registered tonnage (grt), built in Leith in 1886. On 10th November 1895, the *Highland Home* became separated from the steam tug *Warrior* while under-tow, with the loss of 20 lives (wrecksite.eu). The wreck is located beyond the revised Offshore Development Area, at a depth of c. 21m below lowest astronomical tide (LAT; UKHO number 68924). The RCAHMW also records a wreck at this location, though it is unnamed in its database (NPRN 240879). Artefacts from the wreck, including the ship's bell, have been recovered from a location c. 3km to the south-east of the recorded position of the wreck (**CA1**; NPRN 273100; **Volume 5: Figure 24A-10**), within the revised Offshore Development Area. Both the location of the wreck and recovered artefacts are recorded in Table 24A-4.



Table 24A-4. Llŷr floating offshore wind project Offshore Development Area gazetteer entries

CA no.	Name	Type	Date	Status	Easting (UTM 30N)	Northing (UTM 30N)	Source
1	<i>Highland Home</i>	Wreck*	1895	Live	354054	5725512	UKHO; RCAHMW
		Wreck (artefacts)			356766	5724240	RCAHMW
2	<i>Willemoes of Thuro</i>	Wreck	1924	Live	357165	5725301	RCAHMW
6	Unknown	Wreck	Unknown	Live	334513	5701421	RCAHMW
					334580	5701370	UKHO
7	Unknown	Wreck	Unknown	Dead	334174	5697983	UKHO
8	Submerged forest	Feature	Mesolithic	n/a	357411	5724974	RCAHMW
			Prehistoric	n/a	357274	5724404	Dyfed HER
9	Submerged forest	Feature	Prehistoric	n/a	357048	5725613	n/a
10	Occupation site	Site	Mesolithic	n/a	357169	5724802	Dyfed HER
12	Footprints	Monument	Prehistoric	n/a	357368	5724895	Dyfed HER
13	<i>Mary E Wadham</i>	Wreck	1888	Reported loss	357299	5724737	RCAHMW
14	<i>Georges Andre</i>	Wreck	1916	Reported loss	332026	5691342	RCAHMW
15	<i>Mysotis</i>	Wreck	1916	Reported loss	332026	5691342	RCAHMW
16	<i>Roger Bushell</i>	Wreck	1974	Reported loss	341684	5713649	RCAHMW
17	Freshwater West Maritime named location	Seascape	Multiperiod	n/a	357214	5725151	RCAHMW
18	<i>Brothers</i>	Wreck	1819	Reported loss	357214	5725151	RCAHMW
19	<i>Hope</i>	Wreck	1823	Reported loss	357214	5725151	RCAHMW
20	<i>Princess Elizabeth</i>	Wreck	1825	Reported loss	357214	5725151	RCAHMW
21	<i>Cherokee</i>	Wreck	1831	Reported loss	357214	5725151	RCAHMW
22	<i>Blessing</i>	Wreck	1834	Reported loss	357214	5725151	RCAHMW
23	<i>Express</i>	Wreck	1836	Reported loss	357214	5725151	RCAHMW
24	<i>Unknown</i>	Wreck	1840	Reported loss	357214	5725151	RCAHMW
25	<i>Dove</i>	Wreck	1841	Reported loss	357214	5725151	RCAHMW
26	<i>Mary Ann</i>	Wreck	1841	Reported loss	357214	5725151	RCAHMW
27	<i>Gram Para</i>	Wreck	1855	Reported loss	357214	5725151	RCAHMW
28	<i>Unknown</i>	Wreck	1860	Reported loss	357214	5725151	RCAHMW



CA no.	Name	Type	Date	Status	Easting (UTM 30N)	Northing (UTM 30N)	Source
29	<i>Thomas M Reed</i>	Wreck	1879	Reported loss	357214	5725151	RCAHMW
30	<i>Barabara</i>	Wreck	1881	Reported loss	357214	5725151	RCAHMW
31	<i>Astronomer</i>	Wreck	1886	Reported loss	357214	5725151	RCAHMW
32	<i>Margaret Ann</i>	Wreck	1918	Reported loss	357214	5725151	RCAHMW
33	<i>Vickers Wellington XII Mp638</i>	Aircraft	1944	Reported loss	357214	5725151	RCAHMW
					357269	5724804	Dyfed HER
34	<i>Armstrong Whitworth Whitley V Z6941</i>	Aircraft	1941	Reported loss	330696	5694525	RCAHMW
36	Unclassified	Obstruction	Unknown	Live	339350	5712607	RCAHMW
37	Unclassified	Obstruction	Unknown	Dead	325968	5695474	UKHO
38	Bronze hoard	Site	Bronze Age	n/a	357266	5725003	Dyfed HER
39	Landing point at Gumption Barrows Bridge	Site	Post Medieval	n/a	357499	5724870	RCAHMW
41	Prehistoric flint flake	Findspot	Prehistoric	n/a	357065	5725101	NMW
42	Red deer metapodial	Findspot	Prehistoric	n/a	357265	5725103	NMW
43	Arrowhead and Chert Pebble	Findspot	Bronze Age	n/a	357169	5724802	Dyfed HER
60	Bones	Findspot	Unknown	n/a	357078	5724101	Dyfed HER
64	<i>Hope</i>	Wreck	1901	Reported loss	354529	5719998	RCAHMW
CA65	<i>Saint Jacques</i>	Wreck	1917	Live	353795	5722922	RCAHMW; UKHO
					353793	5722953	
					353827	5722936	
		Wreck (boiler?)	Unknown	Unknown	353518	5722375	RCAHMW
CA66	ERS21_0106	Anomaly	Unknown	Live	337286	5710386	RCAHMW

*Located beyond the Offshore Development Area

56. The remains of one wreck are located on the beach at Freshwater West. The *Willemoes of Thuro* (CA2; Volume 5: Figure 24A-9) was a wooden schooner of 186 grt, built at Svenburg in 1911 (NPRN 273193). The vessel went ashore at Freshwater West in December 1924 while on passage from Caernarfon to Erquy, with the loss of one life. It is routinely exposed by winter storms and was previously known as the 'upside-down wreck' (NPRN 420445).

57. During the storms of December 2013 / 2014, 15.5m x 3.4m of the vessel was exposed, including a length of keel, outer planking fastened with iron pins and both main and filling



frames (Error! Reference source not found.2). An additional piece of timber and concretions were reported c. 20m to the south of the wreck itself. The vessel was positively identified as the Willemoes by local resident Gordon Smith, whose grandfather was a member of the Castlemartin coastguard rocket crew (coflein.gov.uk).

58. Cultural heritage assets **CA3-CA5** are not sited within the latest iteration of the Offshore Development Area. They have therefore been removed from this assessment.
59. An unknown wreck (**CA6; Volume 5: Figure 24A-11**) was originally reported as a sonar contact at the end of the Second World War (WWII), with damage to a trawl recorded in October 1981. A wreck was positively confirmed at this location in 2003, lying at a depth of c. 66m LAT. It is reported as intact and upright, measuring c. 48 x 24 x 3.5m (UKHO 11897; NPRN 518403). High-resolution bathymetry hosted on the iMarDIS data portal confirm that it was still intact, with large scour features at its bow and stern, when the data were acquired in 2018.
60. An additional live wreck is located within the revised Offshore Development Area. The SS *Saint Jacques* (**CA65; Volume 5: Figure 24A-10**) was a French steel-hulled steamship of c. 2459 grt, built in Dunkirk in 1909. The vessel was stuck by a torpedo fired from the U-boat *UC-51* on 15 September 1917 while *en route* from Barry to North Africa with a cargo of coal. The engine room was wrecked and flooded, resulting in the loss of five crew. The remaining crew took to lifeboats and were rescued by the trawlers *Sidmouth* and *Barry* and the rescue tug HM *Frances Batey* (NPRN 273164). The wreck measures c. 88 x 11 x 9.5m and lies at a depth of c. 33m LAT, with debris visible on either side of the hull and keel (UKHO 58707).
61. Two areas of debris are located c. 35m to the south east (NPRN 518627) and 30m to the south (NPRN 518626) of the wreck respectively. High-resolution bathymetry acquired in 2017 and hosted on the iMarDIS data portal shows a low-lying outline with a higher central section and outlying upstanding elements, possibly corresponding to the areas of debris noted above.
62. An additional findspot associated with the wreck is reported by the RCAHMMW c. 675m to the south-west (NPRN 240744). This is described in the record as ‘an oiler’; for the purposes of this report it is presumed to be a boiler. High-resolution bathymetry data from the iMarDIS portal are not available for this site. All three associated sites are recorded in **Table 24A-4**.
63. One dead wreck (**CA7; Volume 5: Figure 24A-11**) is reported in the Offshore Development Area. A sonar contact was originally identified at this location in 1945, tentatively identified as a wreck in two parts (UKHO 11894). It has not been identified in recent surveys and the record was revised to dead in 2003.
64. A number of the most significant cultural heritage assets located within the Offshore Development Area are to be found on the beach at Freshwater West (**Volume 5: Figure 24A-9**). These are primarily associated with the submerged forest deposits identified by Leach and Wainwright and discussed in detail above (**CA8**; NPRN 524740; Dyfed HER primary record number [PRN] 11976; **CA9**). These include a near intact Mesolithic occupation site (**CA10**), incorporating a flint tranchet axe and flint flakes recovered from beneath the peat deposits (PRN 503), and a flint working site recorded by Leach during his investigations at Freshwater West, located to the south of the beach (**CA11**; PRN 10094). Following the April 2024 updates, the latter is now located outside of the Offshore Development Area but within the WSA.
65. Another exposure of intertidal peat (**CA12**) is also recorded in the Dyfed HER (PRN 126540), c. 90m to the south-west of Leach’s submerged forest as recorded by the RCAHMMW. This includes two parallel bands of peat, a few metres wide. The seaward band is reported to contain tree stumps and branches; cloven hoof prints are recorded in the more landward exposure. Notably, the latter is also reported to contain human footprints, potentially of both adults and children. The peat appears to sit on a grey clay of possible marine or estuarine /

riverine origin, overlying a reddish-brown clay with frequent stone inclusions similar to the glacial till.

66. The Pembrokeshire coast and the approaches to Milford Haven appear to have been a considerable hazard to shipping throughout history, with numerous accounts of losses, often located close to the shore. Little or no information is available for many of these wrecking incidents, and no remains have been positively identified. It is likely therefore that these relate to reports of losses, rather than the physical location of wrecks themselves. Within the Offshore Development Area, these include:

- the *Mary E Wadham* (**CA13; Volume 5: Figure 24A-9**), a steel-hulled cargo vessel that ran aground at Freshwater West on 8 January 1888 with a cargo of coal (NPRN 272992);
- the *Georges Andre* (**CA14**) and the *Mysotis* (**CA15**), wooden schooners sailing together when they were captured by German U-boat *UB18* in September 1916 (**Volume 5: Figure 24A-11**). Both crews were forced to abandon ship and the vessels were subsequently sunk (NPRN 274651; 544474);
- the *Roger Bushell* (**CA16; Volume 5: Figure 24A-11**), a side-winder trawler built in 1946. The vessel caught fire on 9 April 1974 and was burnt to the waterline (NPRN 273266); and
- the *Hope* (**CA64; NPRN 272405; Volume 5: Figure 24A-10**), a wooden schooner of c. 74 grt, built at Bideford in 1849. The vessel was involved in a collision on the 22 October 1901 'five miles south-east of St Ann's Head' and subsequently foundered. This record was previously located in the WSA; following the issue of the April 2024 update it is now located within the Offshore Development Area.



Figure 24A-12 The Willemoes of Thuro (or 'upside-down wreck') when it was exposed during the storms of February 2014 (www.pemcoastphotos.com/_photo_12563415.html)

67. A maritime named location is also recorded on the beach at Freshwater West (**CA17; NPRN 525694; Figure 24A-9**). These locations serve to highlight the archaeological potential of an area, based on the number of reported maritime losses recorded in the vicinity. These losses have been temporarily assigned a spatial coordinate by the RCAHMS that represents the centre of the generalised area in which the loss was recorded, pending additional information becoming available. The location should not therefore be seen as indicative of the presence or absence of physical remains. Wrecks recorded at this location include:



- the *Brothers* (CA18), a schooner from St Johns, Newfoundland. The schooner was on passage from Trinity when it was driven ashore at Freshwater West on 15 September 1819 (NPRN 273396);
- the *Hope* (CA19), driven ashore at Freshwater West while *en route* from Barnstable to Pembroke in December 1823 (NPRN 273362);
- the *Princess Elizabeth* (CA20). On 15 March 1825, *Lloyds List* reported that a pocket book gilt-embossed with 'Owen Thomas, Princess Elizabeth' was found floating in the bay at Freshwater West. Wreckage had also been noted in the area on 7 March 1825 (NPRN 273340);
- the *Cherokee* (CA21), a wooden sailing vessel that ran aground in fog '3 miles south of Milford Haven' while on passage from New Calabar to Liverpool in August 1831 (NPRN 272857);
- the *Blessing* (CA22), a wooden schooner carrying pigs from Dungarvan. The vessel wrecked in Freshwater Bay in December 1833 with the loss of all onboard (NPRN 272829);
- the *Express* (CA23), wrecked in Freshwater Bay in October 1836 (NPRN 272837);
- an unnamed schooner (CA24), wrecked in Freshwater Bay in November 1840 (NPRN 272855);
- the *Dove* (CA25), a wooden sloop built in Milford Haven in 1786. The vessel was driven ashore at Freshwater West on 13 October 1841 (NPRN 273478);
- the *Mary Ann* (CA26), a wooden smack, wrecked in Freshwater Bay on 20 July 1841 (NPRN 273846);
- the *Gram Para* (CA27), a Portuguese brig carrying a cargo of rubber from India when it was driven ashore at Freshwater West in dense fog in May 1855. The vessel was wrecked, and a quantity of its cargo was plundered (NPRN 518276);
- an unnamed wreck (CA28), reported near Freshwater West in October 1860 (NPRN 515147);
- the *Thomas Reed* (CA29), a full-rigged ship belonging to E & Sewell of Bath, Maine. The vessel ran ashore at Freshwater West in heavy seas on its maiden voyage in January 1879. The vessel was *en route* from San Francisco to Liverpool with a high value cargo, including tinned salmon and preserved fruits and meats. Over £10,000 of property was recovered from the bay over the next four days (NPRN 272601);
- the *Barbara* (CA30), wrecked at Freshwater West in November 1881 while on passage from Rangoon to Liverpool with a cargo of rice (NPRN 524746);
- the *Astronomer* (CA31), a barque stranded in Freshwater Bay on 23 March 1886 (NPRN 273023);
- the *Margaret Ann* (CA32), a steamship of 80 grt that ran aground in December 1918 while *en route* from Briton Ferry to Wexford with a cargo of coke (NPRN 273157); and
- a Vickers Wellington Xii Mp638 (CA33) aircraft, one of 250 X-XIV Wellingtons delivered to the RAF by Vickers-Armstrong, Weybridge, between December 1942 and April 1943. The aircraft's engines are reported to have blown out during radar trials on 9 April 1944, forcing it to belly-land on the beach. It is believed that the aircraft was recovered intact and no remains have been reported at this location (NPRN 515652). An alternative location for this aircraft is recorded in the Dyfed HER, c. 350m to the south (PRN 105259). This location is classified as both a Protected Place and a Site of Special Scientific Interest



(SSSI) in the Dyfed dataset, though it is possible that this may relate more broadly to the beach and dune sequence.

68. One further aircraft is recorded within the Offshore Development Area, within the Array Area itself (**Figure 24A-11**). The Armstrong Whitworth Whitley V Z6941 (**CA34**) was built by Armstrong Whitworth at Baginton and assigned to RAF 10 Squadron (NPRN 515914). The aircraft reportedly ditched into the sea c. 35 km southwest of Milford Haven on 2 October 1941.
69. It is nevertheless important to note that the ephemeral nature of crash sites at sea and the difficulties inherent in accurately recording crash site locations means that remains may not always be present at the stated locations. These locations should be seen as providing an indication that aviation remains may exist at, or in proximity to, the general area. As yet, no remains of these aircraft have been confirmed at their given locations. If remains are identified, they would be designated automatically as Controlled Sites under the Protection of Military Remains Act 1986.
70. There are two obstructions recorded in the Offshore Development Area (**CA36-7; Figure 24A-11**). One is classified as live (**CA36**) and one as dead (**CA37**); the latter is located within the Array Area.
71. Three assets classified as 'sites' are located within the Offshore Development Area, including the occupation site associated with the submerged forest deposits located at Freshwater West and discussed above (**CA10**). A hoard of 28 bronze objects was also recovered from the beach at Freshwater West in 1991 (**CA38**; PRN 14393; **Figure 24A-9**). The hoard included 23 bronze ingots, fragments of three socketed axes, a fragment of Ewart Park-type sword and the broken tip of a Carp's tongue-type sword. The latter is the first of its type to be found in Wales. This location is also defined as a SSSI in the Dyfed HER, though again it is unclear whether this refers to the beach and dune sequence more generally.
72. A convergence of tracks from quarries to the south and a gravel pit to the north suggests the presence of a landing place (**CA39**) on the beach at Freshwater West, close to Gupton Barrows Bridge (**Figure 24A-9**). The OS 1st edition 25 inch map of Pembrokeshire also shows the track from the ford, to the north-east of the bridge (NPRN 524958; PRN 129354).
73. There are four findspots recorded within the revised iteration of the Offshore Development Area, ranging in date from prehistoric to post-medieval. These include maritime finds, flint scatters and worked animal bones.
74. A prehistoric flint flake (**CA41**; National Museum of Wales [NMW] record number 13100) and the metapodial bone of a red deer (**CA42**; NMW 13883) are recorded in the National Museum of Wales dataset (**Figure 24A-9**). The latter was recovered from close to the high water mark at Freshwater West in July 1991 and is described as post-glacial in origin; both appear to be isolated findspots.
75. A Bronze Age barbed and tanged arrowhead and a chert pebble (split for conversion into a core; **CA43**) are recorded in the Castlemartin Burrows area of Freshwater West (PRN 504; **Figure 24A-9**). The record combines two separate finds, though it is not clear whether they were recovered at the same time. The findspot is recorded at the same location as **CA10**, the Mesolithic occupation site, which may suggest that it has been assigned a generic location.
76. A number of bones (**CA60**; PRN 11659) were reported to have been discovered in the dunes at Castlemartin in the early 20th century. The origin and date of the bones is not recorded, and they were subsequently reburied. The coordinates provided for this record place the findspot c. 850m to the south-west of the dune sequence, within the intertidal zone, which



would suggest that it is spatially inaccurate (**Figure 24A-10**). This record was previously located within the WSA; the latest iteration of the proposed Project boundaries place it within the Offshore Development Area.

77. A geophysical anomaly identified during the archaeological assessment of data collected for the Project Erebus offshore windfarm is included within the latest update of the RCAHMW dataset (**CA66; Figure 24A-11**). The anomaly is described as being of medium archaeological potential, and comprises parallel linear features covering an area of c. 47.9 x 5.9m (NPRN 800237). The anomaly is located on two magnetometer lines but has no corresponding signature in the Erebus magnetic data; it is possible that it is geological in origin. A number of other geophysical anomalies identified by Project Erebus and included in the RCAHMW dataset are considered to be of uncertain archaeological potential. These locations will be assessed during the review of project-specific geophysical survey data.
78. It is noteworthy that the northerly extent of both the Offshore Development Area and the WSA are located within the Milford Haven Waterway Historic Landscape Area, principally the West Angle to Freshwater West coastal strip. Within the Offshore Development Area, this is limited to a small area to the north of Gravel Bay, measuring c. 0.5 hectares (**Figure 24A-13**).
79. The West Angle to Freshwater West coastal strip consists of a c. 7km strip of high, hard-rock sea cliff. The historic landscape of the coastal strip is characterised by a number of varied archaeological sites, including military installations dating from the 16th to the 20th century, and the Grade II listed 19th century fort on Thorn Island, now converted to a hotel. An Iron Age hillfort is also located on the cliffs to the south of West Angle Bay; none of these sites or monuments are located within either the Offshore Development Area or WSA and they are unlikely to be impacted by the proposed Project. They will not be considered further. The Pembrokeshire Coast Path also runs throughout the length of the coastal strip.
80. A number of event records are also recorded by the Dyfed HER within the Offshore Development Area and WSA. These are essentially records of previous archaeological surveys and excavations conducted in proximity to the proposed Project, including:
 - the coastal survey of Lower Milford Haven (DAT 1998);
 - threat-related assessments of 20th century military sites, undertaken by DAT;
 - a field survey of the morphology, topography and archaeology of Angle (DAT 2000);
 - the field survey of the intertidal and coastal zone at Freshwater West (DAT 2004; 2006);
 - a condition survey of the Castlemartin Army Training Estate (DAT 2004);
 - the Blucks Pool and Frainslake Sands intertidal and coastal survey (DAT 2006); and
 - the *Wrecks off the coast of Wales* project (Wessex Archaeology 2010).

Sites of cultural heritage interest within the Wider Study Area

81. A total of 12 cultural heritage assets are recorded within the revised WSA, including three wrecks, one obstruction, one findspot, one site, four features, one geophysical anomaly and one landscape (**Table 24A-5; Volume 5: Figures 24A-14-17**). Following route revisions, 14 previously identified assets are now located beyond the WSA, including **CA48-55**, **CA57-9**, and **CA61-3**. These will not be considered in this report. **CA11** was located in an earlier iteration of the Offshore Development Area and is now included here; **CA60** and **CA64**, previously located in the WSA, are now located in the revised Offshore Development Area and discussed above.



Table 24A-5. Llŷr floating offshore wind project WSA gazetteer entries

CA no.	Name	Type	Date	Status	Easting (UTM 30N)	Northing (UTM 30N)	Source
CA11	Flint working site	Site	Mesolithic	n/a	357571	5724608	Dyfed HER
CA46	<i>Christian Borum</i>	Wreck	2003	Live	340378	5687754	UKHO
CA47	<i>Renfrew</i> (possibly)	Wreck	Unknown	Live	338253	5709869	RCAHMMW
CA56	Foul Ground	Obstruction	Unknown	Live	340144	5711704	UKHO
CA67	<i>Wave</i>	Wreck	1859	Reported loss	357969	5723146	RCAHMMW
CA68	Submerged Forest	Feature	Prehistoric	Extant	358023	5722994	RCAHMMW
CA69	Submerged Forest	Feature	Prehistoric	Extant	357973	5722717	RCAHMMW
CA70	Submerged Forest	Feature	Prehistoric	Extant	358076	5722910	RCAHMMW; Dyfed HER
CA71	Bluck's Pool	Feature	Unknown	Unknown	357287	5722499	RCAHMMW
CA72	Findspots of flints	Findspot	Prehistoric	Unknown	358089	5723116	Dyfed HER
CA73	Brownslade Burrows	Landscape	Unknown	Unknown	358091	5723115	RCAHMMW
CA74	ERS21_0103	Anomaly	Unknown	Live	341391	5713917	RCAHMMW

82. There are two live wrecks recorded within the WSA. The *Christian Borum* (**CA46; Volume 5: Figure 24A-17**) was a British fishing trawler of 84 grt built in 1976. It sank while under tow by MFV *Datchet* on 8th July 2003. The wreck is classified as live, and lying at a depth of c. 65m LAT (UKHO 62648; wrecksite.eu).
83. A wreck site (**CA47; Volume 5: Figure 24A-16**) is recorded in the RCAHMMW dataset (NPRN 506390). The record describes an extended wreck site of c. 200m in length, with a separate area of wreckage reported c. 100m to the north, suggesting that it may be the location of two, discrete wreck sites. The wreck site is also visible on the iMarDIS bathymetry data collected in 2018 (SW19 wreck); assessment of this dataset suggests a single wreck, c. 100m long and twisted about its long axis.
84. The UKHO record (UKHO 11919) for this wreck identifies a possible candidate: the SS *Renfrew*, a British cargo ship of 3830grt. On 24th February 1918, the *Renfrew* was struck by a torpedo fired by the German submarine *U-91* while carrying a cargo of iron ore, bound for Barrow-in-Furness (wrecksite.eu). The wreck is considered live and broken up. The position given by the UKHO is located c. 15m to the south-west of the WSA boundary, however, the high resolution



bathymetry data hosted by iMarDIS clearly shows that one end of the wreck extends into the WSA by c. 37m. The position provided in this report has been centred over the portion of wreck extending into the WSA, as visible on the iMarDIS data.

85. One additional wreck is recorded in the latest iteration of the WSA (**CA67; Volume 5: Figure 24A-15**). The *Wave* was a wooden schooner built in 1856. The vessel was caught in a gale in October 1859, and reportedly driven ashore at either Frainslake Sands or Freshwater West, with the loss of all the crew (NPRN 273815). The record is clearly a loss report, and should not be seen as indicative of the presence of physical remains. It is included nevertheless to highlight further the archaeological potential of the area.
86. One live obstruction is located in the WSA (**CA56; Volume 5: Figure 24A-16**). It is classified as foul ground and is visible in the iMarDIS MBES data as a small feature with surrounding scour, located in a field of sand waves.
87. There are four features located within the WSA (**CA68-71; Volume 5: Figure 24A-15**), three of which (**CA68-CA70**) relate to records of submerged forest deposits and exposures of intertidal peats. Six peat deposits were recorded at Frainslake Sands in 2003 and 2005 as part of a programme of archaeological monitoring of Pembrokeshire's beaches (**CA68-CA69**; NPRN 403822; PRNs 48118-48123). The largest of these deposits contained an antler pick. These deposits may be those recorded by Jacobi (1980), which contained evidence of gorse, birch, hazel and alder, along with charcoal and a number of Mesolithic microliths. An additional peat deposit is also recorded further east on Frainslake Sands (**CA70**; NPRN 524739). A diverse collection of lithics and animal bones have been recovered from this deposit, suggesting the presence of an occupation site nearby.
88. One anchorage is recorded in the RCAHMS dataset (**CA71**; NPRN 518486; **Volume 5: Figure 24A-15**), suggested by its placename (Bluck's Pool). An early OS map suggests a landing place on the adjacent coastline, outside of the WSA boundary.
89. One findspot is recorded in the WSA. Various lithic artefacts were reportedly discovered in or around Brownslade Burrows (**CA72; Volume 5: Figure 24A-15**), ranging in date from the Mesolithic to the Bronze Age. At least three different records are assigned to this location in the Dyfed HER (PRN 7747; PRN 526-7), which would suggest that the location should not be considered accurate. It is possible that they may have been recovered from the dune sequence beyond the beach, or from the peat deposits nearby. They are included here to emphasise further the archaeological potential of the beach itself.
90. One landscape is recorded to the south east of Freshwater West (**CA73; Volume 5: Figure 24A-15**). The dune sequence at Brownslade Burrows (NPRN 30014) is primarily located above MHWS, though it is difficult to delineate an exact boundary and it is therefore included in this report. Lithic evidence suggests that the area has been in use since the Mesolithic, with the potential for significant archaeological sites to be preserved beneath the dunes.
91. A geophysical anomaly was identified during the archaeological assessment of data collected for Project Erebus, and is included within the latest RCAHMS dataset (**CA74**). A low mound was identified in the MBES data among a series of sand waves, with an associated magnetic signature of c. 80 nanoTesla (nT). The anomaly is described as being of medium archaeological potential.

24.5 Conclusions

92. This assessment has established that there are no designated or protected wrecks, nor any scheduled monuments, located within the Offshore Development Area or WSA.



93. A total of 41 cultural heritage assets are recorded within the Offshore Development Area, including 25 wrecks, two aircraft, two obstructions, one maritime named location, four findspots, three sites, one monument, two features and one anomaly. The majority of the wreck records refer to reported losses and their location should be considered tentative at best; they are therefore unlikely to be impacted by the proposed Project. This will be reassessed in the project-specific WSI and technical report (Coracle Archaeology 2024b), following the archaeological review of marine geophysical survey data (Coracle Archaeology 2024a).
94. Although the findspots recorded within both the Offshore Development Area and the WSA appear to relate to isolated finds, they nevertheless highlight the potential for similar finds to be identified during works associated with the proposed Project (including construction, operation and decommissioning). This is particularly true of Freshwater West, which appears to have been both an important landing place and the site of numerous wreck incidents throughout history.
95. The number of recorded submerged forest deposits, peat exposures and lithic finds on the beach at Freshwater West and within the WSA also suggests that the proposed landfall must be considered an area of considerable archaeological and palaeo-environmental significance. Potential impacts to these deposits, and mitigation strategies, will be outlined as the project progresses.
96. There are 12 records located inside the WSA, including three wrecks, one obstruction, one site, one findspot, four features, one landscape and one anomaly. Two of the wrecks are considered live; the remaining wreck refers to a reported loss in the general area. These records are included here to highlight the archaeological potential of the area.
97. The relative scarcity of known and, crucially, located historic assets suggests that the potential to encounter unexpected cultural remains during works associated with the proposed Project is low. This is especially true given the recent history of infrastructure development in the wider area and the associated detailed surveys of the seabed. Despite this, the high volume of local, national and international maritime activity in the region, combined with the proximity to Milford Haven, one of the largest and busiest harbours in Britain, suggests that it cannot be discounted. The potential to encounter unexpected cultural remains during works associated with the proposed Project is therefore considered moderate.

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