

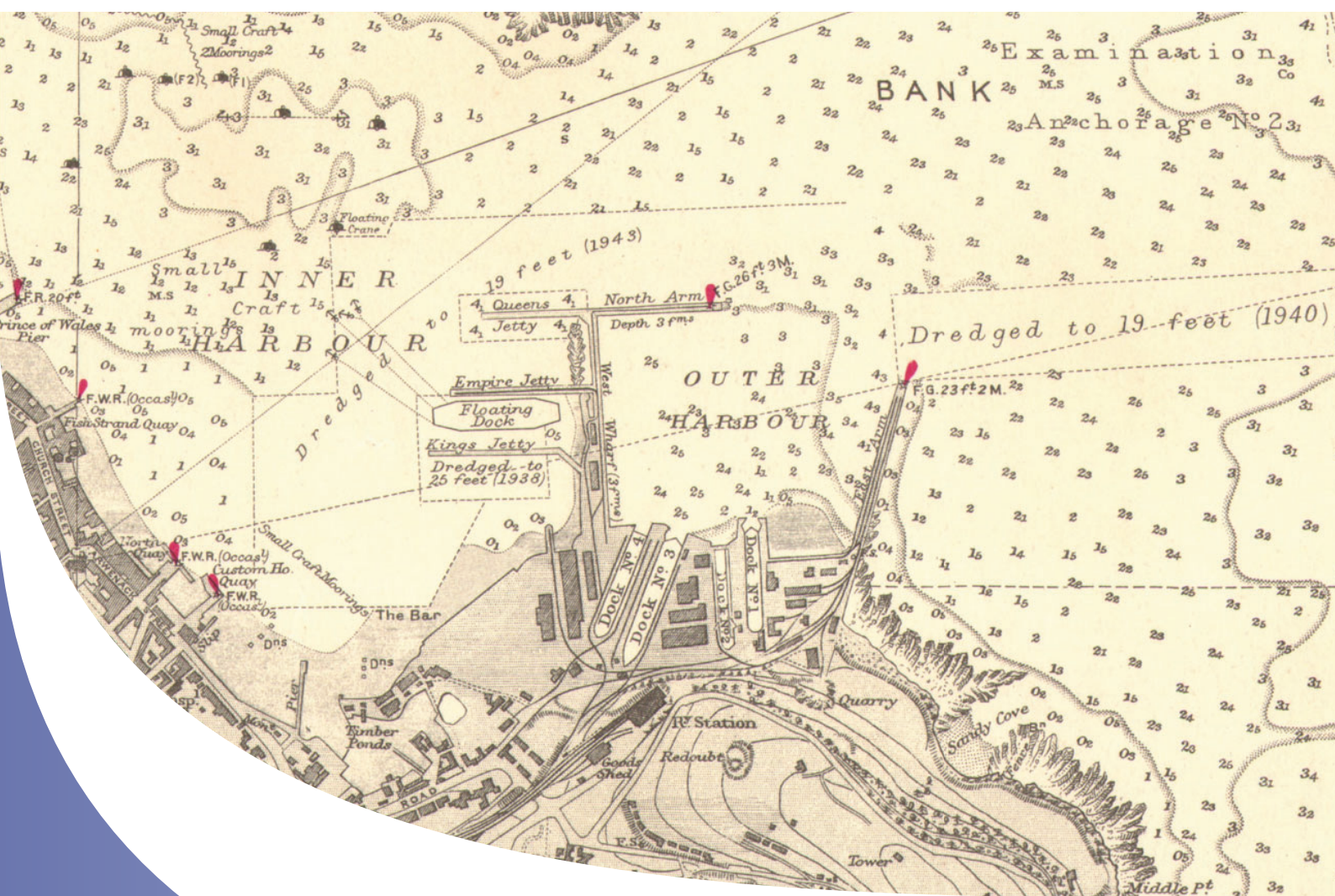
Technical Appendix 11.1:

Marine Archaeological Technical Report



Falmouth Docks Development

Marine archaeological technical report



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Summary

Wessex Archaeology was commissioned by Ramboll to prepare a marine archaeological technical report for the development of Falmouth Docks within Falmouth Harbour, Cornwall, to be submitted as part of the Marine License application.

This document comprises the technical report outlining the marine archaeological baseline data for the area. The aims of the document were to assess the known and potential marine archaeological resource within the study area covering the area of the proposed development, including the wider search area which comprised a 1 km buffer around the study area, and to assess the likely impacts of the development proposals on this resource. A discussion on the historic seascape character and geoarchaeological assessment has also been undertaken for the study area.

There are currently no designated sites within the study area, and a further 14 maritime and intertidal archaeological receptors within the study area. In addition to these known locations, 90 vessels and one aircraft crash site are marked as Recorded Losses within the study area, although the location of any remains is unknown. Three wrecks present along the western wharf are likely to date to the 20th century, while a stockless anchor and chain identified within previous geophysical surveys to the north of the existing Northern Arm may be either late 19th century or 20th century, with the latter being most likely. Extensive dredging works have been completed within the study area throughout the 20th century; as a result of these it is likely that the upper levels of the current seabed are relatively recently deposited; however, there is some potential for undisturbed sediments within the lowest points of the proposed dredging plan. Due to the known and potential archaeological material within the study area, there is therefore some potential for the proposed construction activities, in particular the capital dredging works, to impact as yet unknown archaeological sites related to palaeogeography, shipwrecks, and aircraft crash sites. The geoarchaeological assessment identified a sequence of organic and minerogenic deposits with the potential to contain material suitable for palaeoenvironmental assessment within defined areas of the proposed development, including peat deposits within the Docks Basin.

This heritage assessment sets out potential impacts relating to the proposed development and recommended mitigation measures to reduce the significance of effects with regard to the loss of archaeological material. No Archaeological Exclusion Zones are recommended at this time due to the nature of the known sites and their value. This DBA makes suggestions as to proposed appropriate mitigation strategies that are appropriate to the value of the known sites and to the potential archaeological receptors. The licence conditions will require the creation of a WSI which has been produced based on the findings of this document (Wessex Archaeology 2024). The licence conditions will also suggest the use of an archaeological finds protocol which forms an element of the WSI.

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Wessex Archaeology would also like to thank the Cornwall Historic Environment Record for supplying sites and monuments data, the UKHO for providing wrecks and obstructions data and the NMHR for providing recorded losses data.

The report was compiled by Victoria Lambert, with edits from Ben Saunders and Adam Nightingale. Figures were prepared by Kitty Foster. Euan McNeill managed the report on behalf of Wessex Archaeology and provided quality assurance of the report.



Falmouth Docks Development, Falmouth, Cornwall

Marine Archaeological Technical Report

1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeology has been commissioned by Ramboll UK Limited on behalf of A&P Group to produce a marine archaeological technical report in advance of works associated with the Falmouth Docks Development, Falmouth, Cornwall (the 'proposed development'; **Figure 1**).

1.1.2 This document has been prepared in support of an Environmental Impact Assessment (EIA) for the proposed development. The proposed development would redevelop and modernise the existing facilities at Falmouth Docks to reinstate full alongside berth capability and increase berth capacity. The objectives of the proposed development are to repair and update the currently poor condition dock infrastructure in order to maintain existing business and future proof the docks with respect to cruise capacity, cargo capacity and renewable floating offshore wind (FLOW) (supporting the offshore wind market). The site and the works proposed are considered to be in the jurisdiction of Cornwall Council (CC) and the Marine Management Organisation (MMO).

1.2 Development proposal

1.2.1 The development is proposed to take place on the site of the existing Falmouth Dock facilities. These are working facilities responsible for the repair, maintenance and provision of shipping. Falmouth Docks is centred on British National Grid coordinates SW 81777 32765.

1.2.2 The proposed development comprises the following (**Figure 1**):

- Pocket dredge of berth areas to achieve required underkeel clearance for larger cruise vessels (up to Excellence class) and the FLOW renewable energy device underkeel requirements (considered to be -10.5 m Chart Datum (CD));
- Removal of foul ground within areas of the former Kings and Empire Wharfs;
- Surface skim of seabed on eastern side of the site to maintain -5.5 m (CD);
- Demolition of the remaining existing Western Wharf timber piles and above surface infrastructure;
- Construction of a new Western Wharf suspended deck structure;
- Demolition of the Northern Arm concrete structure and substructure to below seabed level and removal of the gang walkway and old timber piles that are located west of this structure;

- Construction of a suspended deck structure (Northern Wharf) in the existing 90 m gap between Queen's Wharf and the Northern Arm to create a longer functional wharf length;
- Upgrades to the existing Queen's Wharf structure;
- Extension of the Queen's Wharf suspended deck structure 50 m westward;
- Installation of a 290 m deck (the 'FLOW Deck') to facilitate a FLOW device;
- Upgrades to the existing Duchy Wharf structure to facilitate a FLOW device; and
- Demolition of on-site buildings and re-configuration of Falmouth Dock activities.

1.3 Previous impact

- 1.3.1 Falmouth has developed as a port since the 16th century, becoming the Royal Mail packet station connecting Britain with the wider world in 1688. Port infrastructure related to commercial and naval requirements continued to grow until the construction of Falmouth Docks in the late 1850s, which saw the excavation of graving docks and the reclamation of land from the sea to create docklands around them. The eastern breakwater was also constructed during this phase. Expansion in the early 20th century related to the repair of naval and merchant vessels damaged during WWI saw the construction of Western Wharf in 1918, with two wharfs, King's and Empire, being present running west from the western side of the wharf. These structures have generally been named as jetties on charts and mapping but will be referred to as wharfs for the purposes of this report. Further expansion and reworking including the construction of Queen's Wharf occurred during the 1920s and 1930s (AC Archaeology 2013).
- 1.3.2 Extensive dredging was undertaken in the formation of Falmouth Docks in a tidal basin to the west of Bar Point; by 1860 a channel of deep water 300 ft wide had been dredged to connect the Docks with the deep water of Carrick Roads, followed by regular dredging in the later 19th and early 20th century (Cornwall Council 2008).
- 1.3.3 A chart dated 1927 (updated 1953) shows that the area around Queen's Wharf and the Northern Arm was dredged to a depth of 19ft below the chart datum (which in turn was - 9.75 ft Ordnance Datum (OD), so a total of -8.763 m OD) followed by regular maintenance dredging, although there is a lack of bathymetric data relating to dredging in the harbour (Cornwall Council 2008). Further assessment of the extent of dredging completed within the harbour is discussed below in Section 5.4.
- 1.3.4 The project area has been extensively remodelled during the period of operation of Falmouth Docks, with the rebuilding of Queen's Wharf in steel following the timber structure's destruction by fire in 2003. The new wharf was built over the same footprint of the old, with original piles and sub-sea structures remaining in place. The most recent work to the wharfs was the demolition of King's and Empire Wharfs in 2007/8, the remains of which are listed as obstructions in the UKHO records (see below).
- 1.3.5 A review of previous impacts was undertaken by Cornwall Council (2008), who highlighted the impact of pollution incidents in 1991 associated with Wheal Jane mine, followed by a further release of millions of gallons of contaminated mine water from the Nangiles Adit, affecting the Carnon Valley, Restronguet Creek, Carrick Roads and Falmouth Bay.

1.4 Scope of document

- 1.4.1 The purpose of this assessment is to determine, as far as is possible from existing information and survey data, the nature, extent, and significance of the known and potential marine archaeological resource within the boundary of the proposed development.
- 1.4.2 The historic environment, as defined in Annex 2 of the National Planning Policy Framework (NPPF; Ministry of Housing, Communities and Local Government 2021, 67) comprises ‘all aspects of the environment resulting from the interaction between people and places through time, including all surviving physical remains of past human activity, whether visible, buried or submerged, and landscaped and planted or managed flora’.
- 1.4.3 The NPPF Annex 2 (*ibid.*) defines a heritage asset as ‘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 assets include designated heritage assets and assets identified by the local planning authority (including local listing)’.
- 1.4.4 Further definitions of terminology and chronology can be found in **Appendix 1**.

1.5 Aims

- 1.5.1 The specific aims of the assessment are to:
- outline the known and potential marine heritage assets based on a review of existing information within the defined study area;
 - assess the significance of known and potential heritage assets through weighted consideration of their valued components; and
 - assess the significance of the historical seascape character of the study area.

1.6 Copyright

- 1.6.1 This report may contain material that is non-Wessex Archaeology copyright (e.g. Ordnance Survey, British Geological Survey (BGS), Crown Copyright), or the intellectual property of third parties, which Wessex Archaeology are able to provide for limited reproduction under the terms of our own copyright licences, but for which copyright itself is non-transferable by Wessex Archaeology. Users remain bound by the conditions of the Copyright, Designs and Patents Act 1988 with regard to multiple copying and electronic dissemination of the report.

2 LEGISLATION, GUIDANCE AND POLICY

2.1 Introduction

- 2.1.1 There is national legislation and guidance relating to the protection of, and proposals on or near, important archaeological sites or historical buildings within planning regulations as defined under the provisions of the *Town and Country Planning Act* 1990. In addition, local authorities are responsible for the protection of the historic environment within the planning system.
- 2.1.2 The following section provides details of the national, regional, and local planning and legislative framework governing the treatment of archaeological remains within the planning process.

2.2 Marine legislation

2.2.1 There are no known cultural heritage assets or marine parts of the site that are designated under the legislation outlined below. It is possible, however, that as yet undiscovered archaeological features may be present within the study area (for example buried material). If discovered, the following legislation applies within the 12 nautical mile (nm) limit of English territorial waters:

- *Marine and Coastal Access Act 2009;*
- *Protection of Wrecks Act 1973: Section One;*
- *Protection of Wrecks Act 1973: Section Two;*
- *Ancient Monuments and Archaeological Area Act 1979 (as amended);*
- *Merchant Shipping Act 1995.*

2.2.2 The above legislation provides a context for focussing approaches and consultation. These legal frameworks provide protection for marine historic assets of historical, archaeological or artistic value, as well as allowing military wrecks and aircraft remains to be protected. Ownership of any wreck remains is determined in accordance with the *Merchant Shipping Act 1995* as administered by the Receiver of Wreck.

2.3 International conventions

2.3.1 The UNESCO Convention was concluded in 2001 and is a comprehensive attempt to codify the law internationally with regards to underwater archaeological heritage. The UK (including the Bailiwick of Guernsey) abstained in the vote on the final draft of the Convention, however, it has stated that it has adopted the Annex of the Convention, which governs the conduct of archaeological investigations, as best practice for archaeology. Although the UK is not a signatory, the Convention entered into force on 2nd January 2009 having been signed or ratified by 20 member states. To date, the Convention has been ratified by 72 countries.

2.3.2 The Annex of the convention suggests preservation in-situ as best archaeological practice.

2.4 National planning policy framework (NPPF)

2.4.1 The NPPF was first published by the Department for Communities and Local Government in March 2012, replacing Planning Policy Statement 5. The most recent iteration of the NPPF, published by the Ministry of Housing, Communities and Local Government, was released in December 2023.

2.4.2 Section 16 of the NPPF, Conserving and enhancing the historic environment, sets out the principal national guidance on the importance, management and safeguarding of heritage assets within the planning process. The aim of this section is to ensure that Regional Planning Bodies and Local Planning Authorities, developers and owners of heritage assets adopt a consistent and holistic approach to their conservation and to reduce complexity in planning policy relating to proposals that affect them.

2.4.3 The government guidance provides a framework that:

- recognises that heritage assets are an irreplaceable resource;

- requires applicants to provide proportionate information on the significance of heritage assets affected by the proposals and an impact assessment of the proposals on that significance;
- takes into account the desirability of sustaining and enhancing the significance of heritage assets and their setting;
- places weight on the conservation of designated heritage assets;
- requires developers to record and advance understanding of the significance of any heritage assets to be lost (wholly or in part) in a manner proportionate to their importance and impact, and to make this evidence (and any archive generated) publicly accessible; and
- promotes the conservation of heritage assets in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life of this and future generations.

2.5 Marine policy

- 2.5.1 The *Marine and Coastal Access Act* 2009 is the primary legislation relevant to marine development plans. Under this legislation, marine plans must be consistent with the UK Marine Policy Statement (MPS; Department for Environment, Food and Rural Affairs 2011) and fully reflect the requirements of the MPS at a local level. Marine plans must also be in accordance with other UK national policy, including the NPPF.
- 2.5.2 The MPS was prepared and adopted by HM Government and the devolved administrations of Scotland, Wales and Northern Ireland for the purposes of Section 44 of the *Marine and Coastal Access Act* 2009. Marine Plans set out how the MPS will be implemented in specific areas.
- 2.5.3 Under the *Marine and Coastal Access Act* 2009 the UK was divided into marine planning regions, with an associated planning authority responsible for preparing a marine plan for that area. The MSP (Department for Environment, Food and Rural Affairs 2011) sets out the framework for preparing Marine Plans and taking decisions affecting the marine environment and was jointly adopted by the Secretary of State, Scottish Ministers, Welsh Ministers, and the Department of the Environment in Northern Ireland in 2011.
- 2.5.4 The UK MPS notes that ‘marine activities have the potential to result in adverse effects on the historic environment both directly and indirectly, including damage to or destruction of heritage assets’ (Department for Environment, Food and Rural Affairs 2011, 22).
- 2.5.5 It sets out for consideration that:
- some heritage assets have a level of interest that justifies statutory designation, the purpose of which is to ensure that they are protected and conserved for the benefit of this and future generation;
 - many heritage assets with archaeological interest in these areas are not currently designated as scheduled monuments or protected wreck sites but are demonstrably of equivalent significance. The absence of designation for such assets does not necessarily indicate lower significance and the marine plan authority should consider them subject to the same policy principles as designated heritage assets;

- in considering the significance of heritage assets and their setting, the marine plan authority should take into account the particular nature of the interest in the assets and the value they hold for this and future generations;
- where the loss of the whole or a material part of a heritage asset's significance is justified, the marine plan authority should identify and require suitable mitigating actions to record and advance understanding of the significance of the heritage asset before it is lost. Requirements should be based on advice from the relevant regulator and advisors; and
- in England, marine licensing and marine planning was made the responsibility of the MMO.

2.5.6 In England, the MMO have divided the inshore and offshore waters into 11 plan areas for which marine plans are to be produced. The study area is located within the South West Inshore and South West Offshore Marine Plan (Marine Management Organisation 2016, updated February 2024).

2.6 Marine guidance

2.6.1 This assessment was carried out in a manner consistent with available guidance as described below in chronological order of issue:

- Identifying and Protecting Palaeolithic Remains: Archaeological Guidance for Planning Authorities and Developers (English Heritage 1998);
- Managing Lithic Scatters: Archaeological Guidance for Planning Authorities and Developers (English Heritage 2000);
- Military Aircraft Crash proposed developments: Archaeological guidance on their significance and future management (English Heritage 2002);
- Marine Aggregate Dredging and the Historic Environment. Assessing, evaluation, mitigation and monitoring the archaeological effects of marine aggregate dredging: Guidance note (BMAPA and English Heritage 2003);
- Protocol for reporting finds of archaeological interest (BMAPA and English Heritage 2005);
- The Code of Practice for Seabed Developers (Joint Nautical Archaeology Policy Committee 2006);
- Our Seas – A shared resource: High level marine objectives (DEFRA 2009);
- Environmental Archaeology: A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation (second edition) (English Heritage 2011);
- Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (Gribble and Leather 2011);
- Ships and Boats: Prehistory to Present - Designation Selection Guide (English Heritage 2012);
- National Policy Statement for Ports (Department for Transport 2012);

- Marine Geophysics Data Acquisition, Processing and Interpretation Guidance Notes (Plets *et al.* 2013);
- Ports and the Historic Environment. NHPP 4A3 (Historic ports, dockyards, harbours and coastal resorts) (Fisher Associates 2014);
- Dredging and Port Construction: Interaction with Features of Archaeological or Heritage Interest (PIANC 2014);
- Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record (Historic England 2015a);
- Managing Significance in Decision-Taking in the Historic Environment Historic Environment Good Practice Advice in Planning: 2 (Historic England 2015b);
- Piling and Archaeology: Guidelines and Best Practice (Historic England 2015c);
- The Assessment and Management of Marine Archaeology in Port and Harbour Development (Historic England 2016a);
- Preserving Archaeological Remains: Decision-taking for proposed developments under Development (Historic England 2016b);
- The Setting of Heritage Assets – Historic Environment Good Practice Advice in Planning: 3 (Second Edition) (Historic England 2017a);
- Conservation Principles for the Sustainable Management of the Historic Environment (Historic England 2017b);
- Statements of Heritage Significance: Analysing Significance in Heritage Assets: Historic England Advice Note 12 (Historic England 2019);
- Deposit Modelling and Archaeology Guidance for Mapping Buried Deposits (Historic England 2020);
- Standard and Guidance for Archaeological Advice by Historic Environment Services (Chartered Institute for Archaeologists 2020a);
- Standard and guidance for historic environment desk-based assessment (Chartered Institute for Archaeologists 2020b);
- Standard and guidance for nautical archaeological recording and reconstruction (CIfA 2020c);
- Code of Conduct: Professional Ethics in Archaeology (Chartered Institute for Archaeologists 2022); and
- Curating the Palaeolithic (Historic England 2023).

3 METHODOLOGY

3.1 Study area(s)

Scope

- 3.1.1 The study area for marine archaeology is the extent of the site (**Figure 1**). The boundary of the marine archaeology study area defines the area where any potential impact on marine archaeology receptors may occur.

Search area

- 3.1.2 A further 1 km buffer zone beyond the study area was used as a search area for obtaining records of archaeological sites, features and findspots from relevant archive databases. This allowed for a greater understanding of the broader archaeological baseline environment, with the dual purpose of enabling any archaeological trends within the region to be recognised and to allow any heritage assets identified to be represented in a broader archaeological context.

3.2 Walkover survey methodology

- 3.2.1 As part of the baseline characterisation of the site, Wessex Archaeology has conducted a walkover survey of the site at Falmouth Docks. This survey was undertaken by two archaeologists and was focused on the potential maritime archaeology and heritage of the site. The survey took place on 31st October 2023.

- 3.2.2 The primary aims of the survey were:

- to identify previously unknown features or areas of archaeological interest;
- to confirm or remove areas of interest identified by desk-based assessment;
- to provide initial judgement on the impact of proposed works on sites and features of archaeological interest; and,
- to gain a practical familiarity with the working area in preparation for future works.

- 3.2.3 The walkover survey was guided by staff from Falmouth Dock. The archaeologists were able to photograph areas of potential archaeological significance as well as images of those areas suspected of being the most impacted by works.

3.3 Archaeological desk-based assessment

Key themes

- 3.3.1 The methodology follows the best practice professional guidance outlined by the Chartered Institute for Archaeologists' (CIfA) Standard and Guidance for Historic Environment Desk-Based Assessment (2014, updated 2020).

- 3.3.2 The marine themes relevant to marine archaeological baseline as assessed in this report are:

- Seabed prehistory (for example, palaeochannels and other features that contain prehistoric sediment, and derived Palaeolithic artefacts e.g. handaxes);

- Seabed features, including maritime sites (such as shipwrecks and associated material including cargo, obstructions and fishermen's fasteners) and aviation sites (aircraft crash sites and associated debris);
- Intertidal heritage assets;
- Setting of marine heritage assets from offshore activities; and
- Historic seascape character

Data sources

- 3.3.1 Current baseline conditions have been determined by a desk-based review of available information.
- 3.3.2 The main desk-based sources of information that have been reviewed to inform the current baseline description within the vicinity of the proposed development include:
- the United Kingdom Hydrographic Office (UKHO) data for charted wrecks and obstructions;
 - the National Marine Heritage Record (NMHR) maintained by Historic England, comprising data for marine archaeological sites;
 - the National Heritage List for England (NHLE) and National Record of the Historic Environment (NRHE) maintained by Historic England, comprising data of designated heritage assets including sites protected under the *Protection of Military Remains Act* 1986 and the *Protection of Wrecks Act* 1973;
 - Cornwall Council (CC) Historic Environment Records (HER) (acquired January 2024);
 - Various online resources including the British Geological Survey (BGS) Geology of Britain Viewer and the Britain from Above aerial photo viewer;
 - Historic Seascape Characterisation (HSC) using the consolidated HSC national database (LUC 2017);
 - relevant mapping including Admiralty Charts, historic maps and Ordnance Survey;
 - survey reports and information held by A&P concerning Falmouth Docks; and
 - relevant documentary sources and grey literature held by Wessex Archaeology and those available through the Archaeological Data Service and other websites.
- 3.3.3 The Cornwall Historic Landscape Characterisation (Cornwall Council 2014) covers intertidal and port infrastructure as well as the town's rich architecture befitting of a historic port town.
- 3.3.4 For clarity, duplicate entries (i.e., heritage assets or archaeological events that had been listed in more than one dataset) have been removed, with only a single listing for each heritage asset remaining. Maritime Recorded Losses are referred to in the text using the NMHR identification number.

- 3.3.5 A bibliography of documentary sources consulted is presented in the Reference section of this report.

Data structure

- 3.3.6 This report is supported by a Geographic Information System (GIS) using ArcPro, incorporating the positional information of the various data sources listed above, allowing the data to be spatially analysed. The data were subsequently compiled into gazetteers of the known seabed features located within the study area.
- 3.3.7 For the purposes of this report, the gazetteers for the marine dataset are compiled and presented in British National Grid (OSGB36 - OSTN15/OSGM15).

Chronology

- 3.3.8 Archaeological material is generally studied within a framework of 'periods' or 'ages' that reflect the activities and cultural changes taking place over time. All dates are referred to as BCE (Before Common Era), BP (Before Present) or AD (Anno Domini) within the text. BCE refers to calibrated radiocarbon chronology that can be considered equivalent to calendar years. BP dates are used for periods of time older than circa 10,000 years ago.
- 3.3.9 A list of the main archaeological periods of the British Isles referred to in the text, along with their broadly defined dates, are presented in **Appendix 2**, which reflects the archaeological record documented from coastal and marine contexts.

Seabed prehistory

- 3.3.10 The baseline summary for seabed prehistory was based on a review of geological mapping of seabed sediments, solid geology, and bathymetry from published BGS sources, as well as previous assessments undertaken. These have been enhanced by the review of Project-acquired geotechnical data (summarised in Wessex Archaeology 2024) and marine geophysics.

Seabed features: maritime and aviation sites and intertidal archaeology

- 3.3.11 The baseline summary for maritime and aviation archaeology was assessed by means of accessing any records of sites, findspots, wrecks, casualties, and other seabed features obtained from the UKHO, NMHR and local HER located within the study area and wider search area up to MHWS. The baseline assessment of maritime and aviation archaeology was further supplemented by a review of relevant primary and secondary source material in order to provide an indication on the nature of maritime and aviation activity across the region. As well as summarising the known archaeological resource, the baseline assessment underlines the potential for encountering unknown shipwreck and aircraft crash sites within the study area.
- 3.3.12 For archaeological features that were recorded in multiple datasets, the co-ordinates from the UKHO have been used in the gazetteer and in the figures. In general, the UKHO relate to survey co-ordinates, and have been assessed as likely to be more accurate. If no UKHO coordinates were available then the coordinates from the HER were used. The relevant supplementary information from all sources has been combined into a single gazetteer entry.
- 3.3.13 The UKHO records can be listed as 'Live' (a wreck that has been identified in surveys), 'Dead' (the recorded location of a wreck that has been reported but not located on repeated surveys) and 'Lifted' (a wreck that has been salvaged). While it may appear that only the 'Live' wrecks are still present on the seabed, wrecks listed as 'Dead' may have simply been

covered by sediment to obscure their presence on surveys, and material related to 'Lifted' wrecks can remain in their location, both in terms of ship material and the contents of the vessel.

- 3.3.14 The data obtained were reviewed and those located within the study area were extracted and compiled to form a gazetteer of the known seabed features. These records were each given a unique identifier beginning with 2000 continuing sequentially (**Appendix 4**) and were added to the project GIS. Similarly the gazetteer of identified intertidal features (**Appendix 5**) were collated and added to the project GIS.
- 3.3.15 Data relating to Recorded Losses were also extracted from the NMHR data sources (**Appendix 6**). Recorded Losses are records for ships or aircraft that are known to have wrecked or crashed offshore, but for which the exact locations are not known. Recorded Losses are often grouped by area into Maritime Named Locations by the NMHR. For example, a Recorded Loss within this dataset may be based on the loss of a vessel 'stranded near Falmouth' or associated with a known navigational hazard such as a sand bank or rocks (which may give rise to a falsely precise geographic coordinate for the record). The positional data of these records is unreliable and serves only to provide an indication of the types of vessels that passed through the area and the wrecking incidents that are known to have occurred in the general region. Whilst the remains of these vessels and aircraft are expected to exist somewhere on the seafloor, their location is unknown. As such, they signify the potential maritime and aviation resource.
- 3.3.16 A number of early records within the HER relating to finds during the 19th and early 20th centuries have similarly poor locational information to the Recorded Losses. These are largely references to chance finds of prehistoric material within the area of Falmouth Harbour and Pendennis Point for which an exact location is not known. These are discussed as part of the background information for the baseline characterisation.
- 3.3.17 Previous marine archaeology reports and surveys for developments wholly or partially within the footprint the proposed development have been summarised and the results added to the background information for the project. Where surveys have identified potential archaeological material this interpretation has been used without further assessment of the base data.

Historic seascape characterisation

- 3.3.18 In accordance with the European Landscape Convention, 'landscape' can be defined as 'an area, as perceived by people, whose character is the result of the action and interaction of natural and / or human factors' (Council of Europe 2000, Article 1). The term 'seascape' can be defined as a subset of 'landscape', and has 'an area of sea, coastline and land, as perceived by people, whose character results from the actions and interactions of land and sea, by natural and / or human factors' (*ibid.*).
- 3.3.19 Seascape assessment reflects the holistic approach to landscape of the European Landscape Convention, extending it to the sea. Seascape Character Areas include coastal land, intertidal and marine environments and cover the offshore environment to the territorial limit (12 nm). HSC assessment is the identification and interpretation of the historic dimension of the present day coastal and marine environment (Historic England's Characterising Historic Seascape webpage, accessed January 2023).
- 3.3.20 The baseline summary for character of the historic seascape within the study area was assessed using the compiled results of LUC's Historic Seascape Characterisation (HSC): Consolidating the National HSC Database (2017).

3.4 Geotechnical methodology

Geoarchaeological framework

- 3.4.1 To help frame archaeological and geoarchaeological investigations, Wessex Archaeology has developed a four-stage approach, encompassing different levels of investigation appropriate to the results obtained, accompanied by formal reporting of the results at the level achieved. The geoarchaeological assessment for the proposed development (Wessex Archaeology 2024) represents Stages 1 and 2 of this process (**Table 1**).

Table 1 Staged approach to geoarchaeological investigations

Stage 1: Geoarchaeological Desk-based Assessment (GDBA) and deposit modelling	A Geoarchaeological Desk-Based Assessment (GDBA) examines a range of data (published and unpublished ("grey literature"), LiDAR, historic maps) and models existing Ground Investigation (GI) data to inform on the possible Palaeolithic archaeological and geoarchaeological potential of a site. The GDBA may include, dependant on the site and complexity of a site, a Geoarchaeological Deposit Model which demonstrates the vertical and lateral extent of superficial deposits across the site. The GDBA establishes the requirements for and scope of Stage 2 archaeological and geoarchaeological field elevation. Geoarchaeological potential is defined as potential for paleoenvironmental and dating evidence. Should Stage 2 evaluation be required, appropriate and proportionate recommendations for the site are provided.
Stage 2: Geoarchaeological monitoring of GI works and/or Geoarchaeological borehole survey	Field evaluation to establish the geoarchaeological and archaeological potential of Quaternary deposits within an evaluation area, which informs on the requirements and scope of further works at Stage 2 (e.g. purposive borehole survey), Stage 3 palaeoenvironmental assessment and/or Stage 4 mitigation. The principal methods of geoarchaeological evaluation are through monitoring of Ground Investigation (GI) works or targeted boreholes. A geoarchaeological evaluation report is produced, which includes deposit modelling (where sufficient data allows) and recommendations for further work at Stage 2 or Stage 3 if required. Further works may include additional interventions (stepped trenches, test pits or boreholes) to retain additional/suitable samples for assessment.
Stage 3: Palaeoenvironmental assessment	Palaeoenvironmental samples recovered during Stage 2 are assessed to inform on the archaeological and geoarchaeological potential of deposits and guide the scope and need for Stage 4 analysis. A report is produced outlining the palaeoenvironmental potential of the deposits including targeted and proportionate recommendations for Stage 4 analysis.
Stage 4: Palaeoenvironmental analysis	Based on the results of the Stage 3 palaeoenvironmental assessment, palaeoenvironmental analysis on selected deposits/samples may be required. In addition to full analysis of suitable samples identified during the assessment, work at Stage 4 may include additional scientific dating where appropriate/required. A final analysis report is provided on completion of mitigation program. Where appropriate, this may include recommendations for publication or other forms of dissemination.
Publication	The scope and location of a publication report will be agreed in consultation with the client and LPA advisor. The publication report may comprise a note in a local journal or a larger publication article or monograph, dependant on the significance of the archaeological and geoarchaeological work.

- 3.4.2 A total of five trial pits, 21 boreholes and 19 vibrocores were acquired during a geotechnical survey within the study area (**Figure 2**). Of these ten were monitored by an experienced geoarchaeologist in line with the geoarchaeological survey Method Statement (Wessex Archaeology 2023).
- 3.4.3 The supervising geoarchaeologist recorded and interpreted the sequence of deposits encountered in order to allow assessment of likely geoarchaeological potential. Where appropriate, selected cores were retained as part of the sedimentary archive against which further works will be recommended.
- 3.4.4 The results of the targeted geoarchaeological borehole survey were supplemented by a review of vibrocore logs taken during the same phase of GI works. A total of 19 borehole records were reviewed, in addition to the ten geoarchaeological vibrocore records.
- 3.4.5 The results of the borehole survey were supplemented by a review of the stratigraphic logs arising from GI works, including a total of four logs from GI during the investigation for a location for a new marina in Falmouth Harbour (Sub Marine Services 2007), and five logs from the proposed development of Falmouth Harbour (FDEC 1962).
- 3.4.6 A series of geoarchaeological deposit models were constructed for the site using a total of 38 stratigraphic records, including the ten purposive geoarchaeological boreholes, the 19 new boreholes from this phase of GI works, and nine boreholes from previous GI works carried out on the proposed development.
- 3.4.7 Sedimentary units from the boreholes were classified into ten stratigraphic units: (1) Made Ground, (2) Possible Made Ground, (3) Modern Seabed Sediments/Made Ground, (4) Modern Seabed Sediments, (5) Marine Sands, (6) Estuarine Alluvium, (7) Peat, (8) Head, (9) Weathered Bedrock and (10) Bedrock. The classified data for groups 1 to 10 were then input into a database within the RockWorks 17™ program.

3.5 Geophysical assessment methodology

- 3.5.1 Geophysical assessment of the location focussed on the investigation of palaeolandscape features within the surveyed areas, and was undertaken using a sub-bottom profiler dataset that was received in the form of 69 lines of 2D seismic survey data. Logs acquired by the previously described methodology were combined with this survey data to inform the interpretation of the features visible within geophysical data.
- 3.5.2 The SBP data were interpreted within the S&P Kingdom Suite. This software suite allows for the visualisation, processing and interpretation of seismic data, and contains modules allowing for the correlation of borehole data with seismic survey outputs.
- 3.5.3 Seismic survey data was loaded into the software alongside previously mentioned borehole data. Seismic data is recorded with a seismic two-way travel time (TWTT) along the z-axis. In order to convert from TWTT to depth, the velocity of the seismic waves was estimated to be 1,400 ms⁻¹. This is a standard estimate for shallow, unconsolidated sediments. Time-depth conversion was handled natively within the Kingdom software suite, and this calculation was applied uniformly to all survey lines within the data set supplied prior to interpretation. No other additional processing steps were applied.
- 3.5.4 The seismic interpretation of a palaeolandscape can be limited by a number of factors. Data limitations for this survey were a limited survey coverage and resolution. Boomer surveys, such as this, prioritise seismic penetration over fine resolution, leading to an obfuscation of

detail in some cases. While the data was fit for purpose, lower resolution data can result in some small feature and structures being missed. Historic dredging in the locale removed large portions of the Holocene sediment package to the North and the East, destroying any features of the palaeolandscape in these locations. This was not the case for the western portion of the area, however.

- 3.5.5 Initial investigation was comprised of the analysis of 50% of the survey lines to form an initial understanding of the location, and to make a preliminary tag of features of the palaeolandscape that were evident within the data supplied. Should any features be identified, additional survey lines were used to fully map their extent throughout the area surveyed.
- 3.5.6 Borehole logs produced during geoarchaeological investigation were used to understand the sediment profile of any features found, and were used to inform an understanding of their archaeological importance, and to gain an insight into their place within the palaeoenvironment of the area.

3.6 Assessment of setting

- 3.6.1 The NPPF (Ministry of Housing, Communities and Local Government 2021, 71) defines setting as ‘the surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance, or may be neutral.’
- 3.6.2 Historic England’s The Setting of Heritage Assets – Historic Environment Good Practice Advice in Planning 3 (2017a) provides general guidance, largely applicable to terrestrial sites, and notes that the importance of setting ‘lies in what it contributes to the significance of the heritage asset’ (*ibid.*, 4). With regards to significance for heritage policy, the National Planning Policy Framework notes that the interest of a heritage asset ‘may be archaeological, architectural, artistic or historic’ (Ministry of Housing, Communities and Local Government 2021, 72).
- 3.6.3 Historic England states that setting depends on a ‘wide range of physical elements within, as well as perceptual and associational attributes pertaining to, the heritage asset’s surroundings’ (Historic England 2017a, 4). One aspect that contributes to the setting of a heritage asset is referred to as ‘views’, which includes not only views that can contribute to its significance, but also intended views between heritage assets, and planned views. In addition, the guidance suggests that the appreciation of the setting of a site does not depend on the ability to access it (*ibid.*) Reference in the guidance is also made to the setting associated with buried heritage assets which may not be readily appreciated by a casual observer, but retains a presence in the landscape such as, for example, wreck sites that are periodically, partly or wholly submerged. In addition, the location and setting of historic battles, with otherwise no visible traces, may include important strategic views, routes by which opposing forces approached each other and a topography that played a part in the outcome (*ibid.*, 4-5).
- 3.6.4 In order to assess whether, how and to what degree setting contributes to the significance of heritage assets, the following must be considered: the physical surroundings of the asset including its relationship with other heritage assets; the way the asset is appreciated, and the asset’s associations and patterns of use.

3.6.5 The assessment of setting in this document follows the guidance discussed in the paragraphs above, is based on the baseline assessment of the palaeogeography, maritime and aviation assets, and is described using the following two factors:

- physical surroundings and views – which includes the physical presence of the asset on the seabed, its surroundings, and relationship with other assets and navigational hazards in the immediate area. Views to and from the asset, and how the asset is experienced in its immediate physical surroundings are also considered; and;
- non-visual factors – including the way the asset is appreciated in a broader historical, artistic, and intellectual capacity, and the asset's associations.

3.6.6 It is not possible to ascertain the setting of currently unidentified marine heritage assets, where limited information is known, for example wrecks that have not been identified or characterised to determine their period of build, use or loss. Similarly, setting cannot be assessed for geophysical anomalies of archaeological potential or potential sites that have not yet been discovered.

3.7 Determining value and sensitivity

3.7.1 This report will adopt the conceptual approach known as the 'source-pathway-receptor' model. This approach is based on the identification of the source (i.e. the origin of a potential impact), the pathway (i.e. the means by which the effect of the activity could impact a receptor) and the receptor that may be impacted (e.g. known/ potential heritage assets). In order for the significance of any given impact to be fully understood, the sensitivity of any receptors that may be impacted need to be considered. This section outlines the means by which the sensitivity of marine heritage assets is ascertained.

3.8 Impact assessment criteria

Asset sensitivity

3.8.1 The capability of a receptor to accommodate change and its ability to recover if affected is a function of its sensitivity. Receptor sensitivity is typically assessed via the following factors:

- adaptability – the degree to which a receptor can avoid or adapt to an effect;
- tolerance – the ability of a receptor to accommodate temporary or permanent change without significant adverse impact;
- recoverability – the temporal scale over and extent to which a receptor will recover following an effect; and
- value – a measure of the receptor's importance, rarity and worth.

3.8.2 Since archaeological receptors cannot adapt, tolerate, or recover from physical impacts caused by a proposed development for the purpose of this assessment, the sensitivity of each asset will be quantified only by its value. The UK MPS (Department for Environment, Food and Rural Affairs 2011) describes a heritage asset as holding a degree of significance. Significance is the value of a heritage asset to this and future generations because of its heritage interest, which may be archaeological, architectural, artistic, or historic.

Value of an asset

- 3.8.3 The value of known archaeological and cultural heritage assets was assessed on a five-point scale using professional judgement informed by the criteria provided in **Table 2**.

Table 2 Criteria to assess the archaeological value of submerged assets

Value	Definition
High	- Best known or only example and/or significant potential to contribute to knowledge and understanding and/or public engagement. - Assets with a demonstrable international dimension to their importance are likely to fall within this category. - Wrecked ships and aircraft that are protected under the <i>Protection of Wrecks Act 1973</i>, <i>Ancient Monuments and Archaeological Areas Act 1979</i> or <i>Protection of Military Remains Act 1986</i> with an international dimension to their importance, plus as-yet undesignated sites that are demonstrably of equivalent archaeological value. - Known submerged prehistoric sites and landscapes with the confirmed presence of largely <i>in situ</i> artefactual material. 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 public engagement. - Receptors with a demonstrable district level dimension to their importance are likely to fall within this category. - Includes wrecks of ships and aircraft that do not have statutory protection or equivalent significance, but have moderate potential based on a formal assessment of their importance in terms of build, use, loss, survival and investigation. - 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 public engagement. - Receptors with a demonstrable local dimension to their importance are likely to fall within this category. - Includes wrecks of ships and aircraft that do not have statutory protection or equivalent significance, but have low potential based on a formal assessment of their importance in terms of build, use, loss, survival and investigation. - Prehistoric deposits with low potential to contribute to an understanding of the palaeoenvironment.
Negligible	Poor example and/or little or no potential to contribute to knowledge and understanding and/or public engagement. Assets with little or no surviving archaeological interest.
Unknown	There is not presently enough information available about the site to assess its value.

3.9 Assumptions and limitations

Archaeological data

- 3.9.1 Data used to compile this report consists of secondary information derived from a variety of sources, only some of which have been directly examined for the purposes of this study. The assumption is made that the data, as well as that derived from other secondary sources, are accurate.
- 3.9.2 The records held by the UKHO, NMHR and the other sources used in this assessment are not a record of all surviving cultural heritage assets, 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 datasets is not complete and does not preclude the subsequent discovery of further elements of the historic environment that are, at present, unknown. In particular, this relates to buried archaeological features.

4 MARINE ARCHAEOLOGICAL ASSESSMENT: PALAEOGEOGRAPHY

4.1 Geological baseline and background

- 4.1.1 The study area is located within the wider Fal Estuary, formed by a (now submerged) broad river valley cut into Pliocene geological deposits at a level of c.-45 m OD. This valley has subsequently been submerged and altered during the Ipswichian Interglacial and Devensian cold stage, followed by marine transgression during the Holocene, with formerly terrestrial landscapes now submerged beneath fluvial and marine sediments (Ratcliffe 1997).
- 4.1.2 No superficial geological deposits are mapped by the BGS in the area of the study area, although Marine Beach Deposits, comprising sand and gravel, are shown along the foreshore elsewhere in this part of Falmouth and it is likely that these deposits extend across much of the proposed development. However, documentary evidence indicates that Holocene deposits were, and may still be present in the study area underlying the foreshore, including an as yet undated peat deposit referred to as 'submerged forest'. These deposits likely formed on a former land surface on the floodplain of the Penryn River, or encroached on to the peat surface from adjacent dry land, prior to marine transgression during the Holocene (MIS 1; the present interglacial).
- 4.1.3 These include remains of a 'submarine forest' recorded in 1871 (HER ref. MCO28693) during works for the erection of the Prince of Wales Pier, itself listed on the Cornwall HER (ref. MCO4779). The 'forest' bed was recorded as approximately 2.1 m thick, found below 0.6m of sand, resting on a thin bed of shale, with its top at about the level of the low water mark (Whitley 1872). Whitley (1872) describes these deposits as 'composed of peat and consisted mainly of flags mixed with ferns', with the remains of trees of small size, generally about 0.3m in diameter, chiefly of hazel, oak and fir, with some beech and birch'. The peat is described as extending for a short way up the valley known as the Moor.
- 4.1.4 Both the Cornwall HER and the Historic England Intertidal and Coastal Peat Database (Hazell 2008) list other evidence for submerged peat deposits in the Falmouth area, although their exact locations are unclear. Such deposits are recorded as being exposed during exceptional low tides by Leveridge et al (1990), whilst in situ branches, roots of trees and other plant remains exposed after storms are reported in the Fal Estuary by Flett & Hill (1912). Ashton (1920) describes 'ancient forest and peat remains' as deep as 67 ft (20.42m) below high water mark at Falmouth. Hazell (2008) also show records of peat recorded by Kirkham (2005) at Market Strand, and Ratcliffe (1997) at Market Strand Quay, both c. 500 m west of the study area, although none of these deposits are described in detail and the latter are likely the same deposits recorded by Whitley (1872).
- 4.1.5 In the wider area of the Fal Estuary, submerged peat deposits at Maenporth beach are listed by Johnson & David (1982), citing a 19th century reference by Rogers (1832), although this deposit was not identified during a subsequent field visit by Cornwall Archaeological Unit in 1995 (though this visit was not made at low tide).
- 4.1.6 Work undertaken by Bates & Whittaker (2008) as part of the Falmouth Cruise Project (Cornwall Council 2008) revealed a sequence of Late Devensian (c. 17-11,000 BP) fluvial gravels at 3.4 m below bed level, overlain by a fining-upward sequence of Holocene floodplain silty clays and sands containing well-preserved molluscs, forams and ostracods, with plant debris and insects also noted. These were overlain by a sequence of estuarine and marine deposits including those formed in sub-tidal mudflats, saltmarsh or tidal flats. Radiocarbon dating of these deposits indicated that much of the sequence accumulated

prior to 6300 BP (Bates & Whittaker 2008), with the onset of estuarine or marine conditions beginning by 6690 ± 50 BP.

4.2 Geotechnical palaeogeographic assessment

4.2.1 The full sequence of Quaternary superficial geological deposits recorded during the Stage 1 and 2 geoarchaeological assessment, and forming the basis of the deposit modelling, comprises:

- Made Ground/Seabed Sediments (modern);
- Marine Sands (Holocene);
- Estuarine Alluvium (Holocene);
- Peat (Holocene);
- Head (Pleistocene);
- Bedrock (Devonian).

4.2.2 More detail on the variability and composition of these deposits is described in the geoarchaeological assessment (Wessex Archaeology 2024) and summarised below.

Bedrock

4.2.3 The bedrock deposits were recorded as a very stiff, bluish grey to pinkish grey mudstone and slate in ten interventions, and appeared at elevations between -18.47 (1961-BH7) and -7.79 m CD (WA-VC04). It is interpreted as the Portscatho Formation bedrock. In several sequences the bedrock was described as 'weathered', and it was often recovered as a mudstone and slate gravel.

Head

4.2.4 The Head deposits of light yellowish brown gravelly clay to clayey gravels were recorded in eight interventions toward the south-east and north-east of the proposed development at elevations between c. -6.77 (WA-VC04) and -9.24 m CD (VC01), with an upper surface of between -9.14 (VC01) and -6.77 m CD (WA-VC04). The thickness of the Head deposits varied across the site, ranging from 0.10 – 1.82 m thick (average 0.84 m). These deposits were formed under slope processes, such as colluviation and solifluction, during the Pleistocene. The Head deposits appear to flank the rising bedrock surface and generally increase in elevation towards the south-east, though they appear to have been at least partially impacted by previous dredging.

Estuarine Alluvium

4.2.5 The Estuarine Alluvium deposits of silty clay to silty sands were recorded in 29 interventions at elevations between -17.26 (1961-BH7) and -5.22 m CD (WA-VC20), with an upper surface of between -6.74 (1961-BH7) and -5.22 m CD (WA-VC20). These deposits are interpreted as estuarine alluvium, forming under the influence of rising relative sea levels and wider floodplain alluviation on the floodplain of the Penryn River and wider Fal estuary during the Holocene.

4.2.6 The Estuarine Alluvium frequently contains shelly materials, including fragmented and unfragmented shells. These were occasionally recorded as beds of shelly material, possibly reflecting distinct storm events. Pockets of organic material are occasionally present within this deposit, often as fine bands, though distinct peat or organic-rich units were rare and recorded only in WA-VC04 (see below). The impact of dredging is evident in the surface of the Estuarine Alluvium, with dredging having truncated this deposit below its natural level,

which in boreholes 1961-BH1 and 1961-BH2 (outside of the areas significantly impacted by historic dredging) is indicated to lie above levels of c. -5.0 m CD.

Peat

- 4.2.7 Deposits of black to brownish black amorphous silty peat were recorded within the Holocene estuarine alluvium in geoarchaeological borehole WA-VC04. Here bands of peat 0.05-0.18 m thick were recorded within a 1.30 m sequence of intercalated estuarine alluvium and peat at between -5.49 and -6.77 m CD. While this was the only sequence where peat deposits were encountered, the assessment of the geophysical data has indicated a broader distribution to the peat, and thin bands of organic-rich sediments, possibly reflecting a continuation or eroded remnants of these deposits, were recorded within the alluvium in WA-VC18 and WA-VC21. However, in these boreholes the organic sediments are typically very thin, being less than 2 mm thick.
- 4.2.8 In the peat bands recorded in WA-VC04 there are occasional to rare fragments of *Phragmites australis* (common reed) rhizomes and stems, and within the deepest peat deposit (-6.59 to -6.77 m CD) charcoal fragments were recorded. No *Phragmites* or charcoal fragments were recorded within the fine organic pockets within WA-VC18 and WA-VC21.

Marine Sands

- 4.2.9 Deposits of grey to brown coarse sand, with shell fragments and fine gravel clasts was recorded within previous GI boreholes 1961-BH1 and 1961-BH2, overlying Estuarine Alluvium. Here Marine sands were present at levels between -4.22 to -5.44 m CD, with an upper surface between -4.91 (1961-BH2) to -4.22 m CD (1961-BH1). The Marine Sands were only recorded in these boreholes, located towards the north-west of the site, and may have been removed by dredging since this borehole survey was undertaken.

Seabed Sediments/Made Ground

- 4.2.10 Light greyish brown to dark brown clayey sands to clayey sandy gravels were recorded in all boreholes undertaken during the current GI works, and are interpreted as a combination of modern seabed sediments and/or made ground. These sediments generally occur to seabed and are between c. 0.1 to 0.7 m thick, increasing to 1.65 m and 2.6 m in VC12A and VC03 respectively, located to the east and west of the existing causeway.
- 4.2.11 Where sediments are very soft and organic-rich, it is difficult to determine whether these are naturally occurring seabed sediments, or are significantly disturbed by previous dredging or shipping activities with the inclusion of modern anthropogenic material (i.e. Made Ground).
- 4.2.12 These deposits frequently contain organic material, and have a strong organic odour, though this material is anticipated to be modern. Fragmented shell material is often present in this deposit, likely reflecting modern/recent marine biota. Where these deposits are gravelly, gravel clasts are comprised of fine subangular quartz and siltstone clasts.
- 4.2.13 Gravelly sand to clayey gravel with gravel clasts composed of slate and quartz, and occasional ceramic building material, occur locally in the southern central region of the site. These deposits are possible Made Ground, likely related to previous works associated with the jetty/wharfs at Falmouth Docks.

4.3 Geoarchaeological discussion

Sedimentary sequence and depositional environment

- 4.3.1 The sequence of superficial geological deposits recorded overlying the Porthscatho Formation bedrock, comprises Pleistocene slope deposits (Head) that is locally present towards the north-east and south-east, and a sequence of Holocene estuarine alluvium that is widespread across the proposed development. Both of these deposits have been impacted by previous dredging, reducing the level of the Head and Estuarine alluvium to a truncated level of c. -7 m CD, though dredge impacts appear to have been less severe towards the south-east of the proposed development (see below).
- 4.3.2 In a single borehole (WA-VC04) the alluvial sequence includes peat units at between -5.49 and -6.77 m CD. Geophysical assessment indicates that these deposits (Feature 7002) may be present more widely within the south-east of the proposed development. The peat deposits broadly coincide with a mapped palaeochannel feature (Feature 7001) identified in the geophysical data (**Figure 2**). There is tentative evidence in the vibrocores to suggest that the palaeochannel feature is cut into the underlying Head in the area of WA-VC21, indicating that the channel may be of Late Pleistocene or early Holocene date.
- 4.3.3 The basal Quaternary superficial geological deposits are Head deposits which are considered likely to have formed by a range of slope processes during the Pleistocene. Slope processes typically occur during periods when little vegetation is present, such as during glacial periods when landscapes are generally open. While these deposits are likely to be of Pleistocene date, they may contain finer-grained deposits associated with Holocene colluvium (slope-wash) sediments near the top of the sequence. These deposits also formed via slope processes, but are often associated with deforestation during the late Neolithic and Bronze Age. Increased deforestation can lead to increased slope instability, and the downslope movement of sediments.
- 4.3.4 Rising sea levels during the Holocene led to the widespread accumulation of estuarine alluvium, which is recorded here overlying the Head, or where that deposit is absent, the Porthscatho Formation bedrock. The rate of sea level rise increased during the early Holocene, where river valleys, such as the Fal, were submerged. Sea level curves for south-west England show the highest rate of sea level rise during the Mesolithic (Heyworth and Kidson 1982; Haslett et al 1997; Haslett et al 2001; Massey et al 2008).
- 4.3.5 The localised peat deposits recorded within WA-VC04 reflect phases of reduced energy environments when semi-terrestrial plant communities became established. This typically occurs when the rate of relative sea level rise reduces, which would allow decomposed vegetation communities to accumulate at a rate faster than that of sea level rise, although such accumulation can also occur within abandoned channel features or backwater swamps. Features identified within the geophysical assessment (**Section 4.5**) provide further information on the distribution of the peat at the site, beyond that in WA-VC04, and indicate that the peat may be associated with a former channel.
- 4.3.6 It is possible that the peat deposits encountered within the proposed development reflect an extension of the 'submerged forests' which are well reported from the Fal Estuary and surrounding location (e.g. Flett and Hill 1912; Leverage et al 1990; Kirkham et al 2005). Across Cornwall, these 'submerged forests' and associated palaeosols have yielded a range of radiocarbon dates, ranging from the Palaeolithic to Medieval. While none of the 'submerged forests' recorded in Falmouth have been dated, those from Maenporth which occur at -5.53 m OD have been dated to the Mesolithic. The sea level curves for south-west England (Heyworth and Kidson 1982; Haslett et al 1997; 2001; Massey et al 2008) suggest

that the rate of sea level rise slowed down at points during the Mesolithic, although deposits located at the Prince of Wales Pier, c. 1.0 km west of the proposed development, were dated to the Late Neolithic (Wessex Archaeology 2023). However, these peat deposits were present at a higher elevation than the peat deposits encountered during this phase of work, so could represent different periods of peat formation.

- 4.3.7 The Marine Sands, located off the north-west of the proposed development, reflect higher energy conditions following sea level rise. Given the localised nature of these deposits within the site, they likely reflect the higher energy marine conditions observed in the main channel of the Fal estuary in the Late Holocene.

Previous Dredging

- 4.3.8 Past dredging and dock activities have impacted upon the Quaternary superficial deposits within the proposed development, including both the Holocene alluvium and Pleistocene Head. The depth of impact of previous dredging varies, but it appears to be greater in the north-west of the proposed development, and in places the sequence is capped by modern made ground (see below). Both the results of the borehole survey and geophysical assessment indicate that in the area of the Docks Basin previous dredging has been less destructive, and, as such, some features and sedimentary structures have been retained, with two that may be of increased archaeological interest (Features 7001 and 7002).
- 4.3.9 The surface of the modern sediment recorded during the borehole survey shows evidence of the seabed shoaling to the south of the proposed development, away from the previous areas of dredging at the Queen's and Northern wharfs. Where previous dredging intervals around the Queen's and Northern Wharfs have been more prevalent, seabed levels were lowest, being c. -7.0 to -8.0 m CD.
- 4.3.10 Previous dredging activity has largely impacted Holocene sediments across the proposed development, with seabed sediments and made ground typically overlying a truncated sequence of estuarine alluvium. Locally previous dredging activity may have impacted on peat deposits, as organic-rich seabed sediments overlay Holocene peat deposits in WA-VC04. Where deeper dredging activity has occurred around the Queen's and Northern Wharf, the dredging has impacted deeper, and within WA-VC08 the surfaces of the Pleistocene Head deposits have been impacted by previous dredging.

4.4 Palaeogeographic potential

- 4.4.1 The results of the Stage 1 and 2 geoarchaeological assessment allow the archaeological and palaeoenvironmental potential of the deposits to be assessed.
- 4.4.0 An archaeological potential rating has been assigned to the deposits, representing a measure of probability. This has been determined via the application of professional judgement, informed by the evidence from the site itself and equivalent deposits in the surrounding area. Potential to preserve significant paleoenvironmental remains and material suitable for scientific dating is included within this assessment. '*Potential*' is expressed on a four-point scale, assigned in accordance with the following criteria:
- **High** Situations where evidence is known or strongly suspected to be present within deposits and which are likely to be well preserved.
 - **Moderate** Includes cases where there are grounds for believing that evidence may be present, but for which conclusive evidence is not currently available.

- **Low** Circumstances where the available information indicates that evidence is unlikely to be present, or that their state of preservation is liable to be severely compromised.
- **Unknown** Cases where currently available information does not provide sufficient evidence on which to provide an informed assessment with regard to the potential for material to be present.

4.4.1 The relative '*Significance*' of known and potential archaeological evidence has been determined in accordance with the criteria set out in **Table 3**. These criteria are related to national (e.g. Historic England 2015a) and regional (South West England Archaeological Research Framework) research themes and priorities.

Table 3 Generic schema for classifying the significance of archaeological assets (based on Historic England 2015d)

Significance	Categories
Very High	World Heritage proposed developments (including nominated sites) Assets of recognised international importance Assets that contribute to international research objectives
High	Scheduled Monuments Non-designated assets of national importance Assets that contribute to national research agendas
Moderate	Assets that contribute to regional research objectives
Low	Assets compromised by poor preservation and/or poor contextual associations Assets with importance to local interest groups
Negligible	Little or no archaeological or geoarchaeological interest
Unknown	The importance of the asset has not been ascertained from available evidence

4.4.2 The archaeological potential of deposits is summarized in **Table 4** and discussed below.

Table 4 Archaeological potential

Lithostratigraphic unit	Geological Period	Archaeological Period	Depth m bgl	Depth m CD	Geoarchaeological potential	Archaeological Significance
Head	Pleistocene	Palaeolithic?	0.08-4.00	-6.77 – -9.24	Moderate	Low
Estuarine Alluvium	Holocene	Unknown	0.00-5.60	-5.22 – -17.26	Moderate	Low
Peat	Holocene	Unknown	0.70-1.98	-5.49 – -6.77	High	Unknown
Marine Sands	Holocene	Unknown			Low	Unknown

Head

4.4.3 Pleistocene Head can contain reworked archaeological artefacts of Palaeolithic date, as well as mask soil horizons or *in situ* archaeology. While the age of the Head is not fully understood, the deposits may be associated with the Devensian glaciation and may therefore be of Middle to Upper Palaeolithic date.

- 4.4.4 Human occupation during the Palaeolithic in Cornwall is poorly understood, with very little evidence recorded from the region, although occasional flint lithics from the region do occur, they are often with little lithological context. While they may be associated with river terraces (Hosfield et al 2006), there is little evidence for lithics from within the terraces associated with the rivers which feed into the Fal Estuary. However, this paucity of records could reflect the lack of extant river terrace gravels within Cornwall, and the lack of a history of gravel mining in the area, when compared to that of south-east England.
- 4.4.5 The surface of the Head deposits has potential to contain *in situ* archaeology, while the body of the Head has low potential to contain *in situ* and/or reworked archaeology. Coastal inundation and flooding during Holocene sea level rise may have preserved prehistoric archaeology on the surface of these deposits.

Estuarine Alluvium

- 4.4.6 The Estuarine Alluvium within the proposed development is of Holocene date, associated with sea level rise and rising base levels in the Fal Estuary from the Mesolithic onwards. While north and west Cornwall has widespread evidence of human occupation during the Mesolithic, in southern Cornwall between the Helford and Tamar rivers, including the Fal Estuary, there is little Mesolithic evidence (Berridge and Roberts 1986). Evidence becomes more frequent into the Neolithic and Bronze Age, which includes finds in close proximity to the Fal Estuary, such as a jade handaxe recovered from Falmouth (Campbell-Smith 1963).
- 4.4.7 This unit is likely to have formed in the intertidal zone, within estuarine mudflats or saltmarsh under the influence of relative sea level rise during the Holocene. This unit is considered to be of low palaeoenvironmental potential on the basis of the minerogenic nature of the alluvium, and the likely reworked nature of any contained organic material. This unit is however considered to be of moderate archaeological potential on the basis of the likely intertidal environments in which they formed, with the potential for well-preserved archaeology including (for example) wooden boats, fish traps and shipwrecks.

Peat

- 4.4.8 The age of the peat deposits within the proposed development is uncertain, but is likely to be of Mesolithic date onwards and they would have accumulated during a period of significant human occupation in the region. These semi-terrestrial plant communities would be attractive to a host of wildlife (e.g. wildfowl, grazers, browsers) which may have provided subsistence to local human communities in the region, and may have attracted humans to the area.
- 4.4.9 Peat deposits typically have high geoarchaeological potential to contain material suitable for radiocarbon dating, and palaeoenvironmental proxies (e.g. pollen), which can provide information on past climate, vegetation and land use.

Marine Sands

- 4.4.10 The Marine Sands deposited within the proposed development overlie Estuarine Alluvium, and are likely to have been deposited during the Late Holocene, following high rates of sea level rise from the Bronze Age onwards. These deposits are coarse-grained and reflect deposition in a high energy environment.
- 4.4.11 While these deposits are deposited during an interval of human occupation in the region, the high energy environment would likely result in reworking or abrasion of any archaeological artefacts or palaeoenvironmental indicators, which would limit the potential of the deposits.

4.5 Palaeolandscapes assessment

- 4.5.1 Geophysical assessment of the sub-bottom sedimentary profile allows conclusions about the geomorphology of past landscapes in the area surveys, and can reveal the location of features of this past landscape that may be of palaeoenvironmental value, or bear artifacts of archaeological importance. When used in conjunction with geoarchaeological interpretation of borehole data, further conclusions can be drawn – for example, it may be possible to map the full extent of a sediment of increased archaeological potential
- 4.5.2 Dredging has removed or disturbed much of the Holocene sediment for the area surveyed, obfuscating or preventing analysis of the palaeolandscape. This is most prominent in area to the north and the east of the existing wharf structures. In the south-eastern area previous dredging has been less destructive, and, as such, some features and sedimentary structures have been retained, with two that may be of increased archaeological interest.
- 4.5.3 Feature 7001 is a broad (~150 m wide) channel of up to 7 m thickness, striking west-north-west to east-south-east and situated in the south-eastern survey areas. While the mapped extent shows a length of 302 m, it is very likely that this feature continues further south-east, though data availability within the confines of this study limits investigation. This channel represents the high-energy erosional flow of water through a location. Two boreholes from within the feature boundaries (WA-VC21, WA-VC24) allow an insight into the sediments present, and into the archaeological potential of the unit. Infill is a layered accumulation of estuarine alluvium, and is not of inherent archaeological interest. WA-VC21 is through the northern flank of the channel, where erosion has cut into bedrock, again, with limited archaeological potential displayed. Along the southern flank, intersected by WA-VC24, the erosional surface of the channel exposes the Palaeolithic Head sedimentary unit. As such, this may increase the potential for the inclusion of Palaeolithic artefacts as reworked material in basal channel infill.
- 4.5.4 Feature 7002 is a peat body stratigraphically above the southern flank of channel 7001. Peat was identified within borehole WA-VC04, and is of significant archaeological importance. Within the core, peat was interspersed with estuarine alluvium at a scale too small for data resolution to display. However, the instance of this repeating peat-alluvium sequence within WA-VC04 intersects a small but discrete feature. This feature can be traced over 14 seismic lines, is 150 x 40 metres in area, and is ~1.5 m thick in places. While there is the potential for the peat to be of limited extent within this feature, the presence of such material is of high archaeological importance.
- 4.5.5 7001 and 7002 appear to share a spatial relationship, with peat bed 7002 exhibiting a linear form that broadly traces the southern flank of channel 7001. This may suggest that 7002 was formed at the southern bank of channel 7001 in the later stages of formation, with 7002 representing a wetland environment on the fringe. The repeated peat-estuarine alluvium sequence may therefore represent a variable rate of flow through the channel, with instances of estuarine alluvium representing a transgression onto the wetland, and peat representing a reduced fluid load, allowing vegetation to grow and peat formation to occur. Without additional seismic data and a more targeted geoarchaeological investigation, a high-confidence conclusion regarding this relationship cannot be drawn, and the area surveyed may be an isolated instance where these two features spatially overlap.

5 MARINE ARCHAEOLOGICAL ASSESSMENT: MARITIME, AVIATION AND INTERTIDAL SITES

5.1 Introduction

- 5.1.1 The following assessment of the maritime and aviation archaeological baseline resource is based on records of known features recorded in the UKHO database combined with Recorded Loss information recorded in the NMHR database and local Historic Environment Record (HER) databases. Only features that are located within the study area are discussed within this section (**Figure 3**).
- 5.1.2 As well as summarising the known archaeological resource, the baseline assessment underlines the potential for encountering unknown shipwreck and aircraft crash sites within the study area. Relevant primary and secondary source material has also been utilised to understand the nature of the maritime and aviation activity across the region.
- 5.1.3 Marine geophysical survey data has been obtained within the study area but has not been archaeologically assessed for this report, excluding the Sub Bottom Profiler (SBP) dataset. This is because the upper stratigraphy of the seabed within the vast majority of the study area has been subject to dredging throughout the 20th century up until 1991, followed by gradual infilling of sediment since then. The upper surface of the seabed within the majority of this area is therefore modern and so should not have any *in situ* archaeological potential. The relatively undisturbed areas around the Empire and King's Wharfs have also been covered by geophysical surveys which demonstrate the upper seabed around these to have a large quantity of debris relating to the wharfs, which has been confirmed by diver surveys (Sub Marine Services 2007a; 2011). It is recommended that any final post-dredge geophysical survey undertaken within the study area should be subject to archaeological review as this newly exposed interface will represent the previously undisturbed seabed.
- 5.1.4 Some of these features are discussed in the results of the walkover survey as they were able to be assessed during that work. For a detailed description of the sites please see **Appendix 4** and **Appendix 5**.

5.2 Designated maritime and aviation sites

- 5.2.1 There are currently no sites within the study area that are subject to statutory protection from the *Protection of Wrecks Act 1973*, the *Protection of Military Remains Act 1986* or the *Ancient Monuments and Archaeological Areas Act 1979*; the three legislative acts that could be used to protect marine archaeological sites.

5.3 Known wrecks maritime and aviation sites

- 5.3.1 There are four known wrecks within the survey area (**Figure 3**). The first, **2001** is located in the south-west of the survey area and is recorded as a dangerous wreck, although the UKHO changed its status to 'Dead' due to it not appearing on repeated surveys. As noted elsewhere this does not necessarily mean that there is no material related to the wreck in the location provided; however it is located within an area extensively dredged in the 1950s for the construction of County Wharf. Historic charts show this area as having been dredged to a depth of over four fathoms (c. 7.3 m) below chart datum in the 1960s.
- 5.3.2 UKHO wrecks **2002** and **2003** are both considered to be 'Live' wrecks located along the eastern edge of the Western Wharf and have been covered by recent geophysical surveys which have identified them in place (**Figure 4**). The records show that these two wrecks were 20th century in date and were deliberately sunk, however do not contain any further information on their origin. **2003** appears to be a barge measuring c. 28 m in length and 6.6

m in width with a rounded bow and square stern, with a central hold. It lies roughly north – south along the eastern side of the causeway. A rectangular anomaly, **2006**, possibly a pontoon is located on its eastern side, measuring c. 13 x 6 m. This anomaly is very similar to the anomaly identified in the same position as the record for **2002**, lying to the north of **2003** on the eastern side of the causeway as it joins the Western Wharf. This is also a rectangular shape measuring c. 13 x 6 m and may also be a pontoon of some kind. Anecdotal evidence from A&P staff suggests that **2002** and **2006** are the remains of two mooring barges built in the 1980s for the docks; however **2003** has similarities with concrete water barges built at various ports prior to the D-Day invasions and so may be of 1940s date.

- 5.3.3 The final known wreck **2000** is located on the eastern side of the Western Wharf, closer to the shoreline. This is the recorded position of the wreck of a converted trawler, HMT *Resparko* used as a minesweeper which was sunk after being bombed in 1940. The UKHO record notes that the wreck was reported as lifted in 2001, It is likely that this is correct given the position of the record within the docks and later aerial imagery (see **Figure 6**) showing large vessels moored in that position. As discussed above lifted/salvaged wrecks can leave related material behind on the seabed.
- 5.3.4 The locations of **2002**, **2003** and **2006** will all be severely impacted by the proposed scope of works. Both wrecks lie in the footprint of the land to be reclaimed behind the sheet pile facing of the new Western Wharf. The location of wreck **2000** is within the dredged berth pocket for the Western Wharf, while **2001** is not within any area of direct impact from the proposed development.
- 5.3.5 The UKHO records have the remains of the Empire and King's Wharfs as obstructions on the seabed (**2004** and **2005**), as material from the piling and foundations of them remains upstanding on the seabed, as shown in seabed surveys completed after their demolition. These are more fully discussed in the following sections.

5.4 Historic charts and aerial imagery assessment: historic dredging

- 5.4.1 As the location has been developed as docklands for a sustained period of time assessment of historic charts and aerial images was completed as part of this desk-based assessment. These showed the development of the various wharfs, jetties and other dockyard features within the study area, as well as presenting evidence for extensive dredging of the seabed during the 20th century. Earlier less extensive dredging during the late 19th century is likely, as the Falmouth Dock Company owned a dredger during this period (Cornwall Council 2008).
- 5.4.2 Pre-war charts show dredging at least within the western inner basin and berths between Queen's, King's and Empire Wharfs as well as their approaches, the berths on the north side of Queen's Wharf and the Northern Arm and the approach channel to these berths. Admiralty Chart 32 (**Figure 5**, Falmouth Harbour, updated in 1953, chart datum recorded as -9.15 ft OD (Liverpool)) show a charted depth of -19 ft CD (c. -5.3 m CD, dredged in 1943) for the wider approaches and area to the west of Queen's, Empire and King's Wharfs, while berthing pockets around the north and south sides of Queen's Wharf to a depth of -4 fathoms CD (c. -7 m) and berth pockets to the south of Empire Wharf and both sides of King's Wharf to a depth of -25 ft CD (c. -7.6 m CD, dredged in 1938). Depths in the berths within the Outer Harbour around the Western Wharf and south side of the North Arm were dredged to -3 fathoms CD (c. -5.5 m CD).
- 5.4.3 In 1965, further dredging was undertaken around the Queen's and Northern wharfs, to a depth of -9.5 m CD, and to -7.5 m CD within the navigation channel to -7.5 m CD. Following

this phase of dredging, the International Chart (Int 1720 1993) showed that the seabed depth around Queen's Wharf was -6.1 m CD, and -5.5 m CD between Queen's and Northern wharfs, and the depth of the navigation channel was -5.2 – -5.8 m CD.

- 5.4.4 Aerial imagery of the harbour from 1928 (EPW023170 and EPW023354, Britain from Above) shows a bucket dredger within the Inner Harbour west of the causeway in the approximate location of Empire Wharf (the image dates to prior to the construction of the wharf). Later images from 1950 (EAW033625, Britain from Above) also show the presence of the bucket dredger *Briton* within the area west of the soon to be built Duchy Wharf (**Figure 6**). The imagery also shows floating dry docks in use to the south of both Empire and King's Wharfs, which would have required the additional depth of water shown in the Admiralty charts for this time.
- 5.4.5 An aerial image from 1934 (EPW045677 and EPW045675, Britain from Above) shows a bucket dredger at work with a hopper barge within the Outer Harbour east of the causeway working to keep the approaches to the dry docks accessible (**Figure 7**).
- 5.4.6 The modern chart of the harbour (Admiralty Chart 0018 Falmouth Inner Harbour including Penryn) shows the outline of the 20th century maintenance dredging within the bathymetry of the area, although it is likely that some infilling has occurred (discussed more extensively in the geoarchaeological assessment (Wessex Archaeology 2024)).
- 5.4.7 From this, the historic charts and bathymetric surveys of the harbour commissioned by A&P (**Figure 8**) it is possible to get an extent of dredging during the 20th century and the probable depths of seabed sediment removal that entailed, although it is possible that more extensive areas were impacted during this period as exact positioning was not as easy as the modern day. Additionally the archaeological report for the Falmouth Cruise Project (Cornwall Council 2008) noted that dredging continued through to 1991, with dredging depths in 1965 identified as -7.5 m CD for the approach channel and -9.5 m CD for the area north of Queen's Wharf and the Northern Arm.
- 5.4.8 The modern chart shows water depths within the Inner Harbour as generally being around -6 m CD, with areas of berth pockets around Queen's Wharf around -7 – -8 m CD and berth pockets around County and Duchy Wharfs around -9 – -10 m CD. There are areas of higher seabed, particularly within the areas of the former King's and Empire Wharfs which have also been surveyed using both geophysical and diver inspection surveys (see below). The Outer Harbour to the east of the causeway have some areas of deeper water along the edges of the former Western Wharf which were former dredge pockets to a depth of c. -6 m CD, while the rest of the seabed is around -4 – -5 m CD. The approach channel to both areas is currently around c. -6 m CD.

5.5 Geophysical Surveys within the study area

- 5.5.1 As a working harbour the study area has been subject to repeated geophysical surveys, both directly related to this development and regular bathymetry to check on water depth. There have also been previous development works, particularly those related to the Falmouth Cruise Project which received archaeological assessment followed by some limited ground truthing of anomalies (Cornwall Council 2008).
- 5.5.2 The 2008 assessment and ground-truthing covered the area to the north of Queen's Wharf out to the deep-water channel in Falmouth Roads, which was to be dredged as an access channel. The archaeological assessment included the identification of anomalies within the sidescan sonar (SSS) dataset and the magnetometry (mag.) dataset which were then grouped where possible. 230 sidescan targets were identified across the survey area, which

extended beyond the current proposed development, of which 90 were assessed as having archaeological potential. 233 magnetic anomalies were identified, 31 of these could have corresponded to nearby SSS anomalies. An initial ROV survey of 24 anomalies with archaeological potential was undertaken to test the geophysical interpretation. This found that the vast majority of the anomalies were debris probably dating to the 20th century operation of the harbour, with fishing gear, hawsers and pipework found. One section of iron wreckage was identified, outside the boundary of the current proposed development, and two anomalies were identified as anchors, one of which is located within the current proposed development (**Figure 3, 2007**). This anchor was reported to be a stockless anchor type, with a length of chain. This anchor type was patented in 1821 and became more common throughout the 19th century, continuing in use in the 20th and 21st century. Given the extensive 20th century dredging within the area it is likely to date to the mid 20th century. Further geophysical assessment and ROV ground-truthing was completed of a second campaign of geophysical survey which was outside the current proposed development.

- 5.5.3 Excluding the stockless anchor and length of chain (**2007**) the ground-truthing of anomalies within the current proposed development demonstrated that the vast majority were detritus and waste material related to the operation of the port during the 20th century, which is likely due to the large amount of maintenance dredging completed across the area during this period, followed by infilling of sediment over time. It is not known whether any of the material was recovered following this work, but as the cruise project did not go ahead it is assumed that no recovery took place.
- 5.5.4 A rapid review of the latest geophysical surveys (completed in 2022 and 2024) found that the SSS dataset contained likely similar debris material, particularly around the edges of the current and former wharfs, with the presence of the remains of timber piles from Empire and King's Wharfs being present. The mag. results (**Figure 9**) also demonstrated that the area around the wharfs contained large areas of high responses from the wharf structures themselves which masked much of the survey area.

5.6 Walkover survey results

- 5.6.1 The first target of the walkover survey was to investigate the potential for surviving port infrastructure from the Second World War. These potential receptors were focused in the south-west corner of the survey area (**Figure 3**). These were **1001**, **1002** and **1003**. **1001** was an anchor point for a Barrage Ballon. The single recorded aviation loss, a Ju 88A-5, was brought down after colliding with the wire from a barrage balloon which may well be from this site. **1002** was an 81 m long concrete slipway. **1003** was an embarkation hard built for receiving landing craft and loading them with soldiers and equipment for D-Day. None of these structures has survived to the present day, most likely being destroyed and/or removed as a result of later 20th century development on the site. Aerial imagery within the Historic England Aerial Photo Explorer dating to the 1940s (references: raf_s592_v_0009 and raf_106g_uk_1663_rs_4193) shows these features in place; however later 1950s aerial images from Britain from Above (EAW033625) demonstrate they have been completely removed by that point.
- 5.6.2 The HER results which formed part of the intertidal gazetteer also included a record of peat (**1004**) being recovered from boreholes within the area east of the Northern Arm, which may relate to earlier land surfaces; these are discussed in the palaeography section above.
- 5.6.3 Remains of two wharfs are visible west of Western Wharf, between Duchy Wharf and Queen's Wharf. These are Empire Wharf (**2004**) to the north and King's Wharf (**2005**) to the south. A pair of buoys mark the original western ends of each wharf in the water. There are also remains of both wharfs present along the western side of Western Wharf (**Figure 10**).

Two anchors (**1005**) were identified within the intertidal zone on the west side of the Western Wharf, covered in marine growth but identifiable as two stockless anchors at least 1 m in length, one of which was more angular and therefore likely to be modern (**Figure 11**). These were not more closely inspected due to their location within inaccessible parts of the site. The two wharfs are recorded as being demolished down to the level of the seabed. However, the area is considered to be fouled ground suggesting significant material remains present.

- 5.6.4 Queen's Wharf has been extensively rebuilt and repaired over the course of its use. The present structure is a suspended deck structure built over a timber structure which was destroyed by fire in 2003. The remains of this earlier timber structure are still visible beneath the modern structure and have not been entirely removed (**Figure 12**). At the Northern Arm, there are the remains of earlier walkways which have been destroyed and replaced by a modern walkway (**Figure 13**). During the walkover it was claimed that this damage was as a result of enemy action during the Second World War. However, aerial photography from the 1960s shows this area to still be intact (Hogan, 2016).

5.7 Previous surveys within the study area

- 5.7.1 Extensive geophysical surveys (MBES, SSS, mag. and SBP) followed by ROV ground-truthing surveys were completed within the study area as part of the Falmouth Cruise project, which shared some of the same footprint as the proposed development. The assessment of the SSS targets identified 117 targets with archaeological potential with 33 of these having mag. anomalies as well). The ground-truthing of 27 targets by ROV found that some of these were debris relating to the 20th century, mostly of low archaeological value. Sixteen targets were debris potentially of earlier date, of which four were identified as potential iron and wooden ship material. These targets have been presented on **Figure 3**.
- 5.7.2 Diver and geophysical surveys over the remains of King's and Empire Wharfs demonstrated that there were substantial quantities of debris and piles from the wharfs, and it is likely that debris from the operation of these wharfs will also be within the vicinity (Sub Marine Services 2007a; 2011).

5.8 Setting

- 5.8.1 The setting of the known wrecks should also be taken into consideration, though as all the sites are underwater they have limited views. They are also located within a busy port and so are unlikely to have been visited by divers or experienced as anything other than a hazard for vessels and mariners.
- 5.8.2 The monuments in the intertidal zone have setting related to their physical surroundings, as they have been experienced by those in the intertidal zone. In addition, the sites have non-visual associations with military activities during the Second World War.

5.9 Value

- 5.9.1 The known intertidal and seabed features largely represent port infrastructure or the wrecks of small dock-related craft dating to the mid-late 20th century. These are likely to be of low to medium archaeological value; however this should be fully established through initial recording as part of mitigation prior to dredging works.
- 5.9.2 Higher value features, such as material related to earlier wrecks buried within seabed sediments, may be identified in the proposed development in the future through the process of the works.

5.10 Maritime archaeological potential

Introduction

- 5.10.1 A maritime site may comprise an articulated or partially articulated shipwreck and/or associated debris of infrastructure. Debris can comprise a single artefact through to an entire scatter of material that was either accidentally or deliberately lost from a vessel.
- 5.10.2 Many vessels were lost without a record being made and sometimes even records that were created have since been lost (Cant, 2013). Consequently, in addition to the charted seabed features and Recorded Losses discussed above, there is also potential for the discovery of archaeological material of a maritime nature, currently uncharted, to exist within the study area spanning from the Mesolithic period to the present day. This potential is less within the areas already subjected to dredging, as discussed below, but within the undisturbed levels of the seabed there is heightened potential, particularly for submerged landscapes.

Mesolithic, Neolithic and Bronze Age (11,000 – 800 BC)

- 5.10.3 The Mesolithic period is characterized by a rise in sea levels which would ultimately separate the British Isles from the continental mainland. This process would take place gradually from 9,000 to 4,000 BC. It was during this period that Falmouth would assume it's most characteristic feature, that of being a deep-water harbour formed by the Carrick Roads. The importance of this harbour to the communication of the British Isles with the wider world was vital. The movement of peoples and goods can be seen in an impressive jadeite stone axe which was uncovered around Falmouth and dates to the early fourth millennium BC (Jones & Quinnell, 2011:199). This stone was quarried in the Alps and must have carried or traded across impressive distances to reach Falmouth. Further evidence for the importance of the maritime world within neolithic Britain can be seen in the logboat burial discovered in St. Albans (Niblett, 2001:159).
- 5.10.4 During the Bronze Age Falmouth would play an important role in the trade of Cornish tin, with material reaching out into the Mediterranean. While direct evidence of tin exploitation is limited there is growing consensus that Cornwall was a hub for the trade within Western Europe (Carey, et. al., 2023:162). By the bronze age maritime technology had reached the stage where commerce at scale was possible. The Dover Bronze Age boat is a prime example. Four sewn together, shaped oak planks were discovered in 1992 (Clark, 2005: 2). While the seagoing capabilities of this craft are still a subject of some debate, the level of ship building knowledge and material culture displayed show that maritime movement at scale could be undertaken with confidence (Roberts, 2004).

Iron Age and Roman Period (800 BC – 410 AD)

- 5.10.5 There is very little direct evidence of maritime activity during this period. However, there are contemporary examples from other sites and some indirect evidence. During the iron age sewn craft and logboats continued in use. The iron age logboat found in Poole Harbor is a good example of this continued use of tested technology. McGrail describes how even over relatively short distances, maritime trade was both fast and cheaper than attempts to move goods over land. The deep water offered by Carrick Roads would make Falmouth an important location for this trade across the eastern coast of the Atlantic and the English Channel (McGrail, 1998: 272).
- 5.10.6 The Roman period would bring in a new style of maritime technology. Romano-Celtic craft became very prevalent across north-western Europe. Craft of this kind mark an important transitory point with boat construction. Older craft appear to be keel-less and flat-bottomed. However, several later examples exist that have a protruding keel-plank. While this is not a true keel, they have a similar role in regards to the construction of the vessel. They mark

an important midway mark between shell-based and skeleton based construction (McGrail, 1995: 141; Ibid., 2013: 188). The most prominent example within British waters is the Blackfriars ship. Discovered in London in the 1960s, she sank in the second century while carrying a cargo of ragstone (Milne, 1996: 234). The Blackfriars ship again shows the use of maritime commerce to move cargo and goods across the English Channel.

Medieval Period (410 – 1540)

- 5.10.7 Britain's maritime during the medieval period can effectively be split into two sections. The first runs from the fall of the Roman period till around the eleventh century and is characterised by the predominance of Scandinavian ship building culture best exemplified by the Viking's. Prior to the arrival of the Viking's, Britain was split into separate independent kingdoms of which Cornwall was one. Over the course of the early medieval period the balance of power across the British Isles would change and shift as different kingdoms rose and fell from prominence. In an attempt to retain independence from their more powerful Saxon neighbours, Cornish King's would seek the help of Viking allies, but this does not appear to have been successful. Ultimately, Cornwall would cease to be an independent kingdom in 876, when the last King, Dungal, was drowned (Dumville, 2002). From this point the Kingdom of Cornwall would join the Anglo-Saxon Kingdom of Wessex as they fought against the Danes for control of England.
- 5.10.8 What made the Scandinavian influence on Britain possible was the introduction of a particular style of ships which were used to great effect by Viking raiders. These were shell-first craft, built upon a central keel with clinker planking involving hundreds of clench iron fastenings (Bill, 2008: 171). An advantage these raiders possessed was that their ships could be repaired almost anywhere. Temporary slipways could be cut for vessels to be dragged ashore and repaired, or whole new ships constructed (Westerdahl, 2008: 21). There are questions over to what extent Viking ships could be constructed by 'eye' (Dhoop and Olaberria, 2015).
- 5.10.9 While these clinker-built craft exemplified the earlier medieval period the later period saw a move toward larger vessels and ultimately the move away from shell based to frame-based ship construction. Craft of the middle and late medieval period would fall within three main types: keels, cogs and potentially hulks. Keels owe much of their design to the earlier Viking Age craft of the medieval period and remained in use throughout the Middle Ages. The name keel originates from Nordic vernacular around the 'clinker' traditional construction method (Adams, 2013: 53). An example of this style of vessel was recently investigated off Poole harbour, Dorset, with the ship dating to the 13th century (Nayling, and Tyers, 2020). A cog meanwhile was normally a larger craft and shows a transitional point between clinker and carvel construction techniques with a combination of both these construction methodologies (Vermeersch & Haneca, 2015: 117). There is a third potential type of craft, the medieval hulk. However, there is very little physical archaeological evidence of these craft, with most evidence coming text based and iconographic source material. They are shown as excessively curved, lacking bow and stern posts with a side rudder moving to a stern rudder later. There is significant debate over whether these vessels existed or are only literary or artistic devices (Adams, 2013: 101). However, a re-examination of a late medieval vessel located in Dalarö Harbour found it lacked the distinctive carvel-built lower hull being entirely clinker-built, offers possible physical evidence (Eriksson, 2021: 127). Another possible example of a hulk could be the Newport ship, which again has a keel-first entirely clinker-based construction (Nayling and Jones, 2014:249).
- 5.10.10 While urbanization did occur within Cornwall during this period, it was largely focussed on in-land areas. There was significant risk of coastal raiding which prevented the establishment of larger ports on the Cornish peninsular. Even with dramatic naval victories

suck as at the battle of Sluys in 1340, it was simply impossible for any power during the fourteenth century to attempt any long-term control of the sea, or even the coastline (Rose, 2007:116). This risk prevented the establishment of the large port and harbour facilities now present around Falmouth, until action could be taken to establish a stable level of security.

Early Modern (1540 – 1815)

- 5.10.11 It is in 1540 that a truly concerted effort was made to gain that security. Henry VIII, aware of the vulnerability of his coastline to raiding, ordained the establishment of a series of coastal defences to be constructed (Harrington, 2007:11). Known as Device Forts, these are some of the earliest defences designed around the use of cannon, both to defend against incoming fire to utilise them in their own defence. Pendennis Castle and St. Mawes Castle were constructed on each side of Falmouth Bay at the entrance of Carrick Roads. Between them, their guns provided protection from any hostile ships attempting to force an entry into the sheltered waters inside.
- 5.10.12 It was with this security provided by the Device Forts that allowed Falmouth to be founded and to prosper. Within a century the area had developed from a collection of fishing shacks to the town and port of Falmouth in 1613 by Sir John Killigrew. Over time, Falmouth would come to replace and surpass the town of Penryn as the most influential port on the River Fal. The importance of having an effective port and victualling facilities for trade and exploration through the 16th and 17th centuries can be seen in the recommendations made for more investment in port infrastructure by Sir Walter Raleigh.
- 5.10.13 This period marks the beginning of the move toward the establishment of a more permanent naval arm. While previously it had been common for rulers to press merchant vessels into a military role the advancement of military technology was making this impractical. Dedicated warships began to be constructed and maintained by the state, the most well-known example would be *Mary Rose*. Carrying dozens of cannons and built using a new carvel construction method, these vessels were larger and more powerful than the medieval craft that predated them. The expense of these vessels meant that only King's and national leaders had the resources available, with the ships becoming symbols of national pride prestige as much as weapons of war (Adams and Rönby, 2022:52).
- 5.10.14 During this period there was also the establishment of the Falmouth Packet Service. Initially this was founded between Falmouth and Lisbon in 1689 (Laakso, 2007:14). These vessels allowed Britain the ability to communicate rapidly and effectively across the world. Until the War of American Independence these were usually privately owned vessels chartered by the Post Office (Fletcher-Tomenius, 2013:393). The strategic importance of this service was to grow over the course of the 18th and 19th centuries as Britain's Empire grew. Packet ships were small light craft, equipped for speedy over brute force. A good example of these agile craft is the *Hanover*. The vessel was identified through the ships bell, which included the date of '1757' (Parham, et.al., 2013:405). Exemplifying the importance of Falmouth's role in news entering Britain is that news of the victory at Trafalgar and the death of Lord Nelson was first heard there when HMS *Pickle* landed there.
- 5.10.15 Falmouth became an important base of operations for the Royal Navy over the course of the 18th century playing a key role in the wars against France and Spain. During the French Revolutionary and Napoleonic Wars, Falmouth was the base for the Western Frigate Squadron. These vessels were responsible for patrolling the Western entrance to the English Channel and maintaining the blockade of Brest. The best-known action of this squadron was the battle between the frigates HMS *Indefatigable* and HMS *Amazon* against the 74-gun third-rate *Droits de l'Homme*. In rough seas the British frigates under

Commodore Edward Pellew engaged the significantly more powerful French ship until the *l'Homme* and *Amazon* went aground (Pellew, 1797).

Modern (1815 - 1945)

- 5.10.16 The advent of steam propulsion made a significant impact to Falmouth. Steam ships were no longer restricted by the wind and could continue their passage through the English Channel to London. This called into question the continued operation of the Packet Service. In an effort to retain this business Falmouth Docks were constructed in 1863 to provide the infrastructure and facilities required to meet the needs of steam ships. Number 1 and number 2 docks were constructed during the 19th century, with expansions made to maintain the connections with the ever-expanding railway network.
- 5.10.17 During the First World War the docks were used as a base of operations for minesweepers and for anti-submarine operations. The inter-war years saw further expansion at the site as a further two dry docks were constructed as well as Northern and King's Wharf as well as Empire Wharf and the Docks took on the general shape they maintain till the present. There is the potential for several notable finds from the First World War at Falmouth. In particular, seven German U-boats were sent to Falmouth to be used for gunnery practice. Some were sunk in deeper waters, but others were blown onto the rocks and sank during heavy weather in 1921 (Larn, 1996:90). While significant salvage was undertaken there remains a high likelihood of surviving components, particularly those made of brass.
- 5.10.18 The Second World War again saw the docks utilised for military purposes, both by the British and American Armed Forces. Falmouth Docks were utilised extensively for training and the deployment of equipment and personnel. It is very likely that material from boarding and disembarking from landing craft remains in the vicinity of concrete ramps used for their deployment (ibid., 1996:86). A notable vessel which departed from Falmouth was HMS *Campbeltown*. A retrofitted First World War destroyer, she rammed and disabled the gates during the St. Nazaire raid, Operation Chariot, in 1942. During the course of the raid, intended to disable the only channel port able to support the battleship *Tirpitz*, 401 of the 611 British commandos and naval personnel were killed or taken prisoner.
- 5.10.19 Falmouth was subject to the highest density of bombing within Cornwall during the Second World War (Brimstone 2023) with up to 54 bombs falling within the harbour and docks area, five of which confirmed to have fallen within the Proposed Development. In addition to this there is the wreck of HMT *Resparko* which was listed as sunk by enemy aircraft in 1940 and the recorded loss of a Junkers Ju 88 aircraft which may be within the area of the proposed development. There is therefore potential for material relating to these bombing raids and the defence of the area during them.

1945-Present

- 5.10.20 Following the Second World War Falmouth Docks would switch from a military to a more commercial focus. In 1958 a new dry dock, the Queen Elizabeth II Dock, was opened. There was also the construction of the County and Dutchy Wharfs. While the scale of activity within the docks has seen a steady decline over the course of the last fifty years, there has been a continual commercial presence and work carried out on the docks. Empire Wharf and King's Wharf were both demolished in 2008, though there is a high likelihood of archaeological material still being in place.

Navigational hazards

- 5.10.21 A project entitled Enhancing our Understanding: Mapping Navigational Hazards as areas of Maritime Archaeological Potential, undertaken by Bournemouth University (Merritt *et al.*

2007), assessed historical records of navigational hazards to interpret and characterise the marine historic environment.

- 5.10.22 The study notes the sheltered, low risk nature of the Fal Estuary due to its deep water and complex channel structures, along with soft seabed sediments. The approaches to the Fal are listed as an Area of Maritime Archaeological Potential (AMAP) due to the likely quantity of traffic entering the estuary and the long period of use. The Lizard peninsula to the south-west is noted to be a navigational hazard due to its exposed nature, overfalls and rocky foreshore. Unlike the more sheltered areas on the approaches to the Fal, the Lizard is not regarded as an AMAP due to it being exposed bedrock surrounded by high energy seas, which leads to scattered preservation within gullies rather than intact shipwrecks. Some of this material could be drawn into the approaches to the Fal by currents and storm; however it is unlikely that any material would travel as far as the study area.

Seabed (or potential for preservation)

- 5.10.23 The AMAP project also identified the area of the Fal Estuary as having a high proportion of fine-grained sediments such as fine sands and mud (Merritt *et al.* 2007). Boreholes completed within the study area in 2007 demonstrated that these upper sediments were mostly fine mud with a strong organic smell (Sub Marine Services 2007b). These sediments are mobile and could have buried archaeological material within the seabed. The boreholes demonstrated that the area around King's Wharf had been dredged in the past and then infilled with at least 5 m of this soft sediment, while the area to the west of the old wharfs had between 1.2 and 3 m of soft silt above stiffer degraded bedrock sediments. While the previously dredged areas are highly unlikely to contain *in situ* archaeological material there is some potential for buried archaeological material within the undredged areas.

Recorded losses

- 5.10.24 The Maritime Recorded Losses date from the 17th century to the present day. They cover a wide range of vessels of both a civilian, commercial and military nature. There are 90 recorded losses in total. The majority of these are named losses, with only 18 unnamed losses. The frequency of losses decreases over time, as technology and understanding advanced, making maritime travel safer. For a more detailed description of these records please see **Appendix: 6**.

Table 5 Summary of maritime recorded losses by period.

Date	Named	Unnamed	Total
Pre-1500	0	0	0
1500-1815	29	17	46
1816-1913	29	1	30
1914-1945	12	0	12
1946-Present	2	0	2
Total	72	18	90

- 5.10.25 The Recorded Losses are categorised based on the date ranges used in the Selection Guide Boats and Ships in Archaeological Contexts (Wessex Archaeology, 2008). While there are no recorded losses prior to the Early-Modern period, their absence from the record does not remove the possibility of material from this period being present within the archaeological record.

- 5.10.26 Most of the Recorded Losses relate to craft of British origin. Where the port of origin and destination is recorded, the expected voyage was to involve sailing outside local British water. This suggests the importance Falmouth played in Britain's involvement with international trade, and its position as an increasingly global power. For example, the *Elizabeth*, which sank in 1745 carrying a cargo of sugar and rum from the Caribbean.
- 5.10.27 There does not appear to be any one more prominent or likely cause for these losses. The given manner of loss for these vessels gives a fair representation of the dangers associated with working within the maritime environment throughout history.
- 5.10.28 Falmouth played a pivotal role in Britain's Packet Service. This was a vital system of communication that allowed Britain to run her growing Empire. There are four packet vessels which were recorded as lost.
- 5.10.29 The records also reveal Falmouth's role and importance in Britain's defence. A notable loss was the *Queen*, a troopship returning to Britain with wounded from fighting in the Peninsular Campaign. *Queen* ran aground, likely because of negligence, becoming a total loss. At least two hundred of the returning soldiers and their families were killed in the wreck. Although salvage operations took place, it is very likely that material from the wreck including the possible personal effects of those who lost their lives, remain on the seabed.
- 5.10.30 It is important to consider the accuracy of these records. Many of these reported losses are approximate, with no specific location recorded. This is one of the key reasons why there is such as disparity in the numbers of maritime Recorded Losses and the number of known seabed features. By linking these maritime losses to data obtained through the marine geophysical survey, it may be possible to ascertain to provide a more accurate identification for seabed features.

Overview of archaeological potential

- 5.10.31 The study area contains the potential for maritime, aviation and palaeogeographical material. While some areas have been dredged in the modern period which would remove the potential for *in situ* material, the unimpacted areas retain archaeological potential.

5.11 Aviation archaeological potential

Recorded losses

- 5.11.1 There is a single recorded loss recorded within the search area. This is a Junkers Ju 88A-5 lost in 1941 after hitting a balloon cable. The Ju 88A-5 was a German twin engine medium bomber that was used extensively during the Battle of Britain. For further information please see **Appendix: 7**.

Overview of archaeological potential

- 5.11.2 The south coast of England has seen considerable aviation of activity over the last century. Crash sites, debris and associated material have entered into the archaeological record, particularly from actions taking place during the two World Wars. There has also been considerable commercial aviation activity, though much less of this material enters into the historical record. Previous reports into aircraft archaeology in the UK have noted that it is likely that over 10,000 aircraft have crashed in UK waters since the advent of flight in the early 20th Century (Wessex Archaeology 2008).
- 5.11.3 Aircraft which crash or impact into water will normally suffer a cataphoric structural failure, breaking up and spreading wreckage over a wide area. There are many factors that might affect the dispersal of this wreckage with type of aircraft, speed of impact and sea conditions

all having an impact. Losses resulting from aerial combat can similarly be spread over a very large area. However, if an aircraft were to conduct a controlled descent and ditch into the water then wreckage can remain relatively intact and concentrated. The result of these divergent means of material entering into the archaeological record means that aircraft remains may take many forms, comprising of a single small find, a scatter of material or a concentrated find.

- 5.11.4 During the First World War aviation technology adapted and went through considerable development. Aircraft were needed which could meet the service requirements for deployment against ground, air and naval targets. Due to the limited technology of the period materials used in the construction of these aircraft tended to be lightweight, such as wood and fabrics. During the First World War, several squadrons of aircraft including planes, seaplanes and airships were deployed to help combat the threat of Imperial German U-boats. During the inter-war years, there was a steady increase in cross-channel flights and other commercial and pleasure flights. Aircraft construction also moved away from lighter materials like wood and more to metal, though aircraft with significant wooden components remained in use during the Second World War.
- 5.11.5 The Second World War again saw a considerable leap in aviation technology, with the scale and capabilities of aircraft far exceeding those from the First World War. The number of aircraft involved was also significantly larger. Conducting bombing raids, intercepting incoming raids and naval patrolling resulted in a significant amount of flying taking place over the ocean. Military losses make up the bulk of aviation material which has entered the archaeological record, these include losses from Allied and Axis forces. Falmouth was a port of considerable strategic importance during the Second World War, operating as a vital logistics and naval hub, and saw several raids by German bombers as well as RAF intercepts.
- 5.11.6 Following from the end of the Second World War, commercial and civilian aircraft use has increased exponentially. Military aircraft use was dominated by the Cold War and jet technology. Aircraft crashed and accidents during this period are likely to be well reported and their positions well known. However, this does not remove the potential for recovery of material.

5.12 Potential for heritage assets within the intertidal zone

- 5.12.1 The walkover demonstrated the potential for material related to the maritime use of the foreshore, with the presence of metal anchors and other debris identified along the western side of Queen's Wharf. Much of the foreshore here is covered in thick marine growth and so there is the potential for more maritime debris to be beneath this material.
- 5.12.2 There is also the potential for preserved *in situ* prehistoric land surfaces and artefacts to be present within the intertidal, as previously found in nearby developments on the south side of Falmouth harbour (Wessex Archaeology 2023).

6 ASSESSMENT OF HISTORIC SEASCAPE CHARACTER

6.1 Assessment

- 6.1.1 The assessment of the HSC within the study area was undertaken using the results of LUC's 2017 Historic Seascape Characterisation (HSC): Consolidating the National HSC Database, which consolidated the eight existing HSC implementation projects (undertaken between 2008 and 2015) into a single national database.

- 6.1.2 The method assesses and defines areas with HSC types that promote an understanding of historic trends and processes, to inform the sustainable management of change over time. This is achieved by addressing the multi-level character of the sea, by splitting the marine zone into five tiered levels: the coastal area, the sea surface, the water column, the sea floor, and the subsea floor. The characterisation is GIS based, enabling key characteristics to be identified.
- 6.1.3 The historic seascape character of the region comprising the study area can be described as having the following character types, as defined by the South West Peninsula HSC (Cornwall Council 2014):
- Coastal infrastructure comprising flood and erosion defence (sea defence);
 - Industry comprising shipping industry (shipyard);
 - Ports and docks (wet dock);
 - Navigation comprising navigation features (channel) and navigation activities (anchorage and ferry crossing); and
 - Recreation (marina).
 - Military Base
 - Cultural topography (inter-tidal)
 - Navigation hazard.
 - Tourism

7 POTENTIAL IMPACTS AND RECOMMENDATIONS

7.1 Potential Impacts

- 7.1.1 Potential impacts can be both direct and indirect.
- Direct impacts can include direct damage to structures, features, deposits and artefacts, and the disturbance of relationships between these elements and the wider surroundings. The setting and HSC of any known and named wreck sites and the wider HSC may also be impacted and in turn this could potentially affect the significance of such receptors.
 - The indirect interactions upon the known and potential marine archaeological receptors occur as a result of changes to hydrodynamic patterns and sediment transport regimes, where these changes have occurred as a consequence of activities and structures associated with the project activities. Scour has a negative or adverse impact on marine archaeological receptors whereby it can expose material which leads to increased rates of deterioration through biological, chemical and physical processes. Alternatively, the redeposition of sediments following settling of sediment plumes can be beneficial to the preservation of marine archaeological receptors as greater sediment cover increases the potential for anaerobic environment, which inhibits a range of biological, chemical and physical degradation processes.

7.1.2 Direct impacts on identified maritime and aviation archaeology receptors are likely to include:

- the covering and/or total or partial removal of the three identified wrecks **2002, 2003** and **2006** through the construction of the new Western Wharf and association infilling behind it;
- removal and disposal of the two anchors **1005** from the intertidal zone west of the Western Wharf during either pre-construction clearance works or dredging works;
- removal and disposal of material relating to the former King's and Empire Wharfs and potential previously undisturbed sediments beneath their footprint during either pre-construction clearance works or dredging works;
- removal and disposal of deposits of moderate to high geoarchaeological potential, specifically the Pleistocene Head, and Holocene Estuarine Alluvium and Peat within the berth areas planned to be dredged to -10.5 m CD and the graded edges of these areas; and
- impacts on the HSC within the proposed development and the setting of maritime and aviation receptors due to the construction and dredging works.

7.1.3 The surface skim to -5.5 m CD within the Docks Basin is not expected to directly impact on deposits of moderate or high geoarchaeological potential.

7.2 Recommendations

Avoidance

7.2.1 The primary mitigation for the protection of known archaeological receptors is avoidance. This is achieved through the implementation and monitoring of AEZs, which are proposed for identified high value seabed features of anthropogenic origin.

7.2.2 No AEZs are currently recommended, due to the nature of the dredging works required and the location of low and medium value receptors within the dredging footprint. Mitigation pathways for these receptors is presented below.

7.2.3 Appropriately sized AEZs, should they be required due to future discoveries, are established around receptors which have been considered to be of high archaeological potential, in consultation with the Archaeological Curators. AEZs may be recommended in the future as further information is obtained. These areas would be out of bounds to installation and/or maintenance activities and to anchoring. Monitoring of any AEZs to ensure there is no disturbance to them will be part of this mitigation.

Reduction

7.2.4 Reduction of impact can be achieved by means of appropriate mitigation identified through potential opportunities for further investigation of receptors (e.g. during pre-installation surveys which may include visual survey methods and UXO assessment).

7.2.5 Further investigations would mean that receptors can either have their archaeological value removed, if they prove to be of non-anthropogenic nature or modern, or their value as archaeological receptors 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 as identified through a WSI which includes a Protocol for Archaeological Discoveries (e.g. The Crown Estate 2014).

- 7.2.6 In the case of the three wrecks identified along the eastern side of the Western Wharf it is recommended that they should be investigated to confirm their suspected modern date and therefore low/negligible archaeological value through either an ROV or diver survey with archaeological recording.

Remedying and offsetting

- 7.2.7 In cases where avoidance is either inappropriate or impossible, the damage to archaeological receptors should be offset. In the case of seabed prehistoric receptors, this can be achieved by undertaking further assessment of deposits with High geoarchaeological potential, principally peat deposits. Full recommendations for further palaeoenvironmental work have been laid out in the geoarchaeological assessment (Wessex Archaeology 2024). It is recommended that radiocarbon dating of the peat deposits should be undertaken. This would comprise the dating of the initiation of peat formation across the proposed development, and the final interval of peat formation at the proposed development.
- 7.2.8 Archaeological recording of wreck **2003** is recommended as this feature is likely to either be removed or entirely covered by infill material for the new Western Wharf. This recording should be using photogrammetry and/or still images depending on visibility using either divers or an ROV.
- 7.2.9 Recovery of artefacts and/or other archaeological receptors should be a final resort when all other mitigation has failed. Any recovery should be completed under the supervision of an appropriately qualified and experienced marine archaeologist. If required, recovery methods will be identified through a WSI. These will be covered by a specific Method Statement agreed in consultation with the Archaeological Curator.
- 7.2.10 For the anchors in the intertidal zone (**1005**) as they are isolated artefacts without clear connection to wreck material it is recommended that these are recovered and recorded archaeologically. As the anchor and chain **2007** is outside the proposed dredging area it is not expected to be impacted and so no further work is required.
- 7.2.11 Two areas of archaeological watching brief are recommended. As the development proposals is likely to impact on Head deposits and the extent of the two identified palaeolandscape features **7001** and **7002**, which have the potential to preserve archaeological or palaeoenvironmental evidence during dredging works in the east of the proposed development, an archaeological watching brief is recommended for this area. Archaeological watching brief is also recommended for the areas of the two former King's and Empire Wharfs due to the potential for archaeological material below their footprint relating to intact sediments outside the identified historic dredging footprint.

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APPENDICES

Appendix 1: Terminology

Glossary

The terminology used in this assessment follows definitions contained within Annex 2 of the UK's *National Planning Policy Framework* (Ministry of Housing, Communities and Local Government 2021, 64-73).

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.
Conservation (for heritage policy)	The process of maintaining and managing change to a heritage asset in a way that sustains and, where appropriate, enhances its significance.
Designated heritage assets	World Heritage proposed developments, Scheduled Monuments, Listed Buildings, Protected Wreck proposed developments, Registered Park and Gardens, Registered Battlefields and Conservation Areas designated under the relevant legislation.
Development Plan	This includes adopted Local Plans, neighbourhood plans and the London Plan, and is defined in section 38 of the <i>Planning and Compulsory Purchase Act 2004</i> .
Environment Impact Assessment	A procedure to be followed for certain types of projects to ensure that decisions are made in full knowledge of any likely significant effects on the environment.
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 assets include designated heritage assets and assets identified by the local planning authority (including local listing).
Heritage coast	Areas of undeveloped coastline which are managed to conserve their natural beauty and, where appropriate, to improve accessibility for visitors.
Historic environment	All aspects of the environment resulting from the interaction between people and places through time, including all surviving physical 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.
Setting of a heritage asset	The surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance or may be neutral.
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.
Strategic environmental assessment	A procedure (set out in the Environmental Assessment of Plans and Programmes Regulations 2004) which requires the formal environmental assessment of certain plans and programmes which are likely to have significant effects on the environment.
Value	An aspect of worth or importance.



Chronology

Where referred to in the text, the main archaeological periods in Britain are broadly defined by the following date ranges:

Prehistoric	
Palaeolithic	970,000 - 9500 BCE
Lower Palaeolithic	970,000 - 300,000 BCE
Middle Palaeolithic	300,000 - 40,000 BCE
Upper Palaeolithic	40,000 - 10,000 BCE
Late Upper Palaeolithic	12,000 - 9500 BCE
Early Post-glacial	9500 - 8500 BCE
Mesolithic	8500 - 4000 BCE
Neolithic	4000 - 2400 BCE
Bronze Age	2400 - 700 BCE
Iron Age	700 BCE - AD 43

Historic	
Romano-British	AD 43 - 410
Saxon	AD 410 - 1066
Medieval	AD 1066 - 1500
Post-medieval	AD 1500 - 1800
19th Century	AD 1800 - 1899
Modern	AD 1900 - present day

Appendix 2: Legislative, policy and guidance

Designation	Associated Legislation	Overview
World Heritage proposed developments	-	The UNESCO World Heritage Committee inscribes World Heritage proposed developments for their Outstanding Universal Value (OUV) – <i>cultural and/ or natural significance which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity</i> . England protects its World Heritage proposed developments and their settings, including any buffer zones or equivalent, through the statutory designation process and through the planning system. The National Planning Policy Framework sets out detailed policies for the conservation and enhancement of the historic environment, including World Heritage proposed developments, through both plan-making and decision-taking.
Scheduled Monuments and Areas of Archaeological Importance	<i>Ancient Monuments and Archaeological Areas Act 1979</i>	Under the <i>Ancient Monuments and Archaeological Areas Act 1979</i> , the Secretary of State (DCMS) can schedule any site which appears to be of national importance because of its historic, architectural, traditional, artistic or archaeological interest. The historic town centres of Canterbury, Chester, Exeter, Hereford and York have been designated as Archaeological Areas of Importance under Part II of the <i>Ancient Monuments and Archaeological Areas Act 1979</i> . Additional controls are placed upon works affecting Scheduled Monuments and Areas of Archaeological Importance under the Act. The consent of the Secretary of State (DCMS), as advised by Historic England, is required for certain works affecting Scheduled Monuments.
Listed Buildings	<i>Planning (Listed Buildings and Conservation Areas) Act 1990</i>	In England, under Section 1 of the <i>Planning (Listed Buildings and Conservation Areas) Act 1990</i> , the Secretary of State is required to compile lists of buildings of special architectural or historic interest, on advice from English Heritage/ Historic England. Works affecting Listed Buildings are subject to additional planning controls administered by Local Planning Authorities. Historic England is a statutory consultee in certain works affecting Listed Buildings. Under certain circumstances, Listed Building Consent is required for works affecting Listed Buildings.



Designation	Associated Legislation	Overview
Conservation Areas	<i>Planning (Listed Buildings and Conservation Areas) Act 1990</i>	A Conservation Area is an area which has been designated because of its special architectural or historic interest, the character or appearance of which it is desirable to preserve or enhance. In most cases, Conservation Areas are designated by Local Planning Authorities. Section 72 (1) of the <i>Planning (Listed Buildings and Conservation Areas) Act 1990</i> requires authorities to have regard to the fact that there is a Conservation Area when exercising any of their functions under the Planning Acts and to pay special attention to the desirability of preserving or enhancing the character or appearance of Conservation Areas. Although a locally administered designation, Conservation Areas may nevertheless be of national importance and significant developments within a Conservation Area are referred to Historic England.
Registered Parks and Gardens and Registered Battlefields	<i>National Heritage Act 1983</i>	The Register of Parks and Gardens was established under the <i>National Heritage Act 1983</i> . The Battlefields Register was established in 1995. Both Registers are administered by Historic England. These designations are non-statutory but are, nevertheless, material considerations in the planning process. Historic England and The Garden's Trust (formerly known as The Garden History Society) are statutory consultees in works affecting Registered Parks and Gardens
Protected Wreck proposed developments	<i>Protection of Wrecks Act 1973</i>	The <i>Protection of Wrecks Act 1973</i> allows the Secretary of State to designate a restricted area around a wreck to prevent uncontrolled interference. These statutorily protected areas are likely to contain the remains of a vessel, or its contents, which are of historical, artistic or archaeological importance.
Protected Places and Controlled proposed developments	<i>Protection of Military Remains Act 1986</i>	The <i>Protection of Military Remains Act 1986</i> provides protection for designated military vessels and for all aircraft that crashed while in military service. The Act provides two types of protection: Protected Places (wrecks designated by name and can be designated even if the location of the site is not known) and Controlled proposed developments (sites designated by location – covers wrecks within the last 200 years). It is illegal to disturb sites or remove anything from sites. Protected Places can be visited by divers, but the rule is look but don't touch. For Controlled proposed developments it is illegal to conduct any operations (including diving or excavation) within the Controlled proposed development unless licensed to do so by the Ministry of Defence.

Other relevant legislation

Legislation	Overview
<i>Merchant Shipping Act 1995</i>	This Act sets out the procedures for determining the ownership of underwater finds that turn out to be 'wreck', defined as any flotsam, jetsam, derelict and lagan found in or on the shores of the sea or any tidal water. It includes ship, aircraft, hovercraft, parts of these, their cargo or equipment. If any such finds are brought ashore, the salvor is required to give notice to the Receiver of Wreck. This Act is administered by the Maritime and Coastguard Agency.
<i>Marine and Coastal Areas Act 2009 (Marine Policy Statement 2011)</i>	Marine licensing and marine planning made the responsibility of the MMO. England's inshore and offshore waters have been divided into 11 plan areas, for which marine plans are being produced by the MMO.
<i>UNESCO Convention on the Protection of the Underwater Cultural Heritage</i>	The UNESCO Convention was concluded in 2001, and is a comprehensive attempt to codify the law internationally, with regards to underwater cultural heritage. The UK abstained in the vote on the final draft of the Convention, however it has stated that it has adopted the Annex of the Convention, which governs the conduct of archaeological investigations, as best practice for archaeology. Although the UK is not a signatory, the Convention entered into force on 2nd January 2009, having been signed or ratified by 20 member states.

Guidance

Policy	Overview
Marine Policy Statement 2011	The Marine Policy Statement was jointly published by all UK Administrations in March 2011 as part of a new system of marine planning being introduced across UK seas.
NPPF Section 12 Para. 128	In determining applications, local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance. As a minimum the relevant historic environment record should have been consulted and the heritage assets assessed using appropriate expertise where necessary. Where a site on which development is proposed includes or has the potential to include heritage assets with archaeological interest, local planning authorities should require developers to submit an appropriate desk-based assessment and, where necessary, a field evaluation.
NPPF Section 12 Para.129	Local planning authorities should identify and assess the particular significance of any heritage asset that may be affected by a proposal (including by development affecting the setting of a heritage asset) taking account of the available evidence and any necessary expertise. They should take this assessment into account when considering the impact of a proposal on a heritage asset, to avoid or minimise conflict between the heritage asset's conservation and any aspect of the proposal.
NPPF Section 12 Para. 132	When considering the impact of a Project on the significance of a designated heritage asset, great weight should be given to the asset's conservation. The more important the asset, the greater the weight should be. Significance can be harmed or lost through alteration or destruction of the heritage asset or development within its setting. As heritage assets are irreplaceable, any harm or loss should require clear and convincing justification. Substantial harm to or loss of a grade II listed building, park or garden should be exceptional. Substantial harm to or loss of designated heritage assets of the highest significance, notably scheduled monuments, protected wreck sites, battlefields, grade I and II* listed buildings, grade I and II* registered parks and gardens, and World Heritage proposed developments, should be wholly exceptional.
NPPF Section 12 Para. 135	The effect of an application on the significance of a non-designated heritage asset should be taken into account in determining the application. In weighing applications that affect directly or indirectly non designated heritage assets, a balanced judgement will be required having regard to the scale of any harm or loss and the significance of the heritage asset.



Policy	Overview
NPPF Section 12 Para. 137	Local planning authorities should look for opportunities for new development within Conservation Areas and World Heritage proposed developments and within the setting of heritage assets to enhance or better reveal their significance. Proposals that preserve those elements of the setting that make a positive contribution to or better reveal the significance of the asset should be treated favourably
NPPF Section 12 Para. 139	Non-designated heritage assets of archaeological interest that are demonstrably of equivalent significance to scheduled monuments, should be considered subject to the policies for designated heritage assets.
NPPF Section 12 Para. 141	Local planning authorities should make information about the significance of the historic environment gathered as part of plan-making or development management publicly accessible. They should also require developers to record and advance understanding of the significance of any heritage assets to be lost (wholly or in part) in a manner proportionate to their importance and the impact, and to make this evidence (and any archive generated) publicly accessible. However, the ability to record evidence of our past should not be a factor in deciding whether such loss should be permitted.
National Policy Statement for Ports Section 5.12	The NPSfP recognises the importance of the historic environment and that the construction, operation and decommissioning of port infrastructure has the potential to result in adverse impacts on it. Therefore, the significance of heritage assets and the extent of the impact of the Project on the significance of any heritage assets has to be understood. Both designated heritage assets and undesignated heritage assets have to be considered, and the setting of a heritage asset also has to be taken into account.



Appendix 3: Palaeogeographic features of archaeological potential

WA_ID	Type	Archaeological Discrimination	Depth Range (mBSB)		Description
			From	To	
7001	Channel	Moderate	2	9	A palaeochannel striking broadly WNW, 150 x 302m in size. It is very likely that this feature continues further south-east, though data availability within the confines of this study limits investigation. This channel represents the high-energy erosional flow of water through a location. Two boreholes from within the feature boundaries (WA-VC21, WA-VC24) allow an insight into infilled material and into the archaeological potential of the channel. Infill is a layered accumulation of estuarine alluvium and is not of inherent archaeological interest. WA-VC21 is through the northern flank of the channel, where erosion has cut into bedrock, again, with limited archaeological potential displayed. Along the southern flank of the channel, WA-VC24 shows that the channel cuts into the Palaeolithic head unit, increasing the potential for inclusion of reworked Palaeolithic artefacts into the channel infill.
7002	Peat Bed	High	0.75	2	Feature 7002 is a peat body stratigraphically above the southern flank of channel 7001. Peat was identified within borehole WA-VC04, and is of significant archaeological importance. Within the core, peat was interspersed with estuarine alluvium at a scale too small for data resolution to display. However, the instance of this repeating peat-alluvium sequence within WA-VC04 intersects a small but discrete feature. This feature can be traced over 14 seismic lines, is 150 x 40m in area, and is ~1.5m thick in places. While there is the potential for the peat to be of limited extent within this feature, the presence of such material is of high archaeological importance.



Appendix 4: Maritime archaeology gazetteer

WA_ID	Type	Name	Ext. Reference	Built	Lost	Construction	Description	Manner of loss	BNG_N (SW)	BNG_E (SW)
2000	Minesweeper	HMS <i>Resparko</i>	HOBUID_919751; CHER_MCO5956 2	1928	1940	Steel	Converted trawler. Hired by RN in First World War as anti-submarine patrol vessel, converted to minesweeper in 1940. Sunk in air raid August 1940. Tonnage - 253 gross. L - 37m B - 7m D - 4m.	Bombed	32681	181820
2001	Wreck		UKHO_16349				Dangerous Wreck. Now declared DEAD.		32538	181490
2002	Wreck		UKHO_88263				Barge	Intentionally sunk	32814	181811
2003	Wreck		UKHO_94278				Dangerous wreck	Intentionally sunk	32735	181811
2004	Structure	Empire Wharf	UKHO_73080	1933	2007	Wood	Debris from the remains of Empire Wharf. Wharf demolished to seabed level but significant debris remains.	Demolished	32869	181666
2005	Structure	King's Wharf	UKHO_73081	1937	2007	Wood	Debris from the remains of King's Wharf. Wharf demolished to seabed level but significant debris remains.	Demolished	32758	181651
2006	Wreck						Rectangular pontoon or barge similar to 2002 lying to east side of wreck 2003 identified in bathymetry survey		32744	181817
2007	Anchor and Chain		Falmouth Cruise Project GT 24			Iron	Iron stockless anchor with length of chain discovered during ground-truthing of geophysical anomalies 2007-8		33130	181923



Appendix 5: Walkover gazetteer

WA_ID	Ext. Reference	Type	Period	Description	Observations	BNG_N (SW)	BNG_E (SW)
1001	MCO50123	Structure	Modern	Barrage Ballon proposed development. Original site around 11m. Anchor point for Second World War barrage balloon.	No	32568	181673
1002	MCO50128	Structure	Modern	Slipway. 82m long slipway constructed during Second World War. Remains have been destroyed by present development.	No	32521	181614
1003	MCO50127	Structure	Modern	Embarkation Hard. Second World War embarkation point. Destroyed by modern development.	No	32483	181567
1004	MCO55453	Submerged landscape	Prehistoric	Evidence of submerged landscape, Mesolithic-Neolithic preserved in core samples taken from this location.	No	33010	182095
1005		Anchors	Modern	Anchors along western edge of Western Wharf. 1 x stockless, other possibly Admiralty pattern	Yes	32833	181760



Appendix 6: Maritime recorded losses

NMHR ID	Name	Type	Nationality	Built	Lost	Construction	Cargo	Manner of loss	Journey
920009			Welsh		1667	Wood	Coal	Aground	Wales to France
1387025			Dutch		1667	Wood	Pack goods, chairs, books and rye.	Stranded	Amsterdam to Lisbon
1084483			English		1668	Wood	Coal	Foundered	Wales to Falmouth
920020					1669	Wood		Aground	
1115756					1669	Wood		Stranded	
920029			French		1670	Wood		Stranded	
920032	<i>Bear</i>		Prussian		1670	Wood	Wine	Stranded	
920053		Schooner	French		1691	Wood		Stranded	Falmouth to -
920054			French		1693	Wood		Stranded	
1225918			French		1696	Wood	Wine, brandy, prunes.	Wrecked	Bordeaux to -
1225833	<i>Narborough</i>	Ketch	English / French	1691	1696	Wood		Aground	
1225806			English		1696	Wood			London to Lisbon
1084534			Dutch		1720	Wood	Brandy, Saffron	Burnt	Nantes to -
1439048		Coaster	British		1739	Wood		Foundered	
1456262					1739	Wood		Stranded	
1456260		Fishing vessel	British		1739	Wood	Fish	Stranded	Newfoundland to -
920078		Coaster	British		1739	Wood			
920077			French		1739	Wood	Salt	Aground	
920079	<i>Two Brothers</i>		Irish		1739	Wood	Tallow, candles	Stranded	Cork to Le Havre
1375788	<i>Elizabeth</i>		British		1745	Wood	Sugar and rum	Burnt	Montserrat to Falmouth
920248	<i>Katherine</i>		British		1758	Wood		Aground	Barnstaple to Southampton
920305					1773	Wood	Silk	Stranded	Naples to -



NMHR ID	Name	Type	Nationality	Built	Lost	Construction	Cargo	Manner of loss	Journey
920306	<i>Duke Of Gloucester</i>		British		1773	Wood		Stranded	Genoa to Hamburg
1156391	<i>Speedwell</i>		British		1777	Wood		Lost	Dungarvan to Lisbon
1084752	<i>Firebrand</i>	Fireship	British	1777	1781	Wood		Exploded	Falmouth to -
1325544	<i>St Anne</i>	Merchant Man	Portuguese		1782	Wood	Wine	Foundered	Oporto to Guernsey
920381	<i>Charlotte</i>				1795	Wood		Stranded	Falmouth to London
920382	<i>Martinico Packet</i>	Packet	British		1795	Wood		Stranded	West Indies to Falmouth
920395	<i>Westmoreland Packet</i>	Packet	British		1797	Wood		Aground	
920396	<i>Indian Chief</i>		American		1797	Wood	Pilchards	Burnt	Falmouth to Genoa
920400	<i>Phoenix</i>	Frigate	Portuguese		1797	Wood		Stranded	
920398	<i>Carolina Wilhemina</i>				1797	Wood		Stranded	Liverpool to Szczecin
920403	<i>Elizabeth</i>		British		1798	Wood		Stranded	Plymouth to Lisbon
1133153	<i>Washington</i>		British		1799	Wood	Cotton, mail and passengers	Burnt	Lisbon to Liverpool
920630	<i>Union</i>	Brig / collier	British		1800	Wood	Coal, 'Manchester goods' likely textiles	Burnt	Bristol to Lisbon
920637	<i>Newham</i>	Brig	British	1802	1802	Wood	Gunpowder, hemp, provisions	Burnt	London to Falmouth
1316251	<i>Lady Arabella</i>	Packet	British		1804	Wood			Falmouth to United States of America
920658	<i>Pelican</i>	Schooner	British	1799	1804	Wood	Textiles, sailcloth	Stranded	
920652	<i>Eclipse</i>	Brig	British		1804	Wood	Rum	Stranded	Antigua to Guernsey
920679	<i>Hyana</i>		British		1808	Wood		Foundered	Falmouth to Guernsey
920698	<i>Charlotte</i>	Sloop	British		1809	Wood	Limestone	Foundered	Plymouth to -
1084482	<i>Duke Of York</i>	Sloop	British		1809	Wood		Collision, foundered	Ireland to -



NMHR ID	Name	Type	Nationality	Built	Lost	Construction	Cargo	Manner of loss	Journey
920699	<i>Harriet</i>	Sloop	British		1809	Wood		Foundered	Plymouth to Falmouth
1084302	<i>Carteret</i>	Packet	British		1809	Wood		Aground, later recovered.	
920741	<i>Unanimity</i>				1813	Wood		Aground	Newcastle to Quebec
920745	<i>Queen</i>	Troopship	British		1814	Wood		Aground	Lisbon to Falmouth
1351825	<i>Harmonie</i>	Cargo vessel	Norwegian		1824	Wood		Foundered, broken up	Porsgrunn to Falmouth
921115	<i>St Nicholas</i>	Brig	Russian		1830	Wood	Government stores	Stranded	St. Petersburg to Mediterranean
922231	<i>Catherine</i>		British		1832	Wood	Coal	Stranded	Newport to Truro
922243	<i>Traveller</i>	Brig	Scottish		1836	Wood	Coffee, cotton, logwood	Stranded	Port Au Prince to Antwerp
922260	<i>Richard And Elizabeth</i>	Fishing vessel	British		1838	Wood		Foundered	
1436363					1840	Wood		Wrecked	
1202303	<i>Catherine</i>	Schooner	Welsh		1854	Wood	Slate	Collision	to London
922054	<i>Victor</i>	Schooner	British		1855	Wood		Stranded	Falmouth to -
922133	<i>Dandy</i>		British	1857	1858	Wood		Foundered	to Falmouth
1156368	<i>Iberia</i>	Brigantine	Portuguese		1867	Wood	Wine	Aground	Oporto to Le Havre
1223987	<i>Ida Patrone</i>	Barque	Italian		1867	Wood	Wheat	Collision	Odessa to -
923755	<i>Sea Spray</i>	Brig	British	1863	1867	Wood	Rye	Foundered	Eno to -
923751	<i>Miguel Angelo</i>	Brig	Spanish		1867	Wood	Sugar	Foundered	Havana to -
1256989	<i>Lucy</i>	Brig	British		1869	Wood		Wrecked	
923788	<i>Blucher</i>	Brig			1869	Wood	Sugar	Stranded	to Falmouth
923776	<i>Charles Emma</i>	Brig	French		1869	Wood	General cargo	Collision	Antwerp to Trieste
923927	<i>Anthracite</i>	Brig	Welsh	1873	1877	Wood	Coal	Aground	Leith to Trinidad
923980	<i>Otter</i>	Cutter	British	1868	1880	Wood		Foundered	Falmouth to -
923977	<i>Medea</i>	Schooner	British	1861	1880	Wood		Aground	Portsmouth to Falmouth



NMHR ID	Name	Type	Nationality	Built	Lost	Construction	Cargo	Manner of loss	Journey
1257104	Annie	Barge	British		1884	Wood		Foundered	
924247	Gazelle	Lugger	British	1865	1885	Wood		Foundered	St. Mawes to Falmouth
924269	Nautilus		Dutch		1887	Wood		Stranded	Antwerp to Cadiz
924338	Freemantle	Cutter	British		1893	Wood		Collision	Falmouth to -
924351	Harebell	Yawl	British		1894	Wood		Collision, foundered.	Falmouth to -
925432	Aneurin	Schooner	Welsh	1858	1895	Wood		Collision, broken up.	Salcombe to Aberdovey
925433	Manola	Yawl	British	1882	1895	Wood		Stranded	Falmouth to Falmouth
1257402	Eagle	Yacht	British		1905			Foundered	
1257516	Gilberte	Cutter	French		1907	Wood		Foundered	
925568	Ymer	Barque	Russian	1885	1910	Wood	Fertilizer	Burnt	Falmouth to Truro
924458	Brothers	Schooner	British	1866	1911	Wood	Water		Falmouth to -
1547203	UB 86	U-B III U-Boat	German	1917	1921	Steel		Broken up	
1547208	UB 97	U-B III U-Boat	German	1917	1921	Steel		Broken up	
1547217	UB 112	U-B III U-Boat	German	1917	1921	Steel		Broken up	
1547231	UB 128	U-B III U-Boat	German	1917	1921	Steel		Broken up	
1547206	UB 106	U-B III U-Boat	German	1917	1921	Steel		Broken up	
924778	Pride Of The Bay	Yacht	British		1921	Wood		Stranded	Falmouth to -
924781	Curvos	Schooner	Portuguese	1918	1922	Wood	Coal	Burnt	Falmouth to -
924784	W E Gladstone	Barge	British	1885	1923	Wood	Manure	Collision	Penryn to -
924835	Bruce	Hopper Dredger	Welsh	1905	1935	Steel		Foundered	Newport to Southampton
924841	Sprightly	Launch	British		1936	Wood		Stranded	
924843	HMS Torrid	R' Class Destroyer	British	1917	1937	Steel		Aground	



NMHR ID	Name	Type	Nationality	Built	Lost	Construction	Cargo	Manner of loss	Journey
924923	<i>HMS Fisher Girl</i>	Fishing vessel / drifter	British	1913	1941	Wood		Bombed	
1541109	<i>Volant</i>	Schooner	British	1875	1946	Wood	Passengers	Abandoned	Belfast to Sydney
924331	<i>Faithful</i>	Yacht	British		1982			Foundered	Penryn to Falmouth



Appendix 7: Aviation recorded losses

Associated ID	Type of Aircraft	Nationality	Date of loss	Details
HOBUID: 1402777	JUNKERS Ju 88A-5 (3201) B3+HH	German	1941	A German Junkers Ju 88 that was part of Squadron 1/KG54. It crashed into Falmouth Harbour after it hit a balloon cable.

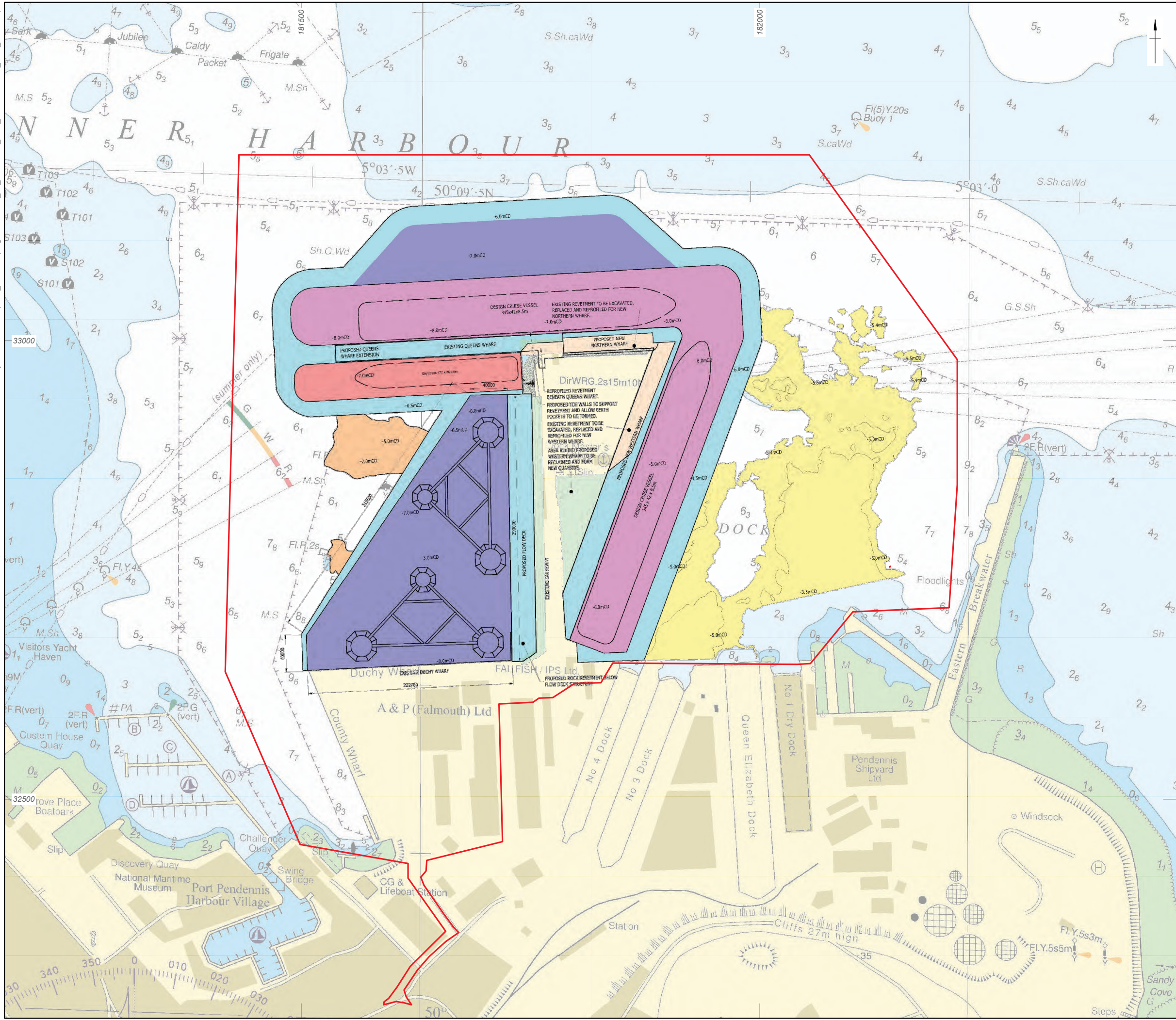


Appendix 8: Previous SSS anomalies of archaeological potential (2007 Falmouth Cruise Project surveys)

WA_ID	ID	E BNG	N BNG	Mag?	Notes	GT	GT notes	Arch potential?
1	L1-14:54:19	182054.6	33143.1		Hard target- wreckage			
2	L3-15:41:19	181715.1	33112.7		Wreckage?			
3	L3-15:37:01	182110	33154.2		Debris			
4	L3-15:36:17	182179.5	33164.4	x	Hard target, possibly iron			
13	L5-16:04:46	182099.1	33158	x	Debris, possibly iron			
14	L5-16:01:04	181693.8	33110.7		Broken ground or wreckage			
15	L7-17:00:48	181728.8	33122.5		Reef or wreckage			
16	L7-16:58:49	181923.2	33129.6		Debris	24	Iron chain and stockless anchor	Y
17	L7-16:57:10	182085.6	33092.7	x	Small hard target, possibly iron	4	Collection of debris C19th-20th	N
19	L9-09:07:28	181583	33078.4		Debris? Very little shadow			
25	L11-09:23:32	181954.5	33032.4	x	Scattered small debris by quay, possibly iron			
26	L11-09:22:14	181836.5	33029.9		Debris- near quay			
29	L13-10:10:34	181564.6	33018.9		Rock or debris			
30	L13-10:08:53	181698.7	33059.2		Debris			
31	L13-10:08:36	181726.2	33076.4		Debris			
32	L13-10:08:17	181750.2	33075.4		Debris			
33	L13-10:06:60	181848.3	33026.9		Rock or debris			
34	L13-10:05:09	181986.3	33014.1		Debris near end of wharf			
41	L15-10:36:52	181972.5	33020.2		Debris near corner of E end of Queen's Wharf	12	Debris, C20th	N
42	L15-10:36:22	181925.7	33013.3		Gap in Queen's Wharf and debris			
43	L15-10:35:28	181843.4	33012.9		Debris near Queen's Wharf- collapsed piles	5	Debris and piles	N
44	L15-10:32:27	181575.3	33019.2		Debris - W end of Queen's Wharf - pile			
45	L15-10:32:17	181558.2	33003.9		Debris? - off W end of Queen's Wharf			
46	L15-10:32:11	181551.6	33022.4		Debris? - off W end of Queen's Wharf			
47	L15-10:28:28	181444.5	33168.2		Debris in scour pit			



WA_ID	ID	E BNG	N BNG	Mag?	Notes	GT	GT notes	Arch potential?
49	L17-11:25:07	181592.4	33013.2		Debris? - off W end of Queen's Wharf - displaced pile	15	Debris, C20th	N
50	L17-11:23:42	181714.8	33016.7		Debris near Queen's Wharf			
51	L17-11:23:35	181723.7	33017.5		Debris near Queen's Wharf			
52	L17-11:22:47	181793.7	33015		Area of Debris near Queen's Wharf	7	Debris, C20th	N
53	L17-11:22:03	181857.7	33005.8		Area of Debris near Queen's Wharf			
54	L17-11:20:46	181969.1	33033.4	x	Area of Debris near Queen's Wharf possibly iron			
55	L17-11:20:34	181983.7	33014.2		Area of Small Debris near E end of Queen's Wharf			
56	L17-11:20:16	182007.4	33018.3		Debris near E end of Queen's Wharf			
57	L17-11:20:18	182009.9	33036.5		Debris near E end of Queen's Wharf			
90	MD1 14:04:11	182095	32731	x	Wreckage?			
91	MD1 14:00:57	182186	32886.8		Hard target			
93	MD3 14:33:48	182160.7	32859.9	x	Cluster of small circular objects			
94	MD3 14:33:31	182194.1	32861.9		Hard target, wreckage?			



Site boundary

Study Area

Proposed dredge plan (Ramboll UK Ltd)

Dredge to -10.5m CD:
55,503m²
229,847m³

Dredge to -10.5m CD for TwinHub:
59,960m²
223,745m³

Dredge to -10.5m CD for Bay Class:
9,810m²
32,945m³

Graded sides:
55,045m²
122,506m³

Remove obstructions from demolished
timber jetty -6.0m CD:
5,501m²
6,051m³

Surface skim to maintain -5.5m CD:
46,653m²
26,646m³

0

100 m

Coordinate system: OSGB 1936 British National Grid

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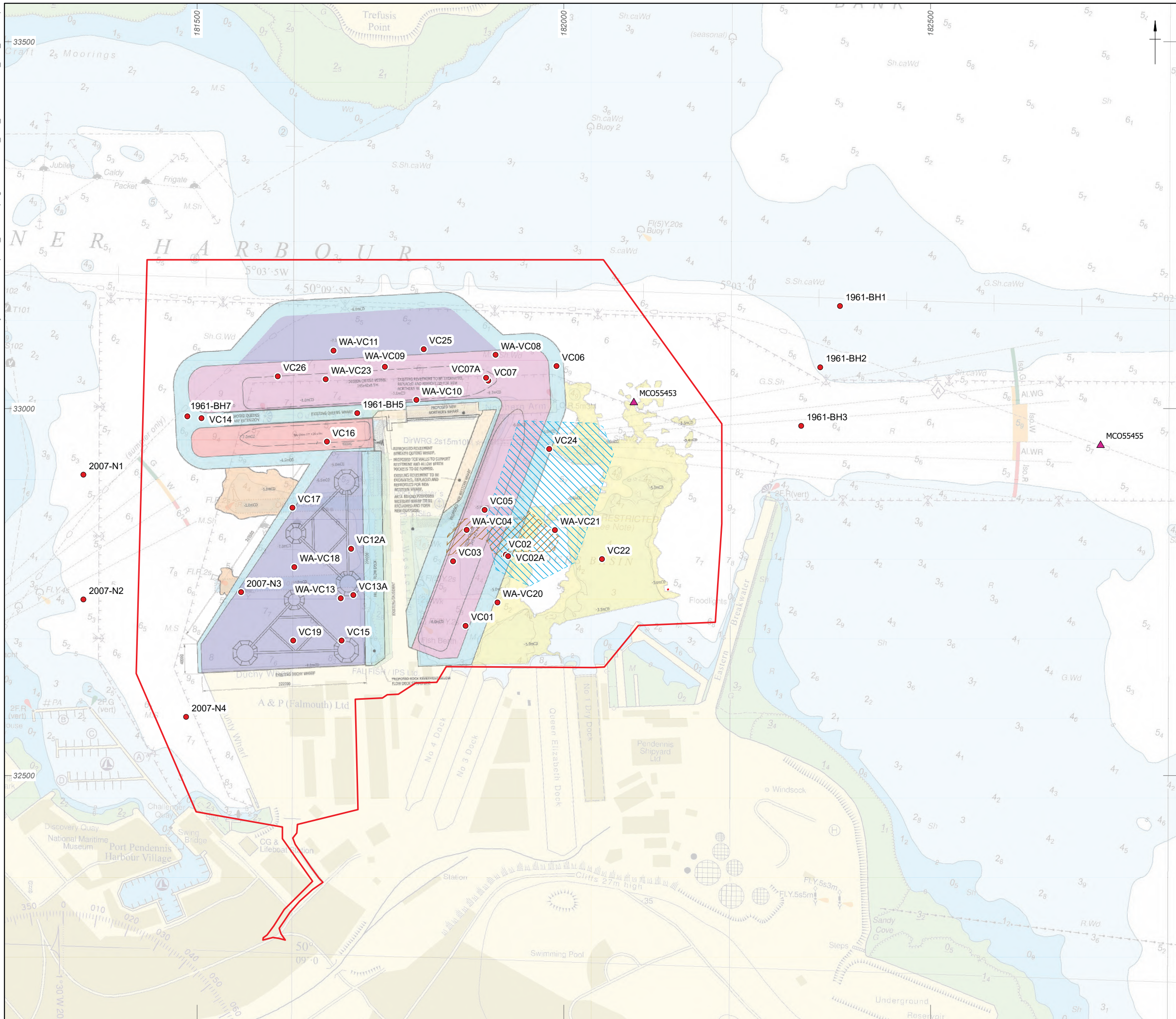
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Scale: 1:4,000 at A3

Revision: 0

Figure 1: Proposed development location





-  Study Area
-  Site boundary
-  Cornwall HER - peat deposits
-  GI data
-  7001 – Palaeochannel
-  7002 – Peat Deposit

Proposed dredge plan (Ramboll UK Ltd)

	Dredge to -10.5m CD: 55,503m ² 229,847m ³
	Dredge to -10.5m CD for TwinHub: 59,960m ² 223,745m ³
	Dredge to -10.5m CD for Bay Class: 9,810m ² 32,945m ³
	Graded sides: 55,045m ² 122,506m ³
	Remove obstructions from demolished timber jetty -6.0m CD: 5,501m ² 6,051m ³
	Surface skim to maintain -5.5m CD: 46,653m ² 26,646m ³



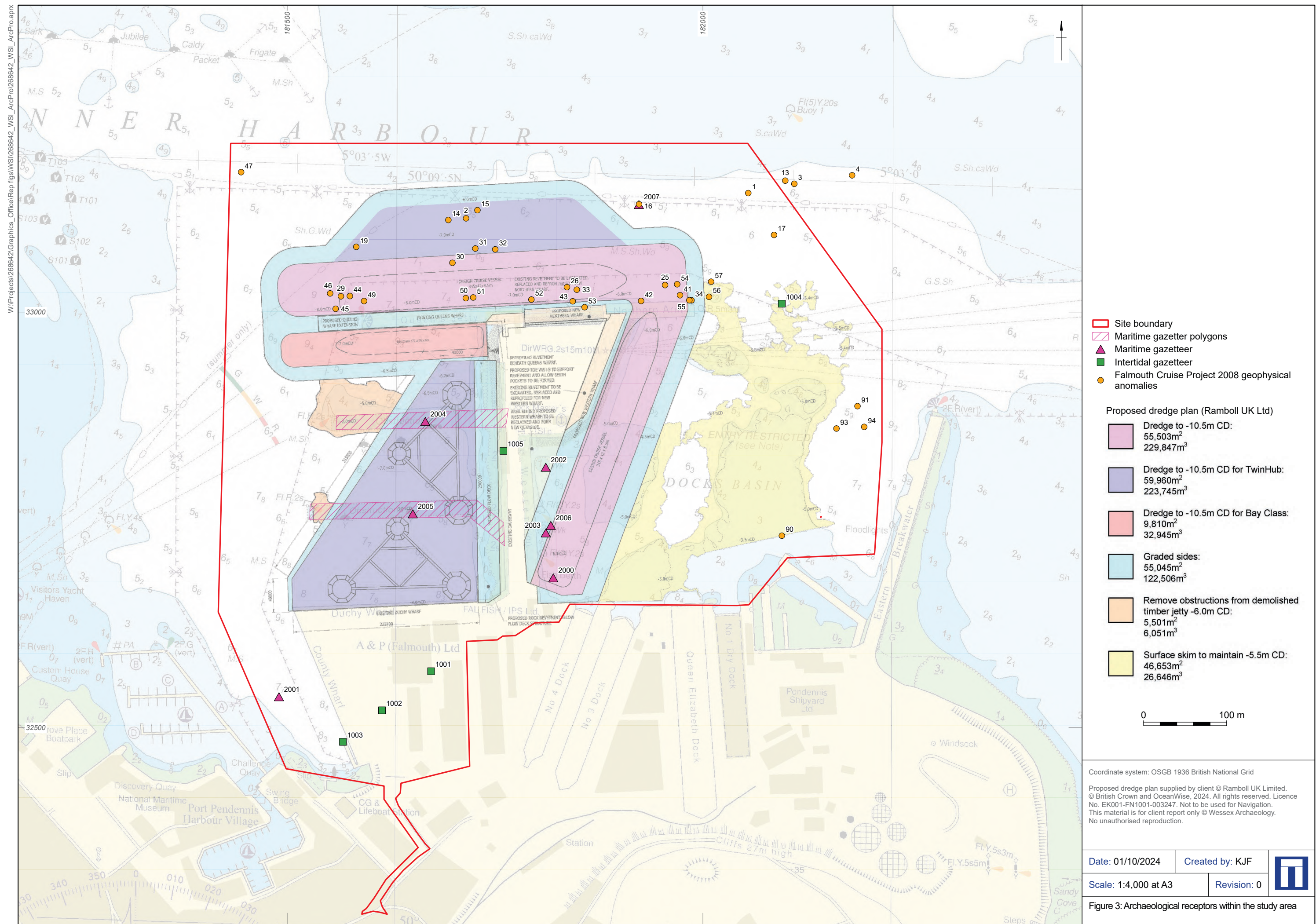
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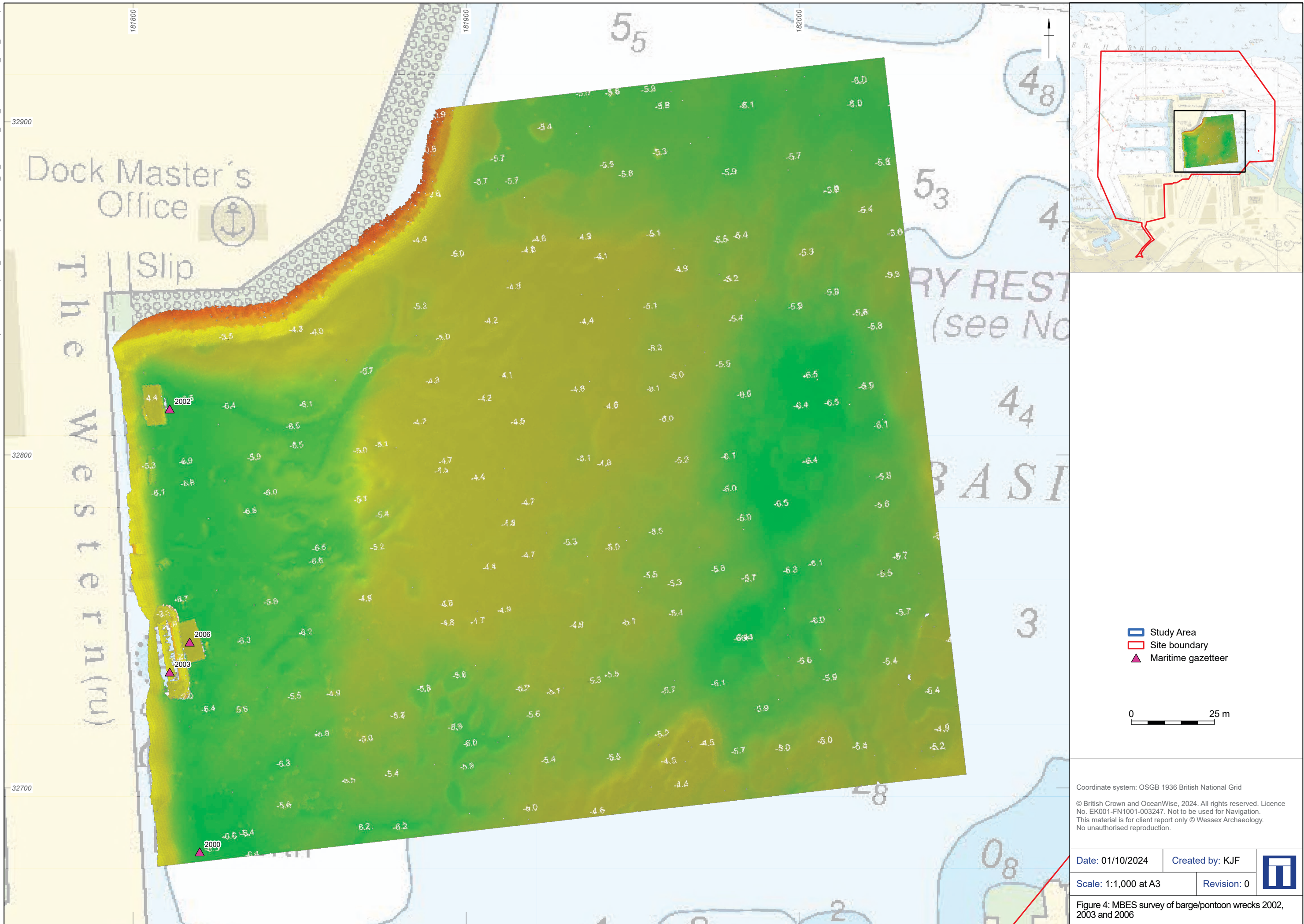
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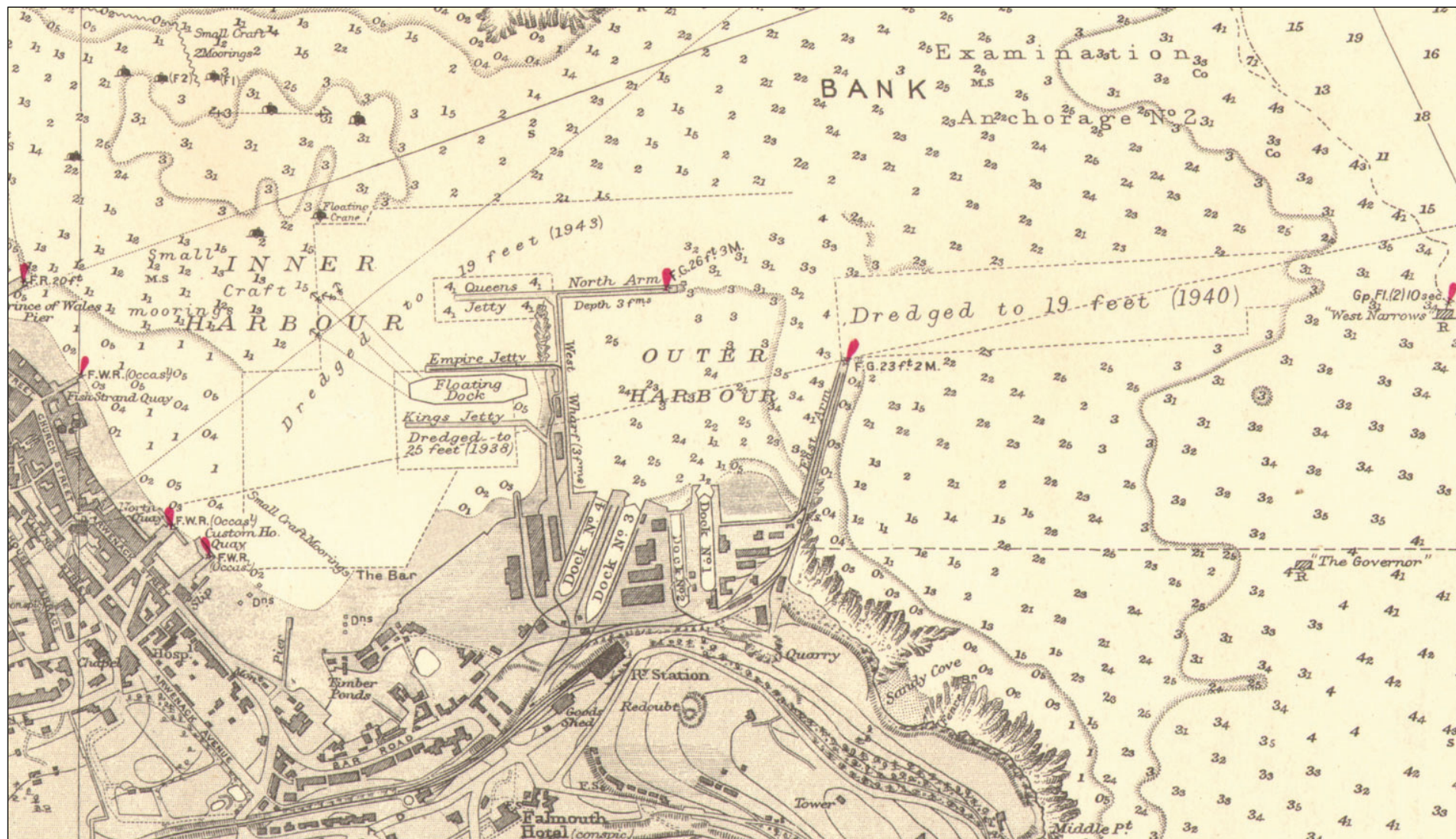
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Figure 2: Geotechnical works and palaeogeographic
receptors within the study area







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Figure 5: Excerpt from Admiralty Chart 32 (Falmouth Harbour), updated 1953



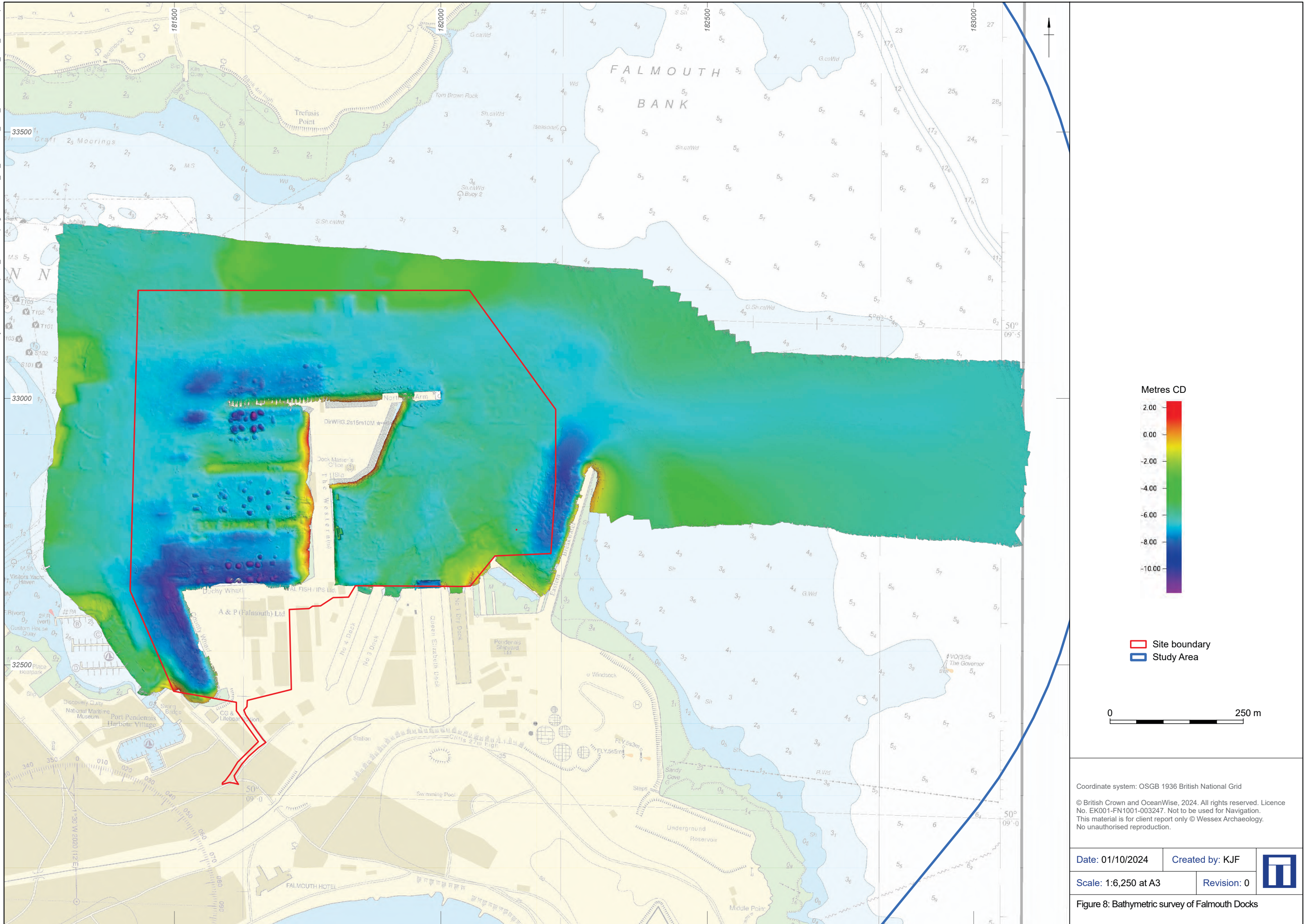


Figure 6: Aerial Image EAW033625 ENGLAND (1950). The Docks, Falmouth, 1950
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Figure 7: Aerial Image EPW045675 ENGLAND (1934). Falmouth Docks, the Outer Harbour and Trefusis Point, Falmouth, 1934 © Historic Environment Scotland

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A horizontal scale bar with a black and white alternating pattern. It is labeled '0' at the left end and '100 m' at the right end.

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Figure 9: Magnetometry survey results of Falmouth Docks



Figure 10: Connections of the former King's Wharf to Western Wharf



Figure 11: Anchors 1005 and other debris along western side of Western Wharf



Figure 12: Original timber construction of Queen's Wharf below modern replacement



Figure 13: Remains of connecting bridge to Northern Arm



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