7097 Rapid Coastal Zone Assessment Survey: Phase One Desk-based Assessment for South-West England (South Coast Cornwall)

Cornwall Archaeological Unit and COARS

Report No: 2018R052

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Project Report

Client	**Historic England**
Report Number	**2018R052**
Status	**Final**
Date	**29/01/2019**
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Acknowledgements

This study was commissioned by Historic England and carried out by Cornwall Archaeological Unit, Cornwall Council and COARS, Southampton University. The English Heritage Lead was Marcus Jecock, the Project Assurance Officers were Helen Keeley and Jenni Butterworth.

We would like to thank: Emma Trevarthen, Hannah Curnow and Francis Shepherd (Cornwall and Scilly HER); Jess Maslen (Plymouth City HER); Bill Horner (Devon County Council); Martin Read (University of Plymouth); Hayley McParland and Samantha Stein (Historic England Science Advisors South-West); Ann Preston-Jones and Dan Bashford (Historic England Heritage at Risk Project Officers); Nick Johnson, archaeologist; Kevin Camidge (CISMAS); Graeme Kirkham for supplying his work on sanding coves; and Lauren Tidbury and Therese Kearns from the CITiZAN project.

The CAU Manager was Charles Johns and the COARS project manager Michael Grant. The CAU team were Peter Dudley, Fiona Fleming and Carolyn Royall. The COARS team were Fraser Sturt and Justin Dix.

The views and recommendations expressed in this report are those of Cornwall Archaeological Unit and are presented in good faith on the basis of professional judgement and on information currently available.

Freedom of Information Act

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Cover illustration

The coast path at Dodman Point, looking south across Veryan Bay (Photograph: CAU).

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Abbreviations

ADS	Archaeology Data Services
AMIE	Archives Monuments Information England
ATL	Advance the line (generic shoreline management option)
BGS	British Geological Society
bMLWS	below Mean Low Water Springs
CAU	Cornwall Archaeological Unit
CC	Cornwall Council
CGS	County Geology Site
CHeRISH	Coastal Heritage at Risk – Imagery in Support of Heritage Management
CISCAG	Cornwall and Isles of Scilly Coastal Action Group
CISMAS	Cornwall and Isles of Scilly Maritime Archaeological Society
CITiZAN	Coastal and Intertidal Zone Archaeological Network
COARS	Coastal and Offshore Archaeological Research Services, University of Southampton
CRO	Cornwall Record Office, Truro
CCC	Case Study Site (CHeRISH)
DBA	Desk-based Assessment
Defra	Department for Environment, Food and Rural Affairs
DOB	Defence of Britain Project
DSM	Digital Surface Model

EA	Environment Agency
EIA	Environmental Impact Assessment
ERCCIS	Environmental Records Centre for Cornwall and the Isles of Scilly
GIA	Glacial Isostatic Adjustment
GIS	Geographical Information System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
HARPO	Heritage at Risk Project officer (Historic England)
HBSMR	Historic Buildings and Sites and Monument Record
HE	Historic England
HER	Historic Environment Record
HIAS	Heritage Information Access Strategy (Historic England)
HLC	Historic Landscape Characterisation
HSC	Historic Seascape Characterisation
HTL	Hold the line (generic shoreline management option)
ICZM	Integrated Coastal Zone Management
IFCA	Inshore Fisheries and Conservation Authority
IRSL	InfraRed Stimulated Luminescence
ISIS	Irish Sea Ice Sheet
Ka	Thousand years ago
MA	Management Area (Rame Head to Hartland Point SMP)
Ma	Million years ago
MAG	Meneage Archaeological Group
MAS	Marine Antiquities Scheme
MHW	Mean High Water
MCO	Monument number in Cornwall HER
MIS	Marine Isotope Stage
MLWS	Mean Low Water Springs
MMO	Marine Management Organisation
MR	Managed retreat (generic shoreline management option)
NAI	No active intervention (generic shoreline management option)
NGR	National Grid Reference
NHLE	National Heritage List for England
NMP	National Mapping Programme
NPPF	National Planning Policy Framework
NRHE	National Record of the Historic Environment
OD	Ordnance Datum – height above mean sea level at Newlyn
OS	Ordnance Survey

PAS	Portable Antiquities Scheme
PCO	Plymouth Coastal Observatory
PDS	Policy Development Scenario (Durlston Head to Rame Head SMP)
PDZ	Policy Development Zone (Rame Head to Hartland Point SMP)
RCHME	Royal Commission on the Historical Monuments of England
RCZAS	Rapid Coastal Zone Assessment Survey
RIC	Royal Institution of Cornwall
RIGS	Regionally Important Geological Sites
SLIPs	Sea Level Index Points
SMP	Shoreline Management Plan
SMR	Sites and Monuments Record
SWARF	South West Archaeological Research Framework
SWCP	South West Coast Path
SWRCHP	South West Strategic Regional Coastal Monitoring Programme
UKHO	United Kingdom Hydrographic Office
WHS	World Heritage Site
WWI	World War One
WWII	World War Two

Summary

The national programme of Rapid Coastal Zone Assessment Surveys (RCZASs), funded by Historic England (HE), is designed to enhance and update coastal Historic Environment Records (HERs) through a two-phased approach. Phase 1 Desk-based Assessment (DBA) assesses the data available on the character of the historic environment within the project area, and potential threats to heritage assets, in order to design a strategy for Phase 2 (Field Survey) which prioritises areas where heritage assets may be most at risk.

This report describes the results of the Phase 1 component of the RCZAS for the South Coast of Cornwall carried out in 2017 and 2018 by Cornwall Archaeological Unit, Cornwall Council, and COARS, Southampton University. The aims of the project were to:

- enhance the Cornwall, Plymouth City and Devon HERs and the National Record of the Historic Environment (NRHE);
- inform future coastal and shoreline management;
- provide an overview of coastal change from the Palaeolithic onwards;
- assess the degree and nature of threat to coastal historic assets;
- provide a broad assessment of the likely archaeological potential and vulnerability of the resource;
- identify future research priorities; and
- enhance public understanding and enjoyment of the coastal heritage.

The project area extended from Andurn Point in Devon to Land's End in Cornwall and included Plymouth and the Tamar Estuaries. It included an assessment of surviving remains along the open coast and its tidal estuaries, including the intertidal zone out to Lowest Astronomical Tide, with a 1km 'hinterland' to the landward side of Mean High Water and extending up estuaries to 1km beyond the tidal extent. The project area was sub-divided according to Policy Scenario Areas (PSAs) and the Policy Development Zones (PDZs) as set out in Shoreline Management Plans for Durlston Head to Rame Head and Rame Head to Hartland Point.

Overall the project added, updated or amended 2,737 records; the new sites created totalled 2,294 for Cornwall, 82 for Devon and 227 for Plymouth.

Twenty-three prehistoric and Romano-British sites in Cornwall were identified by the project. These include a prehistoric occupation site on Maker Heights which was updated to a Mesolithic occupation site, and eight potential barrows were added in Cornwall, all identified by archaeological assessments of National Trust properties. Buried land surfaces, at Poldhu Cove and Church Cove on the Lizard were also added. Place- and field-name evidence suggested the site of four potential rounds, or prehistoric enclosures, in Cornwall. At Corgerrick, on the Lizard, the later medieval settlement may have been built within a round, the curvilinear enclosing bank partially preserved on the north side of the farm.

No new prehistoric sites were added in Devon or Plymouth.

Only two early medieval sites were added. In Cornwall, place-name evidence together with field-names recorded on the *c*1840 Fowey Tithe Award suggests the site of the former settlement of Trewhale. The Cornish language *tre-* place-name suggests an early medieval date. In Plymouth, analysis of historic maps suggested that the now destroyed church at Lower Ernesettle was built in a sub-circular enclosure (perhaps prehistoric?), suggesting the possible site of an early Christian site or *lann* which was built over in the 20th century.

No medieval sites were identified in Devon and Plymouth but 97 new sites were added in Cornwall. A majority of these were in the area of the Fowey Estuary, having been

previously identified by the Fowey Estuary Audit. Of these, 17 were quays, 15 were trackways and 13 were settlements.

Monuments and buildings dating to the post-medieval period form the majority of the data recorded by the project, with 1,854 new sites added across the project area.

These comprised a wide range of monument types, the most common of which were wrecks. In total 389 post-medieval wrecks and potential wrecks were added. The data was derived from a variety of sources, principally the AMIE database of the NHRE and to a lesser extent the estuary audits for the Helford, Fal and Fowey and Martin Read's surveys of hulks on the Rivers Tamar, Lynher and Plym.

Threats to the coastal historic environment resource can be characterised in two ways: 'natural' threats such as coastal change and rising sea-levels and 'anthropogenic' threats including coastal defence schemes, infrastructure works and visitor pressure.

Research priorities and themes identified by the desk-based assessment are presented in the context of the regional themes and research aims set out in the South West Archaeological Research Framework (SWARF). Specific sites and areas which would benefit from further research or work include:

- Scheduled Monuments and Registered Parks and Gardens threatened by coastal erosion;
- Conservation Statements and Management Plans for Protected Wreck Sites;
- New sites identified by the RCZAS;
- Rapid identification surveys across targeted areas of low HER record density;
- The potential for Mesolithic sites on the south Coast of Cornwall between Rame Head and the Helford Estuary;
- Peat deposits and submerged forests along the southern coast of Cornwall;
- Prehistoric cliff castle/promontory forts and the wider historic use of coastal promontories;
- Sea stacks, rocks and islets;
- Salt production in the Romano-British and medieval periods;
- Later prehistoric, Roman and early medieval settlement and industry in the wider coastal zone;
- Tide mills;
- Ropewalks;
- Smaller coastal settlements;
- Quays on the Tamar, Fowey, Fal and Tamar Estuaries;
- Coastal field systems and medieval settlement;
- Survey of the hulks of Tamar Sailing Barges and Brixham Trawlers in the Tamar Estuaries.

1 Introduction

1.1 Project background

England's coastal zone contains a rich legacy of historic assets including a complex array of fragile and irreplaceable archaeological and palaeoenvironmental remains, wrecks, hulks, aircraft crash sites, historic buildings and structures, and indeed entire landscapes. In many cases these remains are of national and even international significance due to their circumstances of survival and subsequent exposure at the coast. These remains are, however, vulnerable to a wide range of threats, including anthropogenic pressures such as those associated with commercial development and shoreline management interacting with natural processes of coastal change. The coast has always been a dynamic environment, but it is now generally accepted that coastal physical processes are being accelerated and magnified by changes in annual rainfall distribution and wave direction, relative sea-level rise and an increase in storm incidence, all associated with wider climate change.

Over recent decades it has been recognised by coastal managers and Government that the entire English coastline cannot be maintained in its present form through the 21st century and that, where possible, it is more feasible and cost effective to work with natural processes than to seek to counter them. Coastal management is now viewed more holistically, taking into account not just the need to protect life and property but also environmental and social factors, as part of the move towards Integrated Coastal Zone Management (ICZM).

Both Defra's programme of shoreline management planning and the remit of the Marine Management Organisation (MMO) vis-à-vis marine planning contribute to this development. A Shoreline Management Plan (SMP), for example, provides 'a large-scale assessment of the risks associated with coastal processes and presents a policy framework to reduce these risks to people and the developed, historic and natural environment in a sustainable manner' (Defra 2001; 2005: see also Defra 2002b and McInnes 2003 for further information on coastal management). Marine Plans guide those who use and regulate marine and coastal areas to encourage sustainable development while considering the environment, economy and society:

(https://www.gov.uk/government/collections/marine-planning-in-england).

The process of SMP and Marine Plan development is consultative, drawing on information provided by, and balancing the needs of, sectoral interests. Effective participation by the heritage sector depends in large part on identifying coastal and marine historic assets, evaluating their significance and potential, and assessing which may be at risk from coastal or seabed change. Data collection, interpretation and synthesis for the Rapid Coastal Zone Assessment Surveys must be directed primarily towards these aims.

In 1997 Historic England (then English Heritage) and the Royal Commission on the Historical Monuments of England (RCHME) published a joint policy statement on the management of coastal archaeological remains (English Heritage and RCHME 1996) and a national assessment of English coastal archaeology (Fulford *et al* 1997). These documents were followed by more specific guidance (English Heritage 2003; 2006). The assessment highlighted the poor quality of archaeological records relating to the coast and the policy statement recommended that: 'The record of coastal archaeology held nationally and locally should continue to be actively developed and enhanced in order to permit effective management of the resource and to facilitate understanding of England's development as a maritime nation.'

Whilst the advantages of thematic surveys on the coast were acknowledged by the assessment, it was also noted that the quality of the available record of coastal remains was such that in many areas, detailed studies would need to be preceded by rapid baseline surveys. This would allow a broad assessment of the range of historic assets identified at the coast, their significance and their vulnerability. An update of the

assessment, reviewing the results of the RCZAS programme to 2013, has recently been published (Murphy 2014).

This Phase 1 DBA RCZAS for South Coast Cornwall was commissioned by Historic England and carried out by Cornwall Archaeological Unit (CAU) and Coastal and Offshore Archaeological Research Services (COARS), University of Southampton in 2017 and 2018.

1.2 Aims and objectives

The broad Aims of this project were to:

1. provide an enhanced Historic Environment Record (HER)/Sites and Monuments Record (SMR) and National Record of the Historic Environment (NRHE) record for coastal and near-shore marine heritage assets (including palaeoenvironmental deposits), to a nationally agreed common minimum data standard, in order to permit an improved curatorial response to strategic coastal and marine planning or management initiatives at a national and regional level;
2. provide a factual basis for the initial curatorial response to individual applications for commercial developments or schemes, in advance of more detailed evaluation and mitigation related to Environmental Impact Assessments (EIAs) and/or planning applications;
3. enhance public understanding and enjoyment of coastal and maritime heritage; and
4. assist Local Authority curatorial archaeologists in development control.

The Objectives of this project were to:

1. provide updated data for the project area which is compatible with the needs of other coastal and marine managers, parallel coastal surveys, industry and researchers;
2. provide an overview of coastal change across the project area from the Palaeolithic onwards;
3. provide an assessment of the degree and nature of threat to the project area's coastal historic assets which has regard to the models of future coastal change presented in relevant Shoreline Management Plans;
4. provide a broad assessment of the likely archaeological potential and vulnerability of all stretches of the coast defined in the project scope;
5. provide a sound basis for developing management and research priorities for the project area in respect of sites and areas of potential with different levels of importance and under different levels of threat, based on:
    - the identification of areas or sites meriting further survey or evaluation;
    - the identification of areas or sites requiring positive management action;
    - the identification of significant historic assets meriting consideration for protection by means of designation, whether as Scheduled Monuments, Protected Wrecks, Listed Buildings, Registered Parks and Gardens or Historic Battlefields, as defined in the National Heritage List for England (NHLE);
    - the identification of areas where heritage assets may be at high risk of damage or destruction; and
    - the establishment of future research priorities for the coast within the project area.

1.3 Methods

1.3.1 GIS database and archive searches

Concordance between the Cornwall, Devon and Plymouth HERs and the NRHE was ensured from the beginning of the project. GIS was used to provide a single platform to carry out the initial production of excel-based gazetteers and as a structured way to update and create records which will be the reference base for later update of the HERs. The gazetteers included new sites that were created and the existing records that were updated by the archive searches and data collection.

Close and continuous contact was established with HE from the earliest stages of the project. Data was MIDAS compliant, and the standard word-lists included in INSCRIPTION were employed. Positional data was supplied in the OSGB36 datum which is preferred by HE. Digital archives will be maintained by the Archaeological Data Service, York (ADS).

The existing HER data was exported from the Cornwall and Scilly, Plymouth City Council and Devon County Council Historic Buildings, Sites and Monuments Records (HBSMR) as shapefiles and selected to the entire project area. This process was discussed with each of the HERs during the preparation of the project design and there were no problems with data transfer. The NMP data for Cornwall was already integrated into the Cornwall and Scilly HER and had limited inclusion in the NRHE.

In addition to the Cornwall and Scilly, Plymouth City Council and Devon County Council HBSMR data, other map/data sources included:

- National Trust and National Parks HER/SMRs, where appropriate;
- NRHE records (as shapefiles);
- The Portable Antiquities Scheme (PAS) and Marine Antiquities Scheme (MAS) databases;
- Defence of Britain records (available from the Cornwall and Scilly HER in digital form);
- Ordnance Survey Master Map (Cornwall Council);
- Early OS map editions (digital copies held by CAU);
- *c*1840 parish Tithe Award maps and apportionments (digital copies for Cornwall held by CAU, digital copies for Devon were obtained from the Devon Archives and Local Studies Service);
- Estate maps (digital copies held by CAU or available at the CRO);
- Early Admiralty charts held by the UK Hydrographic Office;
- The SMPs for Durlston Head to Rame Head and Rame Head to Hartland Point.

Additional, local datasets

- Updates from journals, books;
- Charts (paper and digital copies held by CAU or available online);
- Events Records (in particular, archaeological assessment reports).

All GIS work followed the latest guidelines for Historic England projects involving GIS (Historic England 2015). The GIS methodology for creation of the project GIS database and subsequent enhancement of the HBSMRs is set out below in Appendix 8.

1.3.2 HER Enhancement

During this stage the Cornwall and Isles of Scilly, Plymouth City Council and Devon County Councils HERS were enhanced with the results of the archive searches, using the GIS database that had been created.

For Devon and Plymouth this was carried out by members of the Devon and Plymouth HER teams. Members of the CAU team were granted access to the Cornwall & Scilly HER and inputted directly into the HBSMR.

The data was MIDAS compliant, and the standard word-lists included in INSCRIPTION.

1.3.3 Preparation and dissemination of the project report

This stage involved compiling the project report text and the production of gazetteers and generation of illustrative material. The structure of the report is outlined in section 1.4 below.

1.3.4 Project Design for Phase Two Field Survey

A draft project design was prepared for Phase-2 field survey (omitting costs and Gantt Chart). It defines the objectives for Phase 2 but will remain dormant until funding becomes available.

1.4 Structure of this report

This report comprises 13 sections and eight appendices. Section 1 is an introduction to the project. Section 2 describes the project area, its geology, coastline and landscape character and relevant strategic historic environment projects. Section 3 sets out the historic environment and natural environment designations within the project area. Section 4 concerns coastal and marine management. Section 5 is an overview of coastal change from the Palaeolithic to the present day. Section 6 is a resumé of previous archaeological and historical work divided by relevant PDZ or PSA. Section 7 is an assessment of historic maps and charts and Section 8 assesses other datasets such as the RCZAS NMP component, the Cornwall, Devon and Plymouth HERs, the NRHE, wreck sites, the Portable Antiquities Scheme, droits from the Receiver of Wreck, lidar, and BGS boreholes. Section 9 is an assessment of areas of results and potential. Section 10 appraises threats to the coastal historic environment resource. Section 11 presents research priorities and themes and identifies specific sites and areas that would benefit from further research or fieldwork. Section 12 is a list of references, primary and secondary sources and websites. Section 13 is an inventory of the contents of the project archive. Appendix 1 is a list of Scheduled Monuments within the project area, Appendix 2 a list of Grade I and Grade II* Listed Buildings, Appendix 3 a list of Registered Parks and Gardens, Appendix 4 a list of Protected Wreck sites, Appendix 5 a list of UKHO charts relevant to the project area, Appendix 6 describes new sites identified by period and monument type, Appendix 7 is an article on hulk surveys in the Tamar Estuaries by Martin Read; and Appendix 8 sets out the GIS method.

2 Survey area

2.1 The project area

The main project area for this component of the RCZAS extended from Land's End in the west to the boundary between Devon and Cornwall/City of Plymouth in the east. CAU and COARS ensured edge-matching with both adjacent RCZASs — South Devon (Hegarty *et al* 2014; Pink 2015) and North Devon and North Cornwall (ongoing).

In the east this required reporting on the small part of Devon (county boundary to Andurn Point) that was excluded from the South Devon Coast RCZAS (Pink 2015) because the project area of the latter was aligned with historic National Mapping Programme (NMP) project boundaries.

The extent and scale of the project area (Figs 2.1 and 2.2) was discussed with Emma Trevarthen (former HER Officer, Cornwall and Scilly HER), Rachel Broomfield and Jess Maslen (Historic Environment Officers, Plymouth City Council) and Bill Horner (County Archaeologist, Devon County Council) and included an assessment of surviving remains within both the open coast and its tidal estuaries, including the intertidal zone to Lowest Astronomical Tide (LAT) from the coastal strand, and the immediate coastal hinterland. For Phase 1 Desk-based Assessments the 'hinterland' is generally taken to be all 1km National Grid Squares contiguous with, or overlapping, the coast and estuary shorelines so the study area extends for 1km to the landward side of Mean High Water. In addition the study area extends up estuaries to 1km beyond the tidal extent.

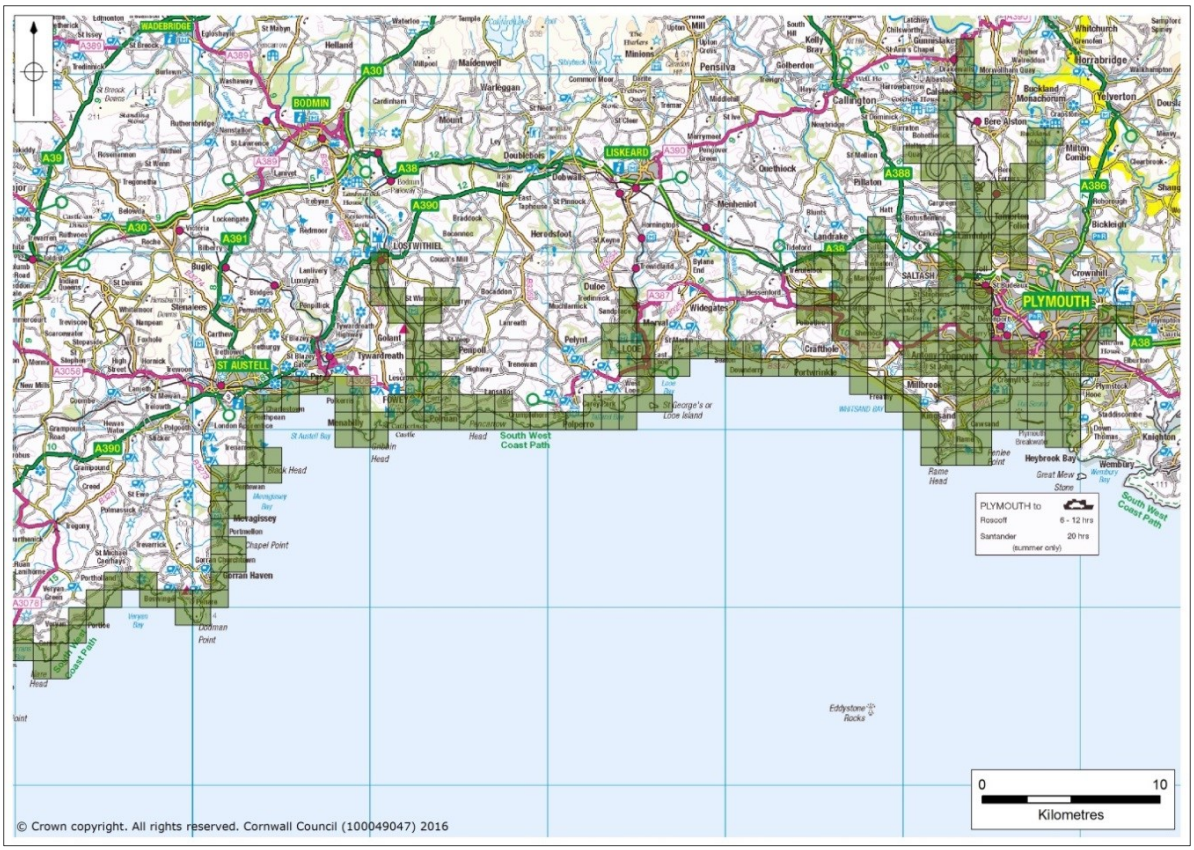


Fig 2.1 South Coast Cornwall RCZAS study area (east - Andurn Point, Devon west to Nare Head on the Roseland peninsula, Cornwall).

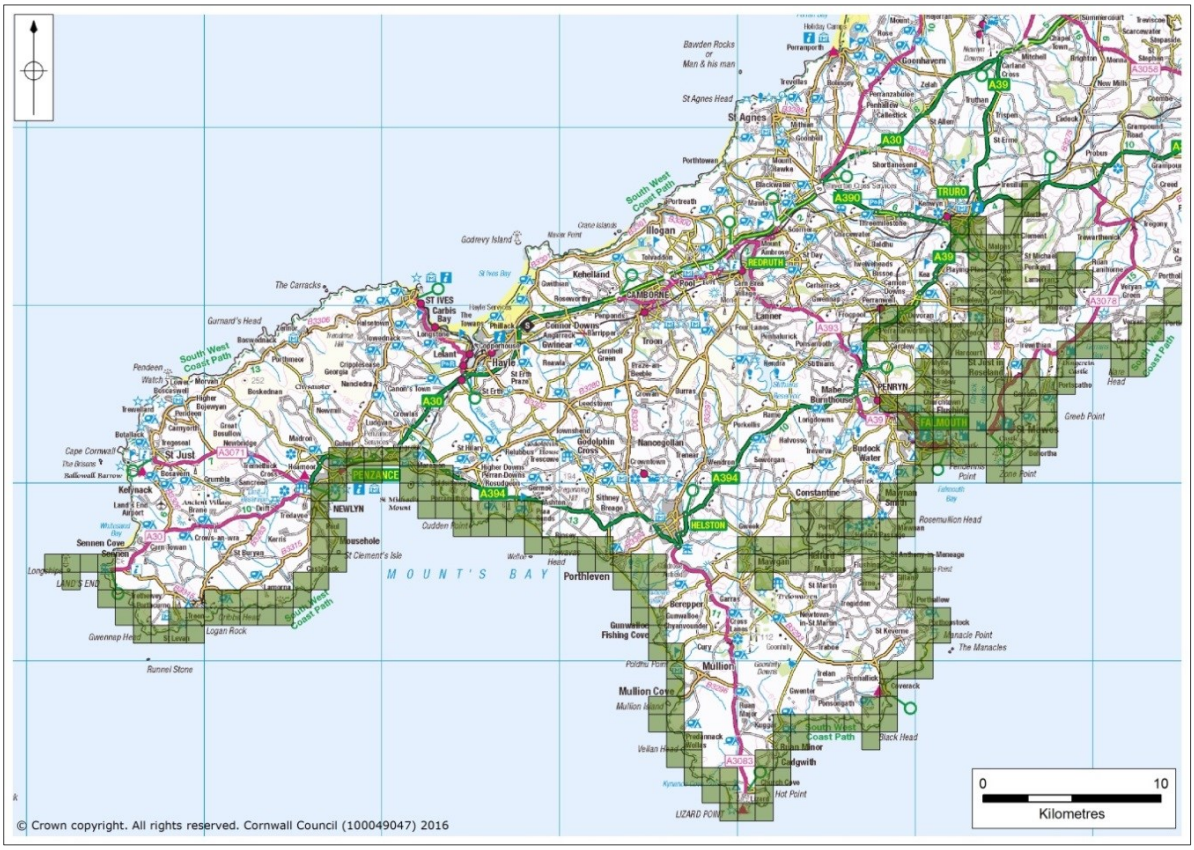


Fig 2.2 South Coast Cornwall RCZAS study area (west – Nare Head west to Land's End).

Coverage of wrecks extended out to 1km below MHW, where there is full swath bathymetry coverage, including most of the outer estuaries. Beyond the 1km limit there is poor bathymetry coverage (either single beam echo sounder or no survey data) for key stretches of the coastline, notably between Dodman Point (south of Mevagissey) and the entrance to Plymouth Sound.

Sediment cells for the study area are fully defined in the Shoreline Management Plans for Durlston Head to Rame Head (Halcrow Group 2011) and Rame Head to Hartland Point (Royal Haskoning 2011): https://www.gov.uk/government/publications/shoreline-management-plans-smps/shoreline-management-plans-smps

The Phase 1 DBA study area was sub-divided according to the Policy Scenario Areas (PSAs)/Policy Units (PUs) set out in the Durlston Head to Rame Head SMP and Policy Development Zones (PDZs)/Management Areas (MAs) set out in the Rame Head to Hartland Point SMPs (Figs 2.3 and 2.4):

- PSA15: Wembury Point to Rame Head including Plym and Tamar Estuaries, Section O Wembury Point to Devil's Point (PUs 6c27–6c30), Section P Tamar Estuary (PUs 6c31–6c40) and Section Q Mount Edgcumbe to Rame Head (PUs 6c41 to 6c45);
- PDZ1: Rame Head to Pencarrow Head, MA01 Rame Head to Downderry, MA02 Downderry and Seaton, and MA03 Seaton to Pencarrow Head;
- PDZ2: Pencarrow to Gribbin Head (including Fowey Estuary), MA04 Pencarrow Head to Gribbin Head and MA05 Fowey Estuary above Boddinnick;
- PDZ3: Gribbin Head to Black Head, MA06 Gribbin Head to Par Docks and MA07 Par Docks to Black Head;
- PDZ4: Black Head to Zone Point, MA08 Black Head to Dodman Point and MA09 Veryan Bay, MA10 Gerrans Bay;
- PDZ5: Zone Point to Nare Point (including Fal Estuary), MA011 Lower Fal ,MA12 Upper Fal, MA13 Pendennis Point to Rosemullion Head, MA14 Helford;

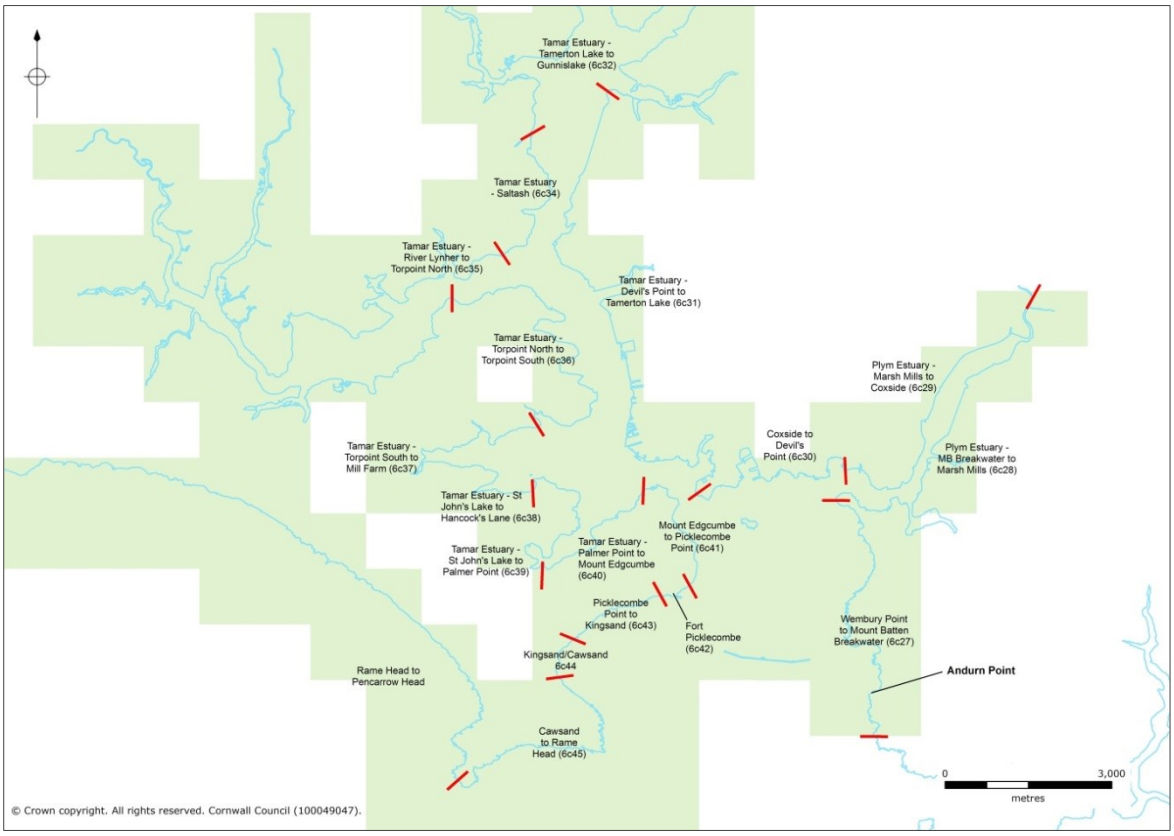


Fig 2.3 Durlston Head to Rame Head SMP Policy Scenario Areas.

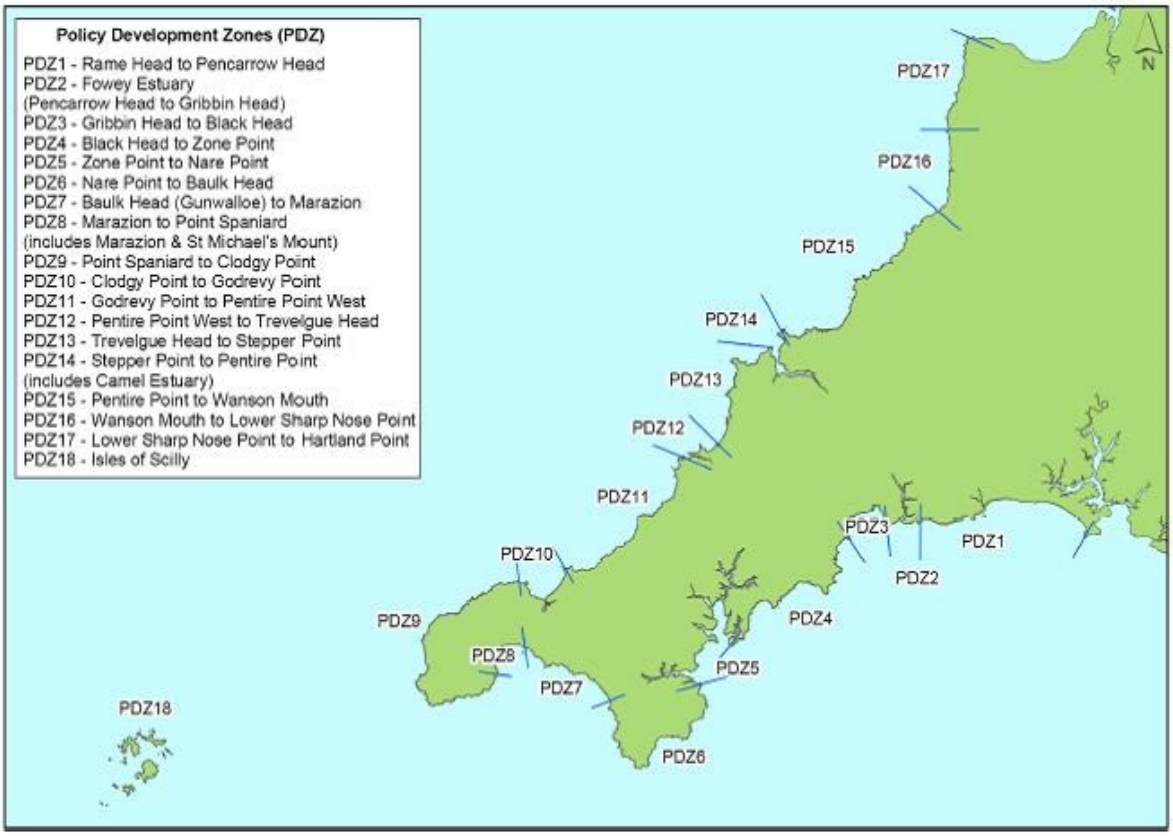


Fig 2.4 Rame Head to Hartland Point SMP Policy Development Zones (from Royal Haskoning 2011).

- PDZ6: Nare Point to Baulk Head – Gunwalloe, MA15 Lizard East (Nare Point to Lizard Point) and MA16 Lizard West (Lizard Point to Baulk Head);
- PDZ7: Mount's Bay East Baulk Head to (Baulk Head (Gunwalloe) to Marazion), MA17 Baulk Head to Trewavas Head and MA18 Trewavas Head to The Greeb;
- PDZ8: Mount's Bay West (The Greeb to Point Spaniard, including Marazion and St Michael's Mount), MA19 Marazion to Longrock, MA20 Longrock to Penzance, MA21 Penzance and Newlyn (Albert Pier to Sandy Cove) and MA22 Mousehole (Sandy Cove breakwater to Point Spaniard); and
- PDZ9: Penwith Peninsula (Point Spaniard to Clodgy Point), MA23 Point Spaniard to Land's End.

2.2 Geology and coastline

See below Section 5, Figure 5.1, for a map of geological map of the South West.

2.2.1 Durlston Head to Rame Head SMP (PSA15)

Andurn Point to Rame Head (Sections O, P, Q)

Fig 2.5 Cannon at Cawsand (Photograph: Reproduced with permission, iWalk Cornwall).

Plymouth developed on the largest estuary on the south Devon coast, and is located at the point of discharge of three major rivers, the Tamar, the Tavy and the Plym. Several smaller streams and creeks also discharge into the estuary. These waters combine to form a *ria* (drowned river valley) with Plymouth Sound, which is flanked by steep rocky cliffs and is partially protected by the Plymouth Breakwater, which limits the wave exposure of the shoreline. The presence of Drake's Island within the Sound also provides an element of shelter for the shoreline (McInnes 2016, 153).

Plymouth is a strategically important port and anchorage, and the Sound a significant area for leisure sailing. Deeper water navigation channels lead from the open sea, either side of the breakwater to the anchorage at Plymouth Sound. From Plymouth Sound a navigation channel passes through The Narrows to the anchorage of the Hamoaze, opposite the Royal Naval Yard at Devonport. Higher up the shallow creeks such as at Kingsmall Lake wildlife watching is an important activity in the coastal landscape. At low tide in the smaller creeks, and flanking the upper reaches of the Tamar, mudflats of alluvium and smaller areas of saltmarsh form significant habitats. Navigation hazards determine the use of the Sound for commercial shipping – the long-term use of the estuary system has also created a high amount of maritime debris but the navigation channels and anchorages are regularly dredged to maintain navigable depth and are marked by several buoys and navigation aids (based upon the HSC Conflated Broad Types).

The depth of the navigation channel at Plymouth is largely due to the cutting down of a river channel and valley during colder periods in the Quaternary period and then its

subsequent inundation. The drowned river estuaries are considered by geologists to still be at an early stage of shoreline evolution (Bristow 1996; Edmonds *et al* 1975).

In terms of Historic Landscape Character (HLC) the coastline has areas of coastal rough ground, several with traces of earlier fields, on the steeper more exposed coastal and estuarine slopes. The Enclosed Land is a mixture of Medieval Enclosed Land and Post-medieval Enclosed Land (Cornwall HLC Types) and Medieval and Post-medieval enclosures (Devon HLC Types). In many places this land extends down to the water's edge. Typically in Cornwall and Devon, the Medieval Enclosed Land is located in the more sheltered ground and characterised by small farming settlements. Many of the steeper slopes on the upper creeks are identified as Ancient Woodland (Devon HLC Type) or Woodland (Cornwall HLC Type). In the vicinity of manor home farms in the wealthier, more sheltered parts flanking the estuaries in Devon the Barton Fields HLC Type can be found - large, regular enclosures likely to have been laid out between the 15th-18th centuries. In the upper reaches of the Tamar, largely within the boundary of the Cornwall and West Devon Mining World Heritage Site, there are several areas of industrial historic character, for example, Morwellham.

The coastal frontage at Plymouth is composed of rocks of the lower Old Red Sandstone group of early Devonian age. North of the coastline there are outcrops of limestones, mudstones and slates of the Torbay and Tamar Groups. These occupy most of the area of the inner harbour (*ibid*, 153). These cliff lines and rocky coasts are resistant to erosion with very slow rates of erosion (Halcrow Group 2011, 153).

Rame Head on the western tip of the entrance to the natural harbour of Plymouth Sound is a treeless conical headland with an ancient chapel. The appearance of the sheltered eastern side of the headland is softened by woodland and contrasts with the exposed cliffs to the west (*ibid*, D-13).

2.2.2 Rame Head to Hartland Point SMP

The geology of the entire coastline of the Rame Head to Hartland Point SMP area consists almost exclusively of ancient, resistant rock. Although direct glacial deposits are entirely absent, the coastline does retain intermittent exposures of raised beaches and head deposits (Defra 2002), such as at Lowland Point near Coverack. These are important because they represent a potential source of sediment to the coastline in the future (Royal Haskoning 2011, 3-1).

Fig 2.6 Rame Head (Photograph: Reproduced with permission, iWalk Cornwall).

The geomorphology and general shape of the SMP coastline is characterised by hard, craggy cliffs, resistant headlands, small and medium sized bays containing wide sandy beaches, rocky coves containing smaller pocket beaches formed from sand, gravel and cobbles, large areas of both relic and mobile dunes (often referred to as 'towans') and several examples of drowned river valleys such as the Helford river system and the Fal Estuary. Many of the smaller bays and coves around the coastline coincide with minor faults in the bedrock geology (*ibid*, 19).

Cornwall's south coast from Rame Head westward to Penlee Point is largely composed of interbedded mudstones and pebbly sandstone, together with some minor beds of limestone, conglomerate and igneous rock (Defra 2002). The exceptions to this are the Lizard and Land's End peninsulas. The Lizard is composed of hard metamorphic and igneous rocks of the Lizard Series. Land's End is composed of granite, as is St Michael's Mount, located in Mount's Bay. Mount's Bay itself is formed mostly of Devonian slates (*ibid*, 19).

Headlands along the south coast are generally formed of harder bands of rock occurring in the Dartmouth slates and Meadfoot Beds, and also due to the occasional presence of harder sedimentary rocks (e.g. St Austell Bay) and dolerite (e.g. Black Head) (*ibid*, 19).

PDZ1: Rame Head to Pencarrow Head

This section of coast generally faces south or south west. It mainly comprises hard, rocky cliffs fronted by shore platforms, sand/shingle beaches and incised valleys with streams discharging to the coast. The largest beach is Long Sand at Whitsand Bay, with a few smaller pocket beaches including Millendreath Beach and Seaton Beach. Tidal inlets exist at Seaton, Looe and Polperro. The main coastal rocks are Dartmouth slates and sandstones. Headlands form where harder bands in the rock are exposed by marine processes. At the eastern boundary Rame Head has been hardened by fine, quartz-grained grit and is bounded and partly defined by faulting to the north east and south west. The superficial geology includes long, intermittent exposures of raised beaches and head material – these are important sources of sediment for the coastal system (Royal Haskoning 2011).

The harbour at Looe was formed by a long straight valley eroded along a line of weakness, probably a fault. During the several glacial periods in the Quaternary period the Looe River cut down in response to the lower sea levels (Bristow 1996).

Whitsand Bay is used for recreational sailing and inshore fishing with a military practise area off Tregantle Fort. Recreational diving is a popular activity in the area of *HMS Scylla* and *The James Egan Lane*, both lying close to Rame Head. There are few navigational hazards in the project area, except for rocks offshore from Lansallos (Udder Rock) and close to Pencarrow Head (based upon the HSC Conflated Broad Types).

The coastal slopes, especially on steeper and exposed locations, are largely Coastal Rough Ground HLC Type (including cliffs and cliff failures). Inland much of the area is Medieval Enclosed Land but in areas of higher ground there are parcels of Post-medieval Enclosed Land (land enclosed and improved since *c*1540), especially in the exposed coastal section between Downderry and Freathy. The River Looe and the Seaton Valley are more sheltered with steep valley sides which include extensive areas of Woodland HLC Type: these river valleys are some of the most wooded in Cornwall.

Rame Head is a conspicuous landmark – a prominent and distinctive headland formed by the hard rocks of the Lower Devonian (408-386 ma) lower Dartmouth Group (usually slates and siltstones with occasional beds of sandstone), the oldest rocks in Cornwall (Bristow 1996).

PDZ2: Pencarrow to Gribbin Head (including Fowey Estuary)

This zone includes the Fowey Estuary with the tidal limits extending to settlements of Lerryn and Lostwithiel. The solid geology of the estuary comprises mainly Devonian sedimentary rocks, typically slates and sandstones with rare limestones and conglomerates. The Devonian sedimentary rocks are overlain with quaternary head deposits associated with valley gravels (Edmonds *et al* 1975; Pirrie 2002). The Fowey Estuary is relatively narrow and steep-sided in relation to its cross-sectional volume. Its intertidal area is very limited in the lower estuary. In the upper estuary, above Golant, and within the Penpoll Creek, there are some significant expanses of mudflat and saltmarsh, though still limited in relation to overall estuary extent. The coastline is rocky with bays at Lantic Bay and Polridmouth (Royal Haskoning 2011).

The Fowey Estuary is steep sided. It has several offshoot creeks, most notably at Lerryn, Penpoll and Pont. Much of the estuary is flanked by the Woodland HLC Type and due to the shelter of its location, Medieval Enclosed Land HLC Type is extensively found, sometimes to the water's edge. In the upper reaches of the estuary and the creeks, and with the drop of the tide, there are large areas of tidal mudflats and, closer to Lostwithiel, salt marshes. Lostwithiel was an important port in the medieval period but the navigability of the channel was increasingly hampered by alluvium washed down from tin streaming activity further up the river catchment.

Gribbin Head is a prominent landscape feature, protruding as it does out into St Austell Bay. Fowey is an important china clay port with relatively large ships able to navigate the lower end of the estuary due to its depth. Leisure sailing is an important activity especially in the summer months. There are offshore navigational hazards in the approach to the mouth of the River Fowey and these are marked by buoys (based upon the HSC Conflated Broad Types).

PDZ3: Gribbin Head to Black Head

This section of coastline encompasses St Austell Bay and includes the communities of Polkerris, Par, Carlyon Bay, Charlestown, Duporth and Porthpean as well as open countryside, tourist amenities and agricultural land. The bay faces south and is a rocky embayment that is relatively protected and rich in sediment with Par Sands and Carlyon Bay relatively large sandy beaches (Royal Haskoning 2011).

FutureCoast (2002) defines the geology as, 'many Devonian rocks, with sandstones, slates and limestones of the Meadfoot Beds. Gribbin Head is formed of more resistant

beds and Black Head is a dolerite intrusion. Head and raised-beach deposits overlie the bedrock to various depths and at various elevations.' The coastal slopes have a low failure rate, but where it does occur, it is normally caused by the sliding of more vulnerable deposits overlying more resistant beds of harder rock. St Austell Bay includes exposures of coarse agglomerates, lavas and tuffs of volcanic origin (Edmonds et al 1975; Bristow 1996).

Like much of the rest of the Cornish coast the bedrock in this PDZ is highly resistant to wave attack. The coast around St Austell Bay forms a boundary of the killas plateau, the elevation of which is around 100m. Streams draining off the killas plateau into the Par and St Austell rivers have cut dendritic valleys, which have tended to infill during periods of seal level rise. The channels of these rivers have submerged seaward extensions, which have been infilled with sediment to depths of up to 15m.

St Austell Bay is relatively sheltered and has been characterised as used for leisure sailing but there is also inshore fishing and potting and, more recently, offshore shellfish farming (based upon the HSC Conflated Broad Types). The river valley at St Blazey is now characterised by low lying Post-medieval Enclosed land, Settlement and Plantation and scrub HLC Types but was, up until the late medieval/early post-medieval period, a shallow creek.

Being sheltered away from the main headlands, there is more limited Coastal Rough Ground HLC Type (compared to neighbouring areas) with Medieval and Post-medieval Enclosed Land often found close to the cliff edge. The coastal margin has seen considerable urbanisation in the late 20th century, and Carlyon Bay, a large beach created by china clay waste, was once a large area of recreational activity but now awaits potential redevelopment. At low tide there are expansive sand flats at Par Sands, again, in part created by china clay waste washing downstream from nearby clay works.

PDZ4: Black Head to Zone Point

The east and south east facing coast of this PDZ comprises a series of rocky bays delineated by headlands and backed by hard cliffs of variable height. From Black Head south to Dodman Point, the east facing coastline of Mevagissey Bay contains the settlements of Pentewan, Mevagissey, Portmellon and Gorran Haven. It is an example of a largely natural coastline, modified only in discrete areas. Streams draining off the killas plateau into the sea at Mevagissey and Portmellon have cut dendritic valleys, which have tended to infill during periods of sea level rise.

Fig 2.7 The coast path at Dodman Point, looking south across Veryan Bay (Photograph: CAU).

South of Dodman Point two bays (Veryan Bay and Gerrans Bay) are divided by Nare Head (Fig 2.7). In Veryan Bay there are the two small settlements of Portholland and Portloe, the latter having a very small natural fishing harbour. There are small sandy pocket beaches at Hemmick Beach and Porthluney Cove/Caerhays Beach. Gerrans Bay again provides an isolated, naturally functioning coastline of hard slate cliffs, rocky shore platforms and rock outcrops with little modification and is sheltered from the extremes of the westerly Atlantic wave climate. The adjacent settlements of Portscatho and Gerrans are the only settlements of note. Beaches exist in discrete locations along the coastline, the main substantial beach being Pendower. Smaller sandy coves are present at Porthcurnick and Porthbeor, at the far south-western end of Gerrans Bay, close to Zone Point (Royal Haskoning 2011).

FutureCoast (2002) describes the geology of this PDZ, 'Devonian rocks with sandstones, slates and limestones of the Meadfoot Beds north of Pentewan, and slates and sandstones with gritty interbeds of the Gramscatho Grit, to the south. Slates, limestone and chert of the Veryan Series also outcrop at Gorran Haven. Dolerite intrusions form headlands at Black Head and in Gorran Haven, Otherwise, headlands are usually east-pointing, following the strike of the folded strata. Dodman Point is formed of more resistant beds within this complex of formations. Head and raised-beach deposits overlie the bedrock to various depths and at various elevations throughout the unit'. The prominent and distinctive headlands of the Roseland peninsula are formed by hard rocks including metamorphic rocks and Ordovician quartzites formed by huge blocks associated with the Roseland Breccia (Bristow 1996). Streams draining off the killas plateau into the sea at Mevagissey and Portmellon have cut dendritic valleys, which have tended to infill during periods of sea level rise.

The coastline is rugged and exposed, especially from Dodman Point westwards. The coastal slopes can be steep and rocky, resulting in extensive parts of the coastal margin being Coastal Rough Ground. Much of the enclosed land is Medieval Enclosed Land HLC Type but there are smaller areas of Post-medieval Enclosed Land, mostly located in the more marginal parts of existing farms, or in more exposed locations. Due to exposure to the wind there are few trees, except in the parkland surrounding Caerhays Castle, located in a sheltered valley. Offshore, Veryan and Gerrans Bays are characterised as used for leisure sailing and fishing (including potting). Currents off Dodman Point can be a navigational hazard forming an overfalls in certain conditions and the Gwineas are rocks offshore from Gorran Haven marked by a buoy (based upon the HSC Conflated Broad Types).

PDZ5: Zone Point to Nare Point (including Fal Estuary)

The solid geology of this section of coastline predominately consists of slates and sandstones of the Portscatho formation of middle Devonian Age with thin limestone beds in the Helford area (Pirrie *et al* 2003a). Outcrops of the Portscatho formation form the cliffs at Trefusis Point and along the eastern side of the Fal Estuary. Between Mylor Creek and Trefusis Point the Mylor Slate formation is present (Royal Haskoning 2011).

The Fal Estuary is a large estuary with a deep navigation channel and anchorage forming one of the deepest natural harbours in the world. This depth has been achieved by the erosional activity of a river which has cut down through the killas country rock in the past glacial periods. Due to its significance as a harbour Falmouth is nationally important port with a lot of activity associated with its docks, bunkering, refuelling and refitting services. Due to the size of the estuary there are several large and popular sailing clubs. The Helford River is also significant in its use for leisure sailing, especially in the summer months. Recreational diving is important, in particular off Pendennis Point. Falmouth Bay is used for bunkering and refuelling and often has several large ships at anchorage (based upon the HSC Conflated Broad Types).

The normal tidal limit of this extensive estuarine water body extends inland some way to the city of Truro and a number of significant tributary creeks at Tresillian, Calenick, Ruan Lanihorne and Cowlands (Royal Haskoning 2011).

Significant communities have developed along the immediate Fal Estuary frontage, particularly at Falmouth and Penryn, with the smaller settlements of St Mawes, St Just, Feock and Mylor Churchtown. Truro, on the uppermost reach of the estuary on the Truro River, is Cornwall's only city and the County Town.

The coast between the mouth of the Falmouth Estuary (at Pendennis) and the Helford River faces east into Falmouth Bay. This coastline is quite varied, and includes hard rock headlands, exposed open cliffs with shore platforms and small beaches protecting brackish lagoons at Swanpool and Maenporth. The Helford Estuary is a flooded river valley, the upper reaches of which are flanked by muddy banks. This estuary is significantly smaller than the Fal and much less developed, with only a few communities at Gweek, Porth Navas, Helford and Gillan (*ibid*).

The coastline of this PDZ is more sheltered than the surrounding areas, especially in the estuaries. There is a thin coastal strip of Coastal Rough Ground HLC Type but in the upper reaches of the estuaries are extensive areas of Woodland HLC Type, especially on the steeper slopes. Inland, the area is mostly Medieval Enclosed Land HLC Type, reflecting the relative wealth and shelter of the landscape. Areas of Ornamental HLC Type surround the several country houses which can be found in the area of the Fal Estuary, most notably, at Trelissick, Tregothnan, Glendurgan, Trebah and Trelowarren.

PDZ6: Nare Point to Baulk Head – Gunwalloe

Fig 2.8 Mullion Harbour in June 2015 (Photograph: CAU).

This PDZ covers the Lizard Peninsula. The south east facing coastline is largely comprised of rugged, hard-rock sea cliffs, and includes lengths of narrow shingle beach and pocket beaches. This shoreline fronts a coastal hinterland that is essentially agricultural and tourism based. There are also two fishing villages with small fleets at Coverack and Cadgwith. Both of these communities are located on the eastern side of the Lizard, making use of the natural shelter from the westerly wave regime, along with the settlements at Porthallow and Porthoustock. There are also two large quarries close to Porthoustock on the east side of the peninsula (Royal Haskoning 2011).

The west-facing coast is exposed to the dominant westerly Atlantic weather systems and its extremely energetic waves. As elsewhere the predominant features are hard-rock cliffs fronted by rock platforms and, as on the eastern side, there are lengths of narrow shingle beach and pocket beaches. This side of the Lizard Peninsula is also notable for the small islands and rocks that have become disconnected from the mainland due to cliff erosion and rising seas. It is extremely sparsely populated but there is a small settlement and harbour at Mullion Cove (Fig 2.8) and some residential and commercial properties along the cliff line around Polurrian Cove, Poldhu Cove and at Dollar Cove/Jangye-ryn (*ibid*).

The area is noted for its particular geological interest, notably around Lizard Point. The cliffs at Coverack include an exposure of a rare Moho discontinuity; a boundary between the earth's crust and mantle (*ibid*). FutureCoast (2002) describes the geology of this PDZ as, 'largely composed of ancient resistant metamorphic rocks (mainly mica and horneblende schists) into which serpentine and igneous materials have intruded'. From Lizard Point to Gunwalloe the geology is 'serpentine and schists of the Lizard Series, overlain by shallow head deposits, forming cliffs of up to 75m fronted by rock platforms and boulder beaches'. To the north there is a combination of Devonian sandstones and

slate, again with rock platforms and boulder beaches'. The coast is notable for the small islands and rocks that have become disconnected from the mainland due to cliff erosion and rising seas.

The PDZ is also notable for its extensive areas of Coastal, Upland and Valley Rough Ground HLC Types, which often extend inland from the coast, especially in the poorly drained areas of the serpentine soils on the south and south-western side of the peninsula. In the more sheltered areas, and more frequently on the eastern side of the Lizard in the area known as Meneage, the enclosed land is Medieval Enclosed Land HLC Type, characterised by small farming settlements with Cornish place-names and sinuous field boundaries. In the more marginal locations, especially on the fringes of the rough ground, and as extensions to existing enclosed land, are large areas of Post-medieval Enclosed Land HLC Type dominated by straight field boundaries. Predannack airfield is a military facility used in conjunction with RNAS Culdrose (outside the project area).

Offshore much of the area is used for inshore fishing (hand lining and potting). Being a rocky coastline there are many navigational hazards including the notorious pinnacles forming the Manacles and the rocky reefs off The Lizard. These rocky outcrops cause extensive areas of water turbulence in certain conditions. Telecommunication cables lead to Kennack Sands and Poldhu (based upon the HSC Conflated Broad Types).

PDZ7: Mount's Bay East Baulk Head to (Baulk Head (Gunwalloe) to Marazion)

Gunwalloe is a small fishing cove settlement at the far eastern end of the PDZ. The length of coastline from Gunwalloe to Porthleven consists of 4.5km of steeply shelving beach, facing south west. Mid-way along this coastline is Loe Bar, a barrier beach feature behind which lies Loe Pool, the largest freshwater lagoon in Cornwall and a designated SSSI. Porthleven is a small fishing village based around a fairly substantial harbour which still supports a small fishing fleet. The exposed nature of Porthleven to storms and large waves from the south west is well documented (Royal Haskoning 2011).

Cliffs of Devonian sedimentary rocks back the beach at Porthleven. To the south of Loe Pool the cliffs are composed of Gramscatho Beds with interbedded slates and sandstones. To the north the cliffs are Mylor Slates. These are overlain by head material which reaches beach level towards Porthleven (*ibid*).

From Porthleven to Praa Sands the coast is rocky cliff, shore platform and rock outcrops, a stretch of rural coastline characterised by well-preserved mine engine houses at Trewavas and Rinsey Heads and a number of well-preserved former mining features. From Praa Sands through to Marazion, a number of beaches provide tourism and recreational opportunities. Agriculture is prevalent along the cliff top areas and forms the primary management of that zone. The coastal footpath skirts alongside the fields at the cliff top and there is very little in the way of a buffer zone along the section from Perranuthnoe to Marazion.

From Porthleven to Marazion the geology is mainly composed of Mylor Slates with some harder Metagabbro and Metadolerite in places. A series of heads and points demarcate bays that range in size from very small to around 1.5km. The largest, between Rinsey Head and Hoe Point, contains Praa Sands. The shore platform between Perranuthnoe and Marazion is particularly wide and is characterised by a set of rocks; most notably The Greeb (*ibid*). The cliffs at Praa Sands, Perranuthnoe and behind Greeb Point are soft boulder clay and easily eroded.

Alongside the characteristic south coast geology of slate with igneous outcrops at Rinsey and Cudden Point, there is a valuable mosaic of lowland heathland, fens, reedbeds and freshwater lagoon in this PDZ (*ibid*).

Offshore, the area is used for a combination of fishing sailing, surfing and diving, with Gunwalloe, Praa Sands and Perranuthnoe popular beaches for swimming in summer. Offshore rocks form navigation hazard, especially close in to shore but notably offshore at the Welloe and Mountamopus, formed by rock pinnacles (based upon the HSC

Conflated Broad Types). The area's coastline is a mixture of a thin strip of Coastal Rough Ground, with more extensive Medieval and Post-medieval Enclosed Land HLC Types. The coastal rough ground is mostly visible on steeper cliff slopes and prominent headlands such as Cudden Point. Surrounding Loe Pool at Penrose is a small ornamental landscape and although the parkland here is limited in scale small shelterbelts of pine trees have a significant visual effect, especially near the coast.

PDZ8: Mount's Bay West (The Greeb to Point Spaniard) (Including Marazion and St Michael's Mount)

The geology of most of this stretch of coastline lies within the Torbay and Tamar Groups of limestones, sandstones and slates of the late Devonian period; Mylor slates form the dominant bedrock geology (McInnes 2016, 174).

The mainland foreshore is an extensive beach composed of sand with gravel barrier. St Michael's Mount (Fig 2.9) is a large granite outcrop that becomes an island at higher stages of the tide but is otherwise connected to the mainland via a causeway (Royal Haskoning 2011).

Fig 2.9 St Michael's Mount (Photograph: CAU).

The beach at Longrock has formed at the mouth of an ancient infilled river valley, which now contains the Red River. The beach is backed by low-lying land and the Marazion Marshes have formed close to where the Red River discharges into the sea. The marsh sediments are both alluvial and reworked head deposits. The Eastern Green section of the marsh has been reclaimed (*ibid*).

Penzance and the neighbouring communities and development at Longrock, Wherry Town and Newlyn almost merge into one densely developed area, squeezed between the coast and the A30 which continues on to Land's End. The other communities in this area, Marazion and Mousehole have maintained a clear separation from the sprawl. Marazion

Marsh provides a buffer between Longrock and Marazion itself and St Michael's Mount provides an identity and focus for the community (*ibid*).

There has been a harbour at Newlyn since the medieval period and today it is the one of the major fishing harbours in the UK, contributing millions of pounds to the Cornish economy each year. Although some of the historic fishing village has been redeveloped over the years the community of Newlyn retains a strong identity with the fishing industry (*ibid*).

Offshore, the area is used for a combination of fishing, sailing, surfing, windsurfing and diving, with Marazion a popular beach for swimming in the summer. There are several small offshore rocks marked by buoys with the main ferry crossing to Scilly passing through the PDZ as it departs Penzance (based upon the HSC Conflated Broad Types). Beyond the coastline settlements the area's coastline is largely a mixture of Medieval and Prehistoric Enclosed Land HLC Types with small areas of Post-medieval Enclosed land in more marginal locations, in particular, the low lying ground surrounding Marazion Marsh and Eastern Green.

PDZ9: Penwith Peninsula (Point Spaniard to Clodgy Point)

Fig 2.10 Treryn Dinas cliff castle (NHLE 100673) from Porthcurno (Photograph: CAU).

This section of coast encompasses the most western tip of the Cornish peninsula and includes Land's End. The solid geology consists largely of granites of the Permian and Carboniferous periods (McInnes 2016, 178). The granite is topped by head material which generally forms a steeply sloping cap deposit above a vertical cliff-face. The hardness of the shore platforms below the cliffs means that they respond very slowly to wave attack and as a consequence they tend to be steep. The cliffs are generally 50m to 70m high, but are lower in some locations. Their gradual retreat has resulted in small shore-detached islands around this coast, generally close to headlands (Royal Haskoning 2011).

The area is rural, quiet and, in many ways, relatively isolated, with small settlements set back from the coastal edge which is exposed to the dominant Atlantic wave regime and weather systems. The rugged cliffs increase the sense of inaccessibility although there are small beaches found at Pednvounder, Percella Cove, Porthcurno (Fig 2.10), Porth Chapel, Porthgwarra and Nanjizal, where small streams enter the sea through steep-sided valleys.

Lamorna, which has a small harbour, Boskenna, Penberth and Porthcurno are the largest communities in the project area. The coastal fringe is mainly used for agriculture and nature conservation, however, tourism is important, particularly at Mousehole, Land's End and Porthcurno (Fig 2.10), which is close to the Minack open air theatre.

Offshore the area is mainly used for fishing with sailing in Mount's Bay. The Runnel Stone, a granite pinnacle, forms a notable offshore hazard and is marked by a buoy. Due to the exposed nature of the coastline there are many wreck sites, some of which form maritime debris. Submarine telecommunications cables focus on Porthcurno and the telegraph station built there in the late 19th century (based upon the HSC Conflated Broad Types). Beyond the coastline settlements the area's coastal slopes are dominated by extensive areas of Coastal Rough Ground backed by a mixture of Medieval and Prehistoric Enclosed Land HLC Types with small areas of Post-medieval Enclosed land in more marginal locations.

2.3 Landscape character

2.3.1 National Character Areas

In 1996 English Nature and the Countryside Commission (now combined as Natural England), with help from Historic England, produced a map of England that depicts the natural and cultural dimensions of the landscape. Two categories were mapped: Natural Areas and Countryside Character. Natural Areas are biogeographic zones that reflect the geological foundation, the natural systems and processes and the wildlife in different parts of England. National Character Areas (NCAs — formerly Countryside Character Areas or CCAs) sometimes follow the Natural Areas boundaries and are described as 'unique in terms of a combination of physiographic land use, historical and cultural attributes'. Concerns about the simplistic nature of the historical and cultural attributes used to define these areas led to HE's Historic Landscape Character (HLC) programme (see Section 2.4.5 below). However, the NCAs provide a broad overview of landscape types and the project area contains two NCAs: West Penwith (156) and The Lizard (157).

In a similar way English Nature characterised Marine Natural Areas for all of England's seas, including for the South West (English Nature 2004).

2.3.2 Landscape Character Areas

Over the last 25 years Cornwall has blazed the trail for landscape assessment in England, producing the first County wide landscape assessment in 1994 (Cornwall County Council 1996). The 2007 study updates the 1994 work and was the first stage in developing an evidence base for future landscape policy and landscape strategies in Cornwall (Fig 2.11). The 2007 study output is an online resource https://www.cornwall.gov.uk/environment-and-planning/cornwalls-landscape/landscape-character-assessment-2007/

The study identified 40 Landscape Character Areas within Cornwall based on their component Landscape Descriptions Units. Those within the project area include: Middle Tamar Valley; East Cornwall and Tamar Moorland Fringe; South East Cornwall Plateau; St Austell Bay and Luxulyan Valley; Gerrans, Veryan and Mevagissey Bays; Fal Ria, Truro and Falmouth; Helford Ria; North East Lizard Peninsula; South Lizard Peninsula; Mount's Bay East; Mount's Bay; West Penwith South (Land's End to Newlyn).

2.4 Strategic historic environment projects

2.4.1 Research Frameworks

There are a number of National and Regional thematic and chronological Research Frameworks which are relevant to the South Cornwall RCZAS. The South West Archaeological Research Framework (SWARF) (Webster 2008) is a particularly useful source. 'The People and the Sea: A Maritime Archaeological Research Agenda for England' (Ransley *et al* 2013) also provides valuable background material.

2.4.2 Cornwall Industrial Settlements Initiative (CISI)

Cornwall's industrial settlements were the subject of a Conservation Area Partnership called the Cornwall Industrial Settlements Initiative (CISI) undertaken between 1998 and 2004. CISI assessed the character and significance of 50 small settlements associated with Cornwall's 19th century industrial revolution.

For each settlement, historical research was undertaken for a date range of 1750 to 1945, together with an analysis of Ordnance Survey base maps to determine the different phases of historical development. Surviving historic components, archaeological sites, key historic buildings, and statutory designations are identified in each report.

The settlement reports relevant to the South Coast RCZAS are: Calstock (The Cahill Partnership and Historic Environment Service 2004); Looe (The Cahill Partnership and Cornwall Archaeological Unit 2002); St Blazey (The Conservation Studio and Cornwall Archaeological Unit 1999b); Pentewan (The Cahill Partnership and Historic Environment Service 2002); Devoran (The Cahill Partnership and Cornwall Archaeological Unit 2002a); Perranarworthal (The Cahill Partnership and Historic Environment Service 2005); Porthleven (The Conservation Studio and Cornwall Archaeological Unit 1999a).

2.4.3 Cornwall and Scilly Urban Survey (CSUS)

The Cornwall and Scilly Urban Survey was a pioneering initiative aimed at harnessing the quality and distinctive character of the historic environment to successful and sustainable regeneration. The Survey investigated 19 historic towns, creating for each an information base and character assessment to contribute positively to regeneration planning. The project was based within Cornwall County Council's Historic Environment Service between 2000 and 2005 and funded by Historic England, Objective 1 and South West Rural Development Agency.

The settlement reports relevant to the South Coast RCZAS are: Saltash (Gillard 2005); Torpoint (Herring 2003); Falmouth (Kirkham 2005); Penryn (Newell 2005); Penzance (Cahill and Russell 2003); Newlyn (Russell 2003); and Truro (Kirkham 2003).

2.4.4 Cornish ports and harbours project

This project, commissioned by Historic England, aimed to establish effective methodologies for assessing the fabric, significance and character of English ports and harbours by using a study of those in Cornwall and the Isles of Scilly as a pilot. It involved a rapid assessment of the forces for change affecting Cornwall's ports and harbours and their vulnerability or capability to benefit from change, classifying the sites according to a range of variables, undertaking historic characterisation of selected ports and harbours and carrying out limited field work at the selected sites. Outputs of the project were: 15 individual port studies; a final project report (Johns and Fleming 2017); a Historic Environment Action Plan (HEAP); management recommendations and a list of candidate sites and features within ports for designation.

The individual port studies that are relevant to the South Coast RCZAS are: Wacker Quay (Johns, Buck and Fleming 2016); Charlestown (Fleming *et al* 2016); Fowey (Fleming 2016a), Lerryn (Johns, Buck and Fleming 2016a), Kilcobben Cove (Johns, Thomas and Fleming 2016); Truro (Johns, Thomas and Fleming 2016a); Penzance (Fleming 2016b); Newlyn (Fleming 2016c); and Penberth Cove (Johns and Thomas 2016).

2.4.5 Historic Landscape Characterisation

Historic Landscape Characterisation (HLC) is a method of assessing and classifying an archaeologist's view of the historic cultural landscape as an aid to informing the management of the environment overall. The approach brings together historic and natural environmental datasets in a GIS format to enable the interpretative assessment of recurring 'Types' of historic landscape character and the areas in which they are expressed. This method encourages the interpretation of data in a manner transcending their isolated expressions to encourage the identification of recurring trends which characterise the historical and cultural landscape. HLC is designed to inform a broad range of applications including spatial planning, conservation and wider approaches to heritage management which emphasise the positive advantages for everyone's quality of life in raising understanding and maintaining the cultural legibility of the world we inhabit.

HLC has now been completed across almost all of England's land area. The HLC for Cornwall was carried out by CAU in 1994 using existing field patterns and early map and place-name evidence to characterise the landscape (Cornwall County Council 1996; Herring 1998). This characterisation reflects the historic processes that have shaped the Cornish landscape and involved dividing the county into a series of HLC types, simplified in a second stage into HLC zones, each of which reflects a particular set of historic processes and tends to contain a predictable range of archaeological sites and historic features.

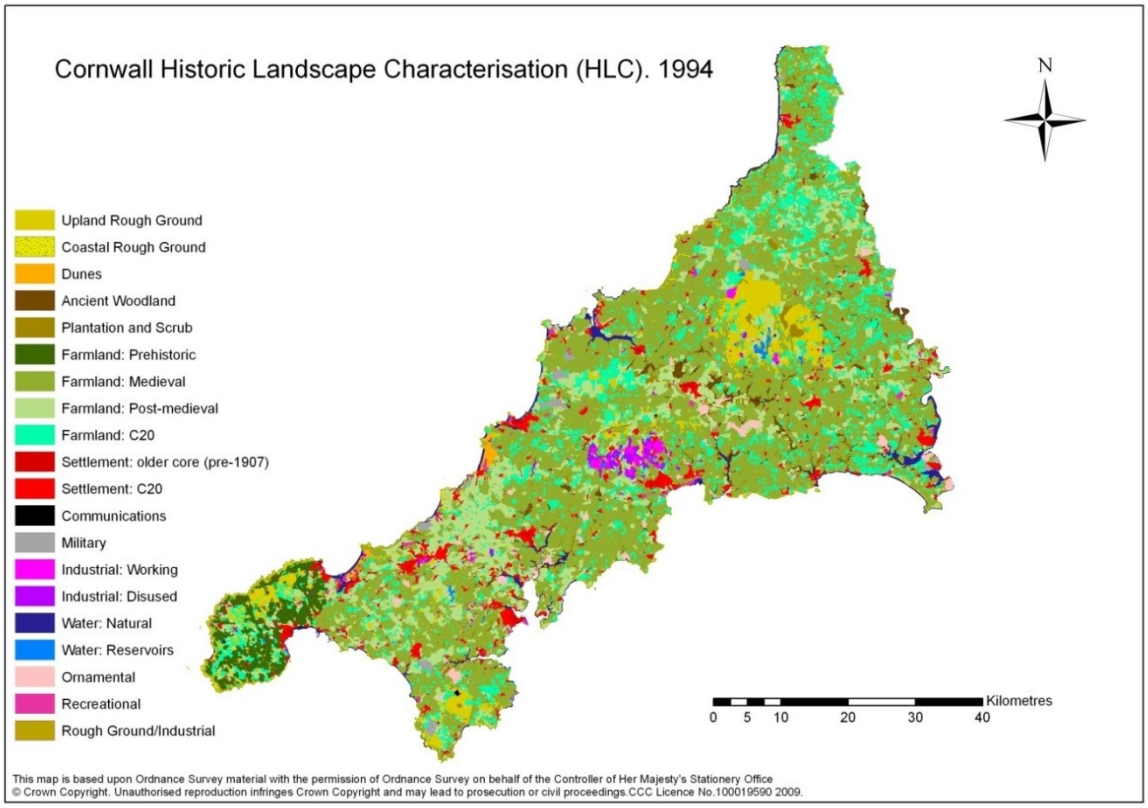


Fig 2.11 Historic Landscape Character Types in Cornwall.

2.4.6 Historic Seascape Characterisation

Historic Seascape Characterisation (HSC) maintains the historic characterisation principles used in HLC but recognises the need for different expressions of those principles in the coastal and marine environment. The coastal zone to landward and seaward of mean sea level is an area of overlapping terrestrial and maritime perceptions, demanding assessment of both landward and seaward perspectives, and requiring

interoperability between the overlapping HSC and HLC coverage. Historic England's national HSC implementation has now covered all of England's coasts and inshore and offshore regions. The South Cornwall RCZAS project area is covered by the South West Peninsula HSC project (Dudley and Johns 2013).

2.4.7 The HEATH Project

The HEATH Project was an innovative environmental partnership which ran from 2004 to 2008 and had particular focus on west Cornwall. The project aimed at improving the management, understanding and interpretation of rough ground – much of this was coastal rough ground – and increasing public use, appreciation and enjoyment of it. The project was particularly notable for an approach which integrated both the natural and the historic environment. Products included two monographs *Managing the historic environment on west Cornwall's rough ground* (Kirkham 2011) and its companion volume *Goon, hal, cliff and croft: the archaeology and history of west Cornwall's rough ground* (Dudley 2011), both funded by Historic England.

2.4.8 Lowland Cornwall

Cornwall's lowland areas probably have the highest archaeological potential in the county to contain buried archaeological features, but are poorly understood and increasingly subject to the impacts of major change in land use and development. The Lowland Cornwall project attempted to address this issue by developing a method for predictive modelling of the lowland prehistoric and Romano-British landscape. The project methodology offers a foundation for informing future management and land use decisions in Cornwall, but the approach has much wider application, highlighting the potential to be realised from a consideration of HLC alongside other historic environment datasets, and it has the potential for application in other parts of the country (Young 2018).

Two of the Lowland Cornwall study areas overlap with parts of with the RCZAS project area. The Penwith study area, in the far west of Cornwall included approximately 23km of coastline around Mount's Bay. The Pelynt study area, located on and around the Fowey Estuary, included a 6km stretch of coastline characterised by moderately high cliffs and steep cliff slopes, stretching between Lansallos in the east and almost as far as Gribbin Head in the west.

2.4.9 Unlocking our Coastal Heritage

In 2012, work was carried out at a number of archaeological sites along the South West Coast Path (SWCP) in order to better conserve, enhance and manage them as part of the Rural Development Agency-funded 'Unlocking Our Coastal Heritage' project. The sites were chosen on the basis that they were on or adjacent to the SWCP and that they were currently at risk of being irreparably damaged or lost, or could be made more accessible for wider audiences. Sites along the south coast of Cornwall included: St Catherine's Point, Fowey (Gossip 2013; Fig 2.12); the Iron Age cliff castle on Black Head (NHLE 1004491), the Iron Age cliff castle on The Dodman (NHLE 1020865); the World War II coastal battery at St Anthony's Head (Taylor 2013), the capstan house at Poltesco on the Lizard (South West Archaeology 2013); and the Iron Age promontory fort (NHLE 1004265) and early medieval settlement at Winnianton, Gunwalloe (Wood 2013).

3 Designations

3.1 World Heritage Site

World Heritage Sites are places of 'outstanding universal value' selected by the United Nations Educational, Scientific and Cultural Organisation (UNESCO). The Cornwall and West Devon Mining Landscape World Heritage Site (WHS) recognises Cornwall and West Devon's historic landscape and outstanding buildings associated with the copper and tin mining, and these counties' contribution to the industrial revolution.

The project area includes five areas of the WHS: Tamar Valley; Charlestown; Devoran and Perran Foundry; Tregonning and Trewavas Mining District; and Tregonning and Gwinear Mining District (Fig 3.1).

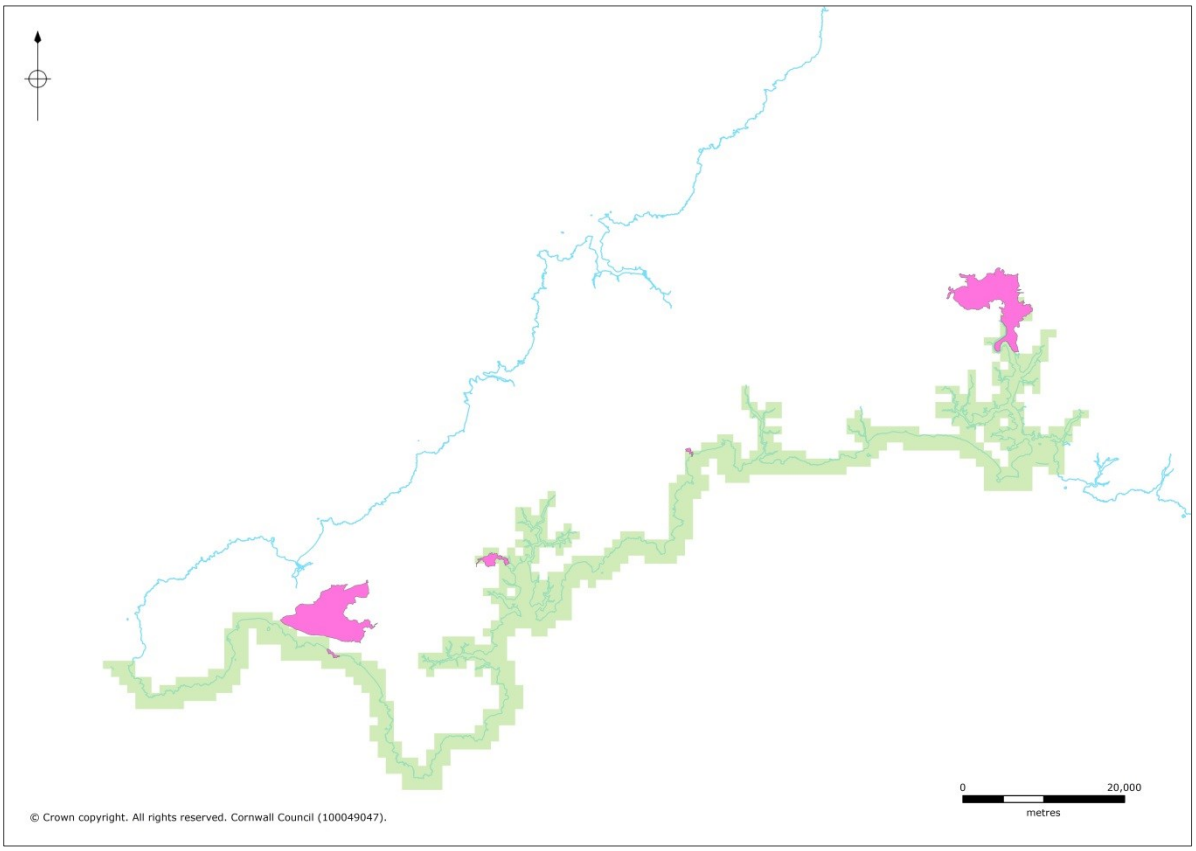


Fig 3.1 Cornwall and West Devon Mining Landscape World Heritage Site areas within the project area.

3.2 Historic Environment Designations

3.2.1 Scheduled Monuments

There are total of 145 Scheduled Monuments in the project area (Fig 3.2): 117 are in Cornwall, 23 in Plymouth and five in Devon (see Appendix 1 for list of Scheduled Monuments).

3.2.2 Listed Buildings

There are a total of 4411 Listed Buildings in the project area (Fig 3.3): 64 Grade I in Cornwall, 20 in Plymouth and four in Devon; 208 Grade II* in Cornwall, 72 in Plymouth and six in Devon; 3,878 Grade II in Cornwall, 463 Grade II in Plymouth and 70 Grade II in Devon (see Appendix 2 for a list of Grade I and Grade II* Listed Buildings).

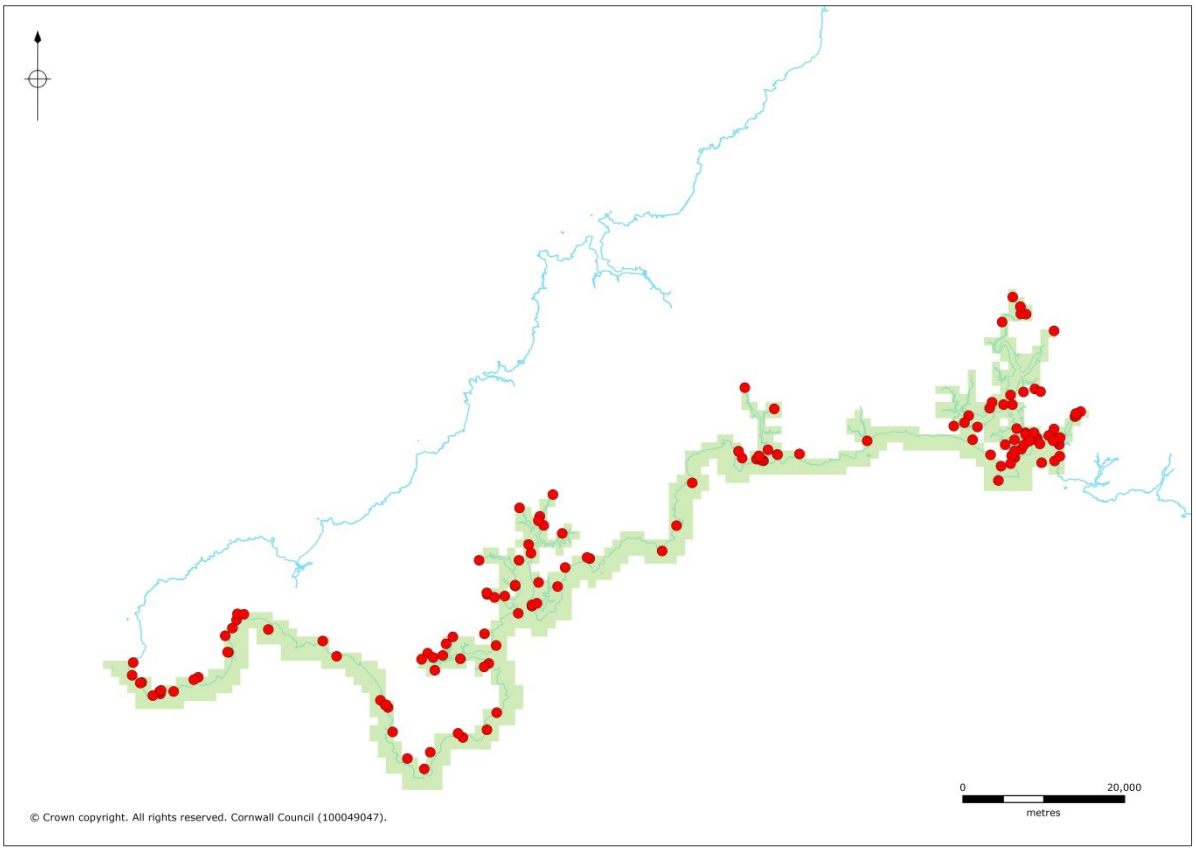


Fig 3.2 Scheduled Monuments within the project area.

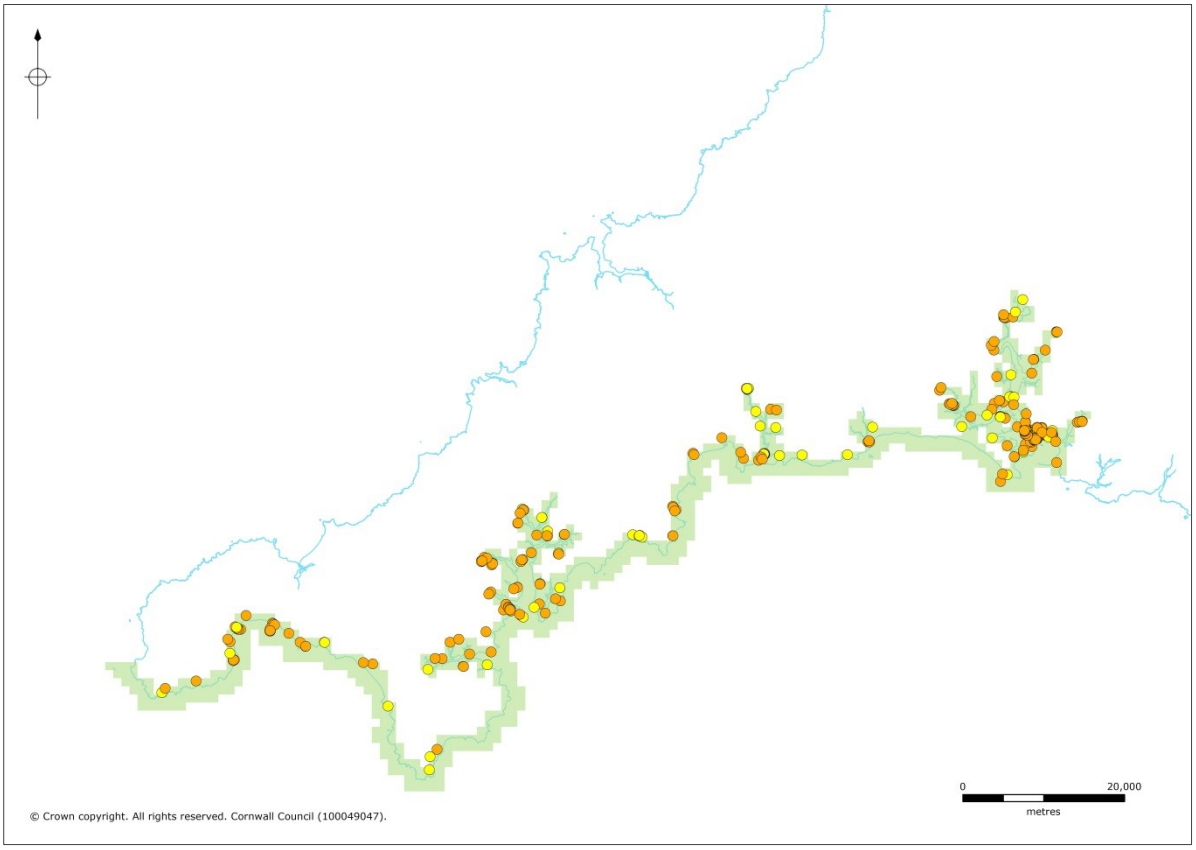


Fig 3.3 Grade I and Grade II Listed Buildings within the project area (Grade I, yellow points; Grade II* orange points)*

3.2.3 Registered Parks and Gardens

Culturally and historically important 'man-made' or 'designed' landscapes, such as parks and gardens, are currently listed on a non-statutory basis on the 'Register of Historic Parks and Gardens of special historic interest in England' which was established in 1983 and is administered by Historic England, affording sites currently on the Register a measure of protection through the planning system. Sites included on this register are of national importance and there are currently 1,600 sites on the list, many associated with stately homes of Grade I or Grade II* status. Emphasis is laid on 'designed' landscapes, not the value of botanical planting. Sites can include town squares and private gardens, city parks, cemeteries and gardens around institutions such as hospitals and government buildings. Planned elements and changing fashions in landscaping and form are a main focus of the assessment.

There are 20 Registered Parks and Gardens in the project area (see Appendix 3 for a list Registered Parks and Gardens). There are two Grade I listed in Cornwall, six Grade II* in Cornwall and one in Plymouth, and nine Grade II listed in Cornwall and two in Plymouth.

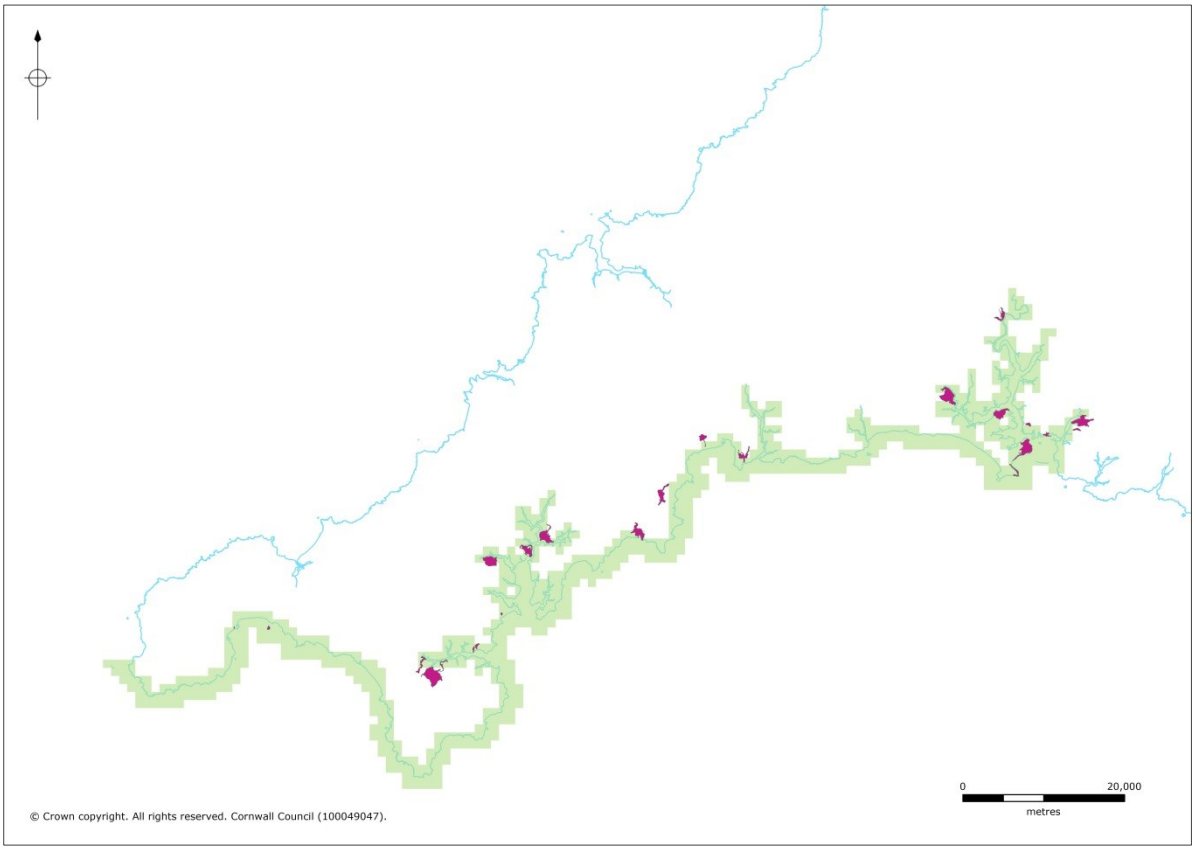


Fig 3.4 Registered Parks and Gardens within the project area.

3.2.4 Registered Battlefields

Battles are dramatic and often pivotal events in the history of any people or nation. Since 1995, Historic England has maintained a Register of Battlefields in order to afford the 46 sites currently on the Register a measure of protection through the planning system. The key requirements for registration are battles of national significance, a securely identified location and topographical integrity – the ability to 'read' the battle on the ground.

The Battle of Lostwithiel, fought over a wide area in late August 1644 during the English Civil War, is the subject of two separate Battlefields Register entries: NHLE 1413619 Battle of Lostwithiel 21 August 1644 and NHLE 1413762 Battle of Lostwithiel 31 August – 1 September 1644 (Fig 3.5).

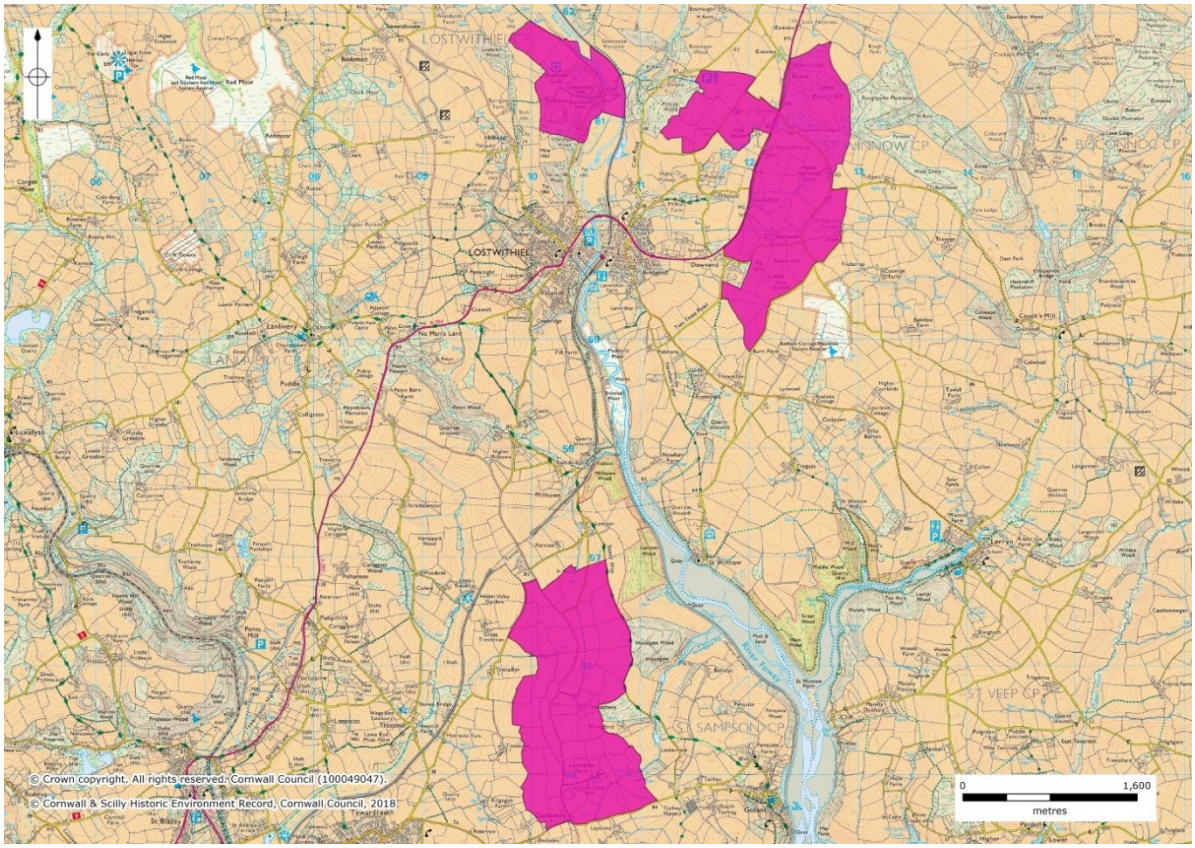


Fig 3.5 The areas of the Registered Battlefield of Lostwithiel, 21st August 1644.

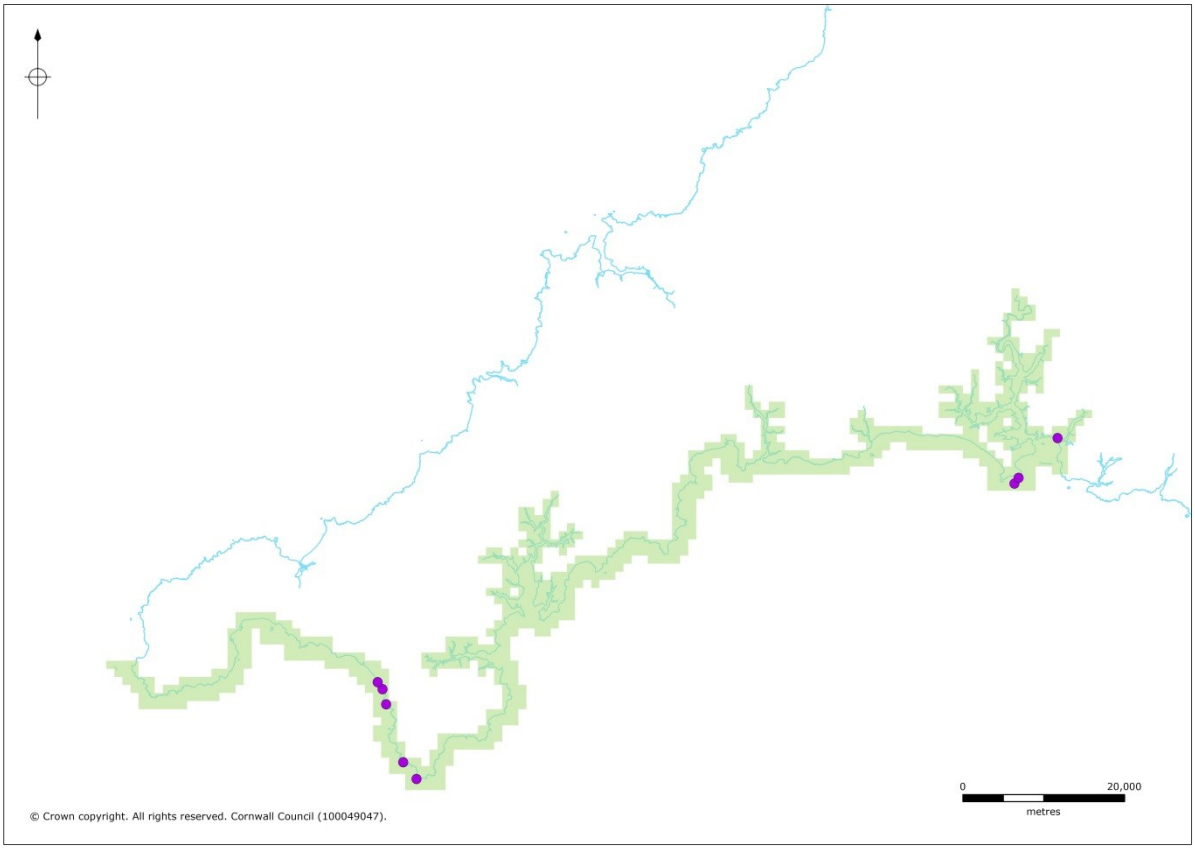


Fig 3.6 Protected Wreck Sites within the project area.

3.2.5 Protected Wreck sites

The Protection of Wrecks Act 1973 (section 1) is designed to protect wrecks that are of historic, archaeological or artistic importance. There are currently 61 designated wreck sites in the UK, eight of these lie within the project area (Fig 3.6 – see Appendix 4 for a list of Protected Wrecks).

3.2.6 Protected Military Remains

The Protection of Military Remains Act, 1986 deals with the remains of military aircraft and ships. The legislation is administered by the Ministry of Defence (RAF for aircraft, Royal Navy for vessels). Military aircraft are automatically protected but vessels have to be specifically designated. The primary reason for designation is to protect as a war grave the last resting place of UK servicemen (or other nationals); however, the Act does not require the loss of the vessel to have occurred during war. Remains fall under two headings: protected places and controlled sites. Wrecks are designated by name and can be designated as protected places even if the location of the wreck is not known. Shipwrecks need to be specifically designated and designation as a protected place applies only to vessels that sank after 4 August 1914. Controlled sites containing the remains of an aircraft or a vessel that crashed, sank or was stranded within the last two hundred years must be specifically designated by location.

There is currently one Controlled Site just outside the project area: *HMS A7* wrecked in 1914 in Whitsand Bay.

There are currently two Protected Places just outside the project area: The British MS trawler *HMS Kurd* lost on 10 July 1945 in position 49.52N, 05.02W off The Lizard and *U-1018* a German submarine sunk several miles off the Lizard in on 27 February 1945.

3.2.7 Conservation Areas

Conservation Areas are designated by local planning authorities as areas of special architectural or historic interest, the character or appearance of which it is desirable to preserve or enhance. They may vary in character, form and size but their designation means that they are all worthy of protection as areas of special integrity and merit. They usually contain buildings which are 'listed' but this is not a prerequisite of designation.

There are over 50 Conservation Areas within the project area in Cornwall: Calstock (Church Street), Bohetherick/St Dominick, Cargreen, Cremyll, Anderton, Forder and Antony Passage (near Saltash), Lower Fore Street (Saltash), Anthony, St John (Antony), Kingsand/Cawsand, Portwrinkle, Sheviock, St Germans, Hessenford, Looe, Polperro, Polruan, Bodinnick, Fowey, Lerryn, Lostwithiel, Tywardreath, Polkerris, Charlestown, Pentewan, Mevagissey, Gorran Haven, Portloe, Gerrans, Portscatho, St Mawes, St Clement, Truro, Tregony, Falmouth, Penryn, Flushing, Perranuthnoe, Devoran, Mylor Bridge. Perranarworthal, Helford, Coverack, Cadgwith, Constantine, Porthleven, Pengersick, Gulval, Marazion, St Michael's Mount, Penzance, Newlyn, Paul Churchtown, Mousehole.

In Plymouth there are nine Conservation Areas: Turnchapel, Stoke, The Hoe, Barbican, Union Street, Erbington Street, North Stonehouse, Stonehouse Peninsula, Adelaide Street/Clarence Place (Stonehouse), Royal Naval Hospital (Stonehouse), Devonport and Tamerton Foliot.

3.3 Natural Environment designations

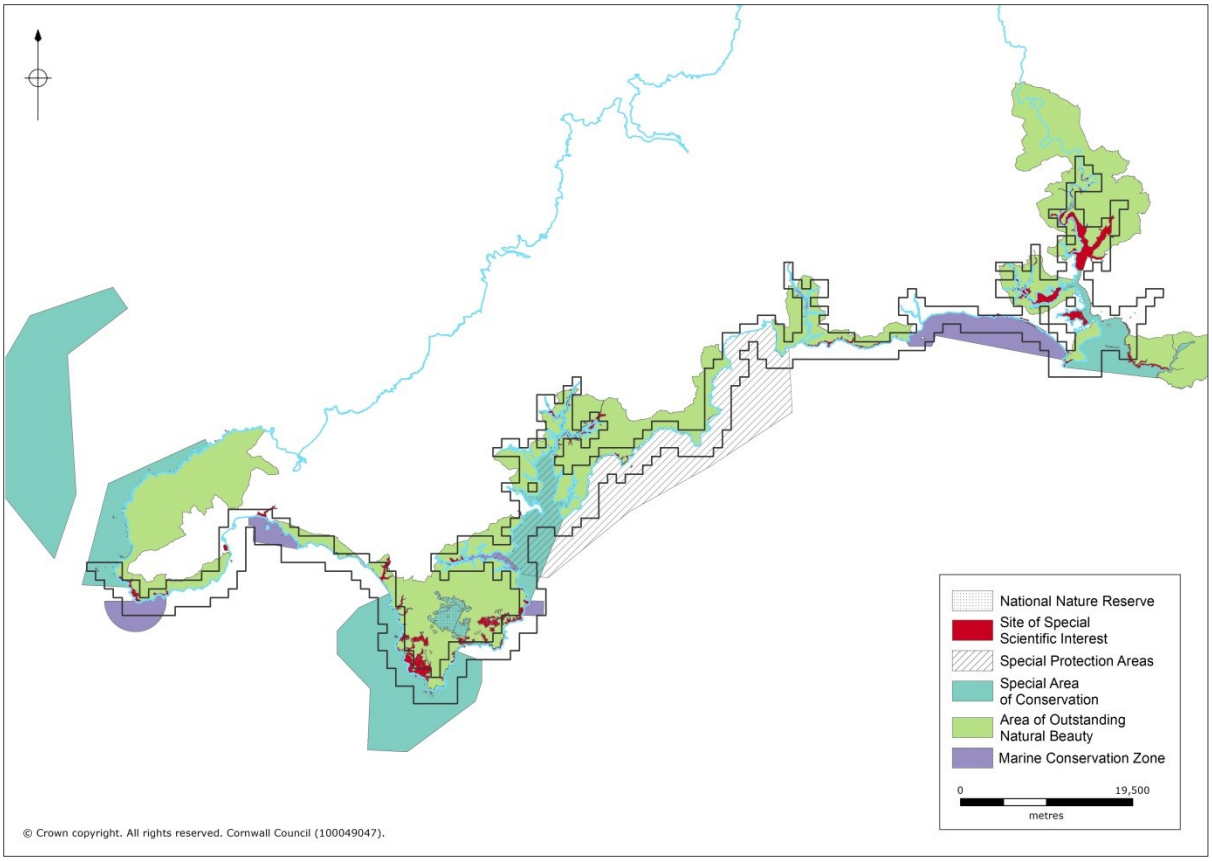
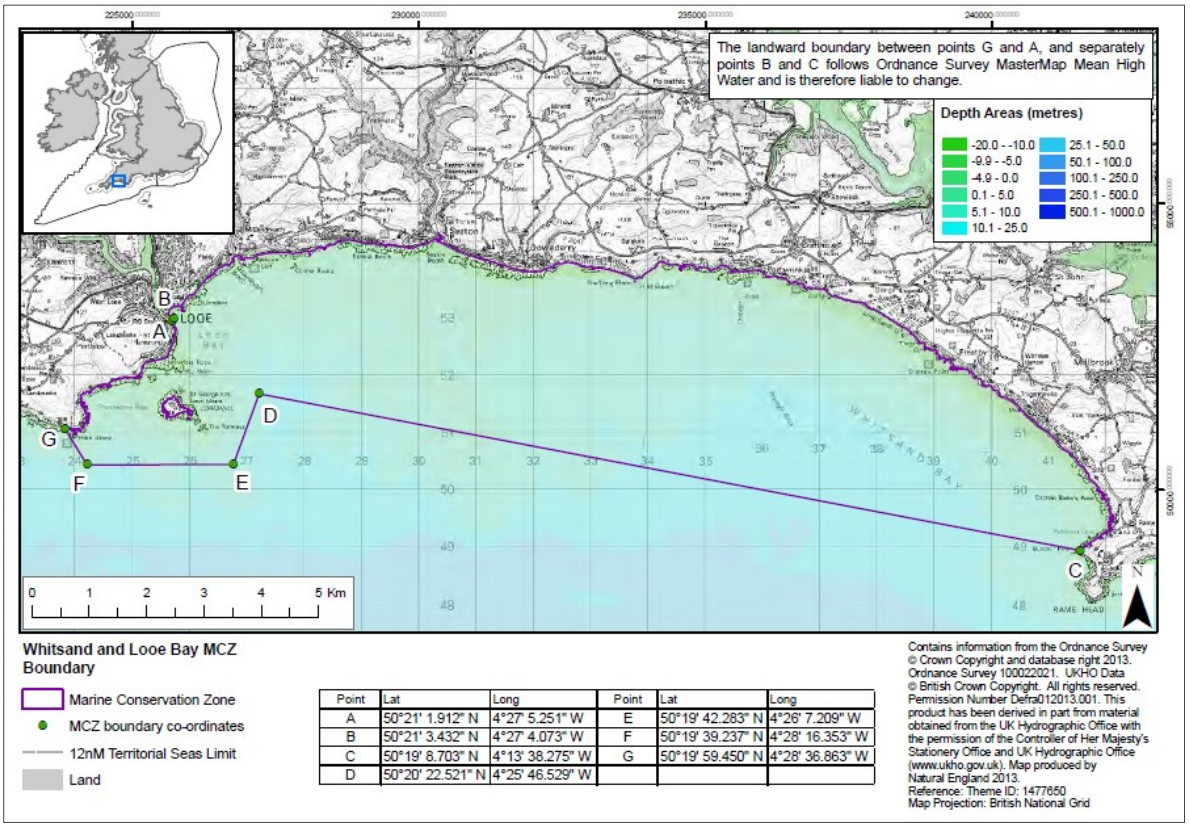


Fig 3.7 Statutory natural environment designations in the project area (dark grey outline). (Natural England Open Data. © Natural England copyright. Contains Ordnance Survey data © Crown copyright and database right 2018.)

3.3.1 Areas of Outstanding Natural Beauty

Areas of Outstanding Natural Beauty (AONBs) were brought into being by the National Parks and Access to the Countryside Act of 1949. The Countryside and Rights of Way Act 2000 strengthened the conservation and management of AONBs in partnership with local authorities. The project area includes part of the Tamar Valley AONB and the Cornwall AONB which has 12 separate geographical areas located across Cornwall. Within the project area are South Coast Eastern, South Coast Central, South Coast Western and West Penwith.

3.3.2 Marine Conservation Zones



Point	Lat	Long	Point	Lat	Long
A	50°21' 1.912" N	4°27' 5.251" W	E	50°19' 42.283" N	4°26' 7.209" W
B	50°21' 3.432" N	4°27' 4.073" W	F	50°19' 39.237" N	4°28' 16.353" W
C	50°19' 8.703" N	4°13' 38.275" W	G	50°19' 59.450" N	4°28' 36.863" W
D	50°20' 22.521" N	4°25' 46.529" W			

Fig 3.8 The Whitsand and Looe Bay Marine Conservation Zone (contains, or is based on, information supplied by Natural England; JNNC website).

The Marine and Coastal Access Act 2009 (Part 5) enabled Defra Ministers to designate and protect Marine Conservation Zones (MCZs) (see below Section 4.1.2). These are a type of marine protected area which will exist alongside European marine sites [Special Areas of Conservation (SACs) and Special Protected Areas (SPAs)], SSSIs and RAMSAR sites to form an ecologically coherent network of marine protected areas. Similar schemes are operating in Wales and Scotland and soon in Northern Ireland to contribute to a UK-wide network of Marine Protected Areas. Twenty-seven new MCZs were designated in the first tranche in 2013, and another 23 in a second tranche in January 2016. Of these, six are in the project area: Tamar Estuary (2013); Whitsand and Looe Bay (2013) (Fig 3.7); Upper Fowey and Pont Pill (2013); The Manacles (2013); Mount's Bay (2016); Runnel Stone (2016).

3.3.3 RAMSAR sites

The international RAMSAR Convention of 1971 requires the government signatories to agree to identify and protect their most significant wetlands for wildlife, especially waterfowl. Under the Convention, each government must select its best wetlands according to very clear criteria, and these RAMSAR sites are then protected from development in all but the most exceptional cases. There are no RAMSAR sites within the project area.

3.3.4 Special Protection Areas (SPAs)

The European Community directive for the Conservation of Wild Birds (1979) defines the duties of Member States generally in relation to all species of wild birds and in particular to preserve enough wild places to safeguard migratory and vulnerable bird species. These are to form a network of protected areas called Special Protection Areas (SPAs). There are three SPAs in the project area: the Tamar Estuaries Complex, Falmouth Bay and St Austell Bay and Marazion Marsh.

3.3.5 Special Areas of Conservation (SACs) and Draft SACs

The European Directive on the Conservation of Natural Habitats (1992) requires Member States to identify and designate areas of land as Special Areas for Conservation (SACs) for their importance as habitats for species other than birds. There are three SACs within the project area: Plymouth Sound and Estuaries, Lizard Point and Land's End and Cape Bank.

3.3.6 Site of Special Scientific Interest (SSSIs)

Within the project area there are 26 Sites of Special Scientific Interest (SSSIs), representing approximately 16% of the SSSIs occurring within Cornwall. These sites have been notified for both biological and geological interest.

3.3.7 Heritage Coast

There are 43 designated Heritage Coasts in England and Wales, covering about one-third of the coastline. There are five in the project area: Rame Head; Gribbin Head – Polperro; The Roseland; The Lizard; and Penwith.

3.3.8 National Nature Reserves (NNRs)

Natural England is responsible for designating areas as NNRs to secure protection and appropriate management of the most important areas of wildlife habitat, to provide a resource for scientific research and to provide for recreation provided this does not compromise the wildlife habitat. The Lizard NNR is the only one within the project area.

3.3.9 County Geology Sites (CGSs) and Regionally Important Geological Sites (RIGS)

The Cornwall Geoconservation Group (formerly the Cornwall RIGS Group) was founded at a public meeting in 1991. The group is the geological arm of the Cornwall Wildlife Trust and is concerned with the county's geology and geomorphology (Hocking 2010).

Non-statutory or 'local' Earth science sites in Cornwall and the Isles of Scilly, formerly known as 'Regionally Important Geological/Geomorphological Sites' (RIGS), are now called 'County Geological sites (CGSs) in Cornwall (Hocking 2010).

These CGSs/RIGs provide a local/regional network of sites that complements the national network of SSSIs and play an important role in delivering Local Geodiversity Action Plans (LGAPs); they form an integral part of the natural history of Cornwall and Scilly, represent local character and distinctiveness and contribute to the quality of life and the well-being of the community, with many sites providing opportunities for education, research and leisure. There are at total of 113 sites within Cornwall and Scilly of which 30 are within the RCZAS project area (Hocking 2010).

3.3.10 Sensitive Marine Areas (SMAs)

Sensitive Marine Areas (SMAs) are non-statutory marine areas notable for their marine animal and plant communities or which provide ecological support to adjacent statutory sites. A particular aim of the designation is to raise awareness and disseminate information to be taken into account in estuarine and coastal management planning. These areas rely on the co-operation of users and local communities for sustainable management. These designations overlap with SSSIs, SACs or draft SACs and cover the features these sites are intended to protect.

3.3.11 Nature Improvement Areas (NIAs)

Section 2 of the Natural Environment White Paper published in June 2011 refers to the integration of people and nature and the implementation of Nature Improvement Areas (NIAs) and in July 2011 Defra launched a new grant scheme competition administered by Natural England to establish NIAs. Nature Improvement Areas (NIAs) are large, discrete areas intended to deliver a step change in nature conservation, where a local partnership has a shared vision for their natural environment. They are not designated. None of the current 12 NIAs lie within the project area.

4 Coastal and marine management

4.1 Management policy

4.1.1 UK Coastal and Marine Policy 1990s to 2009

Since the 1990s, EU and UK Governments have sought better understanding of coastal and marine environments and associated processes to provide the necessary information base for prospective strategic planning and long-term management of the coastal and marine environment.

From the late 1990s, European and UK legislation for the management of coastal and marine environmental resources has focused increasingly on an integrated spatial approach to marine planning. A series of reviews and reports dating from the Marine Stewardship Report '*Safeguarding our Seas*' (Defra 2002a) indicated that a new approach to managing activities in the marine environment was needed. In particular, better integration and more effective spatial management of conflicting pressures were identified as prerequisites for conservation and sustainable development and have subsequently become crucial aspects of delivering the UK vision for the marine environment characterised by 'clean, healthy, safe, productive and biologically diverse oceans and seas' (UK Government 2009).

4.1.2 The Marine and Coastal Access Act, 2009

The Marine and Coastal Access Act was enacted on 12 November 2009 (UK Government 2009). It provided for a new system of marine planning to fulfil the UK Government's marine objectives and priorities for the future, and directed decision-makers and users towards more efficient, sustainable use and protection of our marine resources. '*The Coalition: our programme for government*' was published in May 2010 and in it the Coalition government confirmed that it would take forward the Marine and Coastal Access Act and make sure that its conservation measures are implemented effectively.

The Act's key features were:

- Establishment of the Marine Management Organisation (MMO);
- Preparation of a Marine Policy Statement (MPS);
- Provision for a Marine Planning System;
- Provision for a streamlined marine licensing system;
- Designation of Marine Conservation Zones (MCZs);
- Provision of the coastal access duty in England.

The MMO started work on 1 April 2010, and is delivering UK marine policy objectives for England's inshore and offshore regions through a series of statutory Marine Plans and other measures. The Marine Policy Statement was published on 18 March 2011 (UK Government 2011) and is based on the High Level Marine Objectives for the marine planning system which were set by the UK Government (UK Government 2009b). In April 2011 the MMO embarked on a programme of Marine Plan preparation for the 11 Marine Plan Areas, to be completed in 2021.

4.1.3 The National Planning Policy Framework, 2018

The Department for Communities and Local Government published the National Planning Policy Framework (NPPF) in 2012, setting out Government planning policies for England and replacing the former Planning Policy Guidance (PPG) 16 and 20, and Planning Policy Statement 5 (PPS5) with immediate effect. A revised version of the NPPF was published in July 2018 by the Ministry of Housing, Communities and Local Government.

The NPPF sets out the Government's planning policies for England and how they are to be applied. It provides a framework within which locally-prepared plans for housing and

other development can be produced (Ministry of Housing, Communities and Local Government 2018, section 1, paragraph 1).

The NPPF states that the purpose of the planning system is to contribute to the achievement of sustainable development. At a very high level, the objective of sustainable development can be summarised as meeting the needs of the present without compromising the ability of future generations to meet their own needs (*ibid* section 2, paragraph 8).

Achieving sustainable development means that the planning system has three overarching objectives – economic, social and environmental – which are interdependent and need to be pursued in mutually supportive ways. The environmental objective is to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy (*ibid* section 2, paragraph 8).

So that sustainable development is pursued in a positive way, at the heart of the Framework is a presumption in favour of sustainable development (*ibid* section 2, paragraph 10). However, the list of policies which might provide a reason for refusal has been extended to include those in the NPPF relating to SSSIs; land designated as Green Belt, Local Green Space, an AONB or a National Park or defined as Heritage Coast; irreplaceable habitats (which include ancient woodland and ancient and veteran trees); designated heritage assets and nationally important but non-Scheduled assets of archaeological interest and areas at risk of flooding or coastal change (*ibid* Section 2, footnote 6).

Heritage assets range from sites and buildings of local historic value to those of the highest significance such as World Heritage Sites which are internationally recognised to be of Outstanding Universal Value. These assets are an irreplaceable resource, and should be conserved in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life of existing and future generations (*ibid* section 16, paragraph 184).

Local plans should set out positive strategy for the conservation and enjoyment of the historic environment, including heritage assets most at risk through neglect, decay or other threats (*ibid* section 16, paragraph 185).

Local planning authorities should maintain or have access to a historic environment record. This should contain up-to-date evidence about the historic environment of an area and should be used to assess the significance of heritage assets and the contribution they make to their environment and predict the likelihood that currently unidentified heritage assets, particularly sites of historic and archaeological interest, will be discovered in the future (*ibid* section 16, paragraph 187).

Local planning authorities should make information about the historic environment gathered as part of policy-making or development management, publicly accessible (*ibid* section 16, paragraph 188).

The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. In taking a proactive approach to climate change mitigation and adaptation, plans should take into account the long-term implications of climate change for biodiversity and landscapes (*ibid* section 14, paragraphs 148-9).

In coastal areas, planning policies and decisions should take account of the UK Marine Policy Statement and marine plans. Integrated Coastal Zone Management should be pursued across local authority and land/sea boundaries to ensure effective alignment of the terrestrial and marine planning regimes (*ibid* section 14, paragraph 166).

Plans should reduce risk from coastal change by avoiding inappropriate development in vulnerable areas and not exacerbating the impacts of physical changes to the coast.

They should identify as a Coastal Change Management Area any area likely to be affected by physical changes to the coast, and be clear as to what development will be appropriate in such areas, making provision for development and infrastructure that needs to be relocated away from Coastal Change Management Areas (*ibid* section 14, paragraph 167).

Development in a Coastal Change Management Area will be appropriate only where it is demonstrated that: it will not have an unacceptable impact on coastal change; the character of the coast including designations is not compromised; the development provides wider sustainability benefits; and the development does not hinder the creation and maintenance of a continuous signed and managed route around the coast (*ibid* section 14, paragraph 168).

Planning policies and decisions should contribute to and enhance the natural and local environment by maintaining the character of the undeveloped coast, while improving public access to it where appropriate (*ibid* section 15, paragraph 170).

Great weight should be given to conserving and enhancing landscape and scenic beauty in National Parks and AONBs. The conservation and enhancement of wildlife and cultural heritage are also important considerations in these areas (*ibid* section 15, paragraph 172).

Within areas defined as Heritage Coast which are not already National Parks and AONBs, planning policies and decisions should be consistent with the special character of the area and the importance of its conservation. Major development within a Heritage Coast is unlikely to be appropriate, unless it is compatible with its special character (*ibid* section 15, paragraph 173).

4.2 Coastal management

4.2.1 Coastal access

Delivery of the England Coast Path, under the Marine and Coastal Access Act 2009, is governed by a 'Coastal Access Scheme', approved by the Secretary of State. The Scheme is an important document as it sets out the methodology that Natural England must use when carrying out its Coastal Access Duty (Fig 4.1). It contains the key principles on which their access proposals are based at the local level, and explains how these are applied in each of the main coastal scenarios.

The Act requires Natural England to review the Scheme within three years of its first approval. The first review of the Scheme was completed in March 2013 and the revised version, approved by the Secretary of State on 9 July 2013, is the one now followed by Natural England (Natural England 2013). Natural England expects to complete work on the England Coast Path in 2020. The full length of the project area has long been crossed by the South West Coast Path, the longest of the National Trails, but with a number of management issues, particularly breaks due to landslips in the project area.

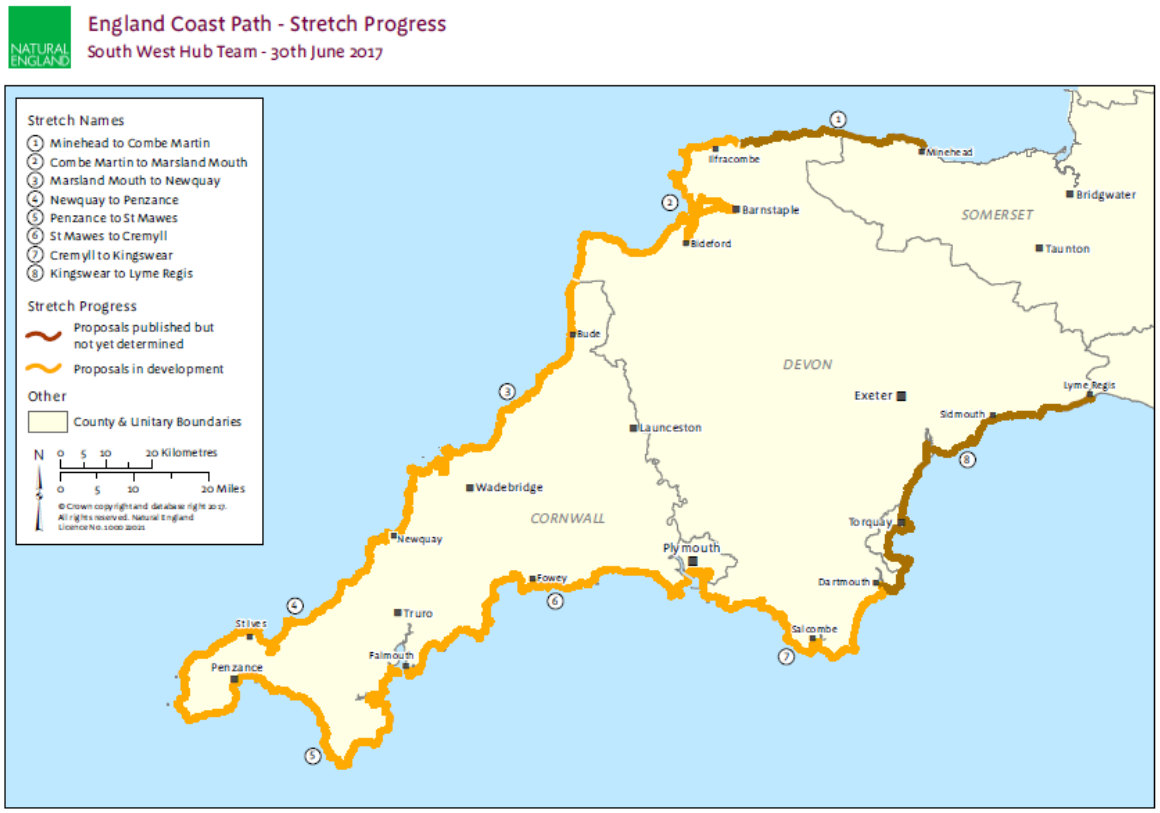


Fig 4.1 England Coast path in the south west of England (England Coast Path website).

4.2.2 Coastal management frameworks

In addition to the Marine and Coastal Access Act 2009, a broad range of management frameworks exist for coastal, estuarine and inter-tidal areas, although they often limit themselves to near-shore areas when making assessments below Mean High Water. Historic England and, in many cases, individual local authorities, are statutory consultees for initiatives towards the implementation and review of Integrated Coastal Zone Management (ICZM) and Shoreline Management Plans (SMPs), both designed to integrate long-term policy decision-making and strategic planning relating to the coastal zones. Historic England's Rapid Coastal Zone Assessment Surveys (RCZAS) are being undertaken across all of England's coastal areas to enhance the coastal historic environment record and inform such initiatives.

Many of Europe's coastal zones face deterioration of their environmental, socio-economic and cultural resources. Integrated Coastal Zone Management is an approach promoted by the European Commission through the EU ICZM Recommendation (EU 2002) to bring together consideration and management strategies to address the many inter-related biological, physical and human problems presently facing these zones. The approach aims to promote a collaborative approach to planning and management of the coastal zone, within a philosophy of governance by partnership with civil society.

The principles of ICZM are integrated into the Marine and Coastal Access Act 2009 and the current UK Government sees ICZM as something that the implementation of the Act will in itself fulfil, in particular through marine planning.

https://www.gov.uk/government/policies/protecting-and-sustainably-using-the-marine-environment

Relevant management plans include: the Tamar Estuaries Management Plan 2014–2019; the Tamar Valley AONB Management Plan 2014–201919 (the 2019–2024 Plan will be published in spring 2019); and the Cornwall AONB Management Plan 2106–021. The introduction of Coastal Change Management Areas in the land-based planning system is

described above in Section 4.1.3, while Inshore Fisheries and Conservation Authorities (IFCAs) have had the long-standing roles (since 2011) in the management of inshore waters.

4.2.3 Marine Plans

The Marine and Coastal Access Act 2009 (section 322) divided UK Controlled Waters into two marine regions: an inshore region (0-12 nautical miles) and an offshore region (12 – *c*200 nautical miles) under each of the four Administrations (England, Northern Ireland, Scotland and Wales). In April 2011 the MMO embarked on a programme of Marine Plan preparation for the 11 English Marine Plan Areas, to be completed by 2021, with Seascape Character Assessment (SCA) being used to inform those Marine Plans.

Marine Plans have relevance to a wide range of issues relating to human activities, their associated infrastructure, and their effects on resources, features and processes in the marine and coastal environment.

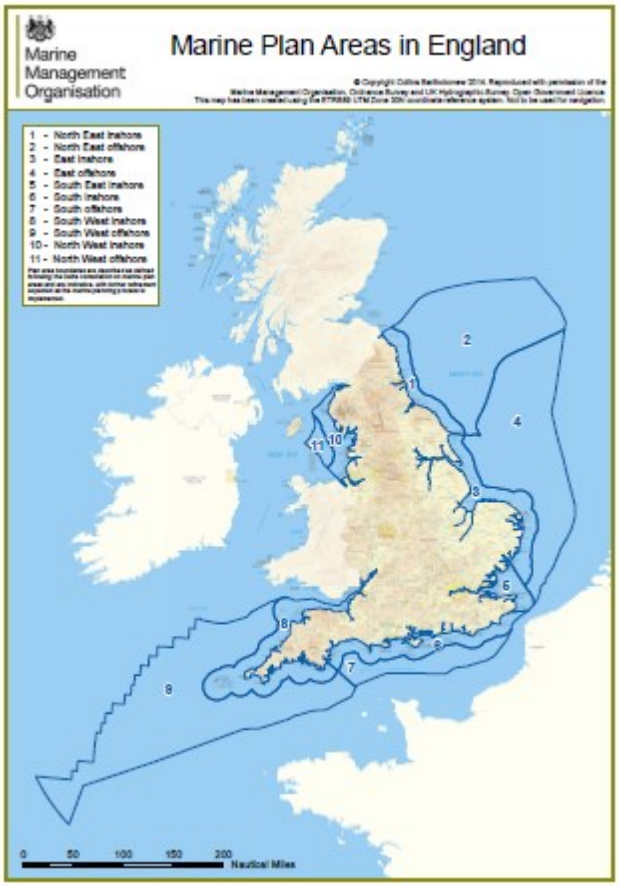


Fig 4.2 Marine Plan Areas in England (Marine Management Organisation website).

The MMO has now completed marine plans for East Inshore and Offshore and South Inshore and Offshore marine planning areas and is currently progressing the remaining seven marine plan areas simultaneously. These include the South West Inshore and Offshore Marine Plan Areas.

The south west inshore marine plan area covers approximately 2,000km of coastline stretching from the River Severn border with Wales to the River Dart in Devon, taking in a total of over 1,6000 sq km of sea. The south west offshore marine plan area includes the marine area from 12 nautical miles extending out to the seaward limit of the Exclusive Economic Zone (EEZ), a total of approximately 6,8000 sq km of sea (Fig 4.2).

Marine Plan development follows an iterative process from plan area selection to implementation and monitoring. The Sustainability Appraisal Options Assessment Report for the South West Inshore and Offshore Marine Plan Areas was published by the MMO in April 2018 and it is anticipated that following the outputs of Iteration 3 the South West

Marine Plan and accompanying Sustainability Appraisal report will be ready for public consultation in 2019–2020.

4.2.4 Shoreline Management Plans

A Shoreline Management Plan (SMP) provides a large-scale assessment of the risks associated with coastal evolution and presents a policy framework to address these risks to people and the developed, historic and natural environment in a sustainable manner. In doing so, a SMP is a high-level document that forms an important part of the Defra strategy for flood and coastal defence (Defra 2005). SMPs are non-statutory but provide a framework within which planning decisions may be taken.

Each SMP covers an area of coastline known as a sub-cell within a littoral sediment cell. A sediment cell is defined as a length of coastline, which is relatively self-contained as far as the movement of sand or shingle is concerned, and where interruption to such movement should not have a significant effect on adjacent sediment cells.

SMPs work in collaboration with other coastal plans including Estuary Management Plans, Catchment Flood Management Plans and Coastal Management Plans and inform key development plans including Regional Spatial Strategies and Local Development Frameworks. The SMP will also inform development control by highlighting areas of risk which will inform the sustainability of land for development.

Within the South Cornwall RCZAS project area, the SMPs for Durlston Head in Dorset to Rame Head in Cornwall and for Rame Head to Hartland Point in Cornwall identify policies over a hundred-year timescale to manage tidal flooding and coastal erosion risks (see above Section 2.1)

4.2.5 Cornwall Maritime Strategy 2012–2030

'*A future for Maritime Cornwall: The Cornwall Maritime Strategy 2012-2030'* (the Strategy) was adopted by Cornwall Council in August 2012 following a series of Consultation Drafts and a Public Consultation document. It is the first, and to date the only, high-level maritime strategy to be produced by a local authority.

The Strategy's vision for Maritime Cornwall by 2030 is:

- Cornwall has a sustainably managed maritime environment, which is well understood and known internationally as an excellent location for work, wildlife and for recreation;
- Cornwall's economy is supported by a diverse range of opportunities for ports, marine-related industries, transport and businesses including environmental technologies;
- Cornwall has a rich and enviable maritime heritage, a healthy maritime natural environment and landscape;
- Cornwall has distinctive, well-connected communities, resilient in the face of change.

This strategy has been adopted to ensure co-ordinated activity across Cornwall Council and its partners and is underpinned by a number of objectives:

- A sustainable, low carbon future for maritime Cornwall;
- Encouragement of partnership working;
- Promotion of low carbon maritime enterprise;
- A healthy, safe and vibrant coastline;
- Protect and develop the 'working harbour' role of Cornwall's estuaries, ports and harbours;
- Stronger connectivity through sustainable, low carbon transport;

- Ensure Cornwall's natural and historic maritime environment and culture is renowned worldwide and a source of pride and inspiration locally.

At various points the Strategy identifies strong roles for landscape and seascape character in building Cornwall's future sustainable economic and community development. The Strategy positively views landscape and seascape as:

- A positive asset for economic development, hugely important in creating distinctiveness of place and an environment in which people choose to live, work and build businesses (Cornwall Council 2012a, 23); and
- Relevant to all economic activity and community cohesion in the area, not just an asset for the tourism industry (Cornwall Council 2012a, 9).

4.2.6 English Heritage assets at risk of coastal erosion and flooding

In 2011, English Heritage undertook a risk assessment of all its coastal properties. Within the project area this included St Catherine's Castle (Fowey), St Mawes Castle and Pendennis Castle. At the time none of the EH assets in the RCZAS project area were considered at high risk although Little Dennis blockhouse (NHLE 1270099) was considered at medium risk of coastal flooding (Hunt 2011).

5 Coastal change from the Palaeolithic to the present

Michael Grant

5.1 Geological background

The geology of south west Britain has played a key role in influencing human activity upon this peninsula, due not only to the wide variety of landforms and available soil types, but also the economic significance of the mineral resource, including tin (Sn), copper (Cu), arsenic (As), silver (Ag) and zinc (Zn), other minerals such as kaolinite (china clay), and quarrying for slate, granite and limestone for building stone. These resources have made the south west one of the most important metalliferous mining districts in the UK, with extraction known since prehistoric times. This has strongly influenced the distribution of the most significant human impacts within the region, notably the vast amount of earth movement, exceeding natural processes during the Holocene by an order of magnitude, that have directly affected several estuaries and the shoreline of south Cornwall. Such activities typify the level of influence that human activity has had on the Earth system as advocated within the concept of the Anthropocene (Zalasiewicz *et al* 2011).

The economic requirement to understand the geology of the region, to move beyond chance discoveries of important mineral resources, has resulted in an in-depth understanding of the geological structure of the area. This is demonstrated by early accounts of the geology of the region by Carew (1602) and Borlase (1758) and the publication of the first geological map, at the scale of one-inch to the mile and associated memoir, for the Ordnance Geological Survey by Henry de la Beche (1839) on the geology of Cornwall, Devon and West Somerset. Opportunities to map the near-surface geology are enhanced by extensive exposures in quarries, mines and coastal cliffs, while the deeper geology (>200m depth) has been revealed by the region's mining activity coupled with deep boreholes related to mineral exploration, some exceeding 1km in depth.

The bedrock geology is summarised in Figure 5.1 according to geological time. The southwest peninsula forms the western part of the Cornubian Massif. The massif is composed of a Late Proterozoic/Early Palaeozoic basement, only visible in isolated outcrops on the south coast within the Lizard Complex (e.g. Old Lizard Head Formation and Man of War Gneiss, the latter dated *c*500 Ma).

During the Caledonian orogeny, a period during the Ordovician to Early Devonian when continental collision brought the two halves of the UK together, the land to the north of the peninsula was raised, leading to the development of a southwards draining pattern into a shallow sea, likely to have formed an extension of the Rheic Ocean. During the Devonian-Carboniferous succession, *c*410–315 Ma, a series of six east-west trending sedimentary basins formed in Cornwall and Devon, with the oldest being the Lower Devonian Looe Basin. The Upper Middle Devonian Gramscatho Basin occupying south Cornwall was limited to the north by an outer shelf within which the Looe Basin developed. The sedimentary basins show evidence of sequential development and infill from south to north, during the Devonian and Carboniferous, with sediment supplied by NW-moving stacked nappes, initiated in the Early Devonian by the progressive closure of the Rheic Ocean, and by fluvial systems bringing in sediment from central Europe. Early Devonian sandstones, shales, conglomerates and some calcareous beds accumulated in this sea and at its margins, while the finer-grained deposits that form the succeeding Middle and Late Devonian slates and mudstones reflect denudation of the northern landmass to a low rolling plain. The successions in the Looe and South Devon basins show along-strike variations due to a westward deepening and a greater submergence of the intervening highs, including the development of the Plymouth High in the east of the study area which is associated with the Plymouth Limestone Formation. The successions in all basins are fault-bounded, dismembered or interdigitated by episodes of

deformation brought on by convergence. Closure of the Rheic Ocean is demonstrated by the Carboniferous coal-bearing mudstones and sandstones with thin developments of lignite and coal within north Devon. Periods of deposition within these basins were punctuated by episodes of rift-related alkali basalt magmatism and volcanism within the basins, such as at Porthleven.

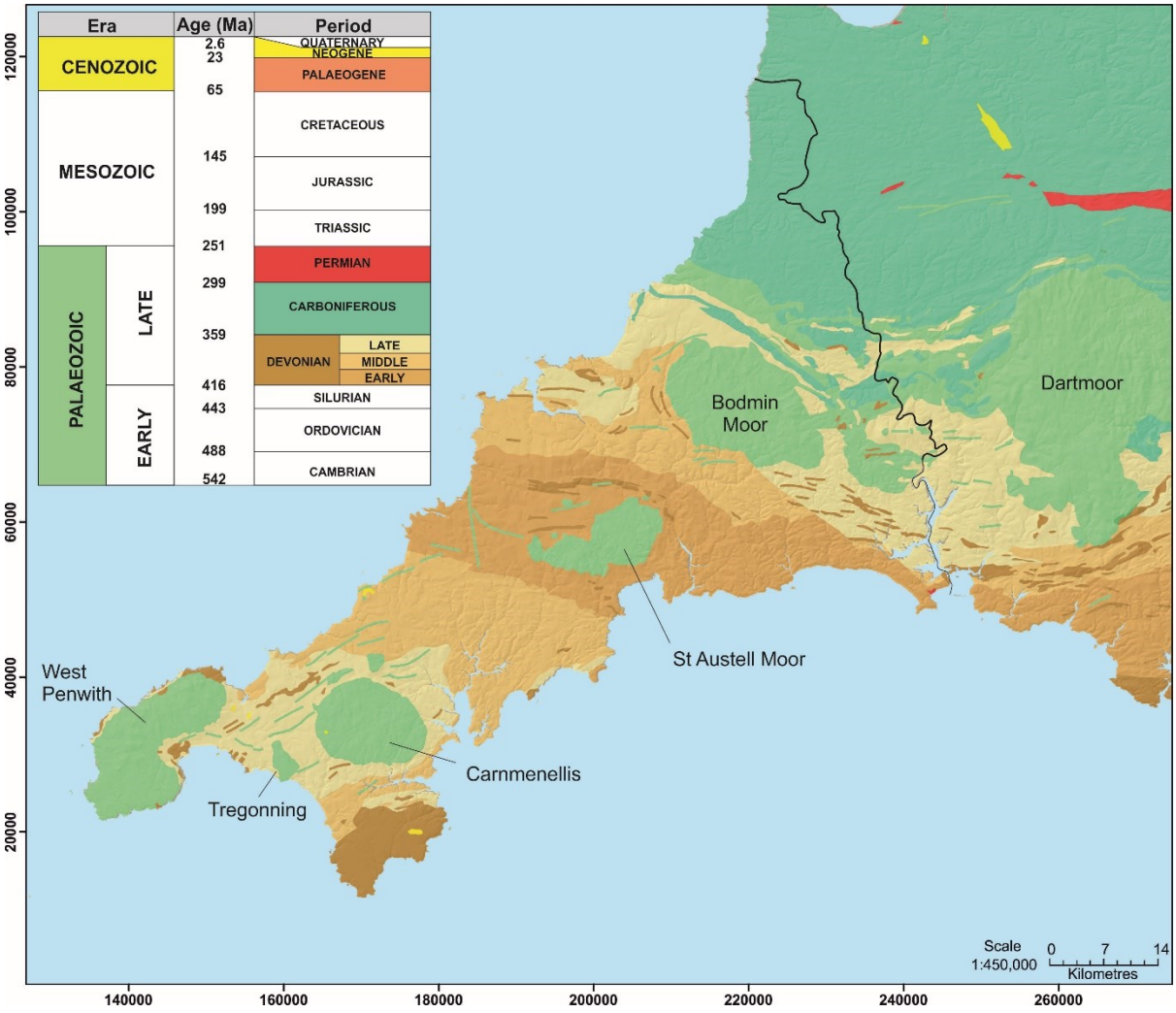


Fig 5.1 Simplified geology of the southwest peninsula (contains British Geological Survey materials © NERC 2018).

During the Variscan orogeny during the Late Carboniferous to Early Permian, *c*290 Ma, the large-scale continental convergence, forming the supercontinent Pangea, led to intense east-west folding, together with faulting and thrusting, of the Devonian-Carboniferous basin. The forces were sufficient to bend the strata over itself resulting in some layers now lying upside down, as visible within the cliff exposures at Jangye-ryn. In the south, where the compression was the greatest, it was strong enough to break the rocks creating faults, along with thrust faulting leading to the deposition of the geologically complex Lizard Complex, containing a variety of igneous and metamorphic rocks including ophiolites. In some places the compression and folding resulted in temperatures and pressures high enough to metamorphose the rocks so that they now have a slate character and have been extensively quarried for use as roofing slates.

These movements were followed by granite intrusions and consequent metamorphism of the country rock, when a large molten mass of magma rose from within the Earth's crust and ascended to near the surface where it spread out to form a long north east – south west aligned cylindrical body (Cornubian batholith) extending from Dartmoor to the Scillies. Extending upwards from this body, seven major plutons rose still further and

now form the granite moors and high ground visible at Dartmoor, Bodmin Moor, St Austell Moor, Carnmenellis, Tregonning, West Penwith and the Isle of Scilly (labelled on fig. 5.1). The rocks into which this magma intruded underwent metamorphism, resulting in harder re-crystallised rocks. The granite pinnacles that rise to the present-day surface have many associated mineral veins that were formed by the cooling of mineral rich liquids associated with the magma as it was emplaced. These have been mined for tin, copper, tungsten (W), lead (Pb) and small amounts of gold (Au) and silver (Ag), with the main areas of activity focused around St Just, Tregonning and Gwinear, Wendron, Camborne and Redruth, Gwennap, St Agnes, Caradon and the Tamar Valley. Some of the mines in these areas reach depths of over 500m and exceptionally the Dolcoath Mine, Camborne, reached a depth of over 1km below the surface at the beginning of the 20th century. Where the granite was altered by hot water circulating through it as it cooled, some of the minerals were altered to a very fine and white clay, known as kaolinite (china clay), which was extensively open cast mined in areas near St Austell, Lee Moor and Camelford.

An extensive post-Variscan landmass, with arid climate and characteristic wet-season debris torrents, resulted in the formation of breccias, marls and sandstones of Permian and Triassic age, but also the erosion of the land that had been uplifted by the Variscan Orogeny. Onshore exposures associated with these periods are isolated, such as the Early Permian Kingsand Rhyolite Formation, and are usually found further east in south Devon. Beyond this small outcrop, there are few geological exposures that can be associated with the Permian to Cretaceous period, though these are found within 10km offshore of the south Cornwall coastline. However, rifting during the Triassic period did lead to the expulsion of basinal fluids and the formation of north west – south east to north – south trending 'crosscourse' quartz veins across Cornwall, prior to the opening up of the North Atlantic.

Beyond these few sites, there is relatively little known of the Mesozoic and early Cenozoic eras in the area, though erosional surfaces, ranging from below sea level to 300m OD, have been identified and suggested to relate to subaerial and marine erosion from this period up until the modern day. For the Pliocene, the most important deposit within the area is the marine deposit found at St Erth, located between 27-45m OD.

5.1.1 Coastal Quaternary deposits and archaeological potential

The coastal sedimentary sequences of the Cornish coast provide a series of key contexts within which archaeological and palaeoenvironmental evidence may be preserved. They also contain a series of Pleistocene deposits that are important for understanding the palaeogeography of the area during the Palaeolithic period, such as past sea level change and palaeoclimate. The coastal deposits are divisible into two categories based upon age: Pleistocene and Holocene, with the boundary at 11,700 years ago (Walker et al. 2009). Subdivision of the Pleistocene is possible using the Marine Isotope Stages (MIS; Fig. 5.2) which record the oscillations between glacial and interglacial phases of global climate.

Pleistocene deposits are associated with raised platforms distributed along the coastline. These relate to periods of elevated sea level during past interglacials, providing an indication of the position of the previous coastline. In a few locations these beach deposits may be overlain by fossilised Pleistocene dune deposits created by blown sands, though these are much less extensive on the south coast compared to the north. The age of these deposits is generally poorly understood, but if shown to be pre-Ipswichian (MIS 5e) they hold the potential to contain Palaeolithic archaeology. In addition to these deposits there are some geological phenomena that are associated with the Pleistocene glaciations themselves, most notably the erratic boulders carried by rafted ice, such as the Giant's Rock at Pargodonnel Rocks, Porthleven (see Campbell *et al* 1998), as well as possible evidence for nearby small glaciers developing upon the peninsula at locations such as Dartmoor (Evans 2012) and Rosemergy, Penwith (Harrison *et al* 2015), and the extension of the Devensian Irish Sea Ice Sheet (ISIS) that reached the Isles of Scilly *c*26

ka (MIS 2; Smedley *et al* 2017). While these glacially-derived deposits are associated with periods when it is believed there were no humans living in what is now Britain due to the harsh climatic conditions that then prevailed, they are nevertheless important for understanding the position of the ISIS in relation to the coastline. The harsh periglacial conditions that existed and which resulted in the development of extensive head deposits may have also severely impacted upon, or even removed, Palaeolithic archaeology that could have been present in the study area prior to the Devensian glaciation.

In contrast, later Holocene coastal deposits are abundant along the coastline and have been shown to provide excellent preserving environments for archaeological material, palaeoenvironmental evidence and material suitable for scientific dating. Three of the most important deposits are the submerged forests, estuarine deposits, and blown sands. Submerged forests may be located within the modern intertidal zone underneath the beach sands, only periodically exposed, or may be found along the river valleys within areas that were formerly estuaries but have subsequently silted up due to high sediment inputs derived from mining activities. These deposits have provided detailed information about the palaeolandscape and, when found in association with archaeological material (including human remains), could provide an insight into human activity within these wetland environments. Estuarine deposits have provided additional opportunities such as the reconstructing of past sea levels and palaeoenvironmental and chemostratigraphic records that can be used to demonstrate changes in past human activity and landscape evolution. These deposits may be located in close proximity to archaeological sites adjacent to the wetland areas, and therefore provide important information about the nature of this human activity within the wider area. The blown sands have been shown to provide outstanding preserving environments, including old land surfaces, field boundaries and settlement sites, industrial activity and structures associated with Britain at War.

5.1.2 **Pleistocene deposits**

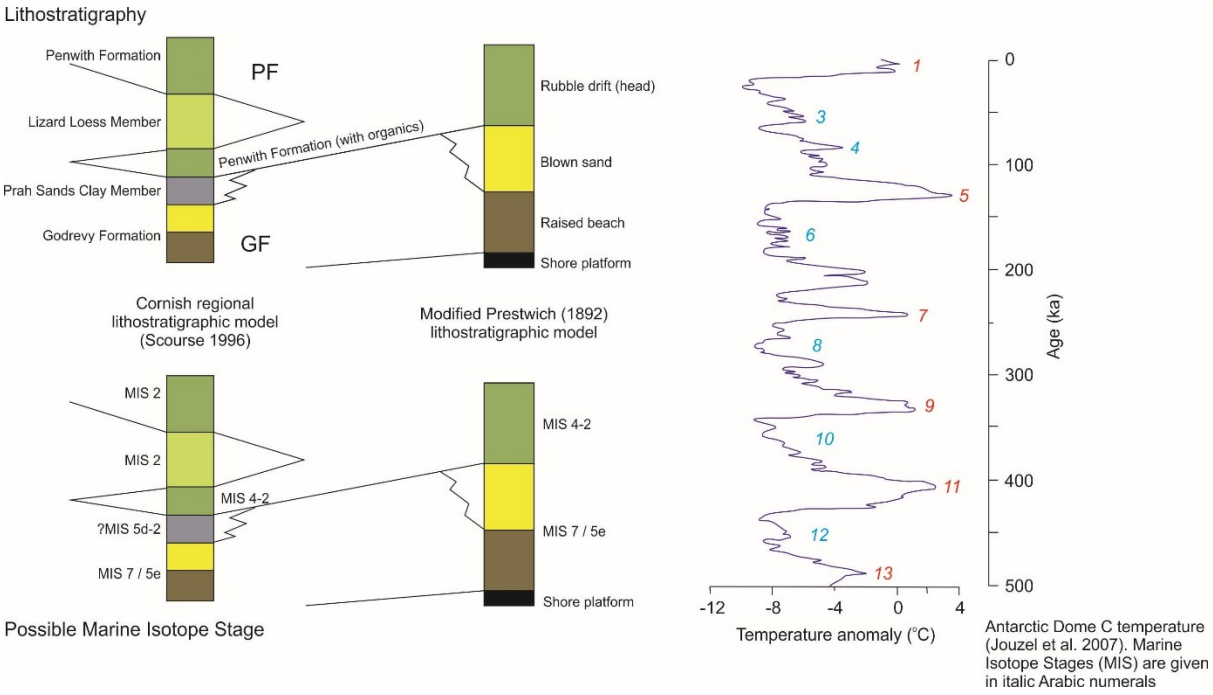


Fig 5.2 Pleistocene lithostratigraphy for Cornwall (modified from Scourse 1996).

The Quaternary geology of the South West has been covered by several authors (e.g. de la Beche 1839; Ussher 1879; Kidson 1977; Campbell *et al* 1998; Scourse 1996) focusing upon the Late Pleistocene deposits exposed within coastal sequences. Ussher (1879a) summarises the importance of the Cornish coastal sequences by stating: '*The numerous*

excellent examples of Raised Beaches and stony loam, or Head, which Cornwall affords, owing to the greater extent of its Palaeozoic coastline, and the completeness of the stream-tin sections, not only make the Pleistocene history of Cornwall more interesting than that of Devon, but to a certain extent make up for the absence of cavern deposits'

Prestwich (1892) adopted a simple triparite stratigraphic relationship for these deposits, consisting of a shore platform, raised beach and overlying head deposits. Scourse (1996) provided a more complex regional lithostratigraphic model for Cornwall with defined type sites and formation names. Scourse's model is broadly compatible with the Prestwich scheme, where the Godrevy Formation is equivalent to the raised beach/fossil dune deposits and the Penwith Formation, most commonly associated with soliflucted deposits (though this process is not always implicit), broadly comparable with the overlying head deposit (see Figure 5.2) produced when the regions postulated glacial deposits are incorporated into a scheme, with the Scilly Till deposits incorporated within the Penwith Formation. Scourse (1996) also presented a modification to the Cornish scheme for the Camel Estuary, but this is not applicable to the south Cornwall coastal deposits.

5.1.3 Shore platforms

Low-level shore platforms are recorded along large stretches of the south-west coastline and it is generally agreed that these initiated during high sea levels during the Pleistocene interglacial stages. The exact timing is much debated, with Kidson (1971) suggesting that these may have been cut over several interglacial stages. In many cases these platforms are overlain by raised beach deposits, with age estimates ranging from the Ipswichian (MIS 5e) to the Hoxnian (MIS 11) interglacial (see Section 5.1.4). Using the altitude of the observed platforms along the coastline, a series of distinct levels have been proposed by some authors (e.g. Zeuner 1959; Orme 1960) although in some areas the presence of multiple platforms is by no means certain, especially where different authors have used different datums (e.g. height above high water, OD, LAT, etc.). James (1974) and Scourse (1996) have also observed that where these platforms can be traced laterally they can be ≥1m higher on headlands than in adjoining coves, presumably due to the stronger wave action in the former localities. Kidson (1977, 264), James (1995) and Leveridge *et al* (1990; 2002), summarising the published data, have collectively identified five broad platforms elevations:

- -6 to 0m OD
- 3.7-5.5m OD
- 12-13m OD
- 20-25m OD
- 35m OD

The most commonly mentioned platform along the coastline is referred to as the so-called 25-foot (7.6m) platform, though this term has been applied to a range of surfaces ranging from modern sea level to elevations well above 10.7m OD (35 feet; Kidson 1971). The depth of this platform is determined by the strength of the geology it cuts into. Reid and Flett (1907) note that, where the cliffs are high and rocks hard, the platform may represent a barely perceptible notch, as was once observable between Newlyn and Penzance prior to development of the coastal frontage. By contrast, where the slope is gentle and geology is comparatively soft, the platform may be wide bounded inland by a small bluff marking the position of the ancient cliff, as found between Penzance and Marazion.

The -6 to 0m platform represents the platform found along the coastline at the base of the modern cliffs. The age of the different platform formations is poorly constrained leading to many age estimations. Zeuner (1959), for instance, attributed +18 and +7.5m platforms to the Ipswichian, with a +3.6m to a Devensian interstadial. Mitchell (1960), however, argues that these may be much earlier and be attributed to a pre-Anglian glaciation (pre-MIS 12). It is very likely that these platforms have witnessed multiple interglacial sea level rises leading to some re-cutting/trimming with each phase. Stephens (1980) has stated that correlation of these rock platforms presents significant

difficulties and strictly altimetric comparisons are at best only tentative. Furthermore, in the absence of datable material upon these platforms, dating of the overlying deposits can only provide a *terminus ante quem* date for their formation.

An unequivocal marine deposit within the area, consisting of marine sand and clay deposits, is found at St Erth, located upon a platform at *c*30m OD, which provides one of the only pieces of direct evidence linking higher sea levels with one of these upper platforms. Originally Millett (1885; 1886; 1895) and Reid (1890) described this as a marine Pliocene deposits, with Mitchell (1965) subsequently suggesting a Cromerian interglacial age, although this was changed to a Late Pliocene age based upon microfossil analysis (Mitchell 1973; Jenkins *et al* 1986). While St Erth can now be firmly associated with the Late Pliocene, the processes responsible for, and age of formation of, some of the lower recognised platforms remain unclear.

A series of high-level erosion surfaces have also been recognised, attributed to marine erosion (see Wooldridge 1954; Kidson 1971) or subaerial processes (Keane 1996) during the Pleistocene or earlier geological periods. Keane (1996, 9) has suggested that some of these may be ancient features that were buried beneath sedimentary rock and only exhumed in the comparatively recent geological past. The high level platforms, similar to the lower ones, do vary in height across the region but in general can be found to cluster in altitudinal ranges reported as:

- 75-90m OD
- 130-155m OD
- 200-210m OD

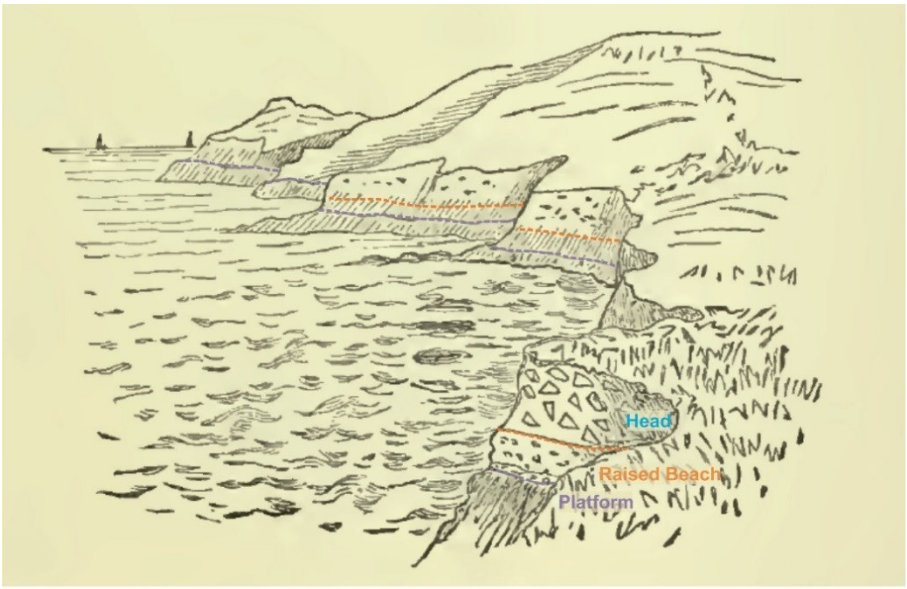
While these high-level erosion surfaces/cliff notches have been commonly associated with Early to Middle Pleistocene sea levels, there has been little agreement on the origin or age of these, exacerbated by the lack of datable material associated with them. Scourse (1987) stated that almost all of these flat surfaces are solifluction or cryoplanation terraces and not erosion surfaces, therefore reflecting a periglacial landscape rather than a relict marine-formed landscape. Kidson (1977) suggested that the intensity of periglacial processes might have led to the loss of depositional evidence of high sea levels.

Westaway (2010) modelled the uplift history of south west England using fluvial terraces, karstic data and the above mentioned 'marine' terraces. From this he has estimated uplift since the Mid-Pliocene of *c*130m in west Cornwall, with uplift since the Early Pleistocene of *c*55m. A key aspect of this modelling focused upon the St Erth deposits, along with fluvial gravels from Crousa on the Lizard peninsula (summarised in Ealey *et al* 1999), which is taken as providing an indicative sea-level elevation for the Late Gelasian (Lower Pleistocene) with age assigned to 2.1–2.0 Ma based upon its planktonic fauna (Head 1999). The indicative sea-level correction for the St Erth marine deposit is dependent upon the sea-level elevation that can be associated with this deposit, with water depth estimates ranging from 10-100m (see Westaway 2010, Supplementary Material 1, 16). As such, the large uncertainty associated with the sea-level correction for the St Erth deposits has significant implications for reconstructing the rate of Pleistocene uplift within Cornwall. Roe and Hart (1999; Roe *et al* 1999) have suggested 35–45m above sea level, while Westaway (2010), although accounting for such a wide range in water depth estimates, settled on an altitudinal range of 90m. These two estimates represent the extremes of the indicative elevation estimates for St Erth and indicate that the rate of Pleistocene uplift suggested by Westaway (2010) could be significantly lower. Westaway (2010) used his uplift model to propose that five low elevation platforms, at 4m, 8.5m, 13m, 18m and 24m, were attributable to MIS 5e-13 respectively, the lowermost constrained by dating of their overlying raised beach deposits (see below). However, this model assumes the St Erth deposits are associated with indicative sea level of 90m and the 130m platform is attributed to a Pliocene wave-cut platform tentatively attributed to *c*3.1 Ma. It also uses the high-elevation gravel outcrop at Crousa on the Lizard Peninsula situated at 108m, which has been

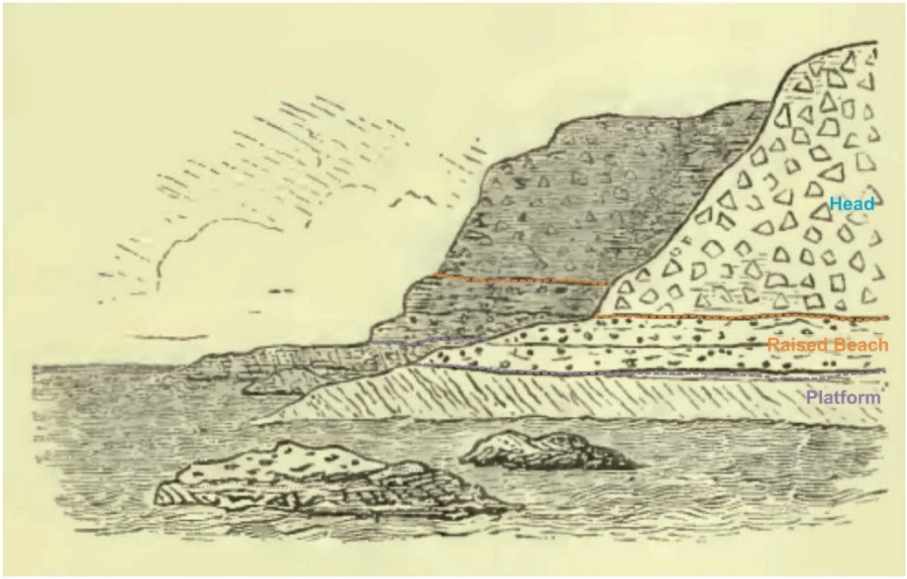
retrospectively fitted to the uplift curve depending upon whether a marine or terrestrial origin of this Pliocene deposit is accepted, though Ealey *et al* (1999) have suggested that it is not possible to date this deposit and have even suggested a possible Lower Tertiary age based upon palynology. While the uplift model proposed by Westaway (2010) for west Cornwall has very few secure altitudinal and chronological control points, it does correlate with the uplift model for south Devon which contains a larger number of dated Pleistocene terraces. The uplift model for west Cornwall is also further complicated by the potential impact that repeated Pleistocene glaciations off the north Cornish coast that could have led to increased crustal loading, river diversion and subsequent crustal rebound. As such, with all the uncertainties identified associated with the Cornwall uplift model, it is possible that some of the lower shore platforms could have been active over several interglacial cycles, as suggested by the raised beach dating evidence (see below), and therefore are not indicative of a sequential increase in MIS by each higher platform.

5.1.4 **Godrevy formation**

The Godrevy Formation is typified in the area by the exposure of Pleistocene raised beach deposits along the coastline, often resting upon the shore platforms at a range of altitudes. The sedimentary composition of the raised beaches on the south coast consists predominantly of pebbles and cobbles but also sometimes finer grades. At some sites these are strongly cemented by iron and manganese, as seen at Gerrans Bay (James 1981).



Coast towards Rosemullion Head (Ussher 1879a)



Gerran's Bay (Ussher 1879b)

Fig 5.3 Illustrations of South Cornwall Shoreline Platform, Raised Beaches and overlying Head (from Ussher 1879a; b).

The earliest known recording of a raised beach deposit in Cornwall was by Borlase (1758) who illustrated and described the raised 'boulder' bed at Porth Nanven, located just north of Lands' End. Hennah (1816) provides one of the first descriptions of a raised beach from the south coast, describing the raised beach at Plymouth Hoe, which Leveridge *et al* (2002) suggest might be the exposure at 2.5m OD beneath the walls of the Citadel. Documentation of raised beaches, sometimes with overlying fossil dune sequences (e.g. Whitsand Bay and Pendower), has been extensive along the coastline, with notable studies including de la Beche (1839), Ussher (1879a; 1879b – see Figure 5.3) Prestwich (1892), Reid and Fleet (1907), Hill and MacAlister (1906), Ealey and James (2001), Robson (1944), James (1974; 1994), Scourse (1996) and Campbell *et al* (1998). Along the south coast there are over 60 named locations that are known to contain raised beach deposits, with particularly dense clusters within the Mount's and Gerrans Bay areas (Figure 5.4). James and Ealey (2018) report that these deposits are susceptible from coastal erosion, with the winter storms of 2012/2014 causing the total collapse of a previously described Quaternary section at Gunwalloe Fishing Cove, though

in part compensated by the exposure of new sections to the south of the raised beach and overlying colluvial sands and periglacial head.

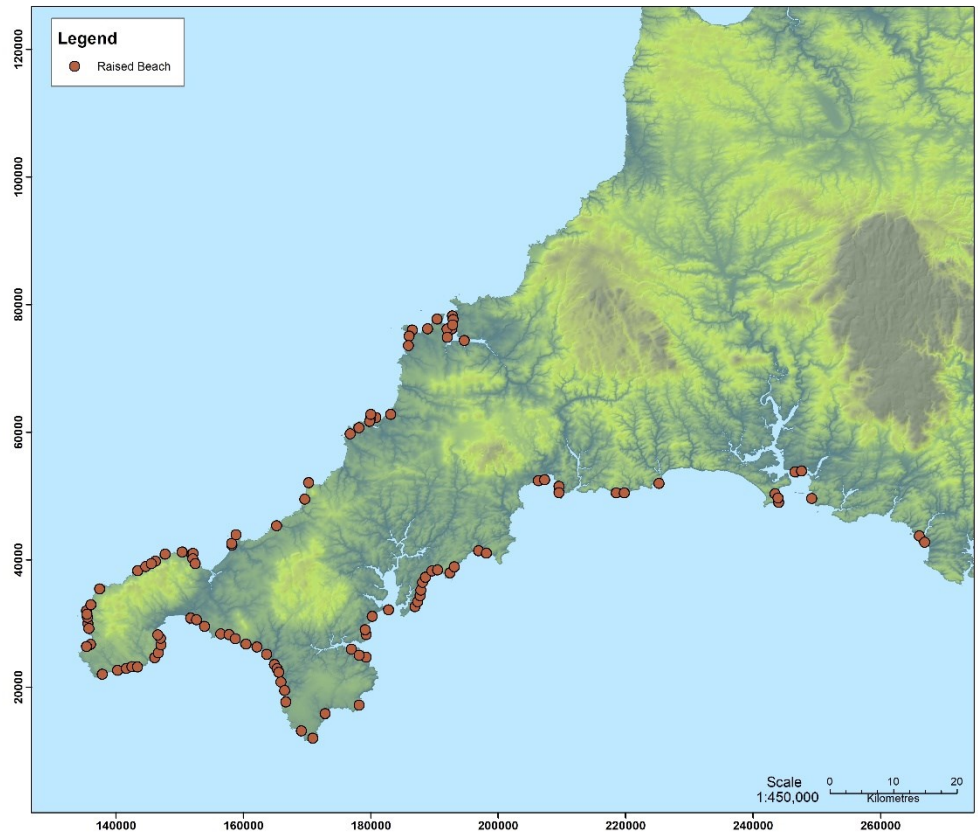


Fig 5.4 Distribution of raised beaches around the coastline (contains OS data © Crown copyright and database right 2018).

James (1995) has shown that the majority of raised beaches in the area are associated with *c*4.4m OD, although there is some notable altitudinal range in some areas such as Mount's Bay and Plymouth Sound, with the highest recorded raised beach at Penlee, south of Penzance, by Reid and Fleet (1907) at *c*20m OD. In some locations multiple raised beaches occupy different elevations. At Plymouth Hoe there are three well-defined raised beach levels, with the second terrace, at 10-15m OD, typically attributed to the Ipswichian MIS 5e. Whitley (1882) also reported an even higher deposit, at *c*36.5m OD, which was composed of boulders and pebbles in a matrix of clay and sand which contained shells of a marine origin, though it is not clear if this is Pleistocene or Pliocene.

The age of the raised beaches has been a point of debate since the 19th century, and since the mid-20th century attempts to date these deposits has often been based upon altitudinal correlation with respect to estimates of interglacial sea levels (e.g. Westaway 2010), though Stephens (1980) has stated that correlations using faunal assemblages have proved as unsatisfactory as altitudinal comparisons, and therefore dating techniques are required to achieve a more precise chronology.

Many authors, such as Green (1943), Zeuner (1959), Guilcher (1969) and Kidson (1977), favoured an Ipswichian (MIS 5e) age for the lower level raised beach deposits within the region. However, there have been very few attempts to obtain independent dating of these raised beach deposits, and of these studies most are focused on the north coast raised beaches and overlying fossilised dune sands. Attempts to use AAR D/L ratios, to infer which MIS the deposits could be attributed to, were not deployed on the south Cornish coast (Davies 1984; Bowen *et al* 1985). James (1995) reports on preliminary InfraRed Stimulated Luminescence (IRSL) dating of the raised beach at *c*5m OD at Bream Cove, near Falmouth, which suggested an Ipswichian MIS 5e date for this

deposit. At Pendower, Thermoluminescence (TL) dating of bed 2, interpreted as an aeolian coastal sand deposit, overlying the raised beach (at 3.5-6m OD) provided a date of 165–252 ka (QTL-444; Southgate 1984) which Scourse (1996) used to suggest the underlying beach was pre-Ipswichian (pre-MIS 5e) and possibly from MIS 7. More recently, dating of the raised beach marine sands at Praa Sands by van Vliet-Lanoë *et al* (2000) using Electron Spin Resonance (ESR) produced an age of 300±27 ka from sands within the raised beach at – 3m OD, and 341±50 ka from the lower marine sand at *c*0m OD, suggesting this deposit is from MIS 9. However, Scourse and Kemp (1999, 158) have raised some concerns over these dates and suggested that it is impossible to assess, in the absence of any published technical data, the precision or accuracy of the dates. In the absence of any collaborating results from other dating techniques, the three dates from south Cornish raised beach deposits suggest different interglacial periods for their formation. These dates should only be taken as preliminary, and there is a need for further new scientific dating programmes on a wider range of raised beach deposits using coupled luminescence and AAR dating. However, even based solely upon the available dates, it is unwise to assume that the majority of raised beach deposits are of Ipswichian age, raising further doubts over the robustness of using the 'marine' platform elevation staircase to infer previous interglacial sea levels and the Pleistocene uplift history of the region in the absence of independent dating.

The raised beach deposits can also provide insights into the evolution of the coastline during the Holocene period. Ipswichian raised beaches indicate the coastal alignment during the last interglacial highstand, with older raised beaches providing a landward limit for the coastline at that time. The presence of raised beaches from a previous interglacial attest to locations where Holocene coastal erosion has been minimal and suggest that where raised beaches are associated with headlands then these were also prominent features during the previous interglacial(s). In other areas where raised beaches and shore platforms are absent it is possible that these are locations which have experienced higher levels of erosion. Prestwich (1892; Plate VIII; Figure 5.5) used this deduction to suggest coastal retreat in several areas, notably between Looe and Rame Head (Prestwich's 'emerged area at the Raised Beach epoch').

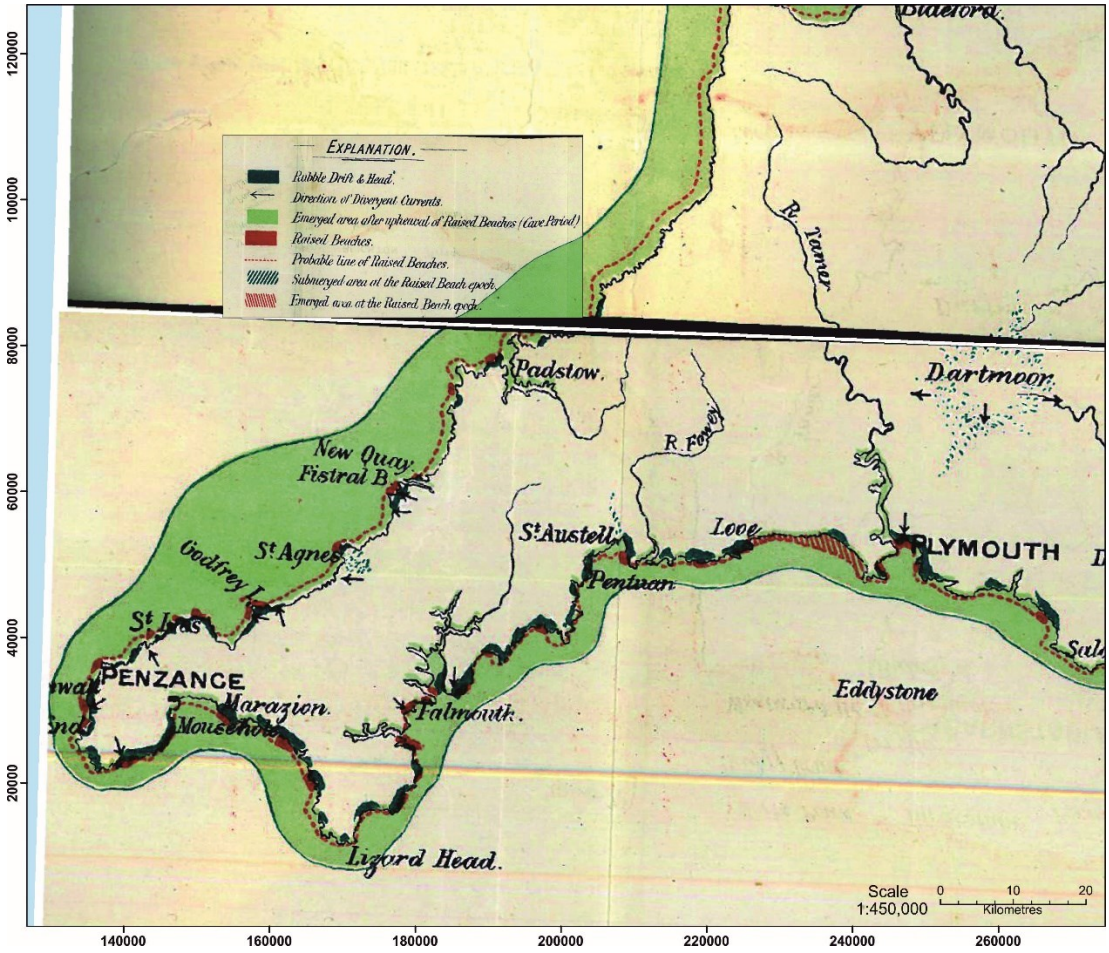


Fig 5.5 Prestwich (1892) map of raised beaches and head/rubble drift in the South of England.

5.1.5 **Praa Sands Clay Member**

One of the most notable coastal sequences in the region is that from Praa (or Prah) Sands, originally described in detail by Reid and Reid (1904) and Reid and Flett (1907). The deposit of most interest here was first mentioned by Ussher (1879a) in Sydney Cove as a 'stiff, drab clay', and later by Reid and Flett (1907) as a 'Palaeolithic floor' consisting of a 'black loam, with fragments of charcoal, burnt bone and burnt earth' (MCO29245). The floor was described as also yielding 'rude implements' of vein quartz that 'had been battered into shape, not flaked' (Reid and Flett 1907) and represented the earliest trace of hominids in west Cornwall. It is also notably the first instance of a Pleistocene palaeosol being described in the British Isles (Scourse 1996). This sequence has been reinvestigated by Robson (1946), Stephens and Sims (1980) and Scourse (1996), with Scourse and Kemp (1999) presenting the most recent synthesis (also see Ealey 1999). Descriptions of the finds associated with the palaeosol have changed, with the 'burnt bone' probably being ferruginous rhizome casts, and the 'rude implements' now regarded as non-anthropogenically fashioned (Scourse and Kemp 1999). This palaeosol sub-divides the Praa Sands Clay Member of Scourse (1996) into two lithostratigraphic units; an upper complex soil and an underlying low-lying basinal deposit. Stratigraphically this forms part of the Godrevy Formation of Scourse (1996), but has only been identified at Praa Sands itself. Scourse (1996) suggested a possible comparable deposit within a cliff section immediately south west of Rosemullion Head. Here a grey matrix-supported gravelly clay, up to 1.5m thick, is present between the raised beach and overlying head. To the east, a basal clay (unit 2a) from Downderry West, Whitsand Bay, has been proposed to also be an equivalent of the Praa Sands Clay Member. van Vliet-Lanoë *et al* (2000) proposed the deposit can be correlated with the Ipswichian (MIS 5e) though

Scourse and Kemp (1999) and Furze (1999) suggest it is more likely to be from the onset of periglaciation during the Devensian (post-MIS 5e), therefore immediately underlying the Penwith Formation.

5.1.6 Penwith formation

The Penwith Formation is associated with the Head/Rubble Drift deposits of de la Beche (1839) and Prestwich (1892) that are extensive across the peninsula and can attain several metres in thickness. A soliflual origin is often associated with these deposits, though some deposits may also include scree or sediments deposited by mudflow or in near-fluvial conditions (Scourse 1996). The formation can, in some locations, be divided into a Main (or 'Lower') and Upper Head if an intervening deposit, such as the Lizard Loess Member, is present. The former is thought to date from the Late Devensian Dimlington Stadial (MIS 2) with subsequent Upper Head emplacement during the Loch Lomond/Younger Dryas Stadial *c*12.7–11.7 ka (James, 1981a and b; Scourse 1996).

One notable deposit associated with the Main Head unit is the organic deposits at St Loy Cove (part of the Boscawen CGS site; Campbell *et al* 1998, 176–178). At this site a soliflucted breccia is found to be interbedded by a chocolate brown to black granular humic silt up to 50cm thick. It is thought to be a lacustrine deposit, either from a small pond or marshy hollow, which is supported by its pollen assemblage indicating open tundra grassland. Radiocarbon dating was undertaken with a bulk date on the humic fraction providing a date of 37.8-30.7 ka cal. BP (29120+1690/1400 BP; Q-2414) implying a late Middle Devensian age (MIS 3/2; see Scourse 1991).

5.1.7 Lizard Loess Member

Loessic sediments on the Lizard were first recognised by Coombe *et al* (1956), formerly defined by Roberts (1985) and dated using TL to 15.9±3.18 ka (QTL-1e; Wintle, 1981). They are genetically and stratigraphically related to the Old Man Sand loess Member of Scilly (Scourse 1991) which yielded similar, albeit slightly older, dates. The Cornish Loess is mineralogically different and coarser than that of the Late Devensian Loess in east Devon and other parts of southern England. The loess would have been predominantly blown from glacial outwash deposits in the southern part of the Irish Sea Basin, although there is also a component derived from weathering of the local granite (Catt and Staines 1982). On the Lizard Peninsula, Ealey and James (2011) have suggested that there are two distinct deposition phases of loess deposition:

1. An early phase accompanied by dynamic periglacial conditions, resulting in shaved surfaces, intense freeze-thaw bedrock fragmentation and soliflucted breccias, contemporaneous with more conventional 'head' deposits.
2. A later phase, more readily recognisable, associated with more quiescent conditions, which forms the basis of a thin loess cover or "the icing on the Quaternary cake" concept that has hitherto prevailed in south Cornwall. The date by Wintle (1981) of 15.9 ± 3.18 ka, from a plateau based soil sample almost certainly relates to this later phase.

While the predominant centres of loess on the south coast are in the Lizard and Falmouth areas (Antoine *et al* 2003; Catt and Staines 1982; Roberts 1985; Ealey and James 2011), loess-rich soils are also found on the Penwith Peninsula (Catt and Staines 1982). Loessic deposits have also been suggested as being present within Upper Head cliff exposures along the coastline, such as the coastal section between Wiggle Cliff and Polhawn Cove in the far east of Whitsand Bay near Rame Head (Furze 1999). Such deposits provide an opportunity for mineralogical studies (including particle size distributions) and Luminesence dating that could be used to constrain the age of the emplacement of the regionally extensive Main Head and also shed light on Middle to Late Devensian events (Furze 1999, 382).

5.1.8 Plymouth Limestone Formation Caves

Within the Plymouth area, the Plymouth Limestone Formation contains a large number of caves onshore, below 35m OD, as well as some submerged caverns as deep as -70m OD (Leveridge *et al* 2002). Exploration of caves on the north and north east margins of Plymouth Sound in the 19th and 20th centuries yielded rich faunal assemblages, the most notable sites being Orsted, Turnchapel, Stonehouse and Cattedown. The latter is especially important as the Cattedown Bone Cave (NHLE 29678) contained the remains of at least 15 hominins (Devon Karst Research Society 2006). A pair of radiocarbon dates were obtained from a tibia (BM-729) and right calcaneum (OxA-17160) of Reindeer (Rangifer tarandus) from the adjacent Cattedown Reindeer Rift Cave, providing dates of 17340–15530 cal BC (BM-729; 15125±390 BP) and 15980–15600 cal BC (OxA-17160; 14550±50 BP), with a combined date of 15980–15610 cal BC (Figure 6), placing this cave assemblage near the end of the Late Devensian Dimlington Stadial (MIS 2), though this date does not necessarily apply to the hominin remains nearby. This does, however, suggest that Upper Palaeolithic activity may have been occurring within the Plymouth Sound area at the end of the last glaciation, contemporary with the south Devon cave Kent's Cavern, and raises the prospect that similar finds might be made on the Cornish side of the Sound or within some of the submerged caverns associated with the palaeo-Tamar during the last glacial low stand (and see below section 6.2.1).

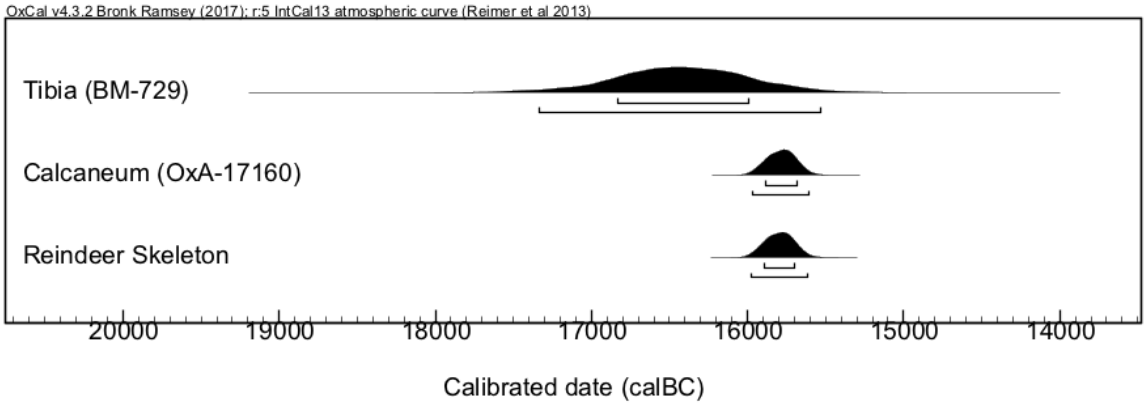


Fig 5.6 Radiocarbon dates from Reindeer bone within the Cattedown Reindeer Rift Cave.

5.2 Holocene coastal deposits

Important Holocene deposits within the study area include submerged forests, estuarine deposits and blown sands, which are discussed below. Other Holocene deposits of interest within the study area, but not covered in this report, include calcareous deposits, tufas and speleothems such as those found at Prussia and Stackhouse coves (Howie and Ealey 2009; 2010b).

5.2.1 Holocene intertidal peats, submerged forests and estuarine sedimentary records

The definition of what constitutes a submerged forest varies considerably. Bird (1998), for example, defines them as '*remains of a forest (tree stumps, trunks, branches, twigs, in a peaty soil) now in the intertidal zone or beneath the sea, usually buried by beach or estuary sediments following a rise of sea level*'. French (1999), however, provided the definition that they '*refer to a group of palaeosols found beneath present-day offshore sediments and typically occur in the intertidal zone of most estuaries and bays'*, making no specific requirement for remains of woodland and could simply contain evidence of herbaceous marsh deposits which could be redefined as 'submerged peats'. The broader definition adopted by French is probably more useful in the south west given that our evidence for the location of some of the sites may be limited to just a named location within 18th or 19th accounts. While many regard submerged forests as those present within the intertidal zone and upon the foreshores in modern estuaries, this fails to

include sites that may never be exposed on the surface and have been preserved *in situ* within river valleys which were once open estuaries. Within the south west in particular, the silting up of many river valleys (and estuaries) has been the consequence of high sediment discharge associated with upstream mining activities, reducing the geographical extent of the intertidal area (see below). Johnson and David (1982), in their discussion of submerged forests in Cornwall, identify two types of situation where submerged and buried forests deposits have been found associated with marine deposits:

- Deposits exposed within and below the intertidal zone of beaches; and
- Deposits found in tin-streaming works in the lower reaches of river valleys.

Each of these two site types provides contrasting benefits and limitations for their investigation. For instance, intertidal sites permit easier site access for excavation and surveying, such as mapping the distribution of trees, palaeochannels and *in situ* archaeology and/or faunal remains. However, these sites are also at high risk from coastal erosion and may not retain the *in situ* estuarine and marine minerogenic deposits overlying the submerged forest bed. By contrast the inshore submerged sites are not exposed to such erosional damage, with the submerged forests often preserved under several metres of estuarine alluvium and, in some locations, blown sands. These inshore submerged sites might therefore yield the best information for reconstructing rates of past sea level change and preserved long stratified environmental records, as clearly demonstrated within Mount's Bay (Healey 1993; 1995). While these sites might be the best preserved and least at risk from coastal erosion, onshore development may impact upon these, such as the redevelopment of the Penzance heliport (Howie 2014), and are often only possible to sample using geoarchaeological techniques.

Records of intertidal and submerged forest sites are included in both the county HERs and Historic England Intertidal and Coastal Peat Database (Hazel 2008), though the geographical location of sites does vary between the two databases with the former generally providing more accurate locations. For a useful geoarchaeological review of the broader context of marine deposits along the coastline of Southern Britain the reader is referred to Timpany (2009).

5.2.2 Intertidal sites

The submerged forests along the Cornwall coast have all formed since the last glacial lowstand. Bell *et al* (2009, 616) states that while such submerged forest sites figure little in archaeological period syntheses, probably because they have produced quite small artefact assemblages, they are important as they are sediment accumulation sites where phases of activity are stratigraphically separated and provide excellent possibilities for dating.

Of the 22 named intertidal locations along this stretch of coastline (shown in Figure 5.7) where remains of a submerged forests (excluding sites where boreholes encountered peat) have been recorded, radiocarbon dating has only taken place in 6 areas (Fig 5.7 and 5.8). The majority of the radiocarbon dating on coastal sequences relate to borehole sequences in the Mount's Bay area (Marazion Marsh, Penzance and Ponsandane; see Healey 1993; 1995) and more recent studies within Falmouth Docks (Johns 2008). Regionally, the most famous submerged forest is that found within Mount's Bay, which has been studied since the early observations recorded by Borlase (1758) and is a County Geology Site (CGS site name: Mount's Bay Fossil Forest). These submerged forests are often obscured by overlying minerogenic and estuarine deposits, though during periods of high storm activity these can be removed revealing extensive submerged forest peat surfaces and prostrate trees, whilst in other locations these submerged forests may only be visible during exceptionally low spring tides. Windows of opportunity to access such exposures may therefore be limited and sporadic, but provide the best chance to survey and sample the submerged forests. However there are good examples of where this work has been achieved. For example, in 1967, exposure of the

submerged forest at Portmellon allowed Pascoe (1970) to map some of the peat sections, coupled with targeted coring, revealing a rich assemblage of macroscopic plant and insect remains. More recently, in February 2014, the winter storms led to one of the largest exposures of the submerged forest in Mount's Bay for several decades, gaining significant public interest and national media coverage (Falmouth Packet website).

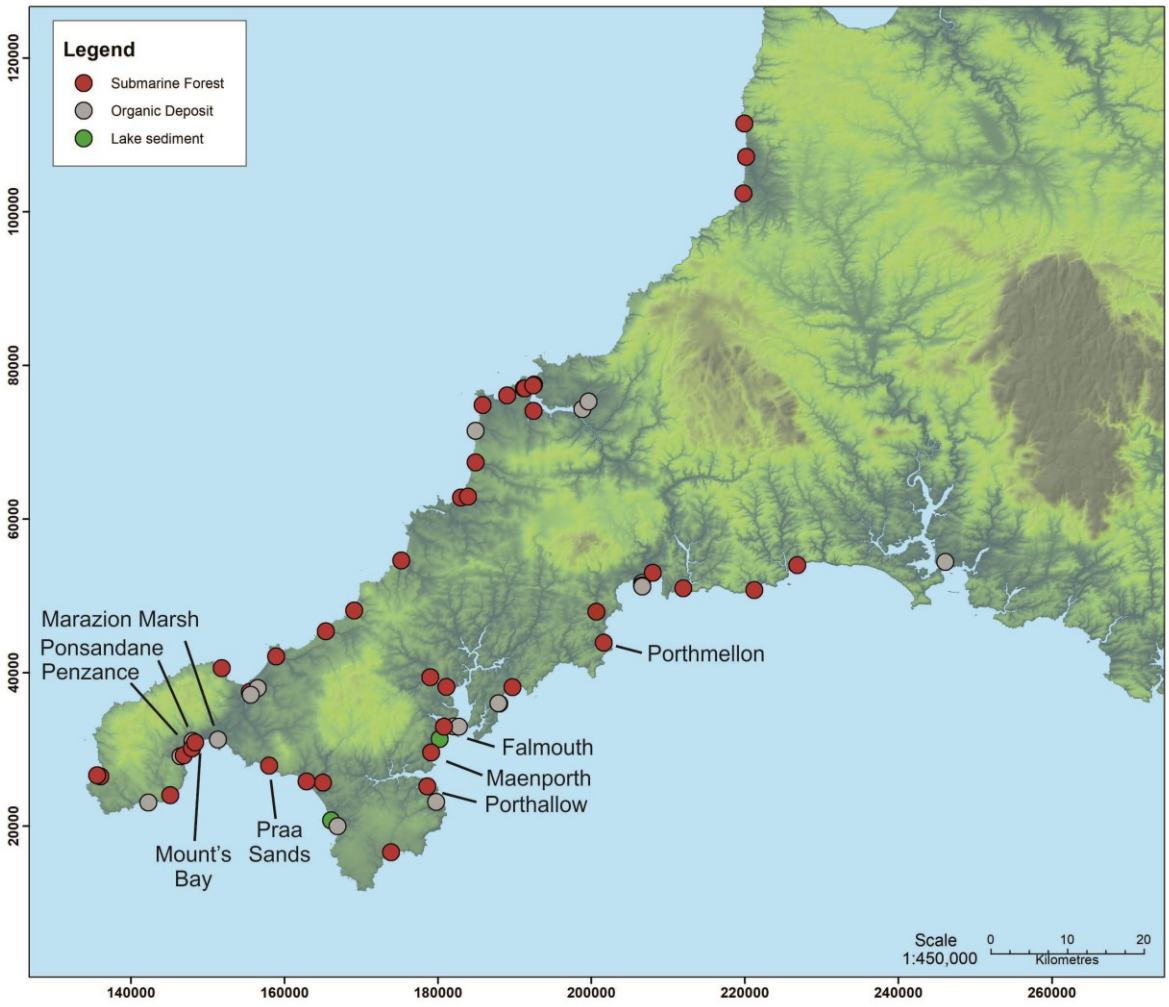


Fig 5.7: Palaeoenvironmental studies from coastal organic deposits (contains OS data © Crown copyright and database right 2018).

With the exception of the radiocarbon date from within Mount's Bay at -32m OD (SRR-3022), the majority of dated deposits are above -6m OD and date between *c*5500 cal BC within Falmouth Docks (Johns *et al* 2008) and 400 cal AD at Praa (Prah) Sands (French 1983; 1999).

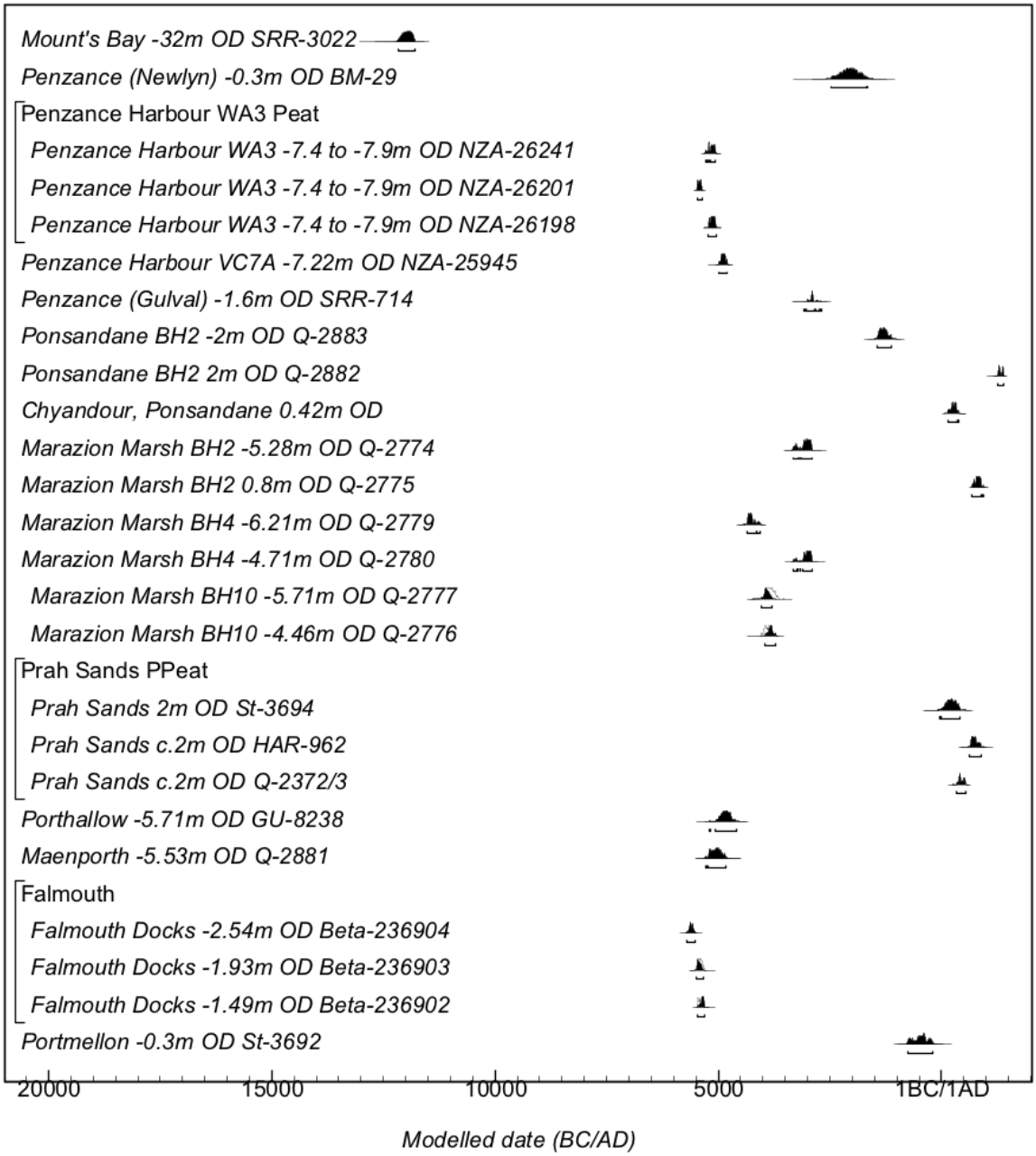


Fig 5.8 Radiocarbon dating of submerged forest and coastal organic deposits.

French (1999) provides a summary of the main plant remains identified from the submerged forest sites, showing the dominance of oak (*Quercus*) and hazel (*Corylus avellana*), with alder (*Alnus glutinosa*) and willow (*Salix* sp.) also common. Some unexpected trees are also recorded, such as trunks of beech (*Fagus sylvatica*) trees reported from Market Strand, Falmouth (Whitley 1872), Millandreath Bay (Davey 1909), Mount's Bay (Boase 1826) and Polperro (Couch 1845). French (1999, 367) notes that such identifications should be treated with caution pending further investigation at these sites. The submerged forests provide opportunities to further understand the vegetation structure of the coastline during the mid to late Holocene, as well as providing information on storm activity based upon the orientation of the prostrate tree trunks and opportunities to tightly constrain the age of these forests using dendrochronology.

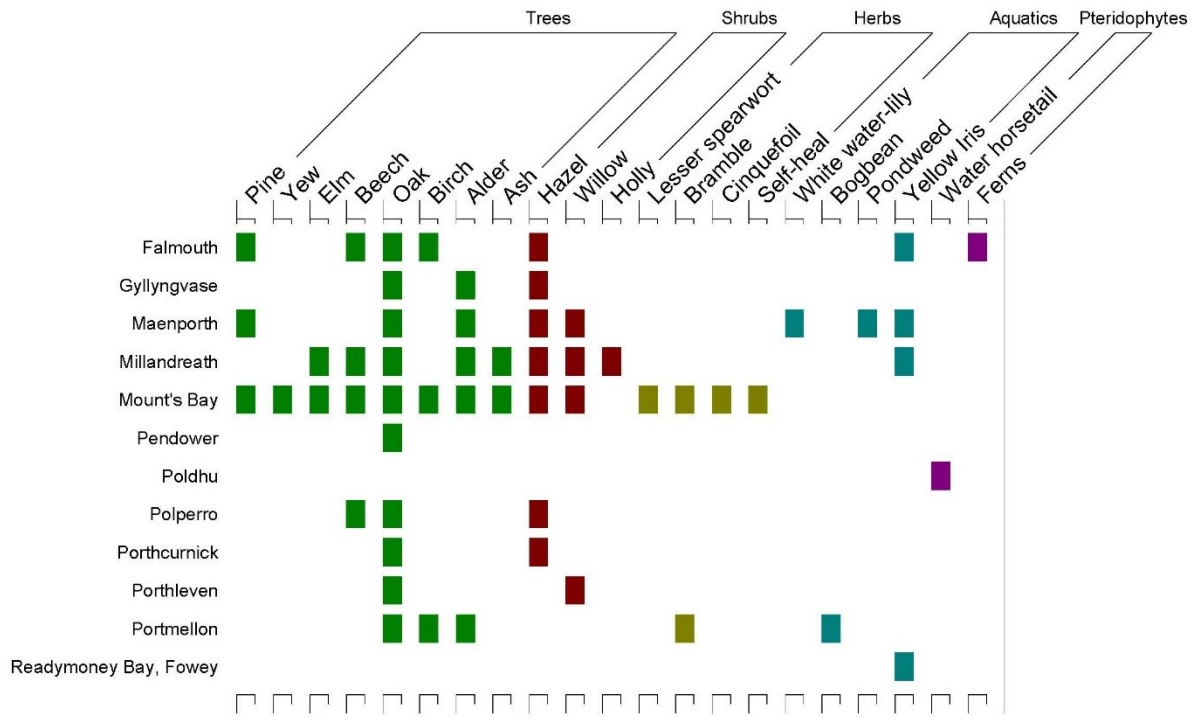


Fig 5.9 Botanical identifications from submerged forests (from French 1999).

5.2.3 'Inshore' submerged forests and tin-streaming

Much of the knowledge about the 'inshore' submerged forest sites is derived from observations made in association with tin-streaming, where deep excavations within the floodplain sometimes encountered 'vegetable layers' including trees and articulated mammal skeletons at the base of the floodplain sequence, directly overlying the basal gravels that contained the tin-rich deposits (stannierfous placers) sought by the miners. Carew (1602) provides one of the first accounts of these discoveries, but it is not until the 18th century that more detailed accounts are available. Most accounts are associated with the south Cornish coast or upland tin-streaming sites such as around Bodmin where these Stanniferous placers, also commonly known as 'alluvial tins', were most prevalent. The most widely quoted lowland sequence is from the Happy-Union tin streamwork, Pentuan (Colenso 1832), which is summarised in Figure 5.10.

A widely held view up until the 18th century was that the origin of this detrital tin was that it had been ripped away from the back of lode outcrops by a cataclysmic event such as the biblical flood. Carne (1838) suggested that the stratigraphy of the streamworks was: *'decidedly opposed to the doctrine that "all the changes which have taken place on the earth's surface have arisen from causes which are still in operation." They, on the contrary, furnish the strongest proof of one sweeping inundation, the effects produced by which have never been repeated by any subsequent flood. In many of these deposits there are several alluvial beds resting on the diluvial detritus: in Pentuan there are even beds of marine origin; but where is the tin? only in the very lowest part of the primary deposit and resting immediately on the solid strata of the earth. None of the more recent beds have such an accompaniment: no secondary deposit has ever been found, the lowest part of which is a bed of tin ore. Whilst, therefore, we have evidence before us of a succession of floods, we have evidence equally strong of a great and general inundation, which must have extended to the highest points where tin existed, as well as to the valleys: and from the almost total absence of tin in the mass which is now found to rest on the primary diluvium, we may infer with an able writer, that such a deluge has never occurred since'.*

Rather than a diluvial origin, these stanniferous placers would have originated from lode exposures that were subject to the process of permafrost, nivation, gelifraction and

gelifluction, causing weathering and erosion of the lodes (Camm and Hosking 1984; 1985; Camm 1999). This weathered material would have moved away from the parent source downslope during summer melts, either deposited as eluvial tin streams on the slopes or within dry valleys, or more commonly incorporated into the streams and river valleys and been transported downstream.

During the digging for tin within the river valleys not only were submerged forests and faunal remains encountered, but deeply buried archaeology was also found at a number of sites. One of the best known discoveries was from the Carnon Stream Works, where it was reported in the West Briton on the 4 April 1823 that: *'On Saturday [the 29th of March, 1823] as the labourers employed at Carnon stream-works were removing a quantity of mud, they discovered a heap of stones, under which were four pieces of oak enclosing a human skeleton, the teeth and larger bones of which were in nearly a perfect state* [see Figure 5.11]*. The tomb was covered with a deposit of mud 17 feet in depth, and was 22 feet below the present [high] water mark, on what is denominated the "tin-ground", namely, stones mixed with gravel amongst which tin is found'.*

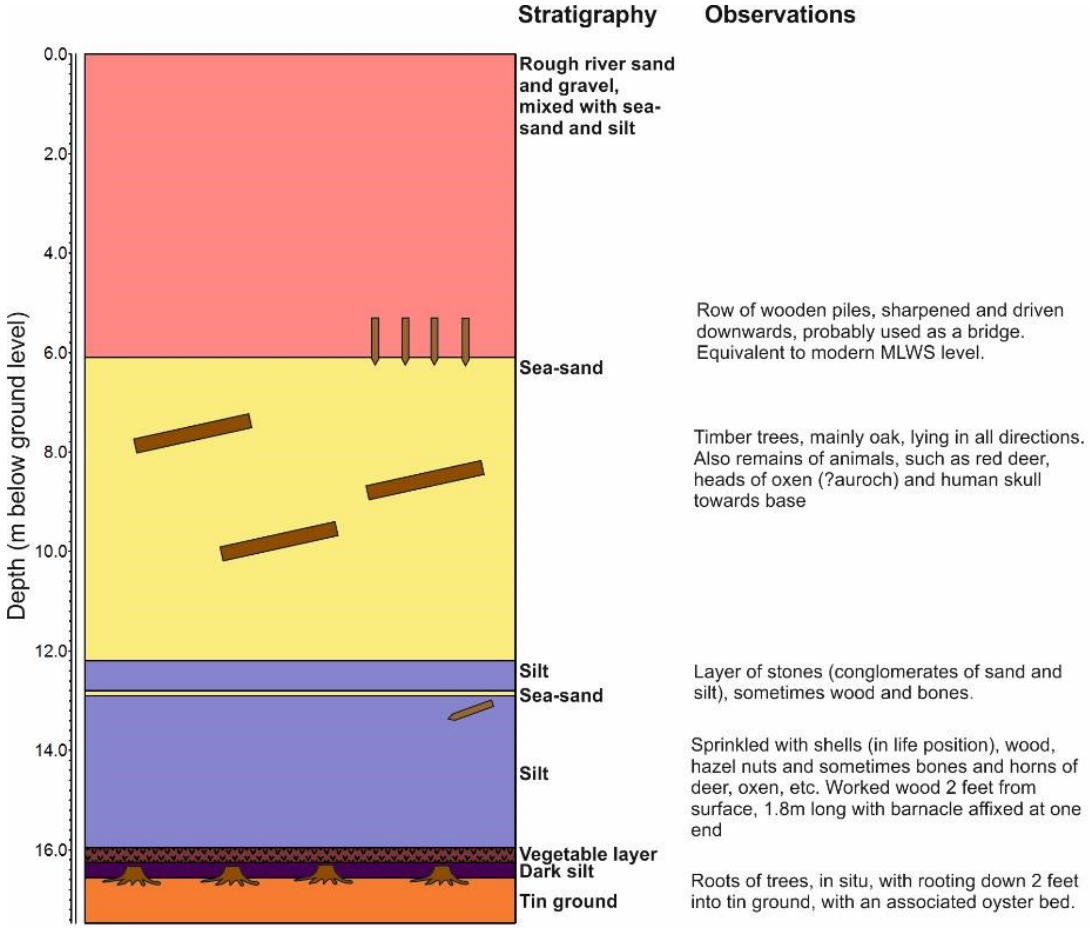


Fig 5.10 Stratigraphy at the Happy-Union Tin Streamwork, Pentuan, reported by Colenso (1838).

Such finds received considerable local interest, with Henwood (1873) reporting that the remains and site were kept open for some time for public inspection. This proved beyond doubt that the base of these river valleys, prior to marine inundation and siltation from mining and/or china clay mining, had been inhabited. While many of these peat surfaces would have been disturbed by the mining activity, it clearly demonstrates the high potential for obtaining both palaeoenvironmental information and good archaeological preservation from within the coastal valleys, and could yield important information to supplement the submerged forest visible in the intertidal zone and subtidal peats located within the offshore submerged valleys.

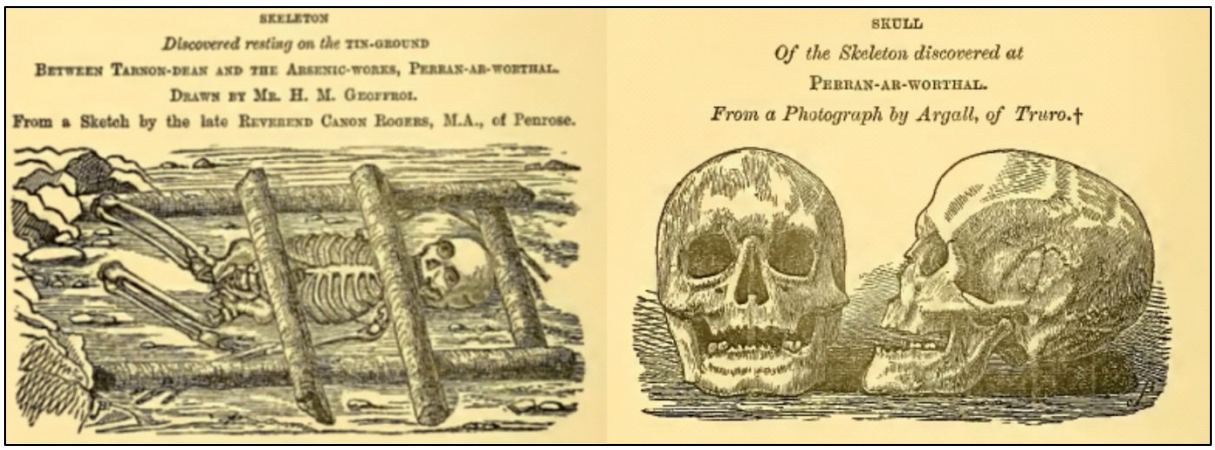


Fig 5.11 Carnon stream works skeleton, discovered 29 March 1823 (Henwood 1873).

5.2.4 Estuarine sedimentation resulting from mining activity

As stated above, the main impact of the extensive mining activities upon the watershed was the vast amount of mine waste entering several of the main rivers draining these areas. Within Restronguet Creek and the Carnon valley, Stapleton and Pethick (1995) established, from cartographical evidence, that 1.8m of sediment accumulated between 1597 and 1693, with a siltation rate of 3.6 to 13 cm yr^{-1} for the period 1821-1842 (Whitley 1881). Hill and MacAlister (1906) stated that the Devoran Creek was subject to the most extensive siltation recognised at that time as a result of mining in the Carnon Valley, ultimately leading to the abandonment of the major port at Devoran.

Similar observations have been made in the St Austell Bay area, with extensive siltation along several rivers as well as along the shoreline. Everard (1962) attributed this to mine waste from china clay, tin-streaming and later hard rock mining and mineral processing. Along the St Austell River within the Pentewan Valley, Everard (1962) states that the narrow estuary was silted up by 1700 as a result of tin-streaming. At Par the estuary used to reach as far inland as Ponts Mill, 3.4km inland of Par Harbour, in the 18th century, but mine waste led to it having silted up entirely as well as prograding the shoreline. Within Carlyon Bay coarse china clay mine waste was supplied to the coastline through an adit constructed after 1842, leading to deposition forming the present beach (Everard 1962).

The impact of mining and the siltation within the river valleys and along the coast has also permitted geochemical studies of these deposits to be used to understand the timing and impact of mining across the region, summarised in Pirrie and Camm (1999). Within Mount's Bay, studies of the offshore sediments by Tooms *et al* (1965) established elevated values of Tin (Sn), most prominently between St Michaels Mount and Porthleven, which was suggested to be derived from mine waste tailings (Hazelhoff and Tooms 1969). Healey (1996) studied sediment sequences from the banks of the Marazion River showing increases in the heavy metals Tin, Copper (Cu), Iron (Fe), Lead (Pb) and Zinc (Zn) towards the surface.

Within the Fal Estuary, cores from Calenick Creek and the Tresillian River analysed by Hughes (1999) and Pirrie *et al* (1996; 1997) revealed significant pulses of mine-waste contamination *c*30-50 cm below the surface. Although the cores were undated, these high levels of contamination (Sn, As, Cu, Pb and Zn) were interpreted as correlating with the discharge of mine waste either during, or immediately after, the peak in mining activity between 1853 and 1893. Within the Carrick Roads area, west of Restronguet Creek, *Pirrie et al* (1999) collected 89 gravity cores and was able to show a distinct plume of higher metal values emanating from this Creek which had been dispersed southwards as a result of the dominant tidal flow conditions. Healey (1996) analysed a core from the Carnon River upstream of the Restronguet Creek similarly showing very high contamination, with notable peaks in Pb exceeding 10,000 ppm at the surface,

while Fe peaks in the middle of the sequence reaching 127,000 ppm, highlighting the extent of contamination within this river resulting from waste water discharge from intensive mining activity. Further south, within the Helford River, Pirrie *et al* (2002) collected a series of ^{210}Pb dated cores and suggested that the pulses of contamination within these cores could be related to mine waste from Wheal Caroline and Wheal Vyvyan to the north, that were active between 1827 and 1864.

Between the Helford River and Fal Estuary, the small coastal lagoon of Swanpool contained high Cu concentrations *c*1m deep (Henon *et al* 1999). These are again linked to increased mining activity in the area, with analysis of the diatoms showing a distinct ecological response, similar to those recorded in Loe Pool (see Simola *et al* 1981; O'Sullivan 1999), coinciding with the peak in heavy metals. These were interpreted by Henon *et al* (1999) as a response to high concentrations of heavy metals within the lake water prior to the main inwash of mine waste after abandonment of the mine.

Within the Fowey Estuary, extensive coring by Pirrie *et al* (2002b) has again revealed a distinct pulse of mine waste, which was considered consistent with sediment supply from tin-streaming and smelting, while the polymetallic hard-rock mining in the catchment had little effect on the estuary sediment geochemistry. The dating of this pulse in mine waste predates 1880, and was predicted to have been from the late 18th or early 19th century.

The main period of metalliferous mining in the Tamar Valley extended from early 19th century until around 1950. From about 1860 to 1900 mines in this area were the world's main producers of Cu and As, along with mining Pb, Zn, manganese (Mn), Ag, Sn and tungsten (W) (Rawlins et al 2003; Dines, 1956; Price 2002). Clifton and Hamilton (1979) studied and dated core sediments from St John's Lake in the lower Tamar Estuary and found that the amount of Zn, Pb and Cu in sediments increased sharply *c*25 years after the onset of peak mining activities in the 1850s, with these levels remaining high after the demise of mining activity in the late 19th century as a result of weathering processes from the spoil tips and seepage of underground water.

5.2.5 Holocene coastal sand dunes

The coastal sand dunes provide an important environment along the coastline for the preservation of archaeology and associated palaeoenvironmental information. The coastal sand dunes are not as extensive or numerous as those found on the north Cornish coast. The archaeological importance of these sites lies in the fact that the sands have buried and preserved many archaeological sites, which led Bell and Brown (2009) to a undertake a survey and review of these coastal sites.

There are eight main areas of coastal dunes on the south coast: Praa Sands, Gunwalloe, Church Cove (Gunwalloe), Pendower Beach, Porthluney Cove, Pentlewean, Par Sands and Tregantle. In 2011 excavations were undertaken at Winnianton Farm, Gunwalloe, in advance of coastal erosion, revealing a midden, early medieval hearths, pits filled with charcoal, clay floor surfaces and a series of walls (Wood 2013; and see below section 6.3.6). The middens had good preservation of animal bone due to the calcareous shell sand, with the recovery of fish bones suggesting exploitation of marine resources as well as farming the land and animal husbandry. Radiocarbon dated mollusc sequences revealed a sequence dating from the Early Bronze Age through to the early medieval period, with settlement occurring within a predominantly open environment (Walker 2014). The dating suggested a strong probability that a major sand blow episode in the 10th/11th centuries AD covered the settlement and probably contributed to the abandonment of the site (Wood 2013).

5.3 Submerged landscapes in South West England

The coastal zone is always in a state of change. One major concern relates to sea level change as a result of anthropogenic-driven climate change, and the impact this will have through increased coastal flooding and erosion. Sea level change has always been an important concept in the south west, most notably within the concept of submerged

landscapes, with much focus having been given to what the submerged forests are and their origin. Reid (1913, 1–2) states that these sites have: '*attracted attention from early times, all the more so owing to the existence of an uneasy feeling that, though like most other geological phenomena they were popularly explained by Noah's deluge, it was difficult thus to account for trees rooted in their original soil, and yet now found well below the level of high tide*'.

This is most apt for the South West and, in particular, Cornwall where the legend of the lost land of Lyonesse has been popular in folklore and was widely debated in the 18th and 19th century regarding the competing theories over how these landscape features might have formed. Lyonesse was a legendary, low-lying country which once extended westwards from Land's End to the Isles of Scilly. Elizabethan antiquaries collected reports current in the 16th century claiming that Lethowstow, the Cornish name for this area, contained fair-sized towns and 140 churches and was suddenly engulfed by the sea. The Seven Stones reef, west of Land's End, was said to be the remains of a town called the 'City of Lions' and fishermen reported that their nets brought up fragments of masonry and windows. The submerged forests around the coastline were regularly cited as evidence to support the loss of Lyonesse, with Ussher (1879a; 45) reporting that "*Several observers have cited the occurrence of hazelnuts, in some cases with branches attached, as proof of a sudden autumnal submergence*". Mount's Bay played an especially important role in further developing this legend. William Camden (1584) stated: '*That S. Michael's Mount is call'd in Cornish Careg cowse in clowse, i.e. the hoary rock in the wood; That 'tis certain, there have been large trees, with roots and body, driven in by the sea between S. Michael's Mount and Pensance, of late years'.*

William Borlase (1758) made similar observations tying together the legend of Lyonesse and the evidence presented by the submerged forests, stating that: '*these fossil trees sufficiently confirm the tradition of these parts, that, where the finds now stretching three miles in length, and a furlong (when the spring tide has retired to its full extent) in breadth, from the town of Penzance to St Michael's Mount, there was formerly a wood. That the body of these trees must have stood at least twelve feet higher than at present; consequently there has been a subsidence of these shores, and the ground has sunk more that twelve feet*'. The mention of subsidence of the shore relates to a widely-held belief that it was not the sea that changed its elevation but instead it was the land which rose and fell (subsided) in relation to the sea – a concept that remains strongly engrained in many accounts relating to submerged landscapes up until the 20th century.

During the 18th and 19th centuries increased tin-streaming activity within the Cornish valleys not only led to the discovery of submerged forests below the alluvial sequences, but also archaeological sites associated with them. Such a unique combination of human remains, submerged forests and significant depth below the water table, coupled with legends such as Lyonesse, provided a key impetus for three notable scholars working in the region during the 19th century and was, as will be argued below, a significant driver in developing the concept and study of submerged landscapes within the British Isles.

Henry de la Beche (1839) considered the tin-streaming discoveries and the work of Borlase, leading him to write that: '*assuming the beds with trees and other vegetable remains… and those with human skulls… are equivalent… and there is little doubt that many oak trees grew at the top of the tin-ground, then a considerable change took place in the relative levels of sea and land since man inhabited Cornwall, allowing estuary or marine deposits to be effected in creeks upon a surface that previously permitted the growth of terrestrial vegetation, the remains of the marine creatures entombed in the mud, silt, or sand, showing that these creatures were of the same species as those which now exist in the adjoining sea*'. De la Beche (1839) continues by stating that: '*unless the search for stream-tin had been so economically important, and the detrital contents of so many Cornish valleys turned over in this search, the facts above noticed never would have been known. In other parts of the district, therefore, where the detrital accumulations in the valleys have not been moved since their deposit, it can rarely happen that the existence of man could be traced to an epoch corresponding with*

that to which the Cornish stream tin-works, especially those near the sea, would assign it'.

Utilising these observations, de la Beche was able to envisage the significant wider implications that these submerged sites presented: '*We seem compelled to admit that a change in the relative level of the sea and land has taken place since these trees lived on the situations where we now find them. When we regard such situations, and in imagination raise the present land merely 30 feet, it will be readily perceived where the ten-fathom line is traced around the coast, that numerous small tracts of dry level country would be produced of shallow bays, and in some situations, a large tract of land would appear*". De la Beche (1834) explained the premise for his observations in more detail within his book '*Researches in Theoretical Geology'*. Here he developed the idea of a large exposed coastal plain, using the 100 fathom depth derived from recently published charts, to indicate the coast during the lower sea level stand (Figure 5.12) and the presence of submerged valley systems upon this shelf. He also clearly illustrated the concept that if sea level, relative to the land, rose or fell then biological life would laterally migrate to remain within its ecological niche. If sea level change was gradual and non-erosive, then the fossil remains would be preserved within these sediments and could be related to their water depth/environment at the time of deposition. This would then enable a study of successions in relation to rising sea levels, along with the lateral movement of species across the coastal plain as it flooded. This idea is very similar to the later concept of *lateral facies succession*, known as Walther's Law, proposed by Johannes Walther (1894).

Robert [Godwin]-Austen (1850) was clearly inspired by this earlier work, stating that: '*Sir H. de la Beche has represented the course of the 100-fathom line round the British islands. In closing these observations on the condition of the bed of the Channel, I gladly acknowledge my obligations to this work; to it, and Sir C. Lyell's ' Principles,' I must trace the idea I have attempted to work out...'.* Utilising his extensive experience of working on the numerous gravel deposits, raised beaches and submerged forest in the region, he proposed: *'that the whole area of the English Channel had at one time a higher level, is directly proved by the numerous instances along its shores where old forest ground passes beneath the present sea-bed… it seems to be constantly assumed that the original position of these wooded tracts was close to the coastline, or at the sea-level; but for such a supposition there seem to be no grounds whatever. Proximity to the sea is generally unfavourable to the growth of timber. If we take the whole line of the coasts of the Channel on either side, we shall not find any wooded tracts coming down to it, or even single trees of any magnitude; yet in many instances the trees of these submerged lands had attained a very great size…the conclusion we may safely arrive at is, that the area of the present English Channel was in the condition of dry land previous to its occupation by the waters of the Pleistocene sea, or during the period of the Pliocene (crag) accumulations of the German basin, and that, together with a large area beyond, it served to connect the British Islands with France on the south, and Ireland on the west, into a tract which had a far greater amount of elevation than any portion of it has at present'.*

Fig 5.12 Early models of the submerged landscape around the British Isles.

In his subsequent paper, Austen (1851) developed this concept further, compiling additional evidence from these submerged landscapes, such as mammal remains recovered by fishermen in the North Sea and English Channel, the coastal sedimentary sequences, and the tin-streaming sites from Cornwall that de la Beche had previously noted were so important. His map, shown in Figure 5.12, therefore presents the first conceptual representation of what the submerged land around Britain might have looked like, noting that: '*the course which this river then had… will be found to correspond in a very remarkable manner with that along which the large mammalian remains have occurred*'. Austen was able in this paper to indicate that the many coastal raised beaches and submerged forests are post-Pliocene deposits (Pleistocene), allowing him to attempt to resolve the succession of events leading to the development of the coastal landforms he was familiar with. Key observations included a consideration of the variability in the mammal remains assemblage, episodes of glaciation were associated with low sea-level stands and erosion of the deep submerged channels might have begun in the early part of the Pleistocene. In attempting to construct a succession of events he also remarked that several distinct periods were present when fluctuations in sea level returned to that close to the present day level. With regard to the submerged forests themselves, he implies (but never explicitly states) that these are probably of Late Pleistocene age.

Several attempts to map the submerged landscape appeared over the following 60 years, such as Prestwich's (1892) map focused on Pleistocene sequences and the potential exposed land surface during the 'cave period' (Figure 5.5). In 1913 a map appeared within the *Prehistoric Times* (Lubbock 1913; 415), focusing on mapping of the

submarine river valleys on the bed of the Atlantic and North Sea, as visible upon charts. This approach, mirroring earlier observations by de la Beche (1834), utilised the notion that rivers cannot excavate valleys below sea level, and therefore such valleys visible upon charts must have been generated when sea levels were lower or land was elevated, though it did imply that their formation could date back to an earlier geological period before the Pliocene. In the same year Clement Reid published his seminal book '*Submerged Forests*' where he made significant use of submerged forests and developed some of Austen's ideas. Most notably he advanced the idea that lower sea levels could be fairly recent in geological time, with the latest phase attributable to the post-glacial period. Reid utilised examples from across England, including material recovered from offshore, to demonstrate the existence of a now submerged landscape which previously humans, animals and plants had inhibited prior to marine inundation. The south west played an important role in the formation of his ideas, enhanced by his extensive study of the region for the Geological Survey. He specifically notes that '*On travelling westward into Cornwall we enter a region which is extremely critical in any enquiry as to the amount of change that the sea-level has undergone…On following tins detrital tin ore downwards towards the estuaries the "tinners" or alluvial miners found in many cases that a rich layer descended lower and lower till it passed well below the sea-level in some of the ancient silted-up valleys…Notwithstanding the early date of these excavations, some most interesting observations were recorded; and though they make us long for fuller details and regret the loss of many of the objects referred to, we must be grateful that so much was noted, and by such careful observers'.*

For submerged archaeology, Reid's book provides a seminal moment, notably by his statement that '*the geologist should be able to study ancient changes of sea-level under such favourable conditions as to leave no doubt as to the reality and exact amount of these changes. The antiquary should find the remains of ancient races of man, sealed up with his weapons and tools. Here he will be troubled by no complications from rifled tombs, burials in older graves, false inscriptions, or accidental mixture. He ought to here find also implements of wood, basketwork, or objects in leather, such as are so rarely preserved in deposits above the water-level*'. Accompanying his book was a map of the North Sea basin (Figure 5.12) where he mapped the early postglacial North Sea shore for Europe and the distribution of the main rivers and estuaries within it. Coles (1998, 47) states that it is in recognition of this map that she coined the term 'Doggerland' which is widely used today. However like Coles, many researchers working on submerged landscapes in this region have overlooked the important work preceding Clement Reid's book. Reid's map shows a very close resemblance to that originally published by Austen (1851) (see Figure 5.12), whose papers he cites within the bibliography. It is therefore fairly certain that although Reid is responsible for a significant advance in our understanding of submerged forests and landscapes, along with wider public dissemination of these ideas through his book, it was the work of his predecessors in the south west, notably Austen and de la Beche that provided the critical basis for Reid's key breakthrough.

During the 20th and 21st centuries the focus of study on submerged landscapes in Britain has shifted towards to the English Channel and North Sea basin, to a large extent driven by offshore developments and aggregate extraction. However this does not mean that important studies of the submerged landscape of the south west have not continued to be undertaken utilising marine seismic geophysical survey and coring techniques, even if not recognised at a national level (e.g. Wessex Archaeology 2013; Bicket and Tizzard 2015). Notable studies include the Lyonesse Project on the Isle of Scilly (Charman *et a*l 2016), Mount's Bay and St Austell Bay (Camm and Dominy 1998; Camm 1999) Falmouth Docks (Johns *et al* 2008) and Plymouth Sound (Eddles and Hart 1989; Reynolds 1990; Spencer 2012). These supplement the rich archive of data derived from studies of the stratigraphy within the deeply buried valleys of the south west, dating back to the activities of the tin streamers and construction of the 19th century railways, through to modern multidisciplinary studies within these areas (e.g. Healey 1993;

O'Sullivan 1999), demonstrating that rich submerged palaeolandscapes exist around the south west peninsula and prehistoric people were active within them.

5.4 Late Pleistocene and Holocene sea Level

The general pattern of Holocene relative sea-level change has been established from multiple studies within the region (Healy 1993; 1995; Charman *et al* 2016). Along the south Cornish coast Healey (1993; 1995) is responsible for the majority of Sea Level Index Points (SLIPs) from sites at Mount's Bay (Ponsandane and Marazion Marsh), Maenporth and Porthmellon. The SLIPs show good agreement with Glacial Isostatic Models (GIA), such as Bradley *et a*l. (2011), and show a period of eustatically-dominated rise from -70m at 13 ka, with a more gradual rise after reaching -7m at 5.5 ka, which continues until present (Figure 5.13). Within this region there are no highstands predicted within the models or suggested through the SLIP data.

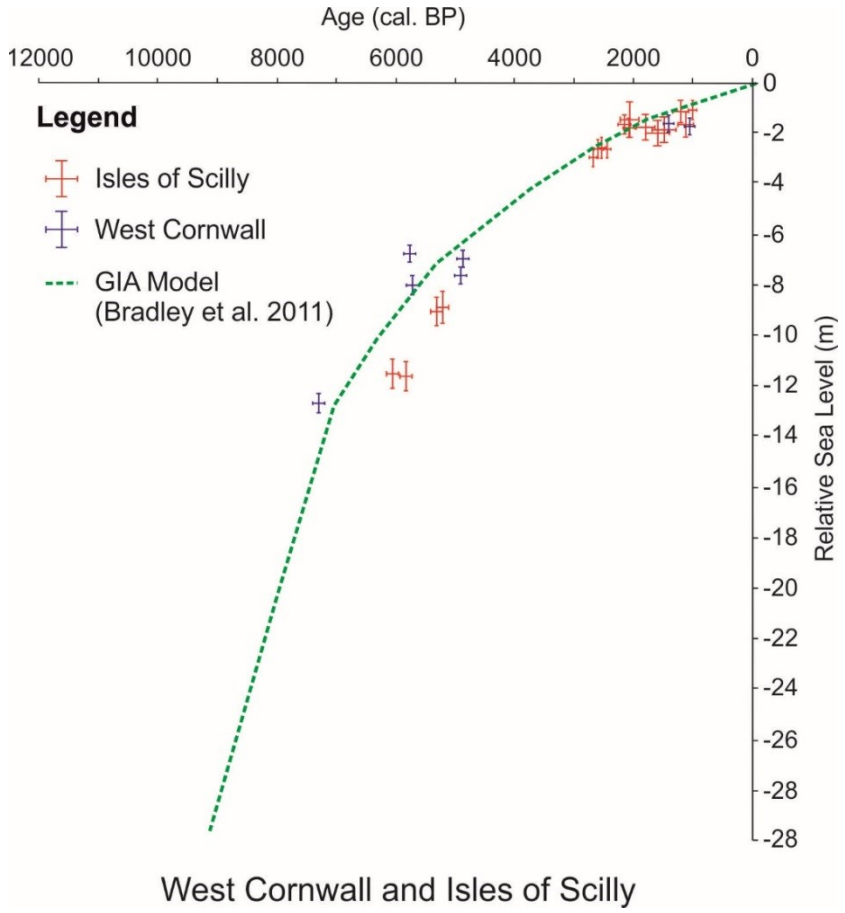


Fig 5.13 Relative sea level (RSL) reconstructions and model predictions for the study area.

In addition to elevating sea-levels, it is suggested that the tidal range has also changed throughout the Holocene period as a response to the changing palaeogeography. Mortimer *et al* (2013) produced palaeotidal amplitude estimates for the Isles of Scilly showing tidal range was probably higher during the Early to Middle Holocene, before relaxing to near-modern levels. This shift is demonstrated by Ward *et al* (2016) through the modelling of the M_2 tidal constituent, also known as the principal lunar semi-diurnal, for the British Isles continental shelf (**Error! Reference source not found.**) showing a slight reduction in the highest amplitudes through the Holocene.

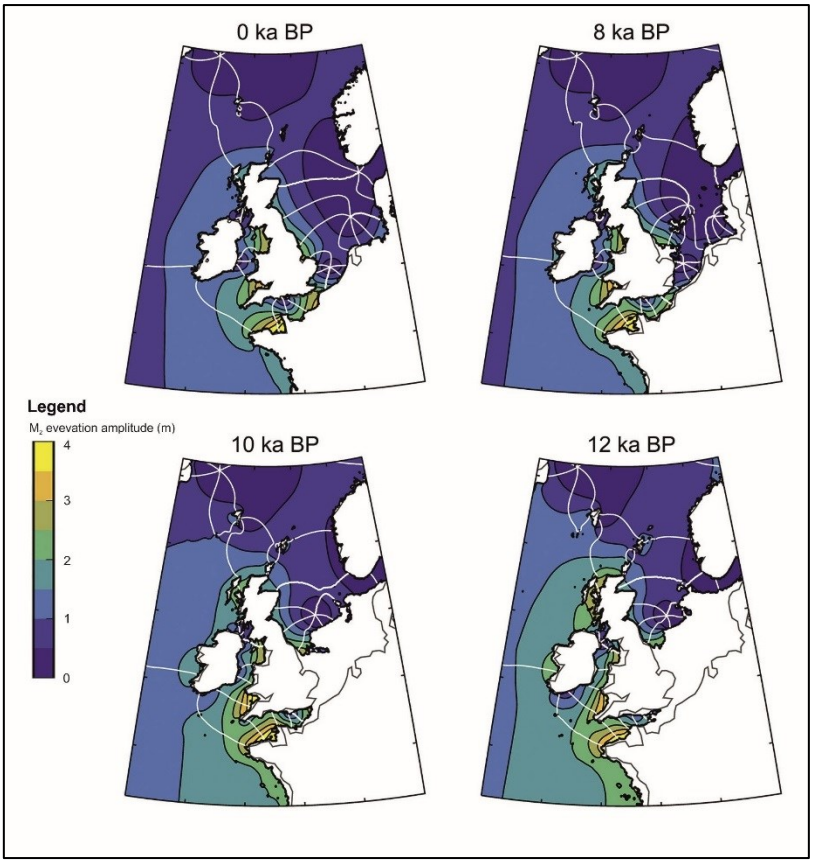


Fig 5.14 Simulated M_2 elevation amplitudes and phases for the past 12 ka, generated by Ward et al (2016) (licensed under CC BY 4.0).

While these models provide the basis for understanding the regional changes in sea level against the modern conditions, it is also important to understand how this has affected the palaeogeography of the area and its potential archaeological implications, as demonstrated by Johnson and David (1982) for the Padstow area on the north coast.

To simulate the rate and extent of submersion of the coastal shelf area, a GIA model has been applied against a Digital Surface Model (DSM) of the southwest region. The DSM is constructed from bathymetry data derived primarily from the UKHO Bathymetry DAC supplemented with the EMODnet DTM (Digital Terrain Model), inshore lidar surveys (1km strip) undertaken by the Channel Coastal Observatory survey programme, and topographic elevation data for onshore derived from the Ordnance Survey. All marine data was standardised to a common vertical datum (mOD) using the Vertical Offshore Reference Frame (VORF; Iliffe et al. 2006), to allow integration with onshore topographic mapping, and transformed using OSTN15 transformation, to create the final DSM (Digital Surface Model) surface (Figure 5.15).

The Glacial Isostatic Adjustment (GIA) model of Bradley *et al* (2011) was applied to the DSM for time preiods from 16 ka to present, following the methodology of Fraser Sturt *et al* (2013). This readjusts the DSM elevation relative to the sea level for a given time interval, and can therefore be used to estimate the position of mean sea level and the coastal margin at the time period of interest. These models take no account of the modelled changes in the palaeotidal range for the area, nor areas where sediment accumulation has taken place, such as the siltation within several of the main rivers and the estuary mouths.

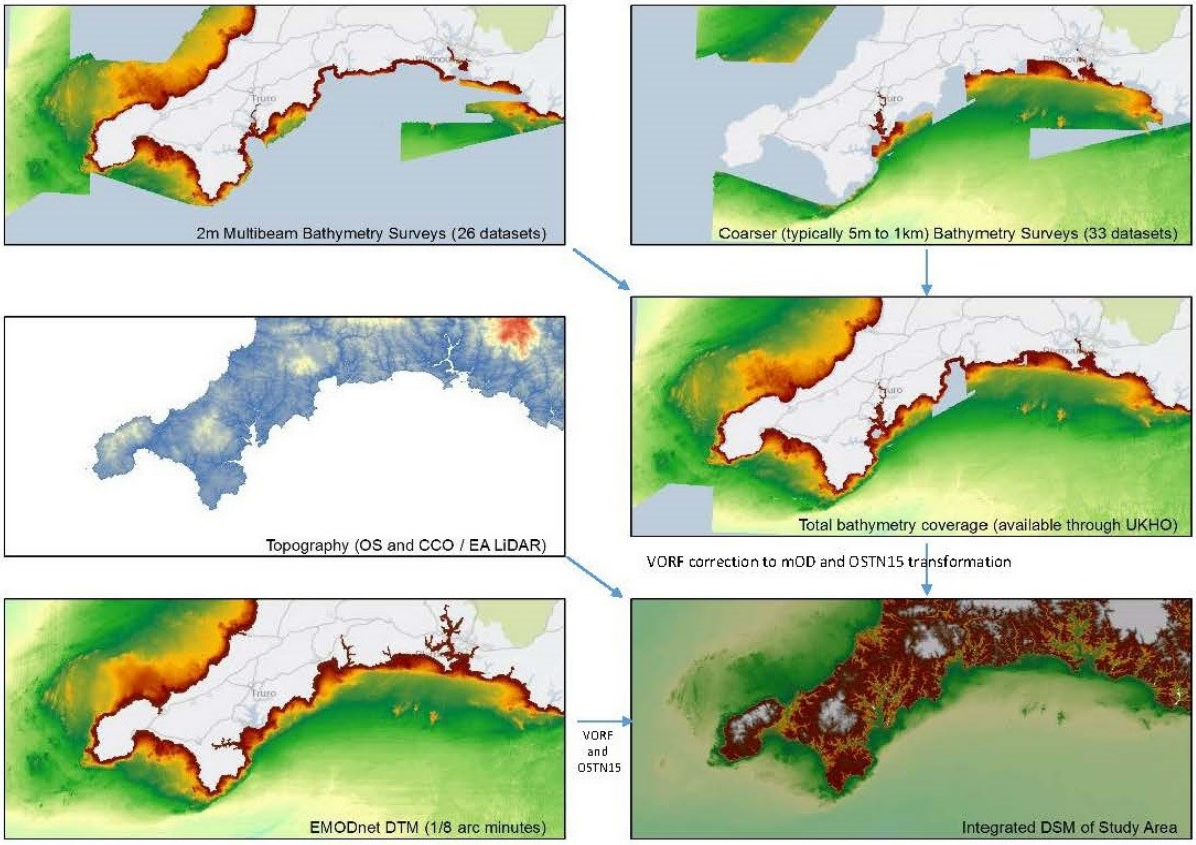


Fig 5.15 Datasets used to create the regional Digital Surface Model (DSM) (contains OS data © Crown copyright and database right 2018. Channel Coastal Observatory data under the Open Government Licence v3.0. Environment Agency data under the Open Government Licence v3.0. UKHO Bathymetry contains public sector information, licensed under the Open Government Licence v3.0. EMODnet Bathymetry Consortium (2016): EMODnet Digital Bathymetry (DTM) http://doi.org/10.12770/c7b53704-999d-4721-b1a3-04ec60c87238).

The models show that at 16 ka (Figure 5.16) most of the study area would have been dryland, though by 14 ka the sea is beginning to encroach close to the Lizard peninsula, and by 12 ka the eastern tip of Penwith is also close to the coast, with both the Seven Stones reef and Eddystone Rocks now segregated from the mainland. At 10 ka the Lizard and Penwith peninsulas have begun to form their modern coastline profile, though north of Penwith there would have remained a large promontory of dryland. The coastline has at this point largely fallen back to the submerged cliff line mapped by Kidson (1977) along south Cornwall. While this may be the prevalent visible cliff line along the coast, a series of different submerged cliff lines have been identified during previous studies. Donovan and Stride (1975) utilised existing bathymetric data to map the presence of submerged coastlines around the south west peninsula, from Hartland Point to Torquay Bay, and inferred the presence of three drowned coastlines. Nearest inshore, a gradual slope is noted continuing from the base of the modern cliffs at LWMST to depths of -7 to -20m, though these are not easily observed in areas with nearshore superficial sediments such as near sandy beaches or seaward of the major rivers, especially those subject to high siltation rates. Beyond this submerged cliff line, a gentle slope then continues seaward to a depth of -27 to -37m, most extensive on the south coast in Bigbury Bay, off Plymouth Sound and Whitsand Bay, St Austell and Falmouth Bays, and indicated by the 10 ka timeslice in **Error! Reference source not found.** In deeper water, three further groups of cliffs are recognised (depths of base are given); upper cliff at -38 to -49m, middle cliff at -49 to -58m and the lower cliff at -58 to -69m. Kidson (1977) mapped these offshore submerged cliff lines around the southwest coastline and suggested they provided clear evidence of a stand of sea-level of considerable duration

at this depth. Wood (1974) also considered this submerged platform of marine abrasion extending for 15km off north-west Cornwall, but concluded the platform too wide to have been cut during a Pleistocene low sea level stage, instead forming prior to the deposition of the St Erth beds but after the Miocene Lenham beds. Similarly, the river valleys crossing the shelf were considered to have initially formed prior to the Quaternary period. If this is the case, then these submerged cliff lines should be considered as features that were inherited as low-stand coastal features during the Pleistocene period.

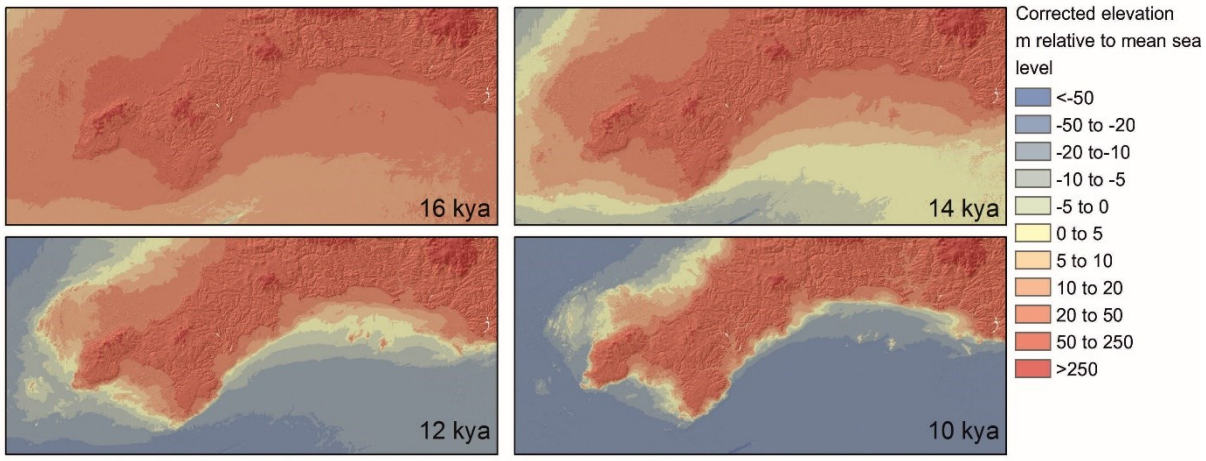


Fig 5.16 Palaeogeographical Reconstructions for 16–10 ka (details as for Fig 5.15).

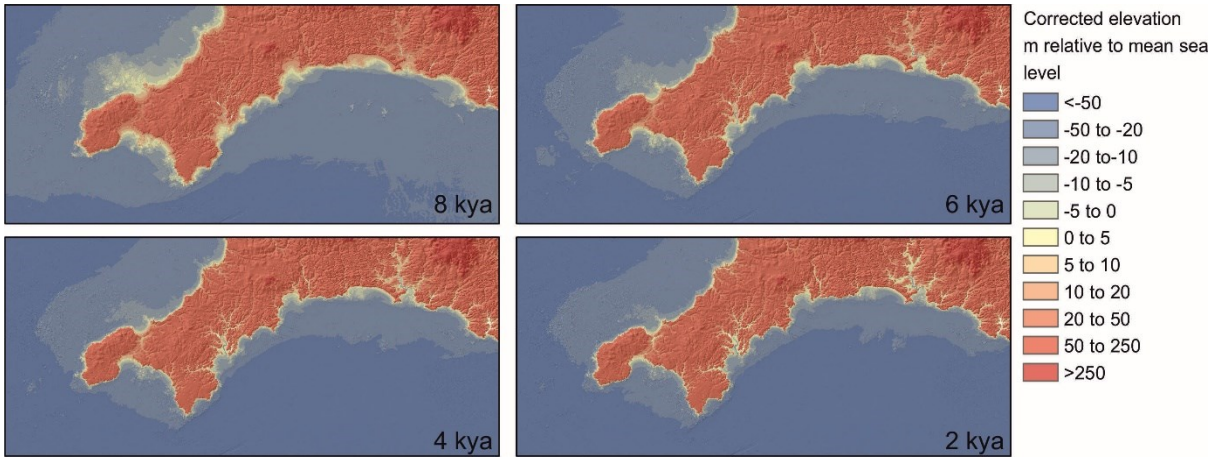


Fig 5.17: Palaeogeographical Reconstructions for 10–2 ka (details as for Fig 5.15).

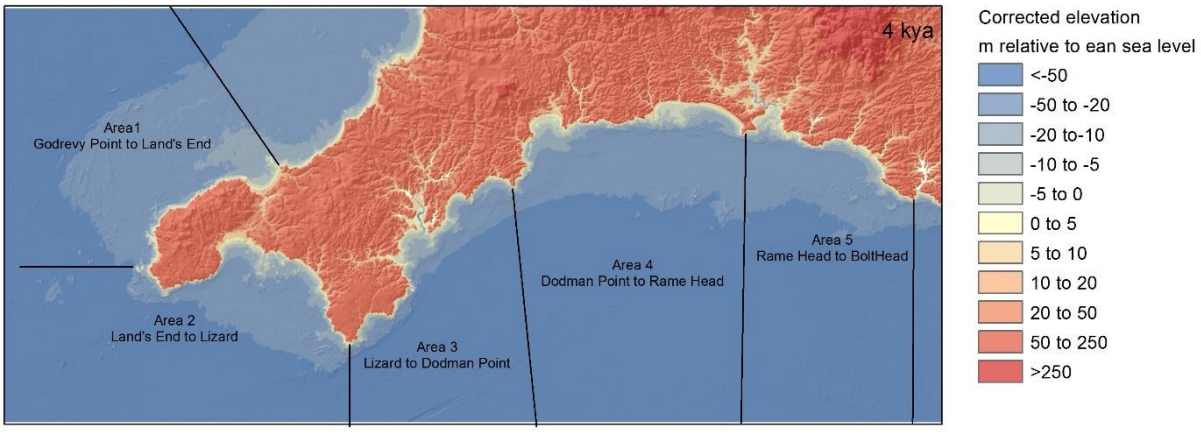


Fig 5.18 Illustrative areas for comparison of submergence rates along the south Cornish coast (details as for Fig 5.15).

By 8 ka (Figure 5.17) the area north of Penwith begun to be inundated. Elsewhere the submerged cliff line has been overtopped and the coastline has begun to take its modern shape with the main bays becoming discernible. This was further expanded by 6 ka.

To demonstrate the spatial variations in the rate and extent of submergence along the coastline, it has been divided into five areas to allow comparisons (Figure 5.18). These divisions are based upon major headlands used in SMP cell divisions.

Figure 5.19 illustrates the extent and rate of submergence of the peninsula within the five areas defined in **Error! Reference source not found.**8. The 16 ka and 14 ka scenarios are not shown as the submergence rates are very high and obscure the post 12 ka result. Each of the five areas follows the same trends, although Area 3 does show a lag in the percentage of area inundated. At the onset of the Holocene up to 25% of the post-12 ka area is submerged within one 500 year period, with Area 1 alone losing over 180 km^2. The rate of loss reduces after 7 ka and by 4 ka is minimal when considered at a regional and Holocene timescale.

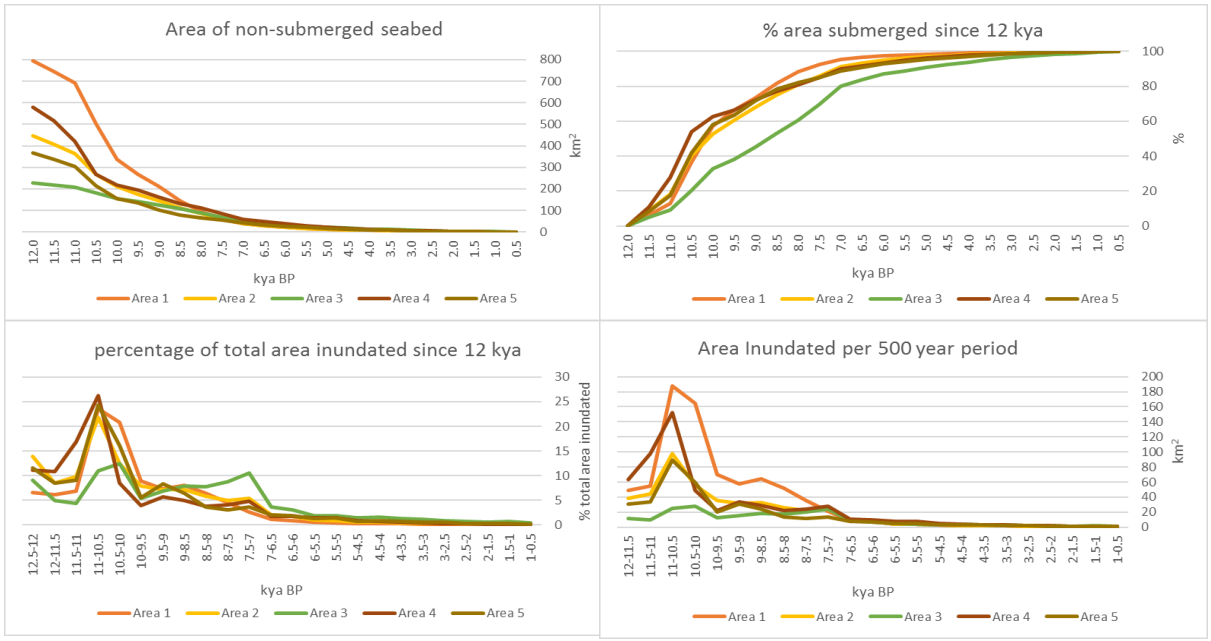


Fig 5.19: Rates of submergence along the coastline for Areas shown in Figure 5.18.

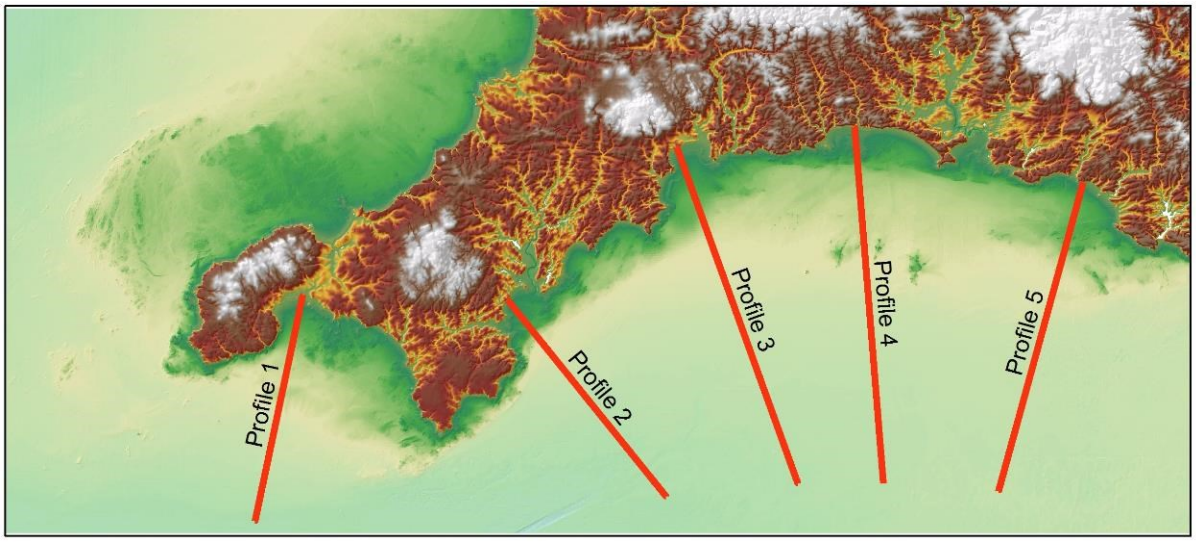


Fig 5.20 Profile lines used to illustrate spatial variations in the rate of submergence and hypothetical coastline positions.

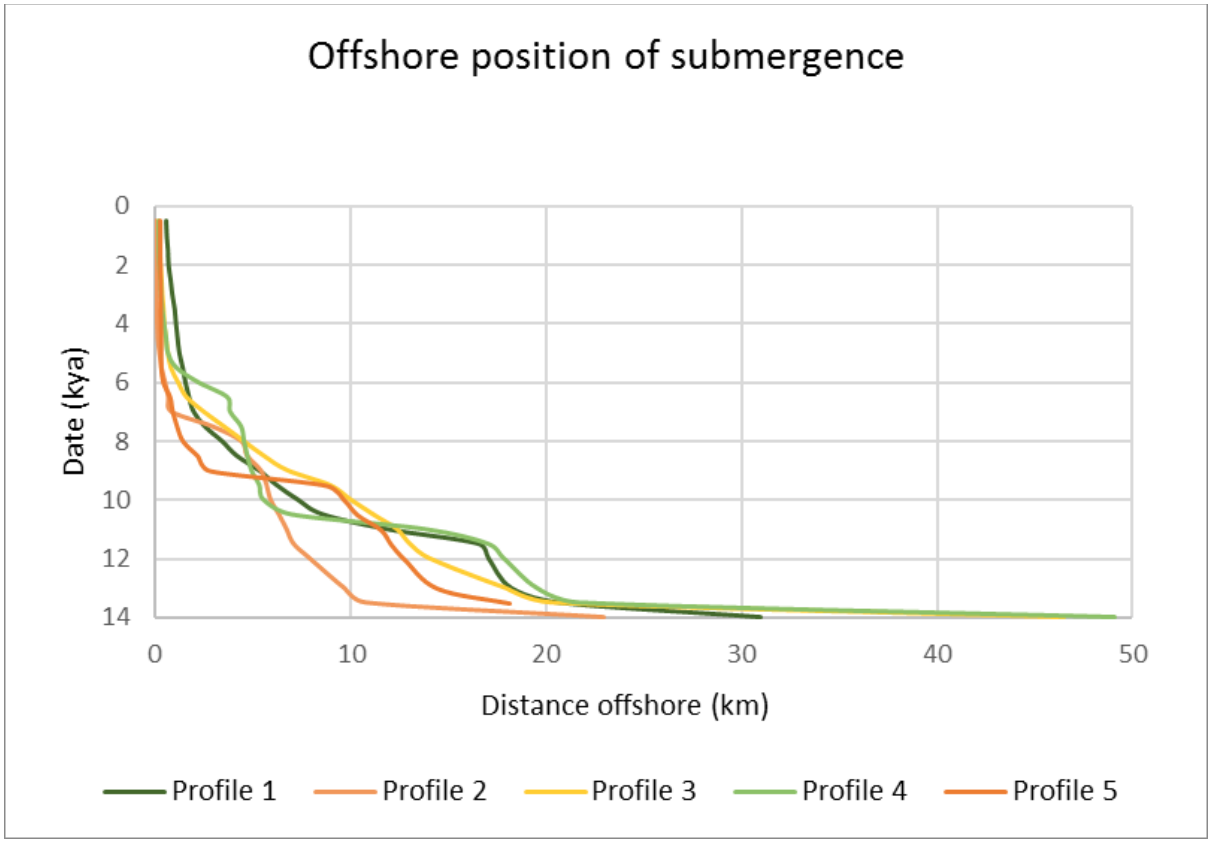


Fig 5.21 Offshore position of the coastline between 16–0 for profiles 1–5 shown in Figure 5.20.

The breadth of the shelf varies along the coastline, notably with a rapid deepening off Land's End and the Lizard peninsula, resulting in these two areas being the first to be encroached during the early Holocene. By contrast, areas such as Mount's, St Austell and Whitsand Bays have much wider shallow shelves. To demonstrate spatial variability in submergence between these areas, five profile lines (Figure 5.20) are used to demonstrate spatial variations in the rate of submergence and hypothetical coastline positions.

Figure 5.21 illustrates that very rapid inundation took place in all scenarios at 14-13 ka, advancing 30km in 500 years directly south of Whitsand Bay (profile 4). The rate of advance slows until 12 ka in all profiles, but then rapidly advances again in Mount's Bay (profile 1) and Whitsand Bay at 11 ka, whereas at Bigbury Bay (profile 5) this occurs later around 9 ka. In contrast, St Austell Bay (profile 3) shows no such jumps and instead has a steady rate of inundation. The coastlines reaches within 1km of present day position by 7.5 ka in Bigbury Bay, while in Mount's Bay this doesn't occur until 3.5 ka.

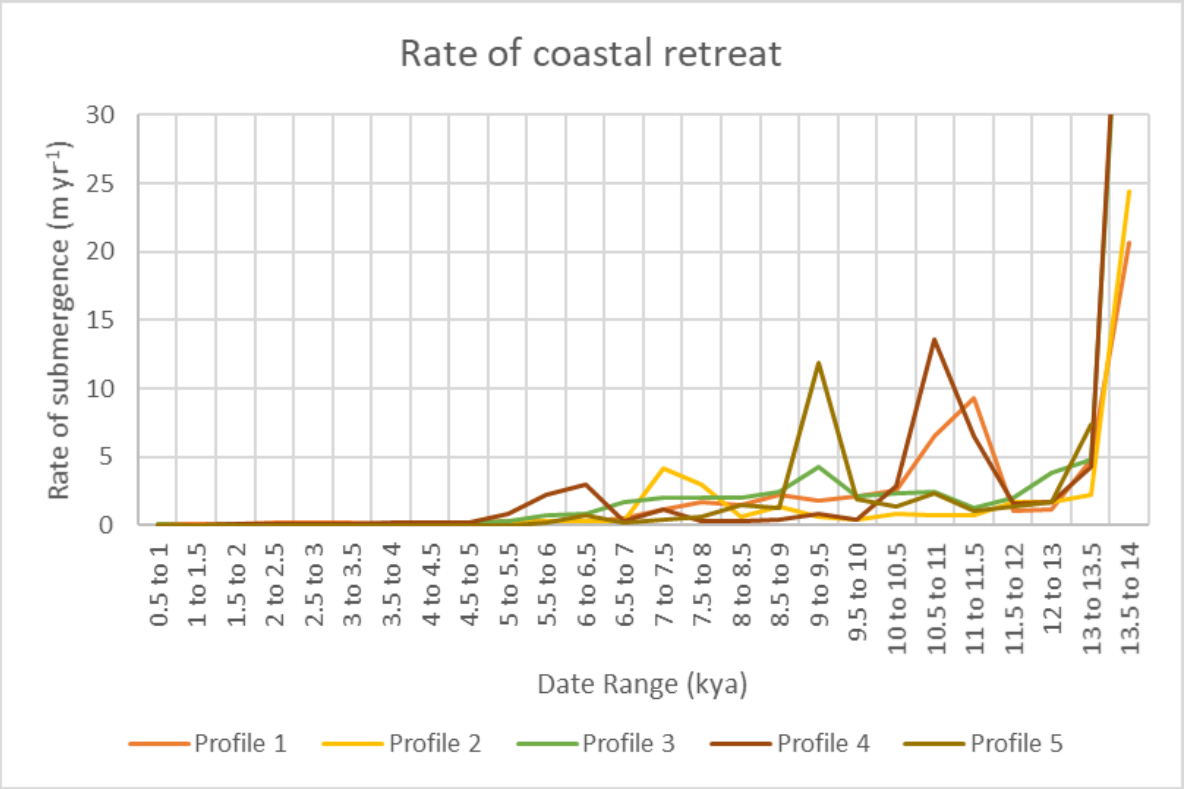


Fig 5.22 Modelled rates of coastal retreat for 500 year time slices between 14–0 for profiles 1–5 shown in Figure 5.20.

Figure 5.22 shows the modelled rates of coastal retreat (submergence) for the five profiles. These illustrate the highest rates are in the Late Pleistocene, up to 60 m yr^{-1} south of Whitsand Bay at 14 ka. This declines through the Holocene, though in some locations periods of higher submergence rates do occur, notably south of Bigbury Bay with accelerations at 11 and 9.5 ka modelled to exceed 10m yr^{-1}. By 5 ka submergence rates are below 1m yr^{-1}, and in some situations have reached their modern position.

These palaeogeography models, as stated above, are based upon a series of simple assumptions about the interplay between the GIA model and reconstructed surface topography. However, in areas of higher sediment accumulation, such as at the mouths of large estuary systems or offshore sandbanks, a false impression may be generated over the extent of dryland at any given time period. Most of the study area fortunately consists of exposed solid geology on the seabed, and therefore although this is detrimental in many instances to the preservation of submerged palaeolandscape features, it does mean that the palaeogeographical models may provide a more accurate reconstruction of past changes in the coastline throughout the Late Pleistocene and Holocene period.

5.5 Mount's Bay

The above discussion focuses on the main regional trends in changing sea level and paleogeography. However, a greater understanding of changes in the rates of

submergence, and local palaeogoeography, can be obtained by focusing on areas which have been subject to previous geophysical survey. Mount's Bay was originally surveyed by Tooms *et al* (1965) who mapped the thickness of sediments overlying the rockhead, though any submerged landscape interpretation of this area was not until the surveys by Camm and Hosking (1984; 1985; Camm and Dominy 1998; Camm 1999). While the Tooms *et al* (1965) survey covered the whole of Mount's Bay at a coarse resolution, the later survey was focused more on the identification of channels and Stanniferous placers within the Bay (Camm and Dominy 1998). The latter revealed a deep sinuous palaeochannel system south of Penzance, with the Penzance Channel in the west and the St Michael's Channel to the east of it, both joining on a latitude level with Mousehole. This showed a reducing gradient from *c* -23m OD west of St Michael's Mount to -43m OD in the lowermost channel. Fills within the channel included a basal gravel typically overlain by occasional basal peat and estuarine silts and sands, capped by marine sands. A radiocarbon date was obtained from peat within the channel at -32m OD, providing an age of 12180–11800 cal BC (SRR-3022; 12070±80 BP) indicating formation during the Late Pleistocene interstadial. Tooms *et al* (1965) also identify areas of increased superficial sediment thickness offshore of the Looe Estuary and Porthleven, with another area of deeper sediment off Praa Sands. These are likely to also indicate channel areas.

The position of these channels can be overlain on the bathymetry of Mount's Bay, clearly showing how they align with the truncated bedrock surface exposed over much of the seabed, most notably the channel areas of the Looe Estuary, Penzance–St Michael's Channel, and smaller tributary channels from Praa Sands and west of Cudden Point (Figure 5.23). Tooms *et al* (1965) suggest that the thickness of the Looe Estuary channel exceed 6m thick. Within the centre of Mount's Bay the 10 ka submerged cliff line is well defined, located where the channels enter a wider floodplain area. The depth of the base of the main surveyed channels within Mount's Bay suggest estuarine conditions were already established within them from at least *c*10 ka, although submergence of the surrounding area was not until later, with the coastline likely to be close to the south of St Michael's Mount by 6 ka. The available radiocarbon dates from the submerged forest beds and palaeogeography modelling would suggest that this isolation was not until the late Prehistoric period (Figure 5.24).

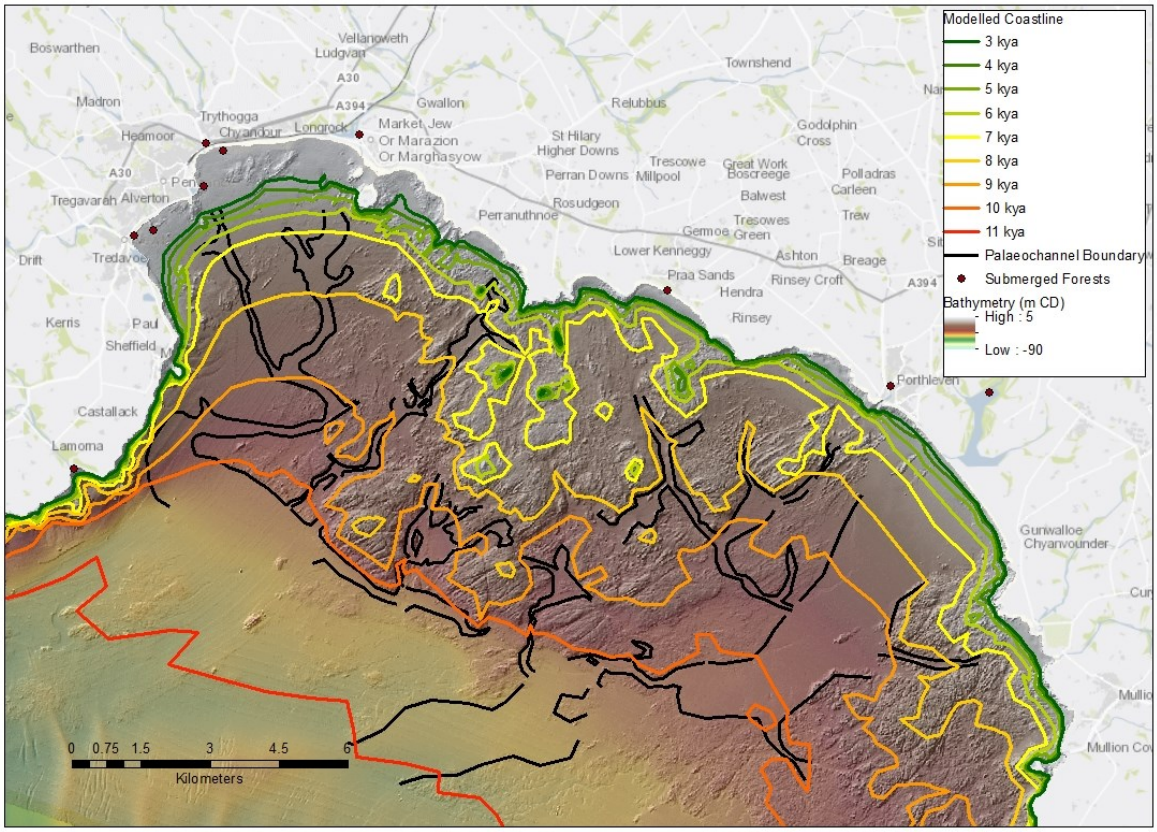


Fig 5.23 Distribution of palaeochannels within Mount's Bay, location of submerged forests, and modelled Holocene coastline.

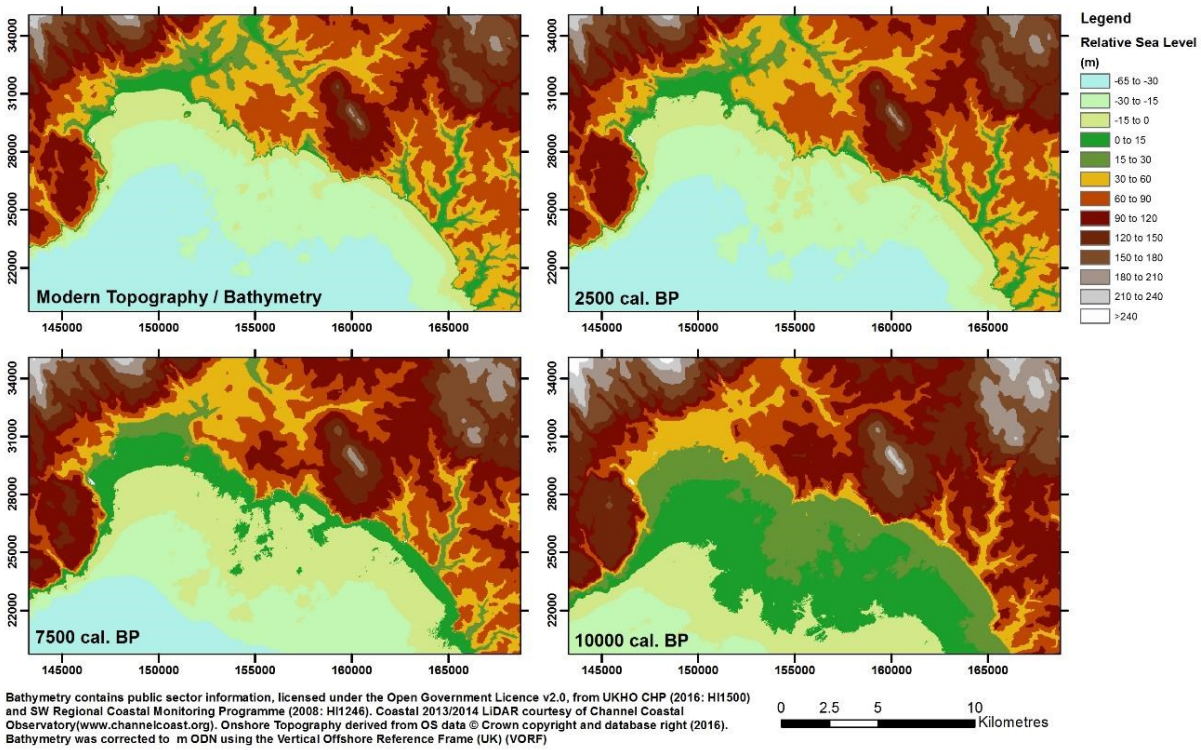


Fig 5.24 Palaeograographic models of the Holocene submergence of Mount's Bay.

5.6 Plymouth Sound

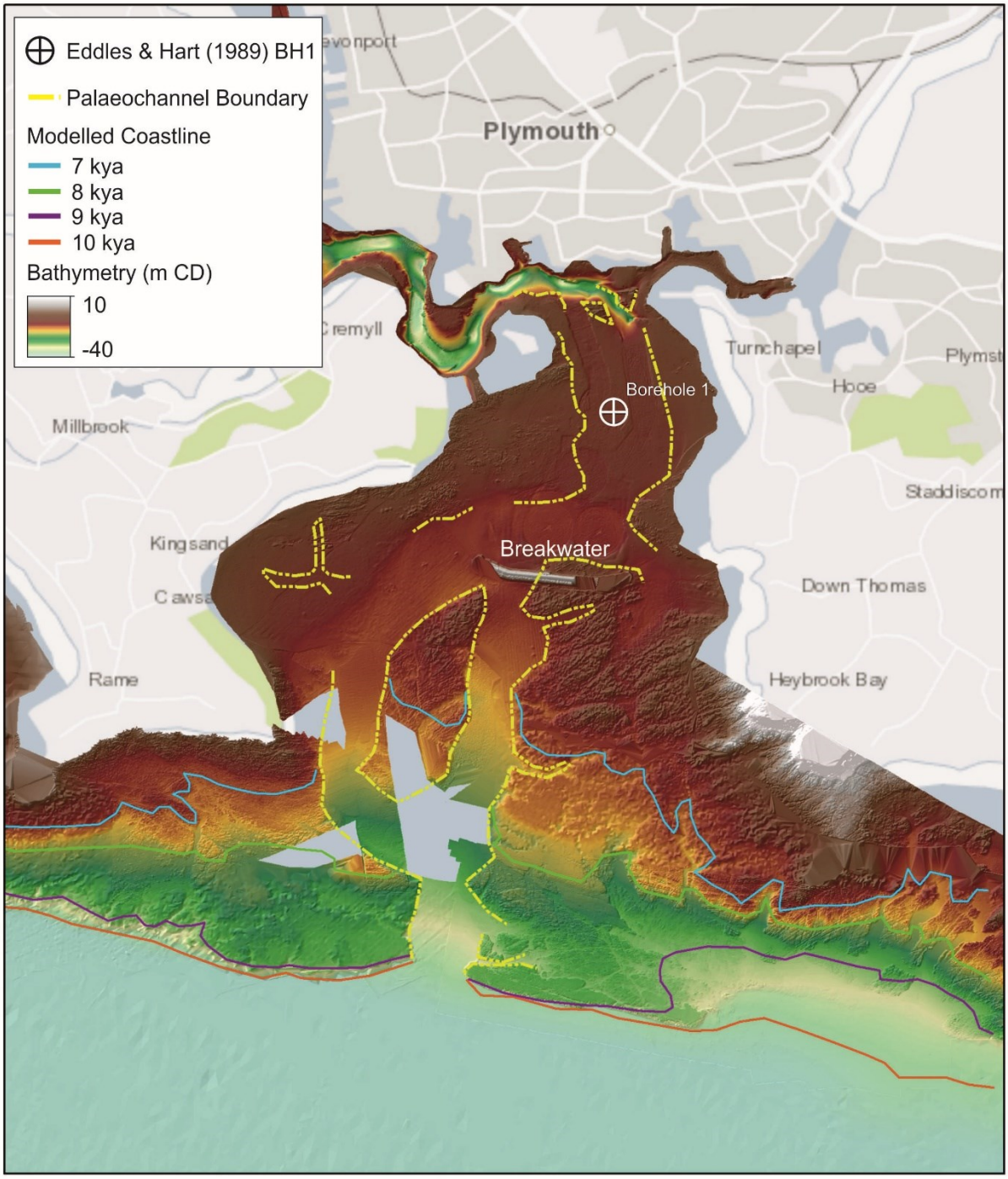


Fig 5.25 Palaeogeography of Plymouth Sound.

Seismic surveys of Plymouth Sound have demonstrated thick sediment fills occur within the main channel areas. Early studies by Eddles and Reynolds (1988; Reynolds 1990) identified the channel base down to -40m OD. Geophysical surveys north and west of Plymouth Breakwater (Plymouth BSc student Eleanor Beeley) have further clarified the position of this palaeochannel, suggesting that sediments within the main channel north of the Breakwater show evidence for prograding sedimentation with episodes of erosion (truncation) and subsequent deposition. The margins of these mapped channels have been enhanced by using the bathymetry to identify areas where the channel margin directly abuts an eroded exposed bedrock face. This mapping (Figure 5.25) shows that the main channel splits into two channels south of the Plymouth Breakwater. Further

offshore the bathymetry clearly shows a 10 high submerged cliff line that corresponds with the modelled 10 ka coastline. By 7 ka the coastline had retreated and the two channels either side of Panther Rock now fronted the open sea. The depth of the buried channels within the Tamar and Plym estuaries were documented by Codrington (1898), with the deepest recorded opposite Eastern King Point at -42.1m below mean low water spring tide (MLWS). Between Millbay and Drake's Island it was measured at -32.9m bMLWS, and by Saltash bridge at -23.2m bMLWS.

An assessment of the foraminifera within borehole 1 by Eddles and Hart (1989; position shown in Figure 5.25) showed that the basal organic muds contained a foraminifera record showing the onset of increasingly marine conditions within Plymouth Sound. Although the sequence is undated, Eddles and Hart (1989) suggested a date of *c*12 ka for the start of estuarine conditions within the Sound. The palaeogeographic models certainly support an early Holocene age for the onset of estuarine conditions within Plymouth Sound. However, what can be concluded is that Plymouth Sound (and many of the other deeply incised valleys along the south Cornish-Devon coastline) is likely to have had a direct connection with the sea, and contained brackish conditions, for the majority of the Holocene. The palaeoenvironmental sequence shown by Eddles and Hart (1989) demonstrates the high potential of using the long stratified sedimentary sequence from within these estuaries in order to reconstruct the Early Holocene sea level history of the area and evolution of Plymouth Sound, and the pressing need to date and analyses similar deep sequences across the region.

5.7 The South West Strategic Regional Coastal Monitoring Programme

While the Quaternary sequences provide detail on the broader changes in the south Cornish coastline over millennia, this data lacks the fine-resolution information required for site management and monitoring coastal change on annual to decadal timescales. Details of these more recent changes have been captured through the South West Strategic Regional Coastal Monitoring Programme (SWRCMP). This programme aims to provide a consistent regional approach to coastal process monitoring, providing information on the development of strategic shoreline management plans, coastal defence strategies and operational management of coastal protection and flood defence. The Programme covers over 1,000km of open coastline between Portland Bill in Dorset and Beachley Point in Gloucestershire. Large quantities of data are made freely available from the survey and analysis programme; this has proved useful to Local Authorities within the region, the Environment Agency, consultants in coastal defence, conservation management and academic research, and for educational purposes. The Programme is managed on behalf of the Coastal Groups, in partnership with the maritime Local Authorities and the Environment Agency Southwest Region. The Programme is funded by Defra, with Teignbridge District Council acting as the lead authority http://www.channelcoast.org/southwest/programme_aims/

Data collected through the programme include routine coastal monitoring through lidar, aerial photography, topographic surveys and nearshore bathymetric surveys. This data can be used for identifying current changes in the coastal zone, such as beach elevation changes, coastal retreat and landslides. For example, at Loe Bar (Survey Unit 6eSU4-4; Figure 5.26) the foreshore is dominated by net erosion, with the crest of the bar having receded landward by up to 10m. By contrast, at Church Cove, Gunwalloe (Survey Unit 6eSU3-6; Figure 5.27), for the same period the beach shows net accretion with some erosion around the MHW level. However intervening surveys within these 10 years show periods of localised increased erosion and accretion upon these beaches which is not visible in the 10 year averaged base level change.

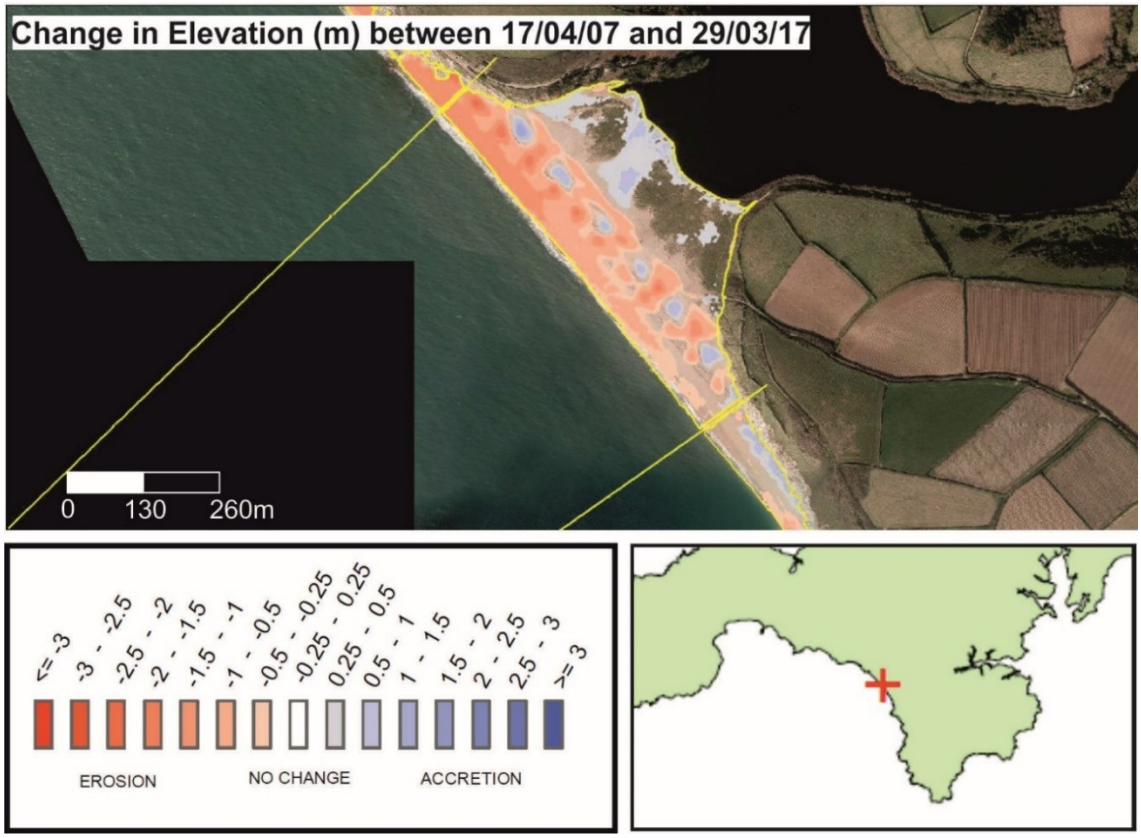


Fig 5.26 Change in beach elevation at Loe Bar (Survey Unit 6eSU4-4). Data from Channel Coastal Observatory (http://www.channelcoast.org/)

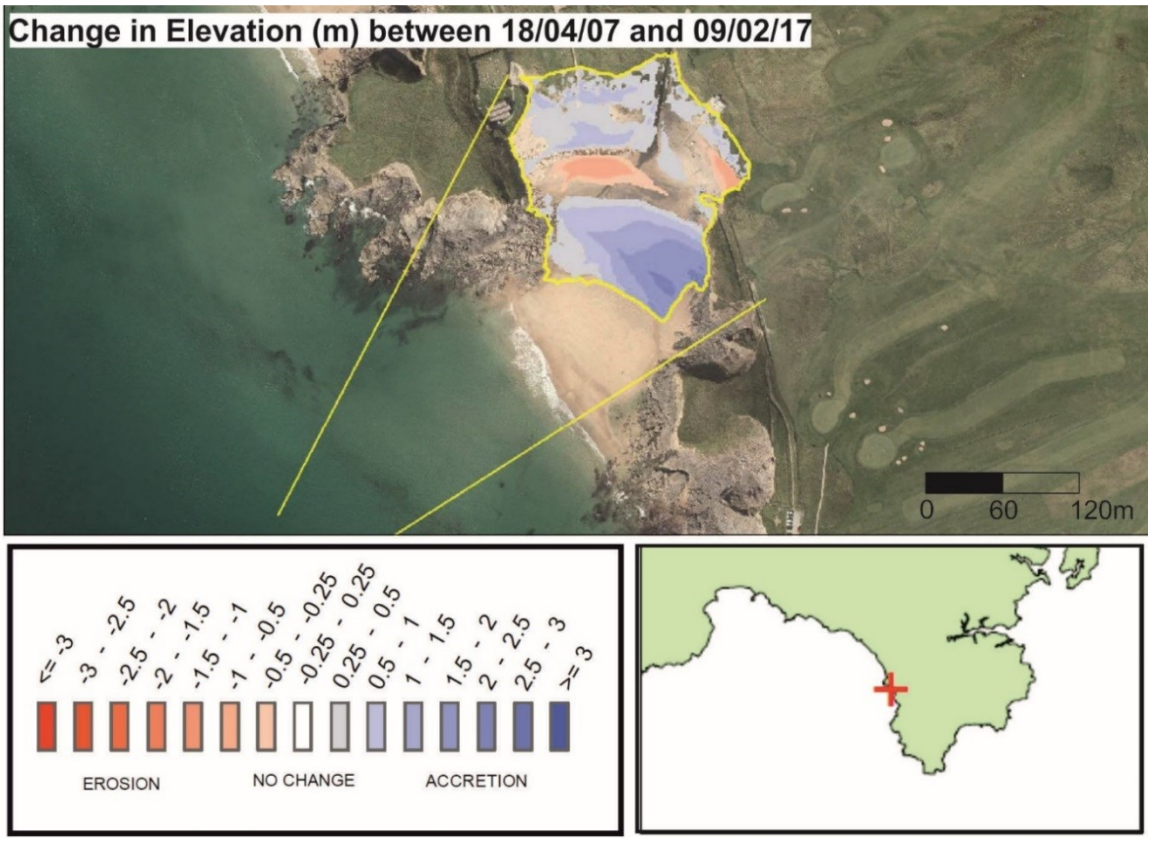


Fig 5.27 Change in beach elevation at Church Cove, Gunwalloe (Survey Unit 6eSU3-6). Data from Channel Coastal Observatory (http://www.channelcoast.org/)

While these surveys highlight changes in the beach profiles, which are systematic of coastal processes and erosion, they may not be fully indicative of the conditions relating to erosion of the cliffs or dune areas located behind the beach areas, especially in stretches with comparatively soft geologies. For example, at Dollar Cove (also known as Jangye-Ryn), Gunwalloe (Survey Unit 6eSU3-7), beach profiles show net sediment loss during the period 2007-14 in the areas not consisting of exposed rock, with some erosion of the cliff line around the margin of the beach. However, over a longer timescale, historic maps and modern aerial photography reveal cliff retreat of c. 30m since the late 18th century, with rates accelerating from c. 0.12m a^{-1} before the mid-20th Century, to c. 0.6m a^{-1}, most notably when comparing the 1962 and 1976 OS Maps (Figure 5.28). In February 2008 cliff erosion revealed a midden site containing Grass-marked pottery, charcoal, bone, shell and burnt, stone, with a piece of gorse charcoal radiocarbon dated to 856-996 cal. AD (GrA-39254; Wood 2013). This probably forms part of the larger early medieval settlement of Winnianton (MCO11687; MCO26936) whose original extent is unknown but thought to have been significantly reduced in area due to cliff erosion. Cliff erosion is also impacting upon the Scheduled Iron Age Cliff Castle (NHLE 1004265; MCO90626) located at the south of the Cove with this site listed in the 2017 Heritage at Risk register.

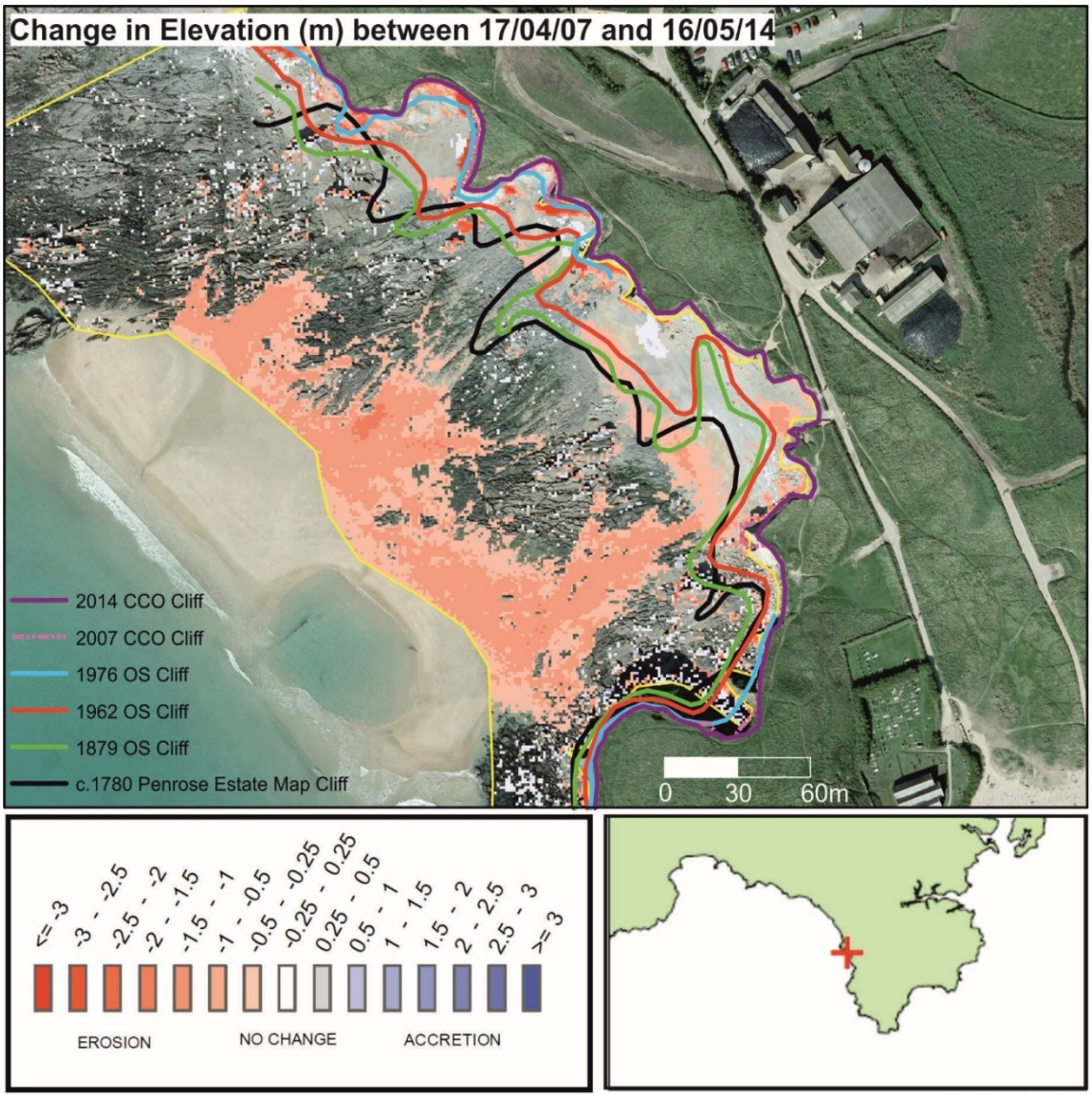


Fig 5.28 Change in beach elevation at Dollar Cove, Gunwalloe 2007-2014 (Survey Unit 6eSU3-7). Former cliff lines are modified from Wood (2013). Data from Channel Coastal Observatory (http://www.channelcoast.org/)

At some locations along the coastline there is a complex combination of factors leading to the erosion of key sites rich in Quaternary deposit exposures and potential archaeological sites. For example, at Praa Sands the entire area is dominated by large areas of erosion, with loss of cliffs, dunes and beach. Erosion rates of 0.2m to 0.1m are recorded for the coastline to the west of Sydney Cove and 0.7m to the east of Sydney Cove, with estimates of cliff erosion for the coastline at the southern of Praa Sands at 0.036m/year between 1880 and 2005, though significantly these have been measured up to 2.5-5m retreat since the beginning of the 21st century (0.5m to 1.0m/yr), although the nature of this erosion is episodic, leading to major failure events and slumping. The sand dunes and cliffs at Praa were eroded during winter storms in both 1989/1990 and 2013/2014, which also resulted in significant beach level reduction. While the overall net sediment balance above MLWS has reduced by -2075m^3 over the period 2007-2017, a net sediment change of -0.5% (Figure 5.29), this hides significant sub-decadal variations. Between 2012-16 net sediment balance above MLWS was -131,779m^3, a net sediment change of -24%, with accretion observed between 2016-17 amounting to a net sediment balance of 43,432m^3 and net sediment change of 9.7% (see Plymouth Coastal Observatory 2017). The rate of cliff erosion is clearly illustrated by the pillbox (MCO56203) at the southern end of the beach. In the 1970s it was positioned near the cliff edge, by 1985 it was on the beach pressed against the cliff face, and today it is situated c. 12m from the cliff edge. This cliff retreat has also resulted in the need to realign the coast path. However erosion is not solely attributable to coastal processes, with the dunes also subject to ongoing erosion as a result of beach users climbing, sliding down and digging into the sand on the dune face (see CH2M 2016). The combination of natural and human-induced processes impacting upon the dune system is also observed at other similar sites along the coastline, such as Marazion (see CH2M 2018).

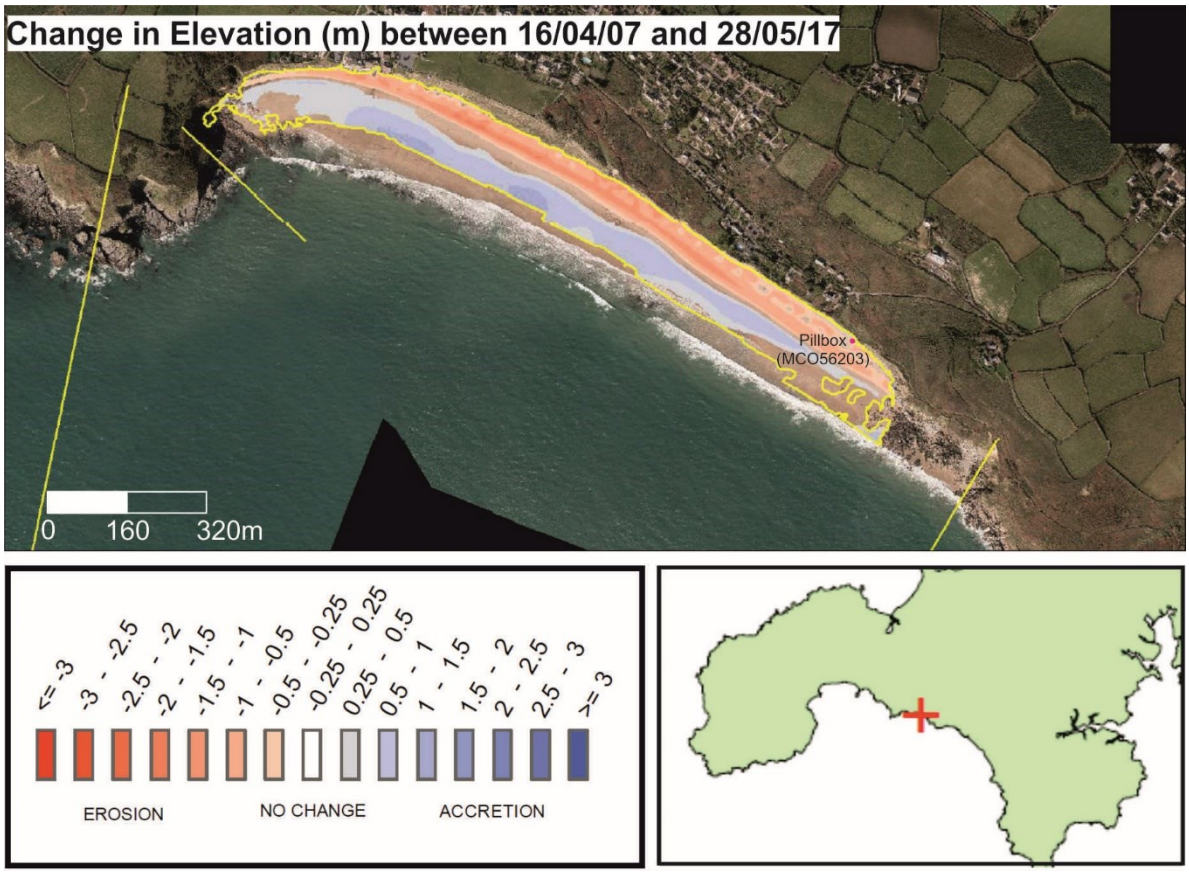


Fig 5.29 Change in beach elevation at Praa Sands (Survey Unit 6eSU6-2). Data from Channel Coastal Observatory (http://www.channelcoast.org/)

6 Previous archaeological and historical research

6.1 Introduction

The project area includes designated Heritage Assets (a World Heritage Site, Scheduled Monuments, Listed Buildings, Protected Wrecks, Conservation Areas, Battlefield Sites, Registered Parks and Gardens) and non-designated Heritage Assets (archaeological sites and finds, historic buildings, wreck sites, other historic landscape features or locally-designated features, or areas of cultural historic importance).

There are a total of 4,585 designated Heritage Assets within the project area. These comprise: parts of the Cornwall and West Devon Mining Landscape World Heritage Site; 145 Scheduled Monuments; 88 Grade I Listed Buildings; 286 Grade II* Listed Buildings; 4,037 Grade II Listed Buildings; one Registered Battlefield; eight Protected Wrecks; two Grade I Registered Parks and Gardens; seven Grade II* Registered Parks and Gardens; and 11 Grade II Registered Parks and Gardens. Designated sites discussed below will be referred to by their designation number given in the National Heritage List for England (NHLE). Non-designated heritage assets will be referred to by their HER reference number (prefixed MCO in Cornwall, UID in Plymouth and MDV in Devon) and those within the National Trust Sites and Monuments Record prefixed with NT. The following discussion provides an overview of the key characteristics of the coastal historic environment within each of the PSA units for the Durlston Head to Rame Head SMP and each of the PDZ units for the Rame Head to Hartland Point SMP. These are considered in a regional and parochial context relating to the following archaeological periods as defined by the Cornwall and Scilly, Plymouth City Council and Devon County Council HERs:

Prehistoric: Palaeolithic	5Ma to -10001 BC
Prehistoric: Mesolithic	10001 to 4001 BC
Prehistoric: Neolithic	4001 to 2351 BC
Prehistoric: Bronze Age	2351 to 801 BC
Prehistoric: Iron Age	801 BC to AD 42
Roman	AD 43 to 410
Early medieval	410 to 1065
Medieval	1066 to 1539
Post-medieval	1540 to 1900
Modern	1900 to present

6.2 Durlston Head to Rame Head SMP (PSA15)

6.2.1 Section O Wembury Point to Devil's Point

This Policy Statement Area extends from Wembury Point (Devon), at the south eastern corner of the approach to Plymouth Sound, to Devil's Point, near the Royal William Yard, Stonehouse, Plymouth. It includes the breakwater, the approaches and anchorages of Plymouth Sound, Bovisand and Jennycliff Bays, Drake's Island, the River Plym and Hooe Lake, Sutton harbour and Mill Bay. It covers a considerable length of built marine frontage including Turnchapel, Plymstock, the south western corner of Plympton, and the southern extent of Plymouth.

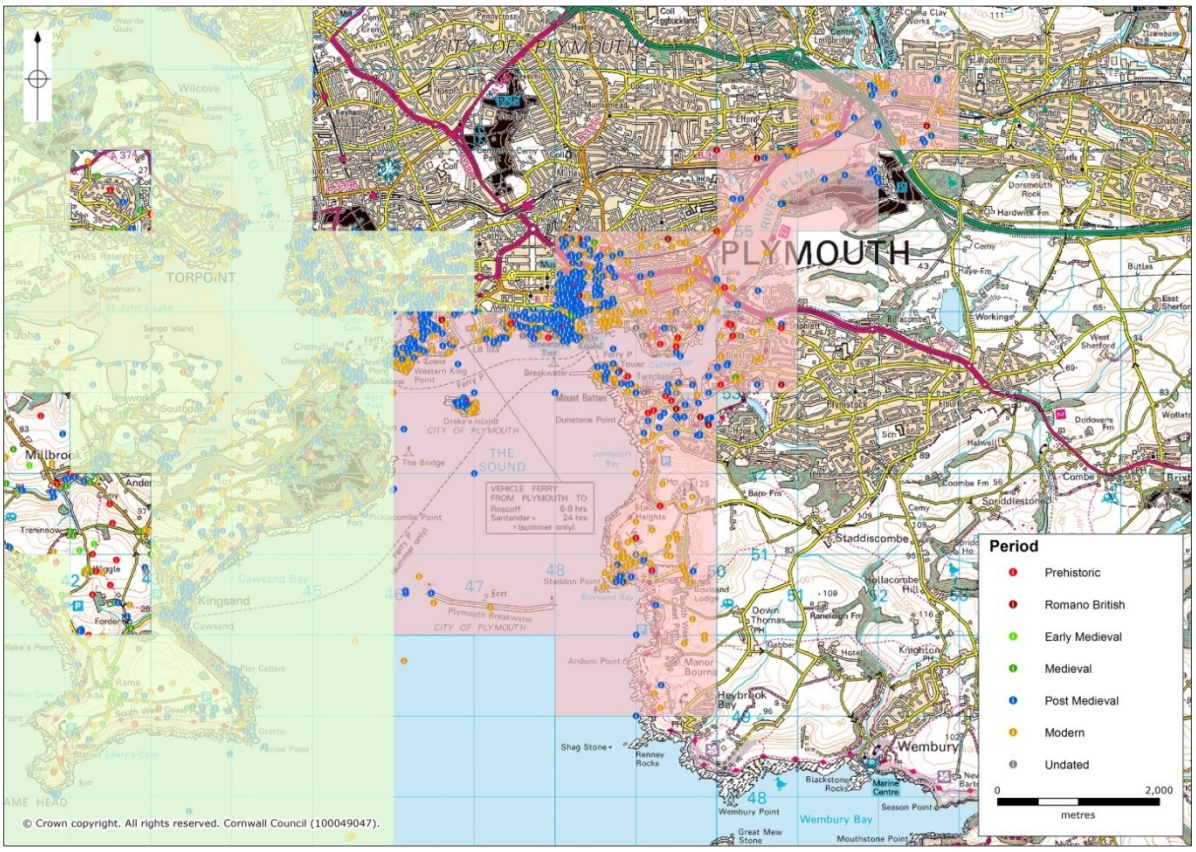


Fig 6.1 Sites currently recorded in the HERs for Section O of the project area (Wembury Point to Devil's Point).

Within the RCZAS project area in this PSA there are 240 Listed Buildings and 18 Scheduled Monuments together with two Registered Parks and Gardens (Saltram House and The Hoe) and the Cattewater Protected Wreck site. Conservation Areas can be found at Turnchapel, Erbington Street, The Hoe, The Barbican and the Stonehouse Peninsula.

In the mid-1990s, large scale archaeological recording was sponsored by the Plymouth Development Corporation in advance of redevelopment at Mount Batten, Stonehouse and Mount Wise (Plymouth Archaeology 1998a; 1998b; 1998c).

Palaeolithic

A number of important Palaeolithic sites have been found at Cattedown where the Middle Devonian limestone deposits to the south of Dartmoor contain numerous fissures and caves. A deposit of the limestone runs in an arc from Cremyll, under Plymouth and then eastwards from the Cattewater to West Sherford. This limestone has been quarried for many years, especially during the 19th century when large amounts of rock were quarried for extensive land and maritime based building projects (Wessex Archaeology 1995, 29).

Nearly all the Palaeolithic sites have been investigated at some time since the early 19th century. Five sites have produced finds of human remains including Worth's Cattedown Bone Cave (NHLE 29678). This site was discovered during quarrying in 1886 and contained the bones of at least 15 hominids with associated flint tools which were subsequently excavated and recorded by a local naturalist, R N Worth. In addition a large quantity of faunal remains has been recovered from the caves including wolf, horse, reindeer, bear, bison, hyena, elephant and rhinoceros. And while some are characteristic of the Devensian glaciation, others are likely to date to the preceding Ipswichian interglacial (Wessex Archaeology 1998, 14). The Palaeolithic cave sites were catalogued by Chamberlain and Ray (1994) and are the subject of ongoing research by the Devon Karst Research Society.

The Cattedown Bone Caves are part of a huge system of caverns thought to spread beneath the whole of Cattedown and to around 50m below sea level. Research using sidescan sonar has led to the discovery of a number of underwater caves in the Tamar Estuaries. At least seven caves at depths of 3.5 and 3m below OD are known between Fisher's Nose and Eastern King (Wessex Archaeology 1998, 15).

Mesolithic

Records relating to the Mesolithic period in the project area are characterised by artefact scatters and find spots. The distribution of Mesolithic sites around Plymouth Sound seems to indicate the active exploitation of marine resources of the coastal and estuarine environments, particularly of the Cattewater and Hamoaze estuaries close to where they enter the Sound (Wessex Archaeology 1995, 32). There are nine Mesolithic flint scatters recorded in the Devon and Plymouth HERs: MDV14099; MDV14765; MDV14766; MDV17348; UID 16495; UID 16499; UID 16502; UID 42360; UID 17356).

Neolithic and Bronze Age

There is relatively little evidence for sustained occupation in the Plymouth area during the Neolithic period but there is evidence for an intensification of settlement activity in the environs of Plymouth Sound during the Bronze Age (Wessex Archaeology 1995, 33, 35). Finds found within the bounds of the Royal Citadel suggest prehistoric settlement on the site (UID 25588).

Iron Age and Romano-British

Within the project area, the HER records for Plymouth indicate a relative drop in the number of sites and finds in the area during this period. The most important site is the high status trading settlement and production site at Mount Batten which originated during the Bronze Age and continued into the Iron Age (UID 14869). A large number of artefacts were found during excavations which indicate extensive Continental trading links during this period (Cunliffe 1988).

Outside the project area, in the area of urban expansion at Sherford (situated between Plympton and Plymstock) recent archaeological excavation has revealed evidence for prehistoric funerary practice, settlement and industrial activity in the late prehistoric and Romano-British period (Wessex Archaeology 2016; Wessex Archaeology website). This area had until quite recently seen relatively little archaeological investigation (Bill Horner, pers comm).

At Mount Batten, extensive midden deposits have been found. These began to accumulate in the Late Bronze Age and continued to accumulate until early Roman times. Further activity continued up until the end of the Roman period and included Iron Age and Roman settlements, fields and an important cemetery (Bate 1864; Plymouth Archaeology 1998a).

Along the Cattewater, however, there is no evidence of Iron Age settlement apart from a single sherd of pottery of 1st century BC to 1st century AD date along with some Romano-British tiles found at Sutton Pool (UID 17370). These finds were discovered in an *insitu* deposit during excavations in an area that had been reclaimed from Sutton Pool in the

13th to 14th centuries. This could indicate settlement in the area in this period (Barber and Gaskell Brown 1981, 144; Wessex Archaeology 1995, 38).

Early medieval and medieval

Plymouth Sound is one of the finest natural harbours in the world. Plymouth was originally a fishing village named Sutton Harbour; it became a major trading port in the 13th century, and was heavily involved in trading and warfare, especially with the French and Spanish (Wessex Archaeology 1995, 43; Wheatley 2000, 127). In 1254 Plymouth was recognised by Royal Charter, becoming the first town in England to be granted a Charter by Parliament (Friel 2003, 70). In the 1490s, artillery towers, or blockhouses, were constructed along the Plymouth waterfront for its defence (Breslin 1998).

Cattedown is recorded as part of the manor of Leuricestone in the Domesday Book of 1086 (Gerrard 1982, 17). During the later medieval period the Cattewater, '*This goodly rode for great shippes*', was the principal anchorage for English and continental shipping arriving alongside the rapidly growing settlement around Sutton Pool. Considerable effort was made to protect the area from silting caused by mining activity upstream. The effects of silting would have been made worse by the deliberate dumping of ballast by trading ships, threatening to make the Cattewater unusable for the safe anchorage of ships (Fenwick and Gale 1998, 41; Redknapp 1984, 3; Wessex Archaeology 1995, 45).

The medieval defences may be summarised as follows: the castle (UID 17345), with below it the Barbican and the causeway flanking the narrow entrance to Sutton Pool (UID 17479, 47558, 51709); a series of bulwarks between Fisher's Nose and the site now occupied by the Royal Plymouth Corinthian Yacht Club (UID 15364, 51630), supplemented by the Henry VII towers on either side of the entrance to Millbay at Firestone Bay and at Devil's Point (UID 42742, 15363); an artillery emplacement on the eastern side of the Hoe near St Katharine's Chapel (UID 17440); and the Henry VIII works on St Nicholas' or Drake's Island (UID 43307). It was not until the more serious threat of Spanish invasion during the reign of Elizabeth I that Plymouth Fort was built on the Hoe itself between 1592 and 1598 (UID 17379). This remained the principal defence of Plymouth until the Citadel was built in 1665 (UID 17322; Woodward 1987).

Post-medieval

Sutton Harbour and Cattewater continued to be Plymouth's main harbours virtually up until the end of the 18th century when construction of the modern naval dockyard at Devonport began (Wheatley 2000, 134). Apparently the place-name Cattedown is derived from a rock outcrop, which it was claimed, had the appearance of a cat. This gave its name to this stretch of water and eventually the name of Cattedown to the adjoining wharves and commercial area.

The Plymouth Breakwater (UID 17342) was built by John Rennie and Joseph Waidbeye between 1812 and 1841 at a cost of £1.5 million, funded by the Royal Navy. The Breakwater protects Plymouth, Plymouth Sound and their anchorages. It is 40 feet wide at the top and 200 feet wide at its base, 3,000,000 tons of rock was used in its construction (McInnes 2016, 94).

The limestone quarries at Cattedown and Oreston were developed extensively, the rock used for construction, ballast and lime-production (e.g. UID 17411). Lime kilns were also found along the River Plym (e.g. 19656). Both banks of the River Plym saw considerable alteration: a toll road (now Embankment Road) was constructed early in the 19th century with a tramway and railway constructed later in the century (UID 19658, 22556). On the opposite bank, there was considerable reclamation of land at Chelson Meadow behind an embankment (UID 20049) and the area used as a race course.

Modern

Plymouth, Plympton and Plymstock continued to grow with considerable urban expansion of terraced housing in the early 20th century. There was a rationalisation and extension of portside facilities with several new warehouses built, as at Victoria Wharf where a new

wharf, dock and pier were also constructed. At Laira Green, the railway yard was altered and extended and in 1935 a lido was built in the art deco style at Tinside, close to the Hoe.

Ferry crossings continued to be an important aspect of the coastal scene with ferries connecting Plymouth, Turnchapel and Oreston. Throughout the 20th century several wooden vessels were abandoned on the River Plym and, in particular, on Hooe Lake. Chelson Meadow became a municipal refuse disposal site and was extensively landscaped.

Military

During the English Civil War Plymouth was a Parliamentarian stronghold and was besieged by the Royalists three times. Wenceslaus Holler's 1644 engraving of the third siege of Plymouth shows the siege works on the Cattedown peninsula: 'Cattedown Work', 'Breastwork' and 'Princes Rock'. It is likely that the Civil War earthworks were entirely destroyed during the 19th century quarrying shown on the 1880 OS map. The 1880 OS map shows that Cattedown Quarry lay at the back of the site, the Cattedown branch of the L&SWR railway ran along the edge of the shore.

The strategic position of Plymouth, vital to the defence of the South West and the Channel Coast and supporting a major naval dockyard, has led to the development of extensive and complex systems of fortification in the surrounding areas including the Rame Peninsula. Many of these systems owed their design and construction to periods of political unrest within Europe, or to specific threats of invasion, both real and imagined. Their development can also be seen as a response to the sometimes rapidly changing nature of warfare. Plymouth is one of four locations in England where there has been continuity of fortification over at least five centuries and, of these, it has the greatest concentration of 18th and 19th century forts and batteries. A total of 216 sites encompassing a wide range of dates were investigated by the survey of the historical defences of Plymouth (Pye and Woodward 1996). This provided an inventory of the historical defensive works in and around Plymouth in order to promote awareness of this historical resource.

Within this section the main fortifications include: Bovisand Battery; Staddon Point Battery; Watch House Battery; Staddon Heights Battery; Staddon Fort; and Lord Howard's Battery.

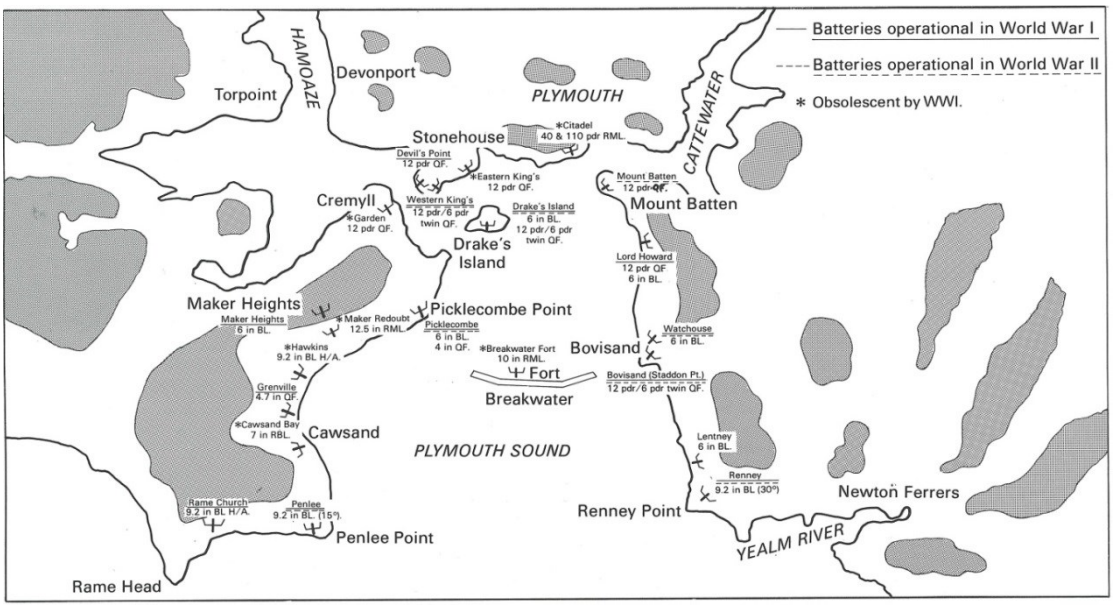


Fig 6.2 Position of coastal batteries sited to defend Plymouth and operational since 1900 (Woodward 1987, plate 33).

Maritime

The Cattewater Wreck (NHLE 1000065), discovered in 1973 during channel dredging in the Cattewater, was the first wreck to be designated by the UK Government under the 1973 Protection of Wreck Act. It is believed to be an unidentified armed merchantman of the first half of the 16th century (Redknapp 1984, 11; Wessex Archaeology 1995, 45). The site was partly excavated between 1975 and 1978. The Cattewater Wreck Archive Project, grant funded by Historic England, aimed to improve the long term care and management of the Cattewater Wreck Excavation Archive held by Plymouth City Museum and Art Gallery.

The Cattewater, Plymouth breakwater and the coastline beneath the Hoe and Mount Batten Point have seen many wrecks. Being an important anchorage the Sound and the Cattewater were often busy with ships undertaking repairs, awaiting orders or lightering goods and potentially vulnerable to drag their anchors in gales and be driven against the coastline (e.g. *HMS Telegraph* which was wrecked in 1813). When a vessel dragged its anchor it often took out several other vessels in its path, depending on its position and the wind direction.

6.2.2 Section P Tamar Estuary

This PSA comprises the Tamar Estuary between Devil's Point, Stonehouse, Plymouth and Cremyll, near Mount Edgcumbe, Cornwall. The estuary system is a large marine inlet comprising the mouths of the Rivers Tamar, Lynher and Tavy, which collectively drain an extensive part of Devon and Cornwall. The Tamar and its tributaries provide the main input of fresh water into Plymouth Sound (a ria or drowned river valley). The estuary complex is designated as a SPA for its international importance to birds.

This stretch of the estuary includes the western part of Plymouth (including Devonport), Saltash and Torpoint (Halcrow Group 2011, D-5). The RCZAS project area extends 1km inland of the tidal limit at Gunnislake (Tamar), Buckland (Tavy), Polbathic and Notter Bridge (Lynher).

Either side of the upper section of the Tamar, including part of the Bere Alston peninsula, is within the Cornwall and West Devon Mining Landscape World Heritage Site. Within the RCZAS project area within this PSA are 571 Listed Buildings and 27 Scheduled Monuments. Conservation Areas are found at nine settlements in Cornwall and for 12 areas of Plymouth. Registered Parks and Gardens can be found at Cotehele (Grade II*), Port Eliot (Grade I) and Antony (Grade II*) within the RCZAS project area in this PSA section.

There have been recent assessments of the National Trust properties at Buckland (Devon; Blaylock and Dudley 2016) and Cotehele (Cornwall; Dudley 2011). A National Trust 'greyback' report has been completed for Erth Barton (Cornwall; National Trust 1986b) and for other properties such as Saltram (Plymouth; Thomas and Blaylock 1992) and Antony (Cornwall; Beamish 1987).

A study of Wacker Quay was carried out for the Cornish Ports and Harbours project (Johns, Buck and Fleming 2016).

Palaeolithic

The Cattedown Bone Caves (described above in Section 6.2.1) are part of a huge system of caverns which extend to East Stonehouse and Mount Wise. Stonehouse Cave was excavated but no report published (UID 16506). Research using sidescan sonar has led to the discovery of a number of underwater caves in the Tamar Estuaries, one which was found at a depth of 20m off Western King. More underwater caves have been reported by divers 20m into Hamoaze from Devil's Point (Wessex Archaeology 1998, 15).

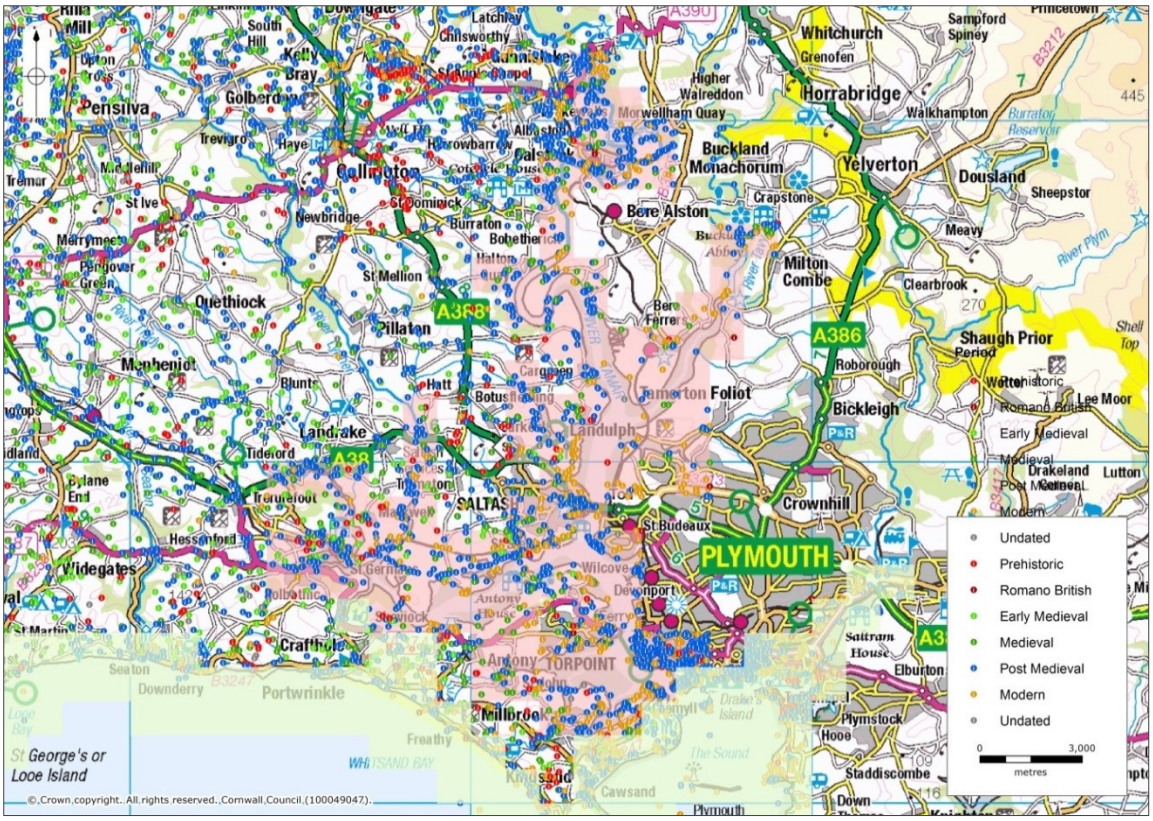


Fig 6.3 Sites currently recorded in the HERs for Section P of the RCZAS project area (Tamar Estuary; Devil's Point to Cremyll).

Mesolithic

The distribution of Mesolithic sites around Plymouth Sound seems to indicate the active exploitation of marine resources of the coastal and estuarine environments, particularly of the Cattewater and Hamoaze estuaries close to where they enter the Sound (Wessex Archaeology 1995, 32).

Neolithic and Bronze Age

There is relatively little evidence for sustained occupation in the Plymouth area during the Neolithic period. During the Bronze Age there is evidence for an intensification of settlement activity in the environs of Plymouth Sound (Wessex Archaeology 1995, 33, 35).

Iron Age and Romano-British

The discovery of a Roman fort at Calstock (Rippon 2008; Claughton and Smart 2008; Smart 2014) and another at Restormel, Lostwithiel (Thorpe 2007; Hartgroves and Smith 2008), when added to the single previously known site at Nanstallon near Bodmin, suggests a far greater Roman military presence in Cornwall than previously realised although the implications are still far from clear. Along with being located on navigable routes the sites at Calstock and Restormel are located close to rich outcrops of ore and this is likely to be significant with implications for the control of these minerals. The socio-economic relationships between a Roman military presence and local communities will be a key element in future research. Aside from creating opportunities for market exchange, opportunities for social interaction will have offered new contexts for the introduction of new technology, ideas and even changes in fashion (Nowakowski 2011, 256).

A recent geophysical survey at Warleigh Barton, near Tamerton Foliot, has revealed evidence for Romano-British activity (Sturgess 2012).

Early medieval and medieval

The earliest references to post-Roman settlement are historical records usually relating to ecclesiastical foundations or bequests in the area, but there are few such references to the Plymouth area (Wessex Archaeology 1995, 38).

At St Germans, near a silted up former creek, is St Germans Church. Built in the mid-12th century as a priory church it has the finest Norman west front in Cornwall and Devon and it is on the site of an important early monastery which in the 10th century was the seat of Cornish bishops. Continuing in use as a parish church the building survived the Reformation, though the choir was left to decay and collapse and only the nave and south aisle survives. Excavations in the 1920s located the remains of a pre-Norman building to the east of the chancel. North of the church, where the cloister stood, Port Eliot House is built on the site of the monastic refectory which it incorporates in its foundations (Olsen and Preston-Jones 1998–9; Johnson and Rose 2003, 30). Both the church and Port Eliot House are Grade I Listed Buildings (NHLE 1140544 and 1140516 respectively).

Post-medieval

In the late 17th century a dockyard and town, Plymouth Dock, later Devonport, was developed as a naval dockyard. Devonport quickly grew in size and importance, and it was defended by a defensive earthwork, the Devonport Lines (UID 51680), built in the late 18th century when the Morice Yard or Gun Wharf was also built (UID 19144). This series of redoubts became largely redundant when a series of Palmerston Forts surrounding Plymouth were built in the late 19th century. The Lines included several small barracks, few of which remain today, for example the gatehouse to the Raglan Barracks (UID 17460; NHLE 1386244). In the 19th century, Devonport dockyard expanded northwards with the extension of the South Yard and the development of the North Yard or Keyham Dock (Naval Dockyards 2015).

RNAD Bull Point wet dock (NHLE 1393253) was developed by the Board of Ordnance in the mid-19th century as a wet dock associated with the use of ancillary buildings for the checking, processing and storage of gunpowder and ammunition.

On the upper banks of the River Tamar, several areas of intertidal salt marshes were enclosed, drained and reclaimed (for example at South Hooe, Devon). The area also witnessed considerable industrial development associated with mining, including the construction of quays, as at Morwelham (Devon; MDV5435), Calstock and Cotehele (Cornwall; MCO39239 and MCO4763 respectively).

Dozens of smaller quays and hards were built as landing points for vessels carrying people and goods, often agricultural products or lime, to feed lime kilns such as those at Bohetherick, Cornwall (MCO151; MCO59600).

Aside from Plymouth the main settlements in this area operated as small ports (Saltash, St Germans, Torpoint and Millbrook) with limited industrial development and small boat yards (e.g. near Commercial Wharf, Saltash; MCO8949). A small shipyard at Cremyll which is still in use has been in operation since the late 19th century (MCO8933). The quays at Southdown, Millbrook, have a history of use by many of the town's industries but are likely to have been constructed in order to serve the Kings Brewhouse (MCO4904).

Modern

A majority of the sites dating to the modern period have a military origin, especially in association with Second World War defences. A gridiron at Saltash (MCO38408) is likely to be associated with the Second World War and the former US Navy repair facility for small craft used in the D-Day landings (MCO43338).

Military

The Blockhouse at Devil's Point is a Grade II Listed Building (NHLE 1129960) and is probably the oldest defensive structure on Western King, guarding the narrow passage to Hamoaze and Stonehouse from seaborne attack in the Tudor period. The Western King Redoubt was completed in 1779 and armed with eight to 12 18-pounder guns. The Redoubt was incorporated into a later battery and then entirely built over in 1897-8. By that time the new Western King Battery was made up of seven 12-pounder QF guns, whose emplacements can be seen today (UID 20424). Traces of the banks and ditches of the 1779 Redoubt were excavated in March 1995 (Plymouth Archaeology 1998a). The south of the Stonehouse Peninsula is dominated by the Royal William Victualling Yard, which caused the ferry to Cornwall to be relocated to Admiral's Hard.

The building of the Royal Dockyard (now part of South Yard) in the 1690s directly influenced the later history of Mount Wise with the construction of the Dock Lines, a series of huge stone and earth walls, in the 1750s. Mount Wise Redoubt was built in 1778-9 on the site of an earlier small mansion to protect the sea approaches to the dockyard. Mount Wise Redoubt remained an important station for military communications into the 20th century (Plymouth Archaeology 1998b).

The Ballast Pond at Torpoint is a Scheduled Monument (NHLE 1007261) and is on the Heritage at Risk Register. It was built by the Admiralty in 1783 and facilitated the storage of ballast-laden barges, thus allowing the ballast to be stored without unnecessary over-handling. It reflects the growing importance of the area for the repair of ships at the naval dockyard. During the 1930s it was used to berth tugs during repairs.

Extensive Second World War defences include pillboxes, barrage balloon sites and anti-aircraft batteries as well as bomb craters (e.g. MCO45382).

Maritime

Since 2002, students from Plymouth University's marine school have carried out hulk recording in the Tamar Estuaries as part of their fieldwork under the supervision of Martin Read (Read 2017). This followed requests from the County archaeologists of both Devon and Cornwall for the University to look at the hulks remaining in the Tamar and the surrounding rivers (Plym, Tavy, Lynher and Yealm). They were getting significant numbers of planning applications from developers to remove hulks, but had no information on which they could assess their importance. This was called the Survey of Hulks in the Tamar, but was later called the Survey of Hulks in the Plymouth System (the SHIPS Project, though this acronym has recently been loaned to another group).

These surveys were originally carried out as final-year group projects which looked at the archaeology of areas of the Tamar System and included other site types such as lime kilns, tide mills (the subject of a future article), fish traps, etc. More recently the hulk recording has been carried out as final-year individual projects (including recent ones on Pomphlett Lake and Hooe Lake). The theoretical and pedagogic background to these projects, as well as other student surveys of the South Hams and the Exe Estuary, have recently been written up as a chapter for a book on The Archaeology of Watercraft Abandonment (Read and Magne 2013). So far over 50 hulks have been located by the surveys and many of them identified, though there is very little information about many of them, sometimes only their name and what sort of vessel they were. An article by Martin Read is included as an appendix to this report (Appendix 7).

6.2.3 Section Q Mount Edgcumbe to Rame Head

This is the most westerly stretch of the Durlston Head to Rame Head SMP, extending from Cremyll, near Mount Edgcumbe, to Rame Head in Cornwall. It includes the western part of Plymouth Sound and encompasses the settlements of Kingsand and Cawsand. The coastline covers part of the estuary mouth of the River Tamar.

This PSA within the RCZAS project contains 208 Listed Buildings, nine Scheduled Monuments and a Conservation Area at Kingsand and Cawsand.

This section contains two Protected Wreck sites associated with the wreck of *The Coronation*, which lies in two parts: Coronation Offshore (NHLE 1000069) and Coronation Onshore (NHLE 1000070). The Coronation was an English Second Rate warship which capsized en route to Plymouth in 1691.

Mount Edgcumbe is a Grade I Listed Registered Park and Garden (NHLE 1000134) and has seen considerable research including two management plans (Cornwall County Council 1987; Gaskell Brown 2003), historic buildings recording (Berry and Herring 2005) and assessments for various works including multi-use trails (Dudley 2005) and the conservation of historic seats (Thomas 1991).

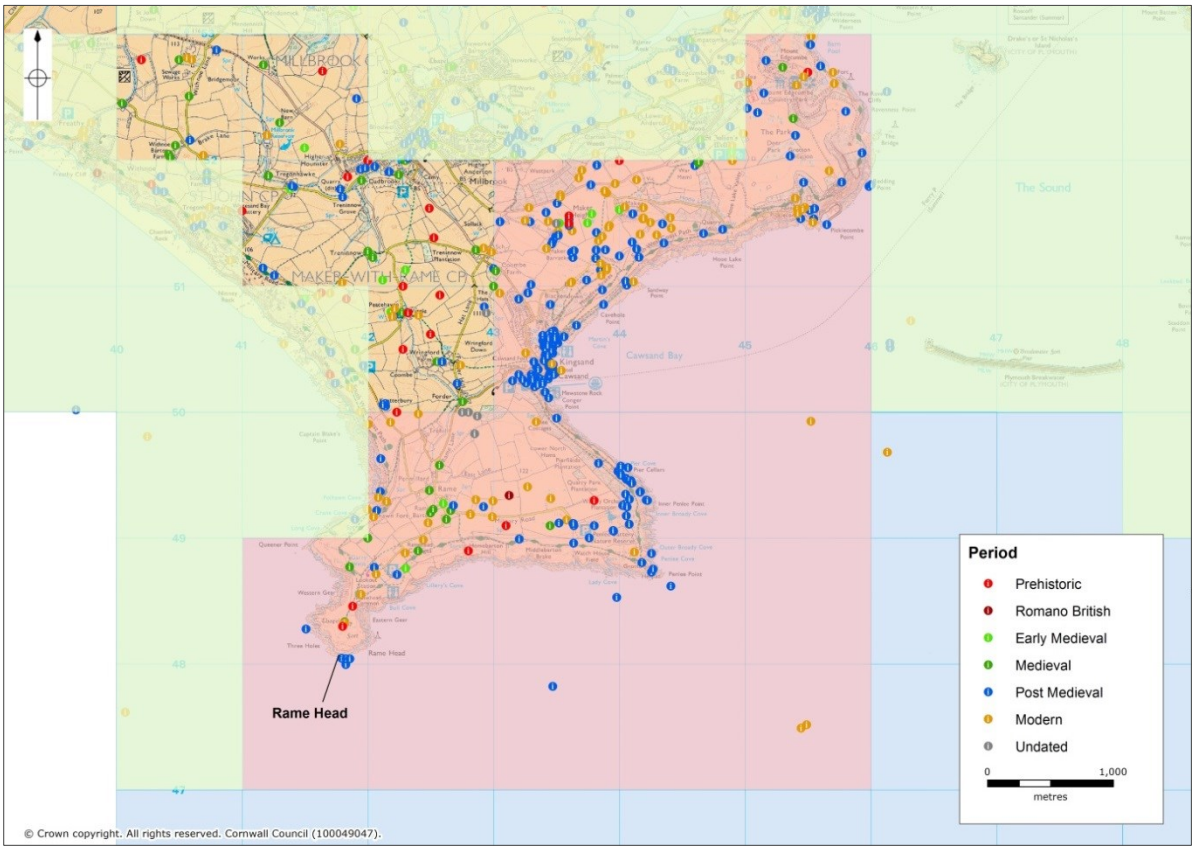


Fig 6.4 Sites currently recorded in the Cornwall HER for Section Q of the RCZAS project area (Tamar Estuary; Cremyll to Rame Head).

Palaeolithic and Mesolithic

There are no recorded Palaeolithic sites or finds.

A flint scatter recovered from near the fort on Maker Heights comprised 'almost all the recognised forms of smaller implements such as flints, scrapers, knives, sling bullets etc., with cores and many fractured pieces (Brent 1886, 59). The site is recorded in the Cornwall HER as an 'occupation site' (MCO6115) because the range of material is said to indicate a flint working site – Brent considered that 'in all probability there was once a village' here (*ibid*). The flints are in Plymouth Museum and have been described as Mesolithic by Berridge and Roberts (1986) and also in SWARF (Hosfield *et al* 2008, fig 2.4). On Rame Head MCO6742 is recorded in the Cornwall HER as a prehistoric lithic scatter but the finds are interpreted as a Mesolithic flint scatter in the NRHE (437403).

Neolithic and Bronze Age

Flint artefacts, knives, blades, cores, scrapers and waste material have been found at Barnpool at Mount Edgcumbe. Within Mount Edgcumbe Park there are one, possibly two, Bronze Age barrows (MCO2065; MCO2066).

Iron Age and Romano-British

Commanding the western approach to Plymouth Sound the Rame peninsula is likely to have been strategically important over several centuries. Later Iron Age sites can be found in the form of enclosed settlements called 'rounds' (for example, MCO44833 located on the gentler hillslope off the crest of the ridge between Millbrook and Kingsand and a cliff castle at Rame Head (NHLE 1004510 – see below Section 8.3.1).

A late Roman 1 amphora (LRA1) was recovered off Cawsand in Plymouth Sound by a diver in the early 1970s. These amphorae were produced between the 4th and 7th centuries AD in the east Mediterranean and were used to transport wine and, possibly, oil (Duggan 2013).

Early medieval

King Geraint of Cornwall and Dumnonia, in granting land in Maker to the Bishopric of Sherborne in AD 705, may have sought to gain favour with the emerging Anglo-Saxon church and to secure political leverage for his British kingdom as it came under increasing pressure from the expansion of the English kingdom of Wessex. The amalgamation of Cornwall into the sway of the Anglo-Saxon world is complicated and poorly understood. It is likely to have developed over several centuries but with more significant assimilation following the defeat of the Cornish and their Viking allies at the Battle of Hingston Down in AD 838 (Deacon 2007). During the 9th century St Germans became the seat of a bishopric, and by the reign of Athelstan (AD 925–39AD) 'the whole of Maker was put into Saxon Devon'. It later came under Norman control when Baldwin de Brionne, Sheriff of Devon, took it over in the late 11th century (Hoskins 1954). This marks nearly 1,000 years of that land lying to the east of a line between Millbrook and Kingsand being administered as part of Devon. Early cartographic evidence (e.g. 1597 Norden, 1610 Speed, 1699 Gascoyne, 1748 Martyn) indicates that until 1841 there continued to be a division between Devon and Cornwall running roughly from Milbrook to Kingsand, and that it was only in 1941 that the parishes of Maker and Rame merged. The 'Boundary House' in Garret Street, Cawsand, has a monument on its wall that commemorates this age-old line.

Medieval

The Domesday Book lists Maker as being held in 1086 by one Reginald, from Robert, Count of Mortain (the King's half-brother), and having previously been in the hands of Edward. There was sufficient land for 8 ploughs, and 60 acres of pasture. Rame was also mentioned in Doomsday, but belonged to the church at Tavistock. Here there was land for 7 ploughs, 30 acres of pasture and 10 acres of scrubland, all leased by Ermanwald.

To the north of Mount Edgcumbe Country Park a deserted medieval village, West Stonehouse, is believed to have been sited in the area between Cremyll and Wilderness Point, opposite East Stonehouse near Devil's Point on the Plymouth side of the River Tamar. It is said to have been destroyed by the French in 1338; Richard Carew, writing in 1602, spoke of 'certaine old ruines yet remaining' and even Duprez, in 1871, claimed to have seen 'still some old remains', though whether or not he was correct is not known It is probable that the great barn, which survived until the mid-18th century and which gave its name to Barnpool, was associated with this settlement (Duprez 1871).

The ferry at Cremyll dates from the 13th century and there are a number of medieval holy sites in the area. The chapel of St Michael's at Rame may well have been an early medieval hermitage, and was later licensed as a private chapel in 1397. St Julian's Well, on the road between Cremyll and Maker, is of similar date. The Grade-I listed Maker Church (NHLE 1140716), dedicated to St Mary and St Julian, was built around 1500.

The twin settlements of Kingsand and Cawsand originated as fishing hamlets in the later medieval and early post-medieval periods. Cawsand is first recorded in 1404 and early spellings include *Cawsham*, *Cousham* and *Causon*. Kingsand is first mentioned in property transactions involving the Edgcumbe Estate in the 1550s. According to Carew, writing in 1602, Kingsand is thought to have derived its name from a visit by Henry Tudor (later Henry VII) in about 1484 and commemorates his victory over Richard III at Bosworth. Early maps show its name as 'Kingston'.

At the end of the 15th century Sir Piers Edgcumbe married the heiress to the manor of West Stonehouse and in 1515 he received permission to empark much of the area which now forms the Mount Edgcumbe Country Park The deer fence commenced somewhere to the east of the inlet at Empacombe and followed a southerly direction before swinging east well to the north of Maker Church. No doubt some of the many land transactions recorded in the Mount Edgcumbe archives allowed his descendants to enlarge the deer park (Scolding 2007, 5).

Post-medieval

Mount Edgcumbe House was built in the deer park just after 1545. Throughout the 16th and 17th centuries the Edgcumbes, staunch Royalists, continued to prosper and made improvements to the House and Park. In the later 17th century Sir Richard Edgcumbe gave the House a grand new entrance and extra wing, a terrace with summerhouses and new woods, walks and drives, and during the 18th and 19th centuries each new heir made his mark on the estate. The House and garden suffered severe bomb damage in 1944 and were used by the American 29th Division for D-Day preparations. Rebuilding of the House by the sixth Earl was completed in 1964 (Scolding 2007, 6–10). The House is Grade II* Listed Building (NHLE 1160959). The 18th century landscape and gardens of the Mount Edgcumbe Country Park has Grade I status in the Register of Parks and Gardens (NHLE 1000134). There is a rich history that pre-dates the gardens here, and which makes the Park and its surroundings of significant historic value in its own right.

The villages of Kingsand and Cawsand developed in the 16th century as Plymouth merchants, attracted by sizeable pilchard catches, opened fish cellars on the beaches. The parish boundary which lies between the two is notable for having formerly been the boundary between Devon and Cornwall, with Kingsand lying in Maker parish, and therefore Devon, and Cawsand in Rame parish and Cornwall. Maker only became part of Cornwall in 1844.

Secondary industries at this time, and which continued to be important in subsequent centuries, included boatbuilding and smuggling. The fishing industry was in decline by the start of the 20th century and smuggling had virtually ceased by 1850. The tourist industry has dominated the local economy from the mid-20th century (Cornwall Council 2012).

Modern

A majority of the monuments recorded in Section Q relate to the Second World War but a coastguard station and coastguards' cottages were built at Rame Head, the headland a natural promontory commanding expansive views of the approaches to Plymouth Sound (MCO59220-21).

Military

The pinch point in the River Tamar known as The Narrows is a key defensive position. Devil's Point (the Devon side) and Cremyll and Mount Edgcumbe (the Cornwall side) have seen a series of defences over the years. At Mount Edgcumbe a blockhouse was built in the 16th century (MCO23226; NHLE 1004497) with a further battery probably positioned in the vicinity of the Bowling Green (MCO23228). In the following centuries several further batteries were built to defend the area, especially during times of conflict and as Plymouth developed as a strategic naval port (e.g. Earl's Battery, MCO23227).

The defensive qualities of the Rame peninsula have long been recognised (Pye and Woodward 1996). In 1544 an invasion scare led to the building of the Grade-II* Listed Blockhouse (NHLE 1161267) at Mount Edgcumbe to protect the area against the French. The peninsula began to be heavily fortified in the late 18th century with the outbreak of the American War of Independence. The Amherst Battery (MCO23199) was constructed in Kingsand by 1770, parts of which survive as retaining walls. A large fort, named Cawsand Bulwarks, was built to supplement Amherst Battery but this fort now lies beneath the later Cawsand Fort (NHLE 1016102) and an earthwork redoubt was built at Cremyll. From 1779 five new redoubts were built on Maker Heights, four of which are Scheduled Monuments (Redoubts 1, 2 and 3 NHLE 1004154; redoubt no. 5 NHLE 1004255). The two flanking redoubts were subsequently rebuilt in stone and a further Grade-II listed redoubt was built at Empacombe (NHLE 1310696) and a Grade-II* listed barracks (NHLE 1375582) built on Maker Heights (Breslin 1998, 2–3).

The next spur to the peninsula's military development was a report on the Harbour Defences of Plymouth in 1844. Amongst other things this recommended the building of a battery and barracks at Picklecombe, which was built by 1849. In 1858 the threat of a French invasion led to an unprecedented period of fortress and battery construction. A Royal Commission report on the Defences of the United Kingdom made detailed recommendations for the defences of Plymouth including 10 batteries for coastal defence and a further 20 forts and batteries (known collectively as Palmerston Forts or Follies) to defend the Dockyard, stretching from Whitsand Bay in the west to Staddon Point in the east. Those planned for the Rame peninsula, known as the Western Defences, included Garden Battery (Grade-II listed; NHLE 1329141), a new Fort Picklecombe (Grade-II listed; NHLE 1160211), Cawsand Battery (Grade-II listed; NHLE 1329146), Polhawn Fort (Grade-II* listed; NHLE 1310634), Tregantle Fort (Scheduled; NHLE 1004364) and the Scheduled Scraesdon Fort (NHLE 1004347). Many of these forts and batteries never received the full number and type of guns first planned for them, as new technology led to more modern guns being developed rapidly (Breslin 1998 3–4). The first defence at Cawsand is recorded in about 1616 on the site of the present fort which was completed in 1867 and survives today as a near complete example of a Palmerston Fort (Scheduled; NHLE 1016102).

In the 1890s additional batteries were built at Maker, Whitsand (Scheduled; NHLE 1004664), Tregantle Down, Raleigh, Hawkins, Rame Church (demolished during the 1970s) and Penlee. A military railway was built to link Wacker Quay with Scraesdon and Tregantle Forts and equipment to launch Brennan Torpedoes was installed at Pier Cellars. Some batteries were re-armed during World War One but by the outbreak of Second World War only the batteries at Penlee and Picklecombe were fully operational. During the D-Day preparations, concrete roads, fuel, storage and large beach landing stages were constructed by the American 29th Division at Mount Edgcumbe. Anti-aircraft batteries were built on Maker Heights and Penlee. Following Second World War the concept of coastal defence soon became outdated and was declared obsolete in 1956 (Breslin 1998, 4).

Being a strategically significant area it was defended heavily in the Second World War with an array of pillboxes, anti-aircraft batteries, barrage balloon sites, gun emplacements, observation posts and part of a Chain Home radar station on Rame Head (MCO43326). At Maker Barracks and in the parkland of Mt Edgumbe fuel tanks were built as part of the build up to D-Day (MCO44855; MCO45384), as were two embarkation hards at Barn Pool (MCO42393; MCO42414).

Maritime

Maker Church, on Maker Heights, was an important navigation mark. Due to its prominent position it was used in the 17th and 18th centuries as an Admiralty Signalling Station. A system of balls and flags, hung from two large arms on the church tower, was designed so that information on the approach of enemy ships could be speedily passed from Maker to Devonport. This system had its drawbacks as the church was often

obscured by sea mist (Breslin 1998, 14). In the late medieval period the chapel at Rame Head also served as a watchtower and a lighthouse (Thomas 1993).

Cawsand Bay has seen many wrecks, often by vessels disabled by gales and driven in to the rocky shore here, for example, the sloop 'Frolic' which sank off Penlee Point in 1821 en route from Plymouth to Falmouth with the loss of all the crew and passengers. The most famous wreck in this area is the Coronation. On the 3rd September 1691 after patrolling for the French fleet, the English Fleet under Russell made for Plymouth. The Coronation foundered in a strong gale from the South East whilst trying to round Penlee Point with a loss of all but 13 of her crew including the Captain, Charles Skelton (NHLE 108219).

6.3 Rame Head to Hartland Point SMP

6.3.1 PDZ 1: Rame Head to Pencarrow Head

The first Policy Development Zone of the Rame Head to Hartland Point SMP runs from Rame Head to Pencarrow Head, 3km east of the Fowey Estuary, and includes Whitsand and Looe Bays. The area covers the River Looe, the port of Looe, Looe Island and the small coastal settlements of Polperro, Portwrinkle, Downderry and Seaton.

Within the RCZAS project area of PDZ1 there are 271 Listed Buildings, four Scheduled Monuments and four Conservation Areas (Sheviock, Portwrinkle, Polperro and Looe).

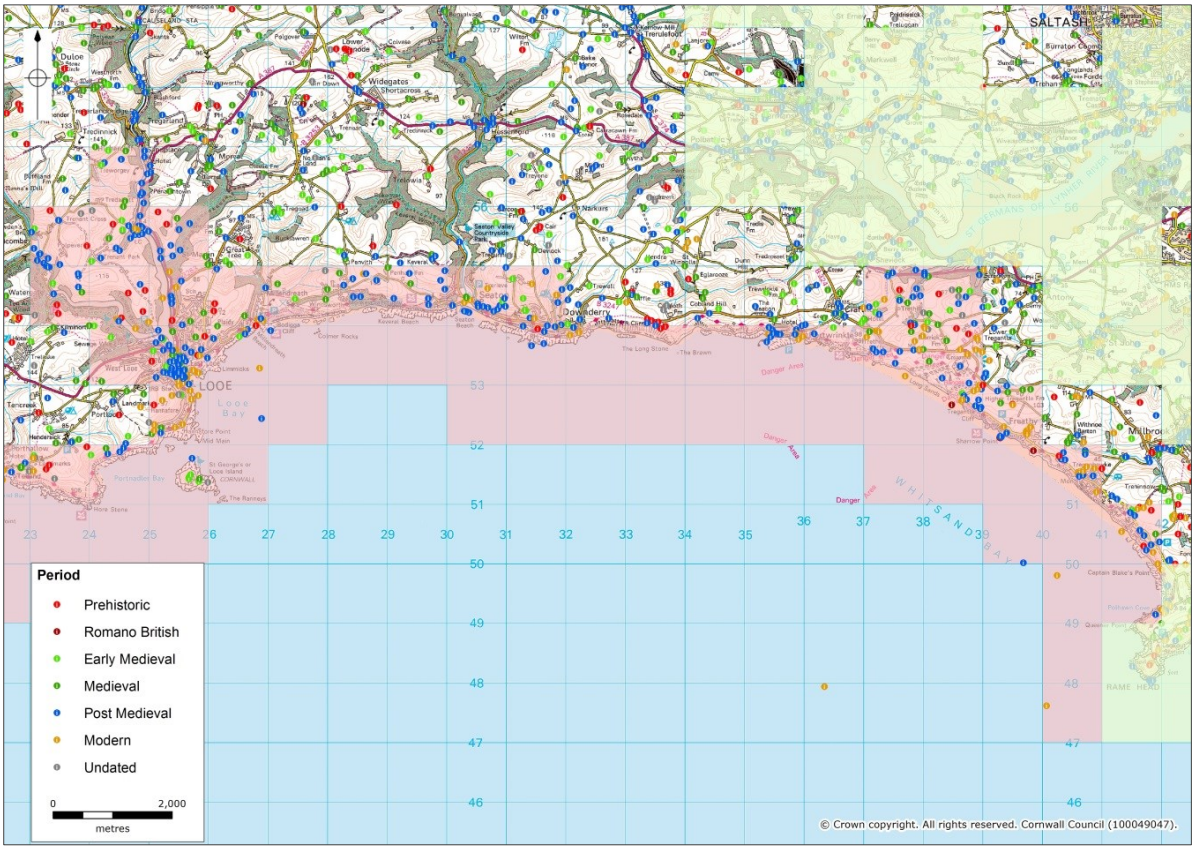


Fig 6.5 Sites currently recorded in the Cornwall HER for the eastern section of PDZ1 of the RCZAS project area (Rame Head to Pencarrow Head) – the map shows Rame Head to Portnadler Bay, west of Looe Island.

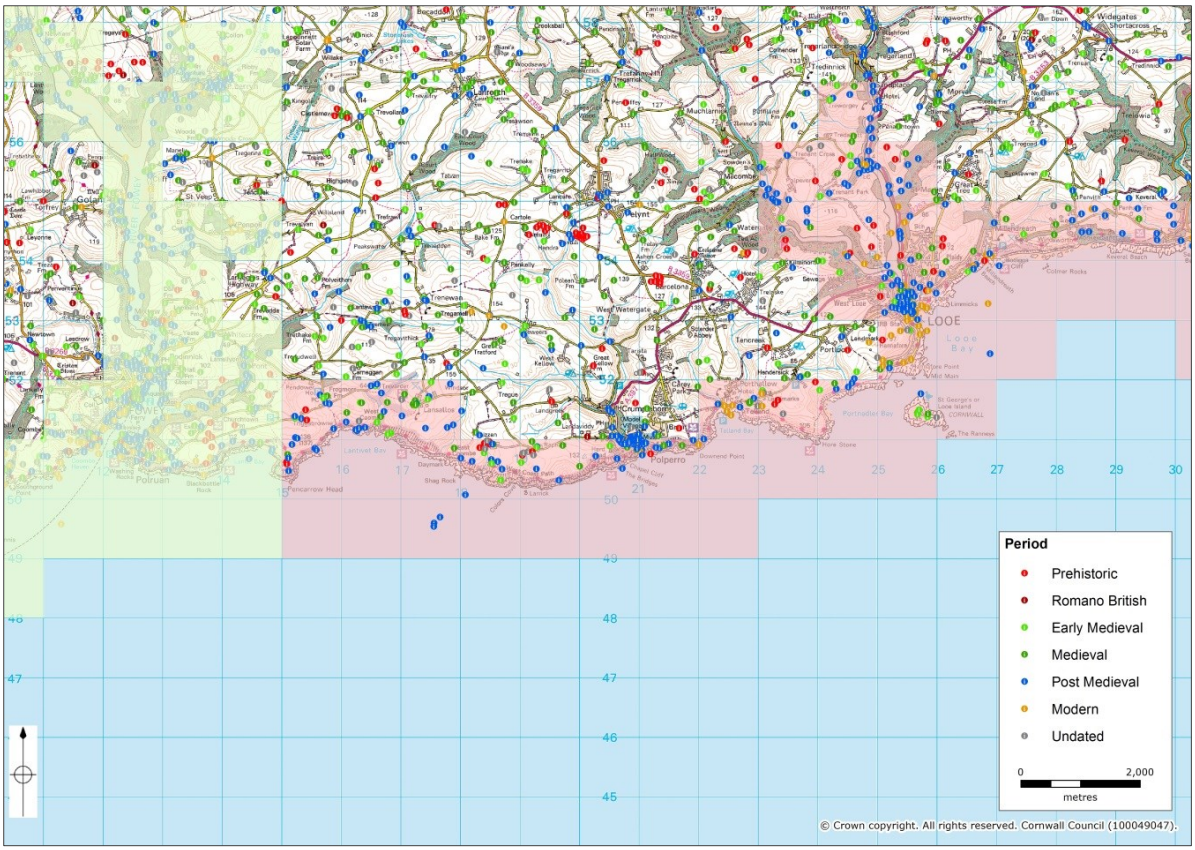


Fig 6.6 Sites currently recorded in the Cornwall HER for the western section of PDZ1 of the RCZAS project area (Rame Head to Pencarrow Head)– the map shows Portnadler Bay, west of Looe Island, to Pencarrow Head.

Palaeolithic and Mesolithic

There is very limited evidence for these periods except for the find of a broken ficron handaxe (Palaeolithic) found at Looe in the 1980s (Berridge and Roberts 1986). Submerged forests at Millendreath and Polperro (MCO23452; MCO44964) have been recorded but not accurately dated.

Neolithic and Bronze Age

There has been relatively little large-scale development in the south east corner of Cornwall and consequently only a handful of modern excavations have taken place although many sites were identified by the Cornwall NMP (Young 2007).

Over the last 50 years archaeological research in the eastern half of Cornwall has focussed primarily on Bodmin Moor and consequently little, or no, systematic fieldwork has been carried out in this lowland landscape during the last two decades. A research project, the South East Kernow Archaeological Survey (SEKAS) was launched in in 2012 focussing on the monumental landscape around Pelynt, between Looe and Fowey. Initial results from the project suggest that Mountain Barrows and the Hendra and Ashen Cross barrow cemeteries are directly associated with routeways and overland paths within the prehistoric landscape and that the number and frequency of recorded prehistoric monuments in the area around Pelynt testify to the importance of this landscape in during prehistory (Frieman and Lewis 2016).

Immediately north of the project area at Triffle, east of Downderry, is a potential Middle Neolithic cursus (MCO43628) (Berridge 1983). Nearby is a group of four barrows situated above the cliff known as Skerrish (MCO3551-3554 incl.) in association with the possible barrow at St Germans' Beacon (MCO1101). Place-name evidence suggests the site of several barrows positioned along the ridge above Whitsand Bay (MCO 2145;

MCO3864; MCO3468; MCO3738). Some survive as earthworks while others have been ploughed out.

An evaluation by Time Team in 2008 on Looe Island and Lammana Chapel and the nearby Monks House on the mainland produced no definite evidence for prehistoric activity on either site, although a large stone apparently buried in the grounds of Island House on Looe Island may have been a prehistoric standing stone that had been demolished during 19th century landscaping (Wessex Archaeology 2009).

Iron Age and Romano-British

There is an Iron Age promontory fort at Rame Head (NHLE 1004510). The headland was defended by a deep rock-cut ditch crossing the neck. There are slight traces of rampart on the inner side and several roundhouse platforms on the slope behind, although Second World War fortifications have disturbed some of the area (Johnson and Rose 2003, 43). Outside the project area, at Knatterbury, 800m to the north west of Rame, is a possible hillfort which has been Scheduled (MCO68; NHLE 1007299).

Fig 6.7 Looe Island (Photograph: HER, Cornwall Council; F70-025).

During the 2008 Time Team evaluation, two ditches on Looe Island (Fig 6.2) produced Romano-British pottery and a small hoard of eight late Roman coins. While one ditch could be fairly securely dated on this basis, the other ditch may have been later in date and could form part of a possible early Christian enclosure around the summit of the island (Wessex Archaeology 2009).

An 'ox-hide' bronze ingot, possibly dating to the Roman period, was found by divers off Looe Island (Beagrie 1985). A single sherd of amphora recovered as a surface find on Looe Island was identified as a Late Roman 2 Amphora (LRA2) (cf Duggan 2013, 243). Further Romano-British chance finds have been identified including several Roman coins dug out of the sand at Whitsand Bay (MCO1843) with further coins found to the south east at Sharrow Point (MCO1336) and at Freathy (MCO1840).

Early medieval

The Giant's Hedge, a linear earthwork cut from the West Looe River to Lerryn, next to the River Fowey, is assumed to be early medieval in date and to define the territory of a local ruler (MCO23462). Earlier Christian enclosures indicated by the Cornish language *lann* place-name are suggested at Talland (MCO23451) and Lansallos (MCO28631). The original name of Frogmore Farm, Lanteglos, was *Lanlyrek*, possibly contains the *lann* place-name element (MCO26461) and similarly, the place-name Lammana, used to indicate the mainland opposite Looe Island and the island itself, contains the Cornish place-name elements *lann* and *manach*, meaning 'the early Christian enclosure or monastery of the monk' (MCO23329).

Medieval

St Michael's Chapel, standing on the highest point on Rame Head, was first licenced in 1397 but may be Norman in origin. It is a Grade II* Listed Building (NHLE 61698) and is also part of a Scheduled Monument (NHLE 1004510). The chapel has a stone gabled roof but tracery has long since disappeared from its windows, which were unglazed. The chapel served as a lighthouse and was probably maintained as a hermitage until the Reformation, after which it was maintained as a watch house – a watchman was employed at the time of the Spanish Armada (Johnson and Rose 2003, 43). During the Second World War the site was used as a gun platform.

A small priory occupied by monks from Glastonbury Abbey is known to have existed on Looe Island from *c*1200 AD. It still existed at the time of the Chantry Commissions of 1546–8, but its final date of demolition is unknown (Wessex Archaeology 2009).

The corresponding mainland site, which was also once owned by Glastonbury Abbey, was excavated by Croft Andrew in the 1930s; he traced the ground plan of Lammana Chapel and exposed two inhumation burials. He also excavated the Monks House. The results of his excavations were published by Olson (1994). The 2008 Time Team evaluation confirmed the ground plan of the chapel and bone from a disturbed inhumation burial provided a radiocarbon date of cal AD 1200–1280 (UBA-9759 799±23 PB) (Wessex Archaeology 2009). The foundation date of Lammana Chapel remains unknown. Croft Andrew considered it to pre-date the Norman Conquest, but the pottery dating on which this was based has since been revised, and it is likely to be 12th century in origin (Wessex Archaeology 2009).

A group of medieval field strips on Tregantle Down (to the south east of Tregantle Fort) were recorded from aerial photographs as part of the Cornwall NMP (MCO44404).

Post-medieval

Looe (East and West) and Polperro continued as busy fishing ports, the industry reflected in the concentrations of fish cellars especially in East Looe.

Looe continued as the main port in the area, declining slightly before flourishing in the 19th century with the transport of sea sand and lime inland for the agricultural industry following the creation of the Liskeard and Looe Union Canal in 1828 (MCO23455). This also served the various mines and quarries north of Liskeard, necessitating an extension of the port's quays in the 1860s (The Cahill Partnership and Cornwall Archaeological Unit 2002a).

The harbour at Polperro was damaged in 1774 and 1817, and nearly destroyed in 1824. A new pier was constructed in 1824 and improved in 1897, with a new pier, due to the growth of the fishing industry (MCO41594).

Lime kilns were established at various landing points between Seaton and Polperro with a concentration on the Looe River (e.g. at Shallowpool, MCO7301, MCO7302, MCO45001).

Modern

A majority of the monuments recorded in the HER within the project area relate to military sites and the Second World War. An interesting site on the south side of Polperro below Chapel Hill is a natural tidal pool which has been adapted for use as a tidal bathing pool with steps built into the cliff side leading down to it (MCO58153).

The 'Downderry cave-dwellers' were arguably the best documented cave-dwellers in Cornwall at the turn of the 20th century, although this seems to have been seasonal occupation by limpet and winkle pickers (Rose 2000–1).

Military

As described above (Sections 6.2.1 and 6.2.2), the strategic position of Plymouth, vital to the defence of the South West and the Channel Coast and supporting a major naval dockyard, led to the development of extensive and complex systems of fortification (cf Pye and Woodward 1996). The late 19th century fortifications in this section include the Scheduled Whitsand Bay (or Tregonhawke) Battery (NHLE 1004664) and Tregantle Fort (NHLE 1004346) and an unfinished battery at Knatterbury (NHLE 1007299). There are Second World War radar installations adjacent to the chapel on Rame Head, also Scheduled (NHLE 1004510).

The usual range of defences was built in the Second World War including pillboxes (e.g. MCO42342), roadblocks (e.g. MCO42564), barrage balloon sites (e.g. MCO42350), beach defences (e.g. MCO39076), gun emplacements and boom (defending Looe harbour; e.g. MCO42562) and minefields (e.g. MCO42338). A Second World War Chain Home radar station on the front at Downderry was one of the Home Chain network of early-warning sites located throughout Britain between 1939 and 1943 (MCO43620).

Maritime

In the days of sail Whitsand Bay was the scene of many shipwrecks because heavy onshore gales would make it impossible for ships to get around Rame Head and into the shelter of Plymouth Sound. Documented shipwrecks along the coast between Rame Head and Looe include; the Greek brig *Taxiarcos* (1843), the Sunderland brig *Deptford* (1817), the Fowey sloop *Friends Endeavour* (1811), the trader *Josiah and Betty* (1721), the Fowey schooner *Jane* (1827), the Plymouth ship *Susannah* (1812), the *Papenburger* (nd), the London barque *Duke of Clarence* (nd), the Plymouth steam trawler *Chancellor* (1934), the schooner *Mary Peers* (1923), the *Gipsy* (1901), the *Endeavour* (1750), the Exeter brig *Albion* (1872), the French brig *Flétan* (851), the Liverpool coaster *Daisy* (1903), the *Konigsberg* (1834), the *Constance* (1865), the *Belissima* (1838), the *Emmelyne* (1867), the *Good Intent* (1817), the *Harmonie* (1824), the *Islander* (1930), the *Jane* (1838), the 90-ton ketch *Zarita* (1926), and the *St Pierre* (1906) (Noall 1968, 165; Larn and Carter 1969, 26).

Further out in the bay and approximately 300m east of the project area is the wreck of the American Liberty ship *James Eagan Layne* (NRHE 919773), which was torpedoed while in convoy near the Eddystone in March 1945. She was a very large ship; Liberty ships were 134.4m (441ft) long and 7,176 tons gross, and carried a valuable cargo of 4,500 tonnes of US army stores including torpedo boats, tank parts, jeeps and lorries, much of which was salvaged in the post-war years. Located at SX40248 49807, the *James Eagan Layne* is probably the most dived-on wreck in Britain (Larn and Carter 1969, 50; Diver magazine May 1997).

Much further out to sea is the wreck of the World War One submarine HMS *A-7*, which failed to surface while on exercise off Rame Head in January 1914. Nine of her crew were lost (Larn and Carter 1969, 48). The wreck is protected under the 1986 Protection of Military Remains Act.

In 2004, the Leander class frigate HMS *Scylla* was placed to form an artificial reef in Whitsand Bay by the National Marine Aquarium, Plymouth (Johns *et al* 2004).

6.3.2 PDZ 2: Pencarrow to Gribbin Head (including Fowey Estuary)

The PDZ runs from Pencarrow Head to Gribbin Head, a headland to the west of the Fowey Estuary. The area covers the River Fowey up to Lostwithiel and its sheltered creeks at Lerryn, Pont and Golant, and includes the settlements of Fowey, Polruan, Lerryn and the southern part of Lostwithiel.

Within the RCZAS project area of PDZ2 there are 288 Listed Buildings, 13 Scheduled Monuments and five Conservation Areas (Polruan, Bodinnick, Fowey, Lerryn and Lostwithiel).

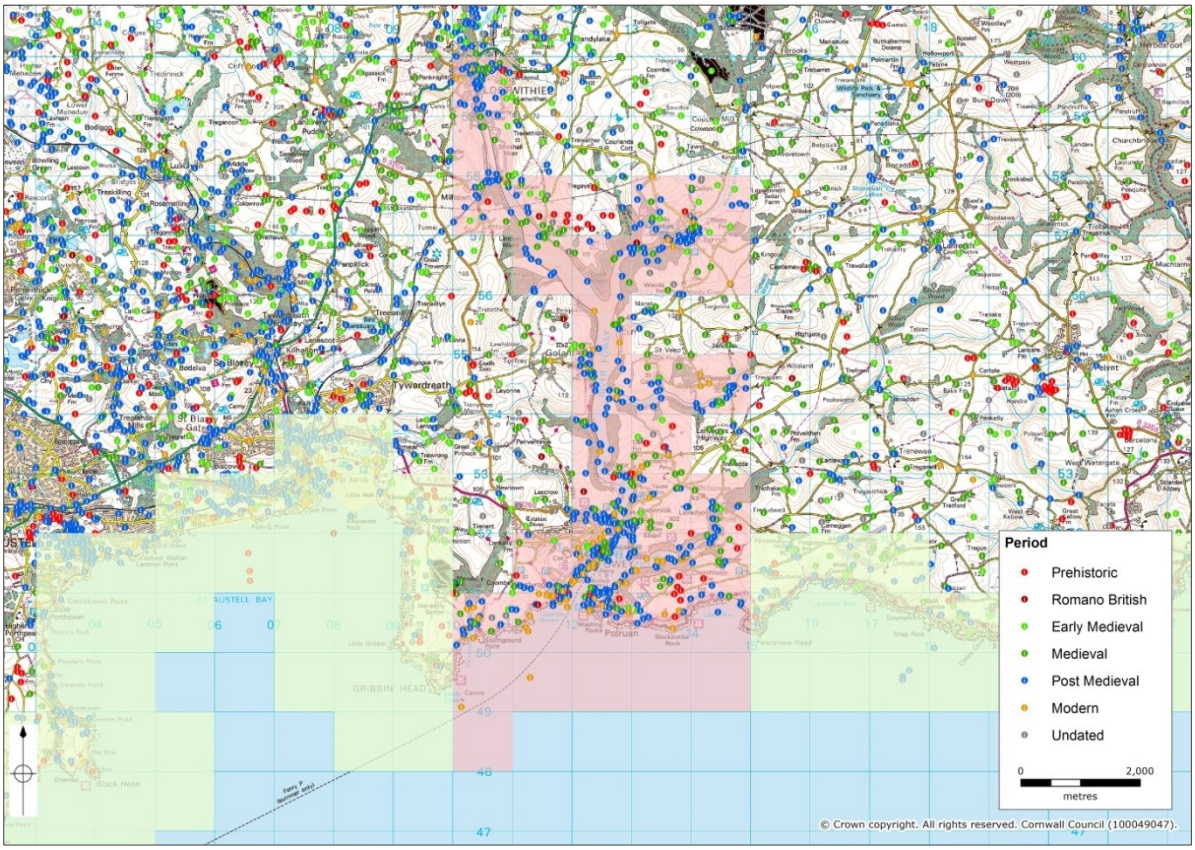


Fig 6.8 Sites currently recorded in the Cornwall HER for PDZ2 of the RCZAS project area (Pencarrow Head to Gribbin Head).

The Conservation Area is particularly extensive at Fowey, covering most of the settlement, the entire waterfront area and a large proportion of the estuary area. This reflects the very significant number of Listed Buildings along the developed frontage. There is a Registered Park and Garden at Menabilly (NHLE 1000651), which includes the Cottage and decoy lake at Polridmouth Cove. There are strong historical links between Fowey and the writer Daphne Du Maurier, with later generations of the Du Maurier family still resident in Fowey.

The Fowey Estuary historic audit was carried out by Cathy Parkes of CAU in 2000. Studies of Fowey (Fleming 2016a) and Lerryn (Johns, Thomas and Fleming 2016a) were carried out for the Cornish Ports and Harbours project.

Palaeolithic and Mesolithic

There are no recorded Palaeolithic or Mesolithic sites or finds in this PDZ.

Neolithic and Bronze Age

A watching brief along the route of electricity supply improvements by Western Power between Lanteglos and Polruan in 2011 (Taylor 2012) recorded buried layers and features of probable Late Neolithic/Early Bronze Age date in a field at the western end of

the scheme where HER records show a possible group of standing stones, allegedly a prehistoric stone row or stone circle.

At the western end of the route of electricity supply improvements, a ditch and lynchet associated with Middle Bronze Age pottery was identified and recorded. Remains of field enclosure dating to this period are scarce in lowland Cornwall (Taylor 2012). Artefacts from the deposits and features were difficult to characterise but include a barbed and tanged arrowhead, other flints, worked stone tools, and a small pottery assemblage and small holed stone, thought to be the toggle for a drawstring of, perhaps, a bag, which was found in a pit that had been covered by a stone lid (Taylor 2012).

A Bronze Age rapier found during dredging work in the River Fowey off Mixtow Quay in 1980, was dated to the Penard phase of manufacture, between about 1100 and 950 BC (Pearce 1982).

Iron Age and Romano-British

Possible Late Iron Age/Romano-British rounds have been identified in the project area at Milltown (MCO40638), Mixton (MCO60080), Castle (MCO7827) and Gribbin Head (MCO41592). St Catherine's Point has been suggested as the possible site of a cliff castle (MCO52793) and its naturally defensible position meant that it was developed as an artillery fort in the 16th century (MCO26674).

Castle Dore hillfort (NHLE 1006691), just outside the project area and situated on the high ground above the Fowey, was excavated in 1936 and 1937 by Dr Ralegh Radford. The results had, and have considerable importance because the excavation remains the most extensive on any Cornish hillfort. The latest phase of occupation was thought to belong to the post-Roman era and the legendary King Mark but a reconsideration of the evidence by Quinnell and Harris (1985) suggested that all the structural phases of the site may belong to the 4th to 1st centuries BC and that sherds of amphorae were imported in the pre-Roman period. There were also Iron Age glass bracelets and beads from the site (Fitzpatrick 1985; Henderson 1985).

During electricity supply improvements by Western Power between Lanteglos and Polruan in 2011, a substantial ditch, possibly of late prehistoric or Romano-British date (*c*100 BC – AD 400), was identified and traced across three fields in the centre of the scheme. The ditch represented a considerable feature and may be the remnants of a 'ranch' or estate boundary. Another ditch of similar form and size was identified in a field to the east and may represent the same enclosure feature, or a similar broadly contemporary feature (Taylor 2012).

Early medieval

Cut into a section of the ditch described above, a stone-walled, slate-floored sunken structure was identified (Fig 6.5). The floor of the structure had been laid on a charcoal-rich deposit which comprised marine shells and quartz pebbles. Their purpose and significance is unknown. Early medieval potsherds and an animal tooth were found within the structure, which appears to date to the 9th to 11th centuries AD (Taylor 2012).

While the SMP suggests that St Saviour's Chapel, on the cliffs above the town at Polruan, is early medieval in date, the Cornwall HER suggests a medieval date (MCO10233). The chapel is a Listed Building (NHLE 1329294) and a Scheduled Monument (NHLE 1019055).

Fig 6.9 An early medieval structure recorded during the Lansallos to Polruan electricity upgrade in 2011 (Photograph: Cornwall Archaeological Unit).

The Giant's Hedge, a linear earthwork cut from the West Looe River to Lerryn, next to the River Fowey, is assumed to be early medieval in date and to define the territory of a local ruler (MCO23462). Earlier Christian enclosures indicated by the Cornish language *lann* place-name are suggested at Lanteglos by Fowey (MCO26670), Lanwithan (MCO15329) and Lawhyre (MCO15353). Charles Henderson suggested that an early monastery may have existed at St Winnow and that the church once had an oval churchyard indicative of a *lann* (MCO26725). It has been suggested that St Cadix Priory, near St Veep, was possibly built on the site of an early medieval monastery (MCO26681).

Medieval

In the medieval period Lostwithiel was a strategically important market and stannary town (where tin could be smelted) and a navigable port (Berry *et al* 2008). The River Fowey was an important route of communication into the heart of Cornwall. Available evidence suggests that for several centuries it formed a linguistic boundary between the Cornish speaking west and the advance of the English language from the east. Polruan may have developed as a settlement before Fowey but by the 14th century Fowey was as an important mercantile and fishing port and a strategically important safe anchorage for shipping (Fleming 2016a; Parkes 2000).

Built in 1457, in response to French raids, the blockhouses at Fowey (NHLE 1019057) and Polruan (NHLE 1019056) were part of a line of south coast defences that included Dartmouth Castle, Plymouth/Stonehouse and St Michael's Mount. A chain boom was stretched between the blockhouses, and circular gun ports covered the entrance to the harbour. During the Second World War an anti-submarine boom was once again stretched between the blockhouses. Fowey blockhouse is ruinous but Polruan was restored in *c*2000 and is easily accessible (Johnson and Rose 2003, 30).

Post-medieval

In the post-medieval period the upper reaches of the River Fowey silted up and Lostwithiel gradually reduced in importance while Fowey's stature as a port and town grew, with quaysides busy with the trade of local pilchards and Newfoundland cod. Imports included timber, coal and limestone, reflecting the growing need of local industry and agricultural improvement. Boat construction was an expanding industry in Fowey and Polruan during the late 18th to early 19th centuries, with some boatyards and shipyards established within the town (Berry *et al* 2008; Fleming 2016a).

During electricity supply improvements by Western Power between Lanteglos and Polruan in 2011, limited evidence for medieval and/or post-medieval field divisions was found, reflecting the similarly limited evidence from the historical mapping, which shows few field boundaries that are no longer extant, suggesting that the present field layout has been little changed since at least the early part of the 19th century (Taylor 2012).

Modern

A majority of the monuments of modern date are related to the Second World War (see below), however the Cornwall and Isles of Scilly HER also records several landing points, steps and quays on the Fowey Estuary (e.g. MCO59901), sea defences (e.g. MCO59909) and a tidal swimming pool at Fowey (MCO46509).

A 20th century shipyard and engineering works at Brawn Point, near Polruan, was built on land reclaimed from the foreshore, comprised a slipway and winching house. The shipyard went out of operation in the 1950s when it became an engineering works, incorporating the former shipyard and a sardine factory (MCO60048).

Military

St Catherine's Castle (MCO26674) was built above Readymoney Cove by Thomas Treffry of Place House in *c*1540 to guard the approaches to the Fowey Estuary. It is similar to the shoreline blockhouses at Pendennis Point and St Mawes. It is a Scheduled Monument (NHLE 1013664) and the scheduling includes a late 19th and early 20th century quick-fire battery built just below the castle (MCO40413; Johnson and Rose 1998, 30).

This is a Crimean War battery with emplacements for two 64-pounder rifled muzzle-loading (RML) guns, which was manned by Artillery Volunteers and maintained as a practice battery. This type of gun was obsolete by the end of the 19th century and the battery was abandoned. During the Second World War, St Catherine's Point again became a gun battery and observation post, with various structures within and extending from the castle on to higher ground (cf Scheduling Description for NHLE 1013664; MCO40413).

Castle Dore's role in the Civil War made it a focus of one of the two Registered Battlefields in this part of the Project area, from two phases of the Battle of Lostwithiel in 1644 (see above Section 3.2.4).

The Fowey Estuary was used extensively in the Second World War and the build up to D-Day. At Pont Pool the remains of a possible Second World War Motor Gun Boats support cradle lies in the mudflats on Pont Pill (MCO53987, MCO53988). As an important staging post for D-Day several military camps were established in the area (e.g. MCO40393) and a row of terraced houses above Whitehouse Point, Fowey, were used as an Armed Forces headquarters (MCO59910). Defence-wise, pillboxes were built at vulnerable locations (e.g. MCO40436), and search light batteries (e.g. MCO42479), anti-aircraft batteries (MCO42500), beach defences (MCO43386) defended the coastline. Chain Home stations were established at Yeate Farm and Polruan (MCO60201; MCO60205).

Maritime

Several hulks of wooden vessels have been recorded in the upper creeks of the Fowey Estuary. Being a small harbour entrance with a rocky foreshore there have been several wrecks between St Saviour's Point and the eastward side of Gribbin Head. An example is

the schooner, 'St Andrews' which was wrecked at Fowey in 1877. The vessel was making for Fowey harbour when she carried away her fore yard, and in endeavouring to weather Daniel Point within the entrance of the harbour, struck on the rocks and quickly sank. The vessel was totally wrecked with portions of the vessel washed ashore at Ready Money Cove.

6.3.3 PDZ 3: Gribbin Head to Black Head

This PDZ covers St Austell Bay, from Gribbin Head west to Black Head, two kilometres to the north east of Pentewan. The Bay is a broad horseshoe-shape backed by low cliffs and sandy beaches. Within the Bay is the small harbour at Polkerris, the china clay port of Par (now largely a brownfield site) and further to the west, Charlestown, a historic china clay port now frequently used as a film set for period dramas. Much of the coastline is flanked by urban development including St Austell, St Blazey, Tywardreath, Par Moor, Charlestown and Duporth. The area of Par Moor and St Blazey is low-lying and vulnerable to flooding, being a former small creek that has silted up and been reclaimed in the relatively recent past.

Within the RCZAS project area of PDZ 3 there are 91 Listed Buildings, 3 Scheduled Monuments and two Conservation Areas (Polkerris and Charlestown). Two Registered Parks and Gardens fall within the project area (Menabilly, Grade II, NHLE 1000651; Tregrehan, Grade II*, NHLE 1000545). Charlestown Harbour is included within the Cornwall and West Devon Mining Landscape World Heritage Site designation.

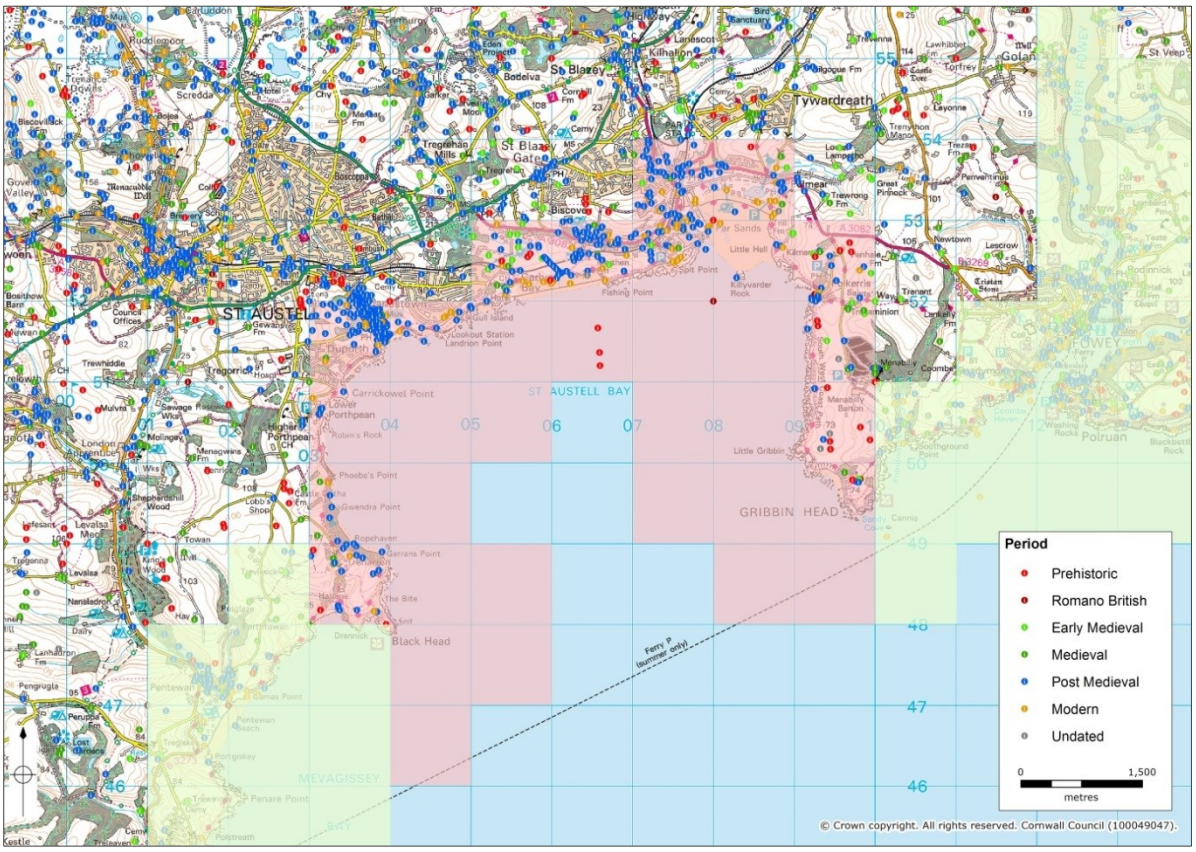


Fig 6.10 Sites currently recorded in the Cornwall HER for PDZ 3 of the RCZAS project area (Gribbin Head to Black Head).

In terms of assessment, of particular use were the research of Charlestown (Cornwall Archaeological Unit 1998) and a rapid assessment of the Cornwall Wildlife Trust reserve at Ropehaven Cliffs (Herring 2001). A study of Charlestown was carried out for the Cornish Ports and Harbours project (Johns *et al* 2016b).

The area contains two ports highly significant in the history of the china clay industry; Charlestown and Par. Charlestown was developed in the late 18th century by the Rashleigh family and Par developed on an industrial scale in the late 19th century as the volume and size of shipping increased.

Palaeolithic and Mesolithic

There are no recorded Palaeolithic or Mesolithic sites or finds. A submerged forest was recorded at Par but is undated (MCO44979) and offshore there are records of peat deposits revealed by borehole survey (MCO54055-57 incl.).

Neolithic and Bronze Age

There are a number of possible Bronze Age barrows surrounding the Bay (for example MCO2748; MCO30976).

Iron Age and Romano-British

Black Head is a small but very prominent headland dividing St Austell Bay from Mevagissey Bay, offering wide ranging views along the coast in both directions. The headland is joined to the mainland by a narrow neck. In the Later Iron Age it was defended by massive ditches cut across the neck, forming a cliff castle or promontory fort (NHLE 1004391).

Located just outside the project area is Castle Gotha, a small, ditched earthwork enclosure, or 'round', overlooking St Austell Bay (NHLE 1000695). Oval in plan, it is sited about 460m from the cliff edge (Fig 6.6) with imposing views across St Austell Bay to Gribben Head and the south-eastern Cornish coast. Excavations between 1957 and 1962 revealed several timber structures and one stone-walled oval building. The excavation results indicated that the site was occupied mainly in the 1st century AD with an overlap into the centuries before and after. Some Late Iron Age Glastonbury, or South West Decorated, pottery and cordoned wares were found, a few Roman traded wares and much local Romano-Cornish pottery. Brooches and other bronze objects were recovered and there were indications of some industrial activity (Saunders and Harris 1982).

The HER records several Late Iron Age/Romano-British rounds in the project area (for example at Penellick, MCO41632).

Post-medieval

The area surrounding St Austell Bay experienced considerable industrial growth from the 18th century onwards with mining, quarrying and the development of the china clay industry. China clay grew substantially in the late 19th century to become the dominant industry, employing many people and creating a unique landscape of huge pits, tapered waste heaps of quartz, dries, ponds and small industrial settlements. A distinctive building associated with the industry is the china clay dry, where the clay was dried in kilns and stored before export. (e.g. at Charlestown, MCO25412).

Charlestown was developed in the late 18th century as a mineral port, the harbour commissioned and paid for by Charles Rashleigh, a local landowner and mining adventurer. The works were completed in 1801 to the plan of John Smeaton, and were specially designed to transport copper ore from nearby mines. By the mid-19th century china clay was to become the port's mainstay and ensured its survival well into the 20th century. The harbour was extended in 1871 and in 1908 an underground railway and clay loader were built (MCO4703). The port grew into a thriving settlement and several fish cellars were built, with other industries established in the port (e.g. a cooperage, MCO25418; lime kilns, MCO25409).

Likewise, Par developed in the mid-19th century as a man-made harbour under the sponsorship of Joseph Treffry, a mine and industrial adventurer, initially to export ore from his mines in the Luxulyan Valley and then increasingly to export china clay. The dock was excavated from the river mouth of a former creek that extended to St Blazey. A 'canal' (MCO59860) was built to bring ore down river from Ponts Mill to the harbour. It

may have been channelled through an aqueduct (MCO29729) at the top end of Par Harbour, the water also used to help scour out the wet dock to keep it operational.

A small quay at Polkerris was built in the early 18th century by the Rashleigh family as part of an effort to start a pilchard industry here. This was not successful and by 1870 only a seine and two drift nets were working from the harbour (MCO4874).

Field boundaries on early maps show that Black Head was once used for agriculture but these are now out of use. In the 19th century a Rifle Range was built across the site with the butts in the centre of the Iron Age promontory fort. The butts consist of a walled trench with machinery for raising and lowering targets, and firing points at every 100 yards distant to 600 yards. A concrete hut survives at the 300 yard point (MCO29688).

A 'Beacon' at Gribbin Head is recorded on a chart dating to 1684. In the early 19th century it was a "Naval Signal Staff". The present day mark was built in 1832 to serve as a day navigation beacon to assist sailing ships to identify the headland and St Austell Bay while far out to sea. It is a stone tower 84 feet high (25.6m) painted in red and white bands (MCO4049; NHLE 1210498).

Modern

The settlements in the area expanded in size into the 20th century as the china clay industry continued to grow. Par became the principal china clay port as small ports like Charlestown could not cope with the increasing size of ships and the volume of material exported. In order to keep the mouth of Par Harbour open and free from silting up a boulder breakwater or training wall was built. Several large china clay dries were built in the area of Par Harbour (e.g. MCO26855). Par itself was eclipsed in the late 20th century as the principal china clay port by the deeper water wharves at Caffamill, Fowey.

Military

Charlestown Battery is located on the tall cliff overlooking Polmear Island and has a commanding view of the approaches to the harbour. It was originally manned by the Crinnis Cliff volunteers, formed in 1795, which became Crinnis Cliff Artillery in 1800. The site was then disbanded and the battery was presumably disused. In 1859 the battery was recommissioned and altered before being abandoned in 1897.Charlestown was the only mineral port specifically built with its own defence and is now the only place in Cornwall where both elements survive (MCO25411; NHLE 1289512).

The usual array of military defences was established in the Second World War to protect harbour and beaches vulnerable to attack. This included pillboxes, gun emplacements, searchlight batteries and mine fields especially in the vicinity of Par harbour and Par Sands (e.g. MCO42893; MCO42896). A tank trap was built at Polkerris (MCO41629) and the Gribbin Head tower was requisitioned by the Admiralty to serve as a lookout station. Military camps were established at Polmear, Par and Duporth and a prisoner of war camp established at Consols Mine near Par (MCO58876).

Maritime

There are several wrecks documented in this part of St Austell Bay, most being grounded on Par Sands or driven on to the rocks at Gribbin Head or approaching Charlestown harbour, as with the Welsh schooner, *Comet*, which was stranded and presumably wrecked on Appletree Point during a gale (MCO61157).

6.3.4 PDZ 4: Black Head to Zone Point

This PDZ covers Black Head west to Zone Point, situated at the eastern corner of the mouth of the Fal Estuary. The coastline has several prominent headlands including Chapel Point, The Dodman and Nare Head and small beaches and two bays, Veryan and Gerrans Bay, which form much of the coastline of the Roseland peninsula.

The area is rural and the coastline predominantly flanked by coastal rough ground and enclosed land with small coastal settlements of Pentewan, Mevagissey, Gorran Haven,

Portloe and Porthscatho. Mevagissey is the principal port in this PDZ, being a small fishing harbour.

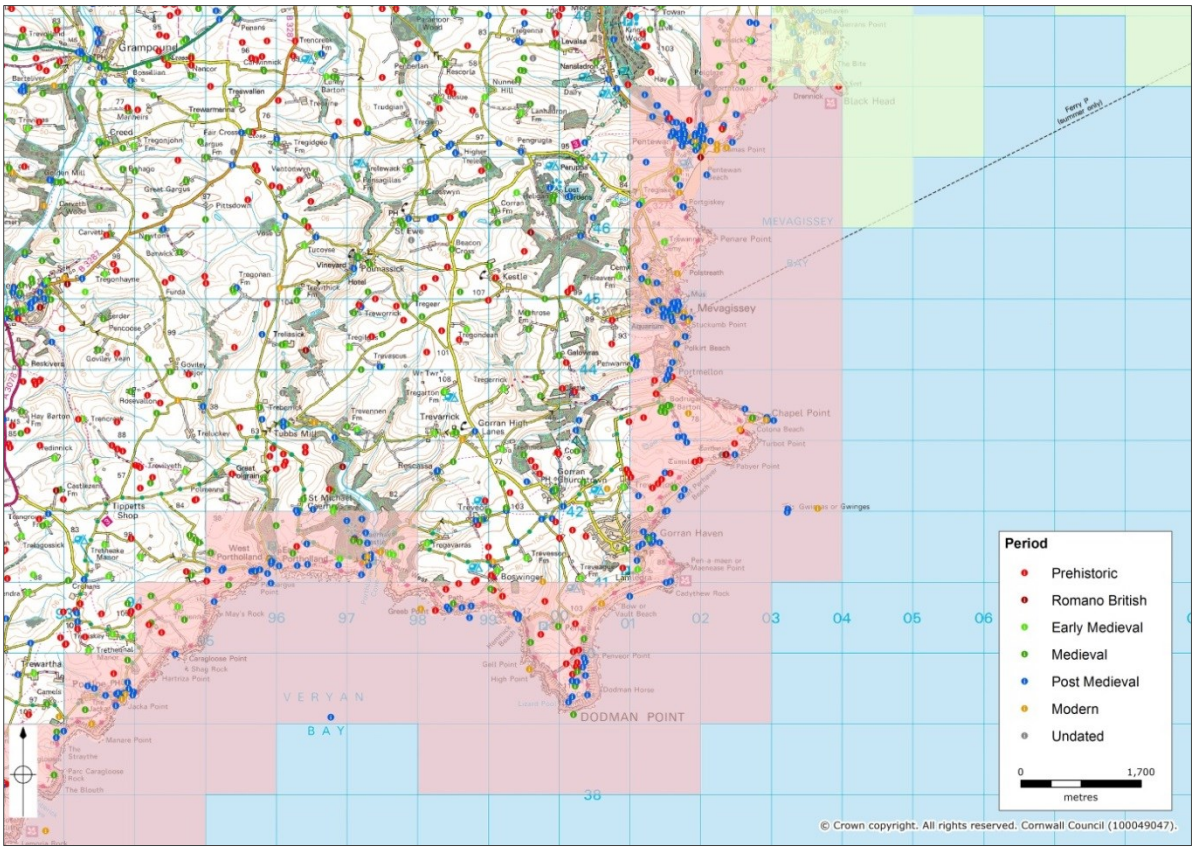


Fig 6.11 Sites currently recorded in the Cornwall HER for PDZ 4 of the RCZAS project area (Black Head to Zone Point) – the map shows Black Head to Caragloose Point.

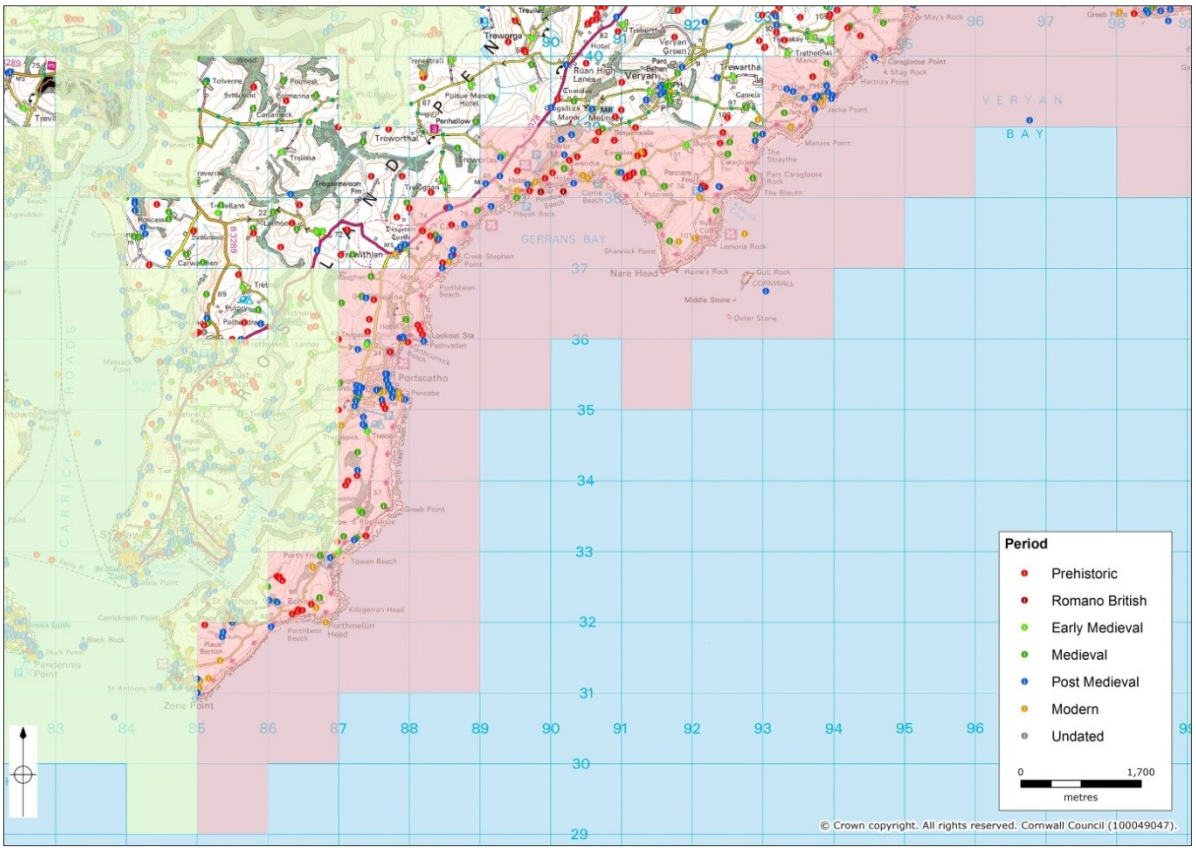


Fig 6.12 Sites currently recorded in the Cornwall HER for PDZ 4 of the RCZAS project area (Black Head to Caragloose Point) – the map shows Caragloose Point to Zone Point.

Within the RCZAS project area of PDZ 4 there are 241 Listed Buildings, seven Scheduled Monuments and six Conservation Areas (Gorran Haven, Pentewan, Mevagissey, Portloe, Portscatho and Gerrans). Two Registered Parks and Gardens fall within the project area (Heligan, Grade II, NHLE 1000538; Caerhays Castle, Grade II*, NHLE 1000448).

The SMP notes the historic Listed harbours at Pentewan (Grade II, NHLE 1211649), Mevagissey (Grade II, NHLE 1210773), Gorran Haven (Grade II, 1329068) are key aspects of the local heritage and help to give the area its diverse character and value. This coast is also valued for many other reasons including its outstanding natural beauty, archaeology, geology, fossils and habitats.

An archaeological assessment of Dodman Point for the National Trust was carried out by CAU in 2008 (Parkes 2008) and in 2015 an archaeological management plan was prepared under Higher Level Stewardship, followed by management works (Fleming 2014; 2016).

Palaeolithic and Mesolithic

There are no recorded Palaeolithic sites or finds in this area. A Mesolithic flint scatter of 72 pebble flint flakes and cores, plus two microburins where found by Philip Steele while field walking at Trewollock near Gorran Haven in January 1983 (MCO6842). There is some palaeoenvironmental interest in a prehistoric submerged forest between Pendower and Portscatho (MCO28644).

Neolithic and Bronze Age

There are a number of barrows at Bodrugan and Trewollack, along the stretch of coast between Chapel Point and Gorran Haven: MCO2121; MCO2122; MCO50258; MCO50385; MCO259; MVO384; MCO50260.

Two round barrows (MCO2549; MCO2550) are located on Dodman Point, within the Scheduled Area (NHLE 1020865). Several further possible barrows have been indicated by a geophysical survey of this area, potentially suggesting a larger cemetery group (Fleming 2014).

A group of four pits found during evaluation trenching at Portscatho, Gerrans, in 2003 contained structured deposits of Neolithic date, which included pottery, flints, beach pebbles and charred plant macrofossils (Jones and Reed 2006). Four radiocarbon dates ranging over the period 3910–3370 cal BC were obtained from the pits. Analysis of the charred plant macrofossils revealed rare evidence for cereals dating to the Early Neolithic period in Cornwall. The authors considered that the pits were the result of the ritualised deposition of artefacts and other materials at a liminal place, near to the end of land and above the sea. In the field immediately to the west, a Bronze Age cist grave had been found in the 19th century (MCO26097).

Veryan (Carne) Beacon is the largest Bronze Age burial mound in Cornwall (MCO2370; NHLE 1019745). Excavations in 1855 revealed a central stone cist containing a cremation, with other cremations nearby (Johnson and Rose 2003, 24). Two small barrow cemeteries at Bohortha have been identified from aerial photographs (MCO50366; MCO50374) together with a further cemetery of five barrows at Carne (MCO50363).

A prehistoric hut circle is visible in the cliff face at Colona Beach, south of Chapel Point (MCO19364) and a prehistoric field system at Bodrugan (MCO50264).

Iron Age and Romano-British

The Scheduled cliff castle (MCO6545; NHLE 1020865), on Dodman Point, is irregular in plan, measuring up to approximately 830m north-south by 800m east-west externally, and covering a total area of 34 ha. It is enclosed by two closely spaced ramparts of earth and stone, with external ditches and a counterscarp or outer bank (Fleming 2014).

Veryan Castle is a multiple enclosure fort and annexe, situated on a steep west slope to a stream below (NHLE 1019746), while Dingerein Castle is small multivallate hillfort and annexe, situated on the crest of a hill, with a fairly steep coastal slope to Gerrans Bay to the south east (NHLE 1019742).

Above Payber Point is the site of a possible Roman signal station with a single bank and ditch, much ploughed down but visible on aerial photographs (MCO24016). The feature is known as 'Sir Henry Bodrugan's Castle' and the Cornish place-name 'Caerlaeynou', probably applies to this site as it contains the element *ker* which means 'fort' or 'a round' (Padel 1985).

Roman coins have been found at Pentewan (MCO1137) and Pendower beach (MCO48665) where a Romano-British bronze fibula brooch has also been found (MCO40318).

Early medieval

The Roseland is dotted with settlements named with the Cornish language *tre*- and *bod*- place-name elements which are thought to mostly date to the early medieval period. Lamledra has been suggested as a *lann* place-name indicating an early Christian enclosure but it is more likely to include the element, *lamm*, 'a leap' (Padel 1985; MCO26201).

Veryan or Crane Beacon has been suggested, somewhat fancifully, as the burial place for King Geraint, an early medieval King of Cornwall (MCO2370; NHLE 1019745).

Medieval

Mevagissey developed as the principal settlement in the area and a busy little fishing port. Pentewan, Gorran, Portloe and Portscatho are also likely to have been small fishing settlements based around coves. Gerrans and Mevagissey have medieval churches and chapels were built at several manor houses (for example, Bodrugan, MCO9808 or

Caerhays, MCO9840) and smaller settlements such as Gorran Haven (MCO9952). The chapel of Goelhofna recorded in 1327 stood on Chapel Point into the 17th century but has since been destroyed (MCO9874).

A field system (MCO20853) of medieval origin extends over the whole of Dodman Point. The medieval strip fields forming its core lie on the top and shoulders of the headland. They are shown on old maps and aerial photographs, and are partially visible on the ground (Fleming 2014).

Post-medieval

Old maps provide evidence of a medieval or post-medieval beacon (MCO4045) for transmitting warnings of hostile shipping, near the later signal station on the high level ground towards the south end of Dodman Point. This may have had a bonfire mound, or a pole or tower for a brazier. The signal station (MCO45827) was built in 1794 as part of a coastal chain supplying information on shipping movements to the Royal Navy (Fleming 2014).

A number of plots, possibly remains of a 19th century field system or market garden complex (NT96914), are visible on the coastal slopes at Dodman Horse, on the south east of the headland (Fleming 2014).

The cross (MCO5238) on Dodman Point, also designed as a minor day mark for shipping, stands above the coastal slope on the southern tip of the headland. On the north east side of the middle step is an inscription with the date 1896 (Fleming 2014).

There are a dozen or more extractive pits, mainly to the south west and north east, on the shoulders and upper slopes of the Dodman (Fleming 2014).

The harbour at Mevagissey was developed with the construction of the east and west quays in the 1770s and the outer harbour in the late 19th century with the construction of the north and south piers (NHLE 1210773). Pentewan harbour was developed in 1744 and included fish cellars. In the 1820s harbour improvements were completed and the port continued in use into the 20th century (MCO4714; NHLE 1211649). The Pentewan Railway (MCO20372) conveyed clay, tin and iron ore for export and imported coal, limestone and sand inland.

Concentrations of post-medieval heritage assets including fish cellars, coastguard cottages, slipways, quays and watch houses survive in the historic fishing villages of Mevagissey, Portmellon, Gorran Haven, Portloe and Portscatho. Lime kilns survive at Pendower (MCO45068), Portloe (MCO7292), West Portholland (MCO45065), Gorran Haven (MCO45058) and Pentewan (MCO26217) but an example at Porthcurnick Beach has been washed away (MCO7285).

Modern

A majority of the sites in the Cornwall HER dating from the modern period relate to the Second World War.

Military

There are only limited and small scale military remains in this area. A small battery once protected the harbour at Mevagissey (MCO59747). At the far western end of the area, at Zone Point, the area of a small post-medieval signal station (MCO28700) was further developed in the Second World War in association with gun emplacements (MCO28698; MCO54005) defending the entrance to the Fal Estuary.

There is a scatter of modern military defences along the coast including Second World War pillboxes and beach defences defending vulnerable beaches (for example at Pendower: MCO42764; MCO42726; MCO43016), military camps at Bohortha (MCO50088) and Caels Farm (MCO43333), and radar stations at Vault Beach (MCO60203) and Manare Point (MCO43332). Extant remains of observation posts survive at Portmellon (MCO42668), Trewollock (MCO42670) and Carne Beacon (MCO56511).

Three possible bomb craters (NT96893-5), on the north east side of the plateau at Dodman Head, are circular dish-like hollows about 10m apart (Fleming 2014).

Maritime

The coastline is rugged with high, rocky cliffs, prominent headlands and difficult waters offshore from Dodman Point in certain tidal and wind conditions and correspondingly, there are a high number of wreck sites.

Examples include a cannon retrieved off Gull Rock by a local diving club that is now in the care of Cornwall Maritime Museum, Falmouth. The gun is made of iron, is reasonably well preserved, but with a crack along the top. It is very plain, with a plain knob cascabel and fillet mouldings at half-way and three-quarters along its length believed to be a Swedish-designed 6pdr dated to around 1650. The French cargo vessel *L'Indurance* ran aground and was wrecked at, Chapel Point, Mevagissey Bay in 1838, and in 1961 a small oil tanker *Allegrity* hit Greeb Point in fog and despite later attempts to refloat her, the vessel capsized and sank slightly offshore.

6.3.5 PDZ 5: Zone Point to Nare Point (including the Fal Estuary and Helford River)

This PDZ covers the Fal and Helford estuaries, Gillan Creek and the coastline from Zone Point west to Nare Point.

The area is a mixture of agricultural land, coastal rough ground, woodland and built environment. It includes the small settlements of St Mawes, St Just-in-Roseland, Tresillian, Feock, Devoran, Mylor Bridge, Mylor Churchtown, Flushing, Constantine, Gweek and Helford, and the larger towns of Truro, Penryn and Falmouth. Falmouth is a nationally important port with deep water anchorage, refitting and refuelling services.

Within the RCZAS project area of PDZ 5 there are 1,257 Listed Buildings (with notable clusters at St Mawes, Truro, Trelissick, Devoran, Perranarworthal, Flushing, Penryn, Falmouth, Gweek and Helford), 38 Scheduled Monuments and 11 Conservation Areas (St Mawes, St Clement, Truro, Devoran, Perranarworthal, Mylor Bridge, Flushing, Penryn, Falmouth, Constantine and Helford). There are seven Registered Parks and Gardens within the project area (Tregothnan, Trelissick, Carclew, Falmouth General Cemetery, Trebah, Glendurgan and Trelowarren).

Perranarworthal and Devoran are within the Gwennap Mining District of the Cornish Mining World Heritage Site. Perranarworthal includes the Perran Foundry complex and Devoran was an important mineral port served by a tramway.

An archaeological assessment of Pendennis Headland was carried out by Johns and Johnson (1992); a Conservation Plan for the historic defences of Falmouth Haven by Richard Linzey was published in 2000. Numerous recording projects and watching briefs have been carried out at Pendennis and St Mawes castles in the 1990s and 2000s.

Archaeological assessments have been carried out for the National Trust's coastal properties at Gillan Creek (Dudley 2003) and Nare Point (Cole 1999). Historic audits of the Fal Estuary and the Helford Estuary have been carried out (Ratcliffe 2001; Reynolds 2001). In 2008 CAU carried out an archaeological assessment and geophysical survey of an area of the Lower Fal for the proposed Falmouth Cruise Project (Johns, Camidge and Rees 2008). Extensive Urban Surveys have been undertaken for Truro (Kirkham 2003), Penryn (Newell 2005) and Falmouth (Kirkham 2005) and at a lighter level for the industrial settlements of Devoran (Cahill Partnership and CAU 2002b) and Perranworthal (Cahill Partnership and CAU 2005).

More recently, the maritime heritage of Truro was assessed and characterised as part of the Cornish Ports and Harbours project (Johns *et al* 2016).

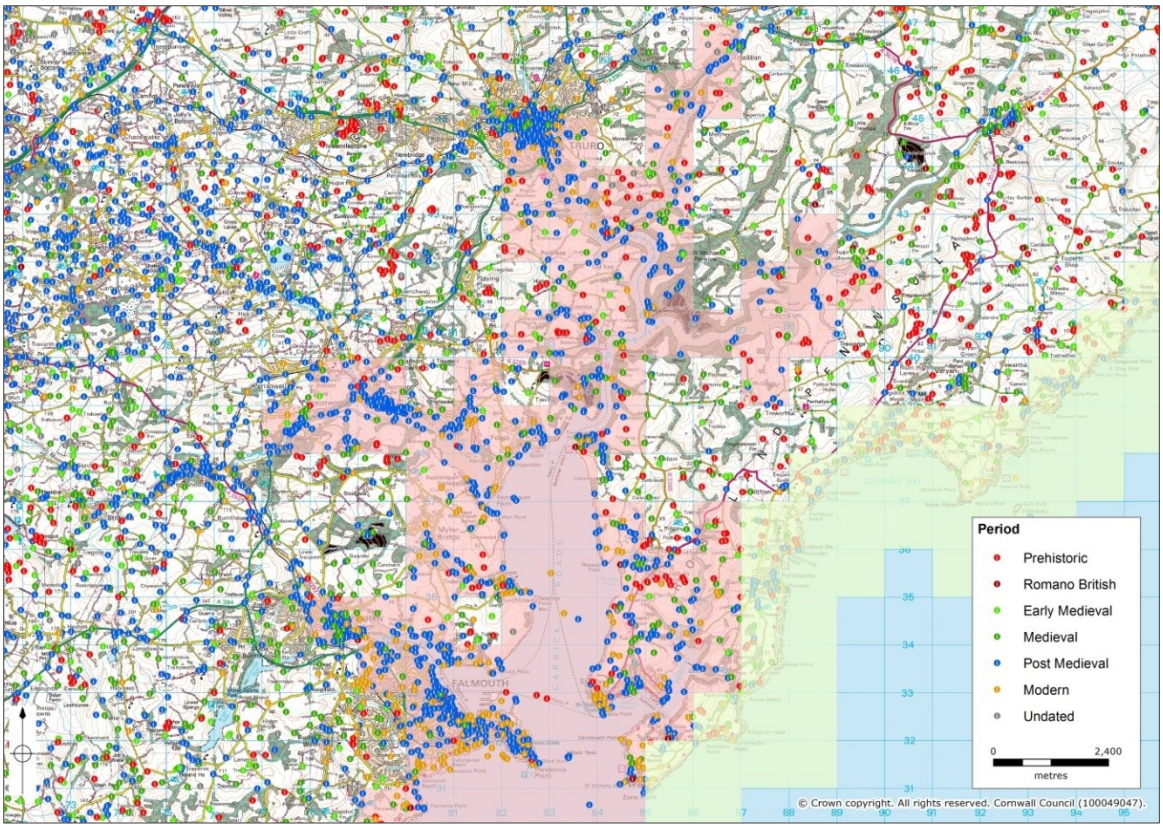


Fig 6.13 Sites currently recorded in the Cornwall HER for PDZ 5 of the RCZAS project area (Fal Estuary and Helford River) – the map shows the Fal Estuary.

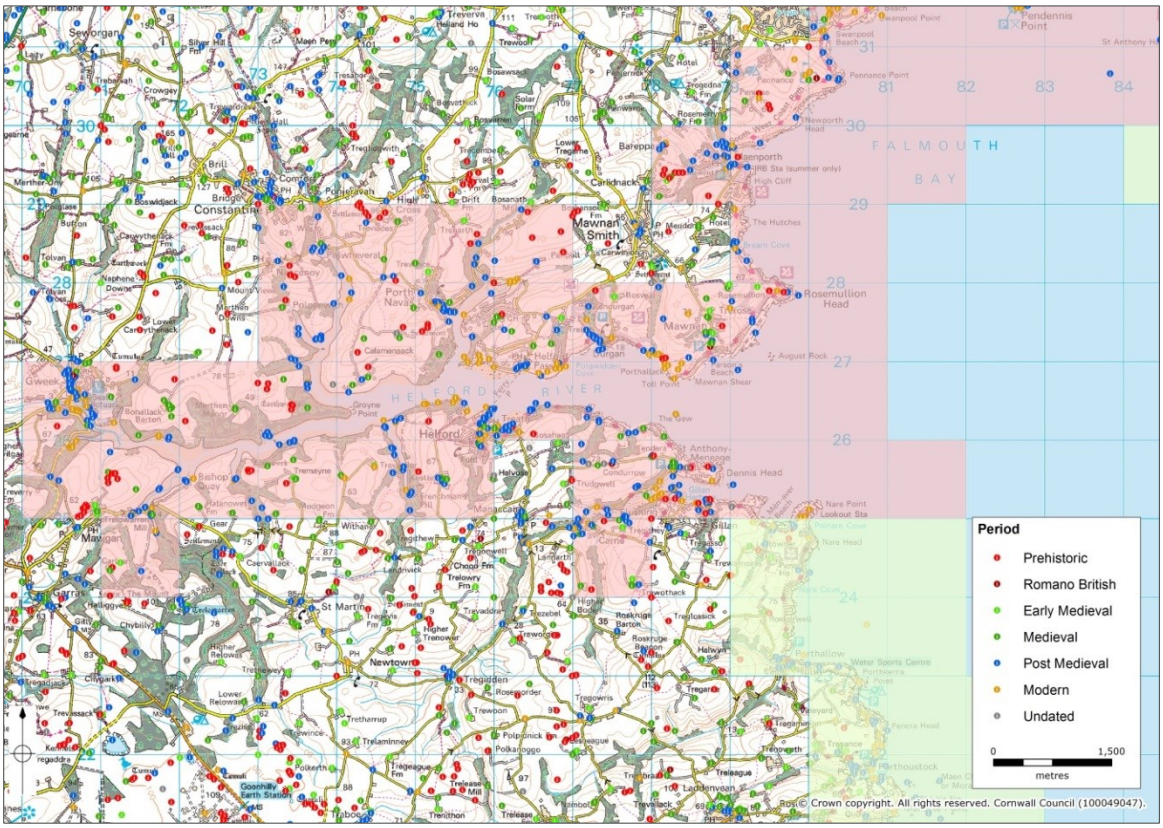


Fig 6.14 Sites currently recorded in the Cornwall HER for PDZ 5 of the RCZAS project area (Fal Estuary and Helford River) – the map shows the Helford Estuary and Falmouth Bay to Nare Point.

Palaeolithic and Mesolithic

There are no recorded Palaeolithic or Mesolithic sites or finds except for a flint scatter at Park Farm, Truro (MCO54207) and a Mesolithic tranchet axe found in Falmouth but now in Plymouth Museum (MCO595; Wymer 1977). Peat deposits and traces of submerged forests have been identified at Restronguet (MCO28694), Carnon River (MCO44977), Falmouth (MCO28693; MCO55453), Maenporth (MCO44725) and Gillan Creek (MCO44966).

Neolithic and Bronze Age

A greenstone axe was found at Penpoll, Mawgan (MCO24470).

There are 68 records of barrows and possible barrows within this area with several recorded from aerial photographs (MCO50477; MCO50463).

A Late Bronze/Early Iron Age hoard of Sompting bronze axes was found in a pottery container at Mylor (MCO56494, MCO1028; Ratcliffe and Marley 2009). Other Bronze Age metalwork is known, for instance an axe from St Just in Roseland (NRHE 428578). Three crouched burials revealed *c*1906 at Castle Point, to the north west of St Mawes Castle, are likely to be Bronze Age or Iron Age in date (MCO25040).

Iron Age and Romano-British

There is a possible Iron Age cliff castle on Rosemullion Head (NHLE 1004272) and a definite example at Dennis Head on the other side of the Helford Estuary (NHLE 1004431). There may also have been a cliff castle on Pendennis Headland (MCO6561; part of NHLE 10552: Pendennis Peninsula Fortifications). Overlooking the River Fal at Round Wood is a multiple enclosure fort (NHLE 1019847).

In the Cornwall HER there are 46 records of rounds and possible rounds including Scheduled examples at Tregeagle (Tresillian; NHLE 1020714), Carlidnack (NHLE 1006687), three rectangular enclosures at Merthen Manor (1006659), Goongillings (NHLE 1004271), High Cross (NHLE 1004270), Gweek Wood (NHLE 1004420), Helford (NHLE 1004340) and Halamana (Gillan Creek; NHLE 1006686).

A rectangular earthwork, labelled 'Camp' and approximately 40m square is shown at St Anthony Head on the 1st Edition 1:2500 OS map but not on later editions. It has been suggested that it may be a Roman signal station, or of later date (Rivet 1956). The area was bulldozed for construction of wartime buildings, and new rough pasture (MCO18669).

At Gear and Caervallack, on the Lizard, is a large hillfort (NHLE 1004430), which has seen geophysical survey, field walking and limited trial trenching (as part of Time Team) (Edwards and Kirkham 2008).

A hoard of approximately 1,000 Roman coins found during ploughing near Pennance Point in 1865 are said to have lain on a 'rude stone floor' 0.6m below the surface (Penhallurick 2009). It is possible that this was part of a house or other structure (MCO19994).

Early medieval

There are several sites of possible early Christian enclosures within the project area including *lann* sites at St Anthony in Roseland (MCO26107), Lamorran (MCO26092), Old Kea (MCO25119), Mylor (MCO26107) and St Anthony in Meneage (MCO26311) and possible *lann* sites at Mawnan (MCO26314), St Gluvias (Penryn; MCO46093), Feock (MCO26278) and Ruan Lanihorne (MCO26082).

Medieval

Penryn and Truro were important planted market towns (Kirkham 2003; Newell 2005) and St Mawes a significant fishing port, sometimes considered a full town with all the privileges although these were not formally set (Sheppard 1980).

Glasney College at Penryn, founded in 1265, was one of the major ecclesiastical centres in Cornwall; the one upstanding section of fabric that survives is listed (Grade II; NHLE 1298629) but the whole site is Scheduled (NHLE 1007260). An archaeological assessment and evaluation of the site, much of which is now a playing field, was undertaken by CAU in 2002–3 (Cole 2016). The results of the evaluation allowed a tentative reconstruction of the church to be produced which has striking parallels with a number of important sites in Devon, particularly Crediton, Ottery St Mary and Exeter Cathedral. Grass-marked pottery suggests activity on the site in the early medieval period prior to the construction of the church.

A tin ingot from St Mawes, which was found in about 1812, is possibly one of the most famous antiquities from Cornwall. There has been considerable debate over the possible date of the ingot, but Beagrie (1983) surmises that it is probably medieval.

Post-medieval

Pendennis Castle and its twin, St Mawes Castle, were built between 1539 and 1543 as part of Henry VIII's national defence policy. The castles were utilitarian artillery towers reinforced by the shoreline blockhouses at Little Dennis and St Mawes. Their purpose was to protect the mile-wide inlet of Carrick Roads at the mouth of the River Fal.

Between 1597 and 1599, following a review of the defences by Sir Walter Raleigh during the hostilities with Spain, the Henrician keep at Pendennis was strengthened by the addition of the Italianate bastioned enceinte that we see today, designed by the military engineer Paul Ivey.

The defences and armaments at Pendennis were periodically upgraded in time of war. By the time of World War I the main long range defences of Pendennis were at Half Moon Battery (Fig 7.3), first constructed *c*1793, situated south of the Castle, facing seawards and working in tandem with the similar long-range battery at St Anthony Head which had superseded St Mawes Castle.

Around 1550, the Killigrew family rebuilt the medieval manor of Arwenack and created a deer park around it, stretching from Swanpool and to the north of The Moor. At this time, Penryn was the main settlement and economic hub in the area (Kirkham 2005).

The Killigrew family were influential in the development of Falmouth in the 17th century, first as a small victualling centre for ships anchoring in the haven but later as a market town (Kirkham 2005; Shepherd 1980). At first the settlement was known as Smithick but the town developed with the building of ale and lodging houses, a customs keeper's house in 1650 and two years later, a market house. In 1661 a Royal Charter created the town of Falmouth from the village of Smithick and in 1664 a new parish church was built. A major influence in the early expansion of the town was the use of the port by the Royal Packet Service from the 1680s. The town grew rapidly along Market Street linking Market Strand and Fish Strand (Kirkham 2005).

As a port, stannary (where tin could be smelted) and market town, Truro developed as the main administrative town in mid and west Cornwall, being the centre for mining interests up until the late 18th century. It was the focus of the substantial country houses and estates clustered around the Fal catchment. Its prosperity and social prominence was reflected in its civic and industrial buildings, and the expansion of its residential streets such as Lemon Street (Kirkham 2003).

On the Restronguet river, Devoran developed as a major industrial port and settlement from the mid to late 19th century (Cahill Partnership and CAU 2002b) and Perran Wharf at Perranarworthal developed under the influence of the Fox family, Quaker industrialists from Falmouth, first in the late 18th century as an industrial port, and later as a foundry complex (Cahill Partnership and CAU 2005).

In the upper reaches of the River Fal and Tresillian River small creeks were annexed off to create fish ponds as at Tresemple.

Modern

Falmouth Docks began in the late 19th century and expanded in the 20th century with the addition of several further docks, jetties and wharves (MCO4705). Falmouth grew as a town with the addition of terraced houses and, in the 1930s, the addition of a large estate of council housing at Old Hill following slum clearances in the centre of the town. And while Truro diminished in significance as a port, it continued to expand as the main administrative, business and retail capital of Cornwall.

The historic audits of the Fal and Helford estuaries identified several boat houses, quays and slipways (Ratcliffe 2001; Reynolds 2001).

Military

As a strategically important port and deep anchorage the Fal Estuary has been defended for at least 500 years (see above).

In the 20th century defences were bolstered at Pendennis and St Mawes castles but also at Zone Point (MCO53463). A flying boat station was developed at Flushing in both the World Wars (MCO42777).

There were extensive defences built in the Second World War, including pillboxes, barrage balloon sites, tank traps, anti-aircraft batteries, searchlight batteries, radar stations and, in the build up to D-Day, military camps and embarkation hards (for example at Turnaware Point, MCO42198). At Mylor harbour, a maintenance site specifically built for landing craft engaged in the 1944 D-Day landings was built. The site includes an arrangement of parallel concrete piers called a gridiron on the shore and, to the seaward side, a concrete and steel mooring dolphin (MCO38903; NHLE1020050).

At Nare Point there are a Second World War decoy site and a post-war observation point which tracked dummy torpedoes along the testing range in Falmouth Bay (Cole 1999). The purpose of the decoy site, which operated between 1940 and 1944 was to mislead enemy pilots attempting to bomb Falmouth Docks. There were a number of such decoys around the Cornish coast to protect other important sites such as RAF stations (Cole 1999).

In 1956 coastal defences were abandoned and Pendennis and St Mawes Castles were given to the Ministry of Public Buildings and Works (now English Heritage).

Maritime

With a relatively sheltered Bay leading to two extensive estuary systems, including the Fal which has a deep water anchorage, the area has seen intensive maritime activity since at least the medieval period. As a consequence the area has a high number of wreck sites. These include the hulks of vessels in the upper reaches of the creeks including the wreck of a Thames barge which now forms part of the breakwater for Penpol boatyard. Built in Northfleet in 1899 and registered in London, its first 28 years was spent transporting cement and then another 20 years trading general wares in the Thames and Medway region (MCO44681).

Examples of notable wrecks include *Queen* and *Rock Island Bridge*. In 1814 the transport vessel, *Queen*, broke its moorings in the Carrick Roads and was driven against Trefusis Point and wrecked with considerable loss of life. Scattered wreckage has been noted. At the mouth of the Helford Estuary are the scattered remains of the *Rock Island Bridge*, an American cargo vessel which sank in 1920. The vessel was a steel hulled steamer which was involved in a collision off Lizard Point and towed to the present position. Unsuccessful attempts were made to salvage the vessel and it is now a popular dive site.

Of considerable note is that the River Fal includes possibly the last sail driven oyster fishery in the world.

6.3.6 PDZ 6: Nare Point to Baulk Head – Gunwalloe (the Lizard Peninsula)

This PDZ covers the coastline of the Lizard peninsula from Nare Point west to Baulk Head. The area is a mixture of agricultural land and coastal rough ground, with little built environment. It includes the small coastal settlements of Porthallow, Coverack, Cadgwith, Lizard and Mullion Cove. Cadgwith has a small fishing fleet and boats work out of Porthoustock and Mullion Cove on a seasonal basis. The coastline is rocky with several offshore reefs and rocks including The Manacles and several off Lizard Point.

Within the RCZAS project area of PDZ 6 there are 96 Listed Buildings, 15 Scheduled Monuments and two Conservation Areas (Cadgwith and Coverack) and no Registered Parks and Gardens.

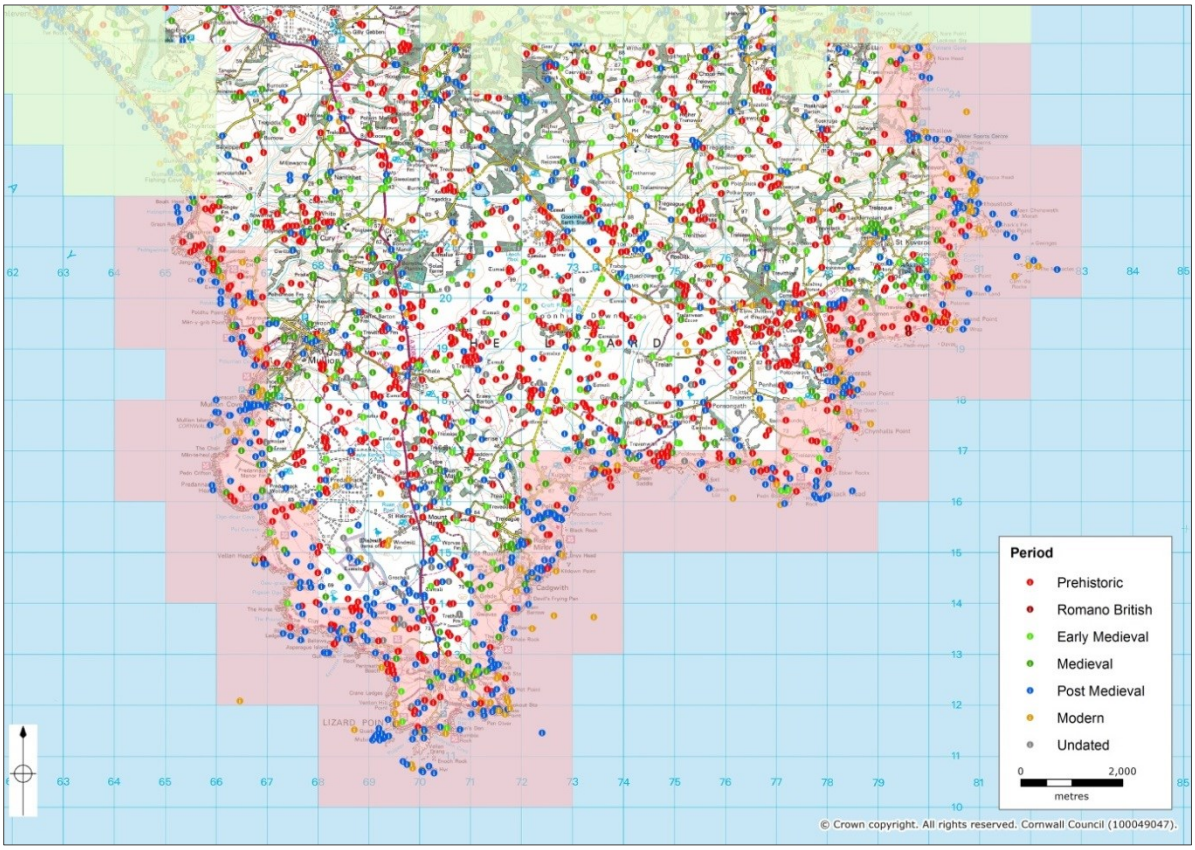


Fig 6.15 Sites currently recorded in the Cornwall HER for PDZ 6 of the RCZAS project area (Nare Point to Baulk Head).

The SMP notes that historic features of interest include the Romano-British salt works at Trebarveth between Lowland Point and Coverack, numerous coastal barrows, Mullion harbour, the 19th century fishing complex at Gunwalloe Fishing Cove, and Winwalloe Church set within the dunes at Church Cove. There are also several Conservation Areas, including Cadgwith, with many associated Listed Buildings. There are numerous other historic features of interest including Scheduled Monuments and three Protected Wrecks lying close offshore (the *Royal Anne Galley*, Rill Cove and the *Schiedam*). There are historical/archaeological associations with Second World War at Kennack Sands, where an extensive peat bed was revealed lying just below the high tide line in 1998.

Archaeological assessments have been carried out for most of the National Trust's coastal properties on the Lizard peninsula. These include: The Lizard Wireless Station (Johns 1998); the Poldhu Wireless Station (Johns 2000); Parn Voose, Gwavas Cliff, Inglewidden, Kildown Point and Enys Head (Johns 2001); Chynall Cliff, Black Head and Beagles Point (Johns 2001a); Kynance Cove and Lower Predannack Downs (Johns 2002a); Poltesco Valley (Johns 2003).

Other assessments include: Kennack Sands and Polpeor Cove for Cornwall County Council (Johns 1999a and 1999b); and the Cornwall Wildlife Trust's reserve at Windmill Farm on Predannack Downs (Johns 2002).

Archaeological assessments have also been undertaken for properties owned by the National Trust and the National Nature Reserve leased by Natural England as part of the HEATH Project (e.g. Kirkham 2007).

An assessment of *c*800ha of farms and farmland in St Keverne parish – candidates for the Countryside Stewardship Scheme – was carried out in the mid-1990s (Johns and Herring 1996). A study of the Lizard lifeboat station at Kilcobben Cove was carried out for the Cornish Ports and Harbours project (Johns, Thomas and Fleming 2016).

A Marine Environmental Assessment has been carried out for the *Royal Anne Galley* Protected Wreck site (Camidge *et al* 2006; 2009; 2011; 2014) and a Conservation Statement and Management Plan for the wreck site was completed in 2016 (Camidge and Johns 2016). Desk-based assessments have been carried out of the Rill Cove and *Schiedam* Protected Wreck sites (Camidge 2013; 2013c). There is report on a rudder exposed at Jangye-Ryn/Dollar Cove which was probably late 19th or early 20th century in date (Camidge and Roberts 2017).

Palaeolithic

A few Middle and Lower Palaeolithic finds have been recovered from the Lizard including a small ovate chert handaxe (Marsden 1922); a large struck Levallois core from Higher Polcoverack farm (Hunt 1973); two small chert handaxes from Coverack and Grade Ruan (Berridge and Roberts 1986); and two handaxes found by The Lizard Project (Smith 1987).

Mesolithic

A number of Mesolithic sites have been identified on the Lizard Peninsula. In 1979 the Lizard became the centre of prehistoric studies in Cornwall with the inception of a long term field project – The Lizard Project – which combined library research, examination of old collections, systematic field walking and the controlled excavation of selected sites based on both research and rescue needs (Smith 1987).

Those sites which were excavated have been interpreted as temporary seasonal camps, such as the coastal site Poldowrian (Smith and Harris 1982) and the inland site at Croft Pascoe (Smith 1984); one site at Windmill Farm on the Lizard Downs has been interpreted as a longer term settlement (Smith 1984a). Many Mesolithic coastal sites, where people will have fished, collected shellfish and killed seals, will have been destroyed by changes in the coastline due to rising sea level, which has thus obscured the overall pattern of settlement and landscape utilisation.

In 1933 a Mesolithic flint working site was excavated on the Crane Carrick Crags – the conspicuous gabbro tors which formed the ancient cliff above the raised beach at Lowland Point; between 600 and 650 flints were recovered (Johns and Herring 1996).

Neolithic

The excellent ceramic qualities of gabbroic clay, derived from the gabbro rock, were soon recognised by Neolithic potters. The currently accepted hypothesis is that most prehistoric Cornish pottery from the Early Neolithic, (*c*3900BC) right through to the end of the Romano-British period (AD 400) – a period of some 4,000 years – was made from the gabbroic clay which is only found in the southern part of St Keverne parish (Quinnell 1987). Pottery production may have continued until the time of the Norman Conquest.

The importance of the clay, first noted in the 1930s, was fully recognised in the late 1960s following Peacock's analysis of pottery from the Romano-British salt working site at Trebarveth (see below). Pottery of gabbroic fabric has been found at many sites including important Neolithic sites such as Carn Brea near Redruth and Windmill Hill in Dorset and even as far afield as Brittany.

It is not known whether the pots were made locally on the Lizard peninsula or whether the raw clay was exported. Evidence from Carn Brea, where 90% of the 6,000 pots used over a *c*1,000 year period were made from gabbro clay and the remaining 105 contained a mixture of gabbro and local clay, suggests that most of the pots were made on the Lizard and a small amount of raw clay exported. It seems likely that by 3900-3700 BC completed pots or raw clay was being exported by sea from the St Keverne area (Mercer 1986, 49; Hunt 1995, 8).

Fragments of Late Neolithic Grooved Ware found secreted in the Crane Carrick Crags above Lowland Point (Johns and Herring 1996; MCO6705; part of the Scheduled area at Lowland Point – DCO1499) and Bronze Age pottery found in crevices at the spectacular granite headland at Treryn Dinas, St Levan, West Penwith, suggest that these, and presumably other dramatic shoreline or cliff top sites were sometimes used as ritual or ceremonial sites (cf Herring 1994).

Bronze Age

The Bronze Age is represented by the relatively large number of barrows which survive along the coastal margins. Some of these are extant while others survive as cropmarks (e.g. MCO51535). A Bronze Age pigmy cup was also found on Mullion Golf course when a new bunker was excavated in the dunes (MCO55835) (Wood 2013).

Bronze Age settlements have been identified at Kynance Gate (Thomas 1955–63), Poldowrian (Smith and Harris 1982) and Polcoverack (NHLE 1004337).

Recent work has demonstrated that large field systems were laid out during the later part of the Bronze Age. These are termed 'co-axial', being deliberately laid out on one major axis with boundaries along the major axis being termed 'axial' or 'parallel' reaves. Extensive co-axial field systems are to be found along the south-eastern coast of St Keverne parish between Trevalsoe, near Coverack, and Treglohan, above Lowland Point (cf Johns and Herring 1996).

Evidence of a Bronze Age flint knapping site or artefact scatter was revealed at Carngoon Bank at the Lizard in 1979 (McAvoy 1980).

The lower half of a Bronze Age urn containing cremated bone was found in the roadside bank on the north side of Poldhu Cove in 1984 (Hartgroves and Harris 1985).

A desk-based assessment, geophysical survey and archaeological evaluation were carried out adjacent to Winnianton Farm and Gunwalloe Church in 2011 and 2012 (Wood 2013). This multi-period site has been a locus firstly for burial and later for settlement for over 3,000 years. Six trenches were opened across the coastal strip, five within a known early medieval settlement and one across the ramparts of the Scheduled Iron Age promontory fort (NHLE 1004265). The investigation of the cliff castle revealed a complex stratigraphic sequence: a Middle Bronze Age cist burial overlain by a Late Bronze Age midden buried below an Iron Age rampart. The work also determined that the initial formation of the dunes there took place early in the Bronze Age (Wood 2013).

Iron Age and Romano-British

There are impressive Iron Age cliff castles at Chynhalls Point near Coverack (NHLE 1003103) and Lankidden (NHLE 1004328) and another at Gunwalloe (NHLE 1004265) which, being vulnerable to ongoing and future coastal erosion, is included on the 2018 Heritage at Risk Register.

Iron Age and Romano-British settlement in Cornwall is characterised by the development of 'rounds', univallate or multivallate defended farmsteads which are found throughout Cornwall, although there is increasing evidence for unenclosed settlements during this period.

Iron Age or Romano-British rounds are found in the north-eastern part of the Lizard peninsula, in Mawgan, St Martin, Manaccan and St Anthony parishes, where well-preserved earthworks survive.

There are a series of rectilinear and circular enclosures located *c*200m north of Gunwalloe Church Cove which were identified from air photos and plotted by the NMP (MCO51536).

In November 1973, 16 gold bars were discovered in a landslip above Pentreath beach. The specific gravity of the bars corresponded to that of Type A Gallo-Belgic gold coins. The bars later disappeared mysteriously without trace while being transported to London (Bates and Scolding 1996, 8; MCO1144).

Fig 6.16 The Romano-British salt-working site at Trebarveth (Photograph: CAU).

A salt-working site at Trebarveth (MCO23588), which flourished in the 2nd century AD, was excavated by Peacock in 1969 (Fig 6.8). The site consisted of a circular stone-walled building containing two superimposed ovens and surrounded by large quantities of briquetage – fragments of the coarse red pottery pans in which the saltwater was evaporated (Peacock 1969). The site was not completely excavated, and the hut circle still remains – gradually crumbling into the sea with layers of briquetage exuding from the eroding cliffs (part of NHLE 1004319).

In 1979 another Romano-British salt-working site was excavated at Carngoon Bank at the Lizard (MCO23515), where briquetage was associated with a timber structure whose occupation seems to have continued until at least the 6th century AD (McAvoy 1980).

A third salt-working site has been identified at Ebber Rocks, between Coverack and Black Head (MCO6646). Four small evaluation trenches were opened in 2000 and a total of 23 kg of pottery was retrieved which appeared identical in style and fabric to the briquetage excavated at Lowland Point, with thick bases with rounded corners (Hunt 2016).

The discovery of a Kimmeridge shale bracelet fragment and a sherd of Late Roman Oxfordshire colour-coated ware at Gunwalloe suggest the inhabitants had contacts beyond Cornwall (Wood 2013).

Early medieval

Lestowder, a round site near Nare Point at the mouth of the Helford Estuary is considered to be an important early medieval settlement; the place-name contains the element *lys* meaning 'court' plus a personal name (Padel 1985, 150, 278). Traditionally,

the site has been associated with the legendary 6th century king Teudar (Pascoe 1985). The place-name certainly indicates a high status site (Johns and Herring 1996).

The existence of an early medieval settlement in the sand dunes at Gunwalloe consisting of stone structures with associated middens and floor surfaces has been noted for over 100 years (MCO47769; MCO58625; MCO18368). The site has been firmly dated to the 8th – 12th centuries AD and occupation comprised a sub-rectangular sunken building, working surfaces and middens (Wood 2013).

Medieval

The nature of administration and settlement in Cornwall prior to the Domesday Book is poorly understood (Preston-Jones and Rose 1986). It is assumed that the Hundreds that existed in post-Roman Dumnonia continued after the Norman Conquest. At Domesday, the Hundreds of Penwith and Winnianton/Kerrier were held by the King, while Pydar and Powder were given by the King to Robert, Count of Mortain (Pearce 2004, 254–5). In 1086, 277 out of the 350 manors recorded in Domesday were owned by the Count of Mortain, whose caput or estate centre lay at Launceston Castle (Preston-Jones and Rose 1986). It is thought that the royal administrative centres for the King's Hundreds were at the manors of Winnianton, near Gunwalloe (Kerrier) and Connerton, near Gwithian (Penwith) (Pearce 2004, 255).

Farmland surrounding many hamlets and towns was organised into extensive 'strip' field systems. Many of these are still recognisable, either as bundles of strips or as enclosed furlongs or cropping units. There are many examples of enclosed strips or small bundles of them in the St Keverne parish at Treloyan, Lestowder, Tregarne, Tregaminion and Rosenithon while furlongs can be seen at Tregonning, Churchtown, Tredinnick, Treleague, Park-an-tidno and Treskewes. These systems were associated with hamlets of co-operating families; fewer, more irregular medieval field systems were laid out by more solitary families (Johns and Herring 1996).

Post-medieval

In the 19th century there was a pilchard seining station at Coverack. Because of its panoramic views Black Head was an ideal spot for a huers' lookout. The huers and runners whiled away their time there by carving their names and dates on a rock (Johns 2001).

From at least the medieval period Cornwall's coastal rough ground was an important source of stone for building. It was also often the source for 'rab' – the dialect term in west Cornwall for the clayey gravels derived from degraded granite – used for infilling and road making, and for cob construction. Certain clays and earths were dug to sweeten the soil, for use in building or making ceramics, and from the 18th to the 20th centuries china clay was extracted (below).

In the later 19th century large roadstone quarries were opened on coastal rough ground, notably at Porthoustock on the Lizard and Penlee near Mousehole. Old photographs and postcards show that Porthallow and Porthoustock were once picturesque fishing coves, Godrevy and Porthkerris sandy beaches. Spillage from quarrying has completely altered their character. Abandoned quarries, heaps of rubble and derelict buildings litter the coastline. Comparative glances at the 1878 and modern OS maps show the extent of the quarrying – most of Dean Point, for instance, having been quarried away (Bird 1987, 83–92; Johns 1996; 12).

Other rocks on the coast were also commercially exploited. From the mid-18th century until about 1840 'soapy rock' (talc or steatite) was quarried on the Lizard at Trethvas, Gue Graze and Holestrow, near Kynance Cove, and on Lower Predannack Downs, the material being shipped to porcelain manufactories in Bristol, Worcester, Liverpool, Caughley and Derby (Barton 1966, 46–51; Johns 2002a, 24–5, 36; Felce 2011). The serpentine of the Lizard was used from the first half of the 19th century for the production of small turned decorative items for the developing tourism industry, but also

for some larger pieces such as tables and fireplaces. The stone was obtained from small surface quarries such as those on the cliff-top rough ground between Carngoon and Yellow Carn, east of Kynance Cove and on Lower Predannack Downs (Johns 2002a, 25, 36-7; Sagar Fenton 2005). There were serpentine factories at Poltesco on the Lizard and at Wherry Town and there is evidence that a water mill at Kynance Cove was adapted to turn serpentine.

Fig 6.17 Casley's shop at Polpeor was built to sell serpentine ornaments to tourists visiting Lizard Point. Built before 1906, possibly by a turner previously employed in a factory at Poltesco (Photograph: Charlie Johns).

Submarine-telegraph cable stations were established from the late 1860s at Sennen and at Kennack Sands and Bass Point (MCO23487) on the Lizard. The earliest purpose-built lighthouse in west Cornwall was constructed at Lizard Point in 1619; this was probably relatively short-lived but another was built at the same place in the mid-18th century. Other forms of communication located on the coast include the telegraph station operated from 1872 by the Fox Company of Falmouth at Bass Point on the Lizard, which sent news of shipping movements, particularly arrivals in the Channel, to Lloyds in London.

Modern

Many more coastguard look-outs were established during the 20th century – e.g. at Penzer Point (south of Mousehole) – but most are now either abandoned or used by the volunteer members of Coastwatch. The paths used by the coastguard and their predecessors in the preventive and revenue services were the antecedents of those which now make up the coastal footpath network and are historic features in their own right.

A Marconi wireless station was set up in 1900 at Pen Olver, near the southern tip of the Lizard, for ship-to-shore communications (Johns 1998a), and in the same year Marconi's experimental transatlantic wireless telegraphy station was established at Poldhu, on the west side of the Lizard between Gunwalloe and Mullion (Johns 2000). It successfully achieved the first transatlantic radio communication in the following year. Poldhu continued as a commercial station until the 1920s and was used until 1934 for experiments in short-wave radio. The Lizard was also the location for the earliest satellite communications station, established in 1962 at Goonhilly; the first of the 'dishes', known as Arthur, is now a Grade II* Listed Building (NHLE 1350341).

Military

During the Napoleonic period a chain of coastal watching posts and signal stations was established to observe the movements of enemy shipping and convey messages to British vessels offshore. Locations within the project area included Manacle Point, Black Head, Lizard Point (within this PDZ), Tater-du, Gwennap Head and Land's End, established during the 1790s. The naval signal station building at Black Head was ruinous by 1891 and a purpose built watch hut for the local coastguard was built in 1915. The hut, which was subsequently modified, remained in operation, until watches ceased in 1987 (Hart 1990, 127).

Too easily overlooked now as an eyesore, RAF Predannack, like all Second World War airfields, is an astonishing human intervention in the landscape (MCO43101). It was built rapidly to open in May 1941 as a fighter base, a satellite for Portreath airfield, and, at its busiest, 3,600 people were stationed here (many more than live on the whole of the Lizard today). Barracks lined parts of the Helston-Lizard road. Hurricanes and then night-fighter Havocs were gradually replaced by search-and-rescue Beaufighters, Mosquitos, airplanes performing anti-submarine duties, and then from late 1943, after the three runways had been extended, Wellington and Liberator bombers. After the war had ended and following a period of abandonment, Vickers used the field for experiments by Barnes Wallis until its closure in 1954. Since 1958, it has been used in conjunction with RNAS Culdrose for helicopter and fixed wing aircraft training (Herring 1996, Smith 2000, 176-189).

Maritime

There are three Protected Wreck sites in this PDZ: The *Royal Anne* Galley (NHLE 1000068), Rill Cove (NHLE 1000068; and the *Schiedam* (NHLE 1000049).

Rill Cove is situated close to the cliff face in the eponymous cove on the west coast of the tip of the Lizard peninsula and was discovered in 1975. A number of objects have been recovered including iron guns and silver coins, all thought to date to the late 16th or early 17th century. No ship structure or positive identification of the wreck has ever been made. It has been suggested that the Rill Cove wreck may be that of the fabled 'silver wreck' of 1619 which was carrying coins and bars of silver, however, no silver bars have been recovered from this wreck (Camidge 2013b).

The *Shiedam* lies in shallow water about 100m from the shore close to the church at Gunwalloe Cove. No positive identification of the wreck has been made but the date of the artefacts recovered and the lack of any other documented wreck of that period has led to the fairly reliable identification of the site as the wreck of the *Shiedam*. The *Schiedam* was a Dutch fluyt or flyboat captured by Salle pirates off Gibraltar. Shortly afterwards she was recaptured by a British galley, the *James* on 10 August 1683 and thereafter often referred to as the *Schiedam Prize*. She was used in the evacuation of Tangiers to transport cargo and passengers back to England. She was lost near Gunwalloe church on 4 April 1684 (Camidge 2103a).

The site of the *Royal Anne* was discovered in 1969, lying off the Stag Rocks, offshore from the Lizard. The galley was built at Woolwich and launched in 1709. It was a fifth rate ship and the last oar and sail fighting ship built for the Royal Navy. There were only six such galleys classified in the Royal Navy when she was built; they were an attempt to combine the advantages of sail and oar propulsion. In 1721 the vessel was wrecked en route for the West Indies whilst trying to turn back towards Falmouth in bad weather (NHLE 1000068; Camidge *et al* 2006; 2009; 2011; 2014).

6.3.7 **PDZ 7: Mount's Bay East: (Baulk Head to Marazion)**

Policy Development Zone 7 covers the eastern half of Mount's Bay from Baulk Head near Gunwalloe Fishing Cove west to Greeb Point, near Marazion.

The area is a mixture of agricultural land and coastal rough ground with only a limited amount of built environment, focussed on the settlements of Porthleven, Praa Sands and Perranuthnoe.

Within the RCZAS project area of PDZ 7 there are 105 Listed Buildings (with notable clusters at Porthleven and Penrose), three Scheduled Monuments and three Conservation Areas (Porthleven, Pengersick and Perranuthnoe) and no Registered Parks and Gardens.

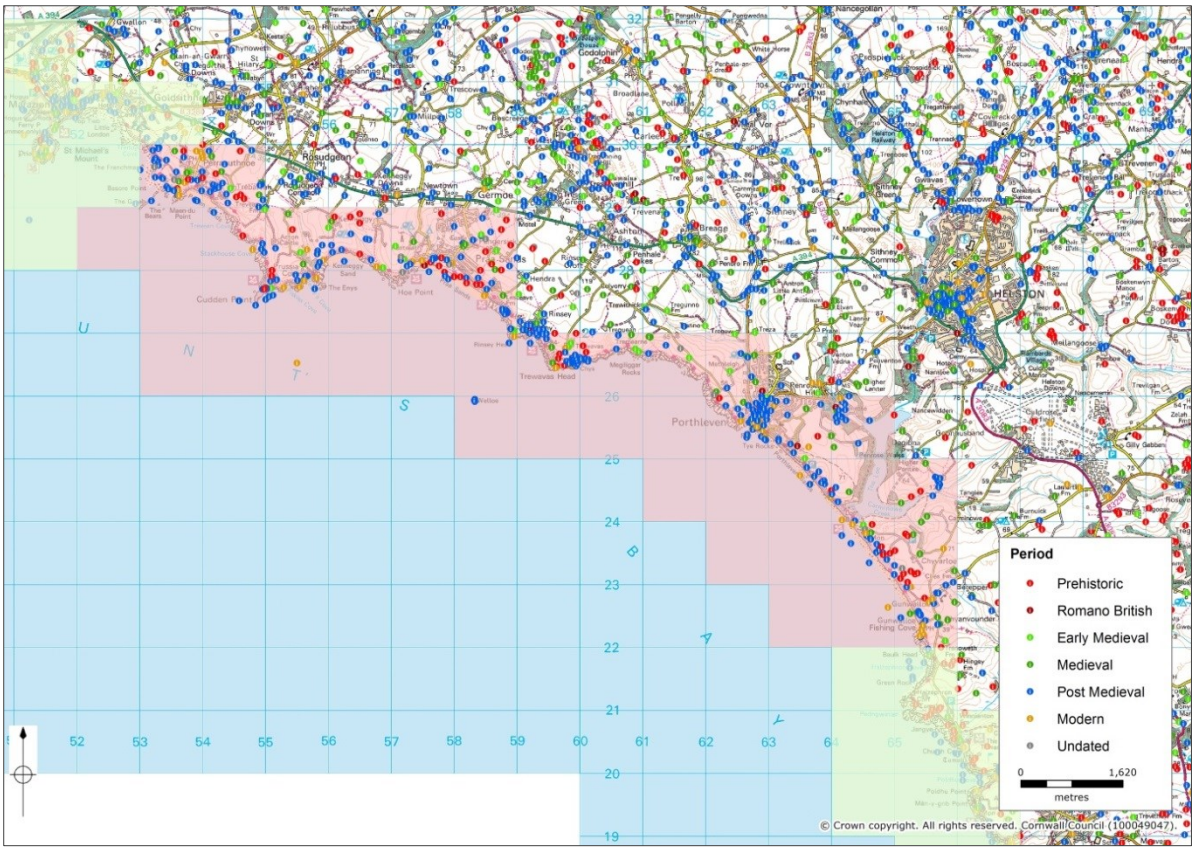


Fig 6.18 Sites currently recorded in the Cornwall HER for PDZ 7 of the RCZAS project area (Mount's Bay East: Baulk Head to Marazion).

Trewavas Cliff is within the Cornwall and West Devon Mining Landscape World Heritage Site with dramatically located engine houses. There are two Protected Wrecks lying close offshore (the *St Anthony* and the Loe Bar Wreck).

Archaeological assessments have been carried out for many of the National Trust's coastal properties in this PDZ. These include: Penrose and the Loe (Johns 2004); Trenow, Cudden Point, Sydney Cove, Lesceave Cliff, Rinsey East Cliff and Trewavas Head (Sharpe 2008); and Carminow Mill (Johns 2010). Other assessments include Porthleven Limekiln (Johns 1998a).

Designated site assessments have been carried out of the Loe Bar Wreck (Wessex Archaeology 2005) and the *St Anthony* Protected Wreck Site (Camidge 2013a).

Palaeolithic and Mesolithic

A peat deposit at Praa Sands was once considered to contain some of the earliest traces of human occupation in Cornwall (Reid and Reid 1904; Hencken 1932; Thomas 1957). The deposit rests on clay and is overspread with sand (Fig 6.10). The sequence has been reinvestigated by Robson (1946), Stephens and Sims (1980) and Scourse (1996), with Scourse and Kemp (1999) presenting the most recent synthesis (also see Ealey 1999). Descriptions of the finds associated with the palaeosol have changed and the evidence for human activity discounted.

There are also intertidal peat deposits at Loe Pool (MCO44976) and Porthleven (MCO44963).

Several lithic scatters in the vicinity of Kenneggy are of possible Mesolithic/Neolithic date (MCO759; MCO45057; MCO45059; MCO41642).

Neolithic and Bronze Age

There are 11 possible barrows and cairns recorded in the project area, recorded from aerial photographs (e.g. MCO49411, Chyvarloe) or suggested by place-name evidence (e.g. MCO3100, Methleigh). A fragmentary beaker found in the garden of Sea Meads, Praa Sands in 1937, and donated to the Royal Cornwall Museum (MCO1232).

Finds of flints, some Bronze Age in date, have been found in the area, with a focus in the vicinity of Praa Sands. Here a plain flat copper or bronze axe with hammered flanges was found during the digging of foundations for a bungalow (MCO1233). At Trevurvas, a kilometre inland from Praa Sands, a greenstone hammer and possible grinder stone was found when a field was ploughed (MCO44116).

An archaeological watching brief at Porthleven revealed a peat deposit which began to develop sometime in the early second millennium BC and continued to develop until the 19th century, when mine waste was dumped on the mire surface. Pollen analysis of the deposit suggests damp woodland in the valley bottom but that the vegetation fluctuated over time as a result of variations in the water table (Lawson Jones 1999).

Iron Age and Romano-British

There are several possible rounds recorded in the project area, all either recorded from aerial photographs (e.g. MCO49409, Chyvarloe) or suggested by place-name evidence (e.g. MCO8563, Trebarvah).

A possible cliff castle has been suggested at Cudden Point (MCO60572) and there is little supporting evidence for a further one postulated at Keneggey (MCO6554). An unenclosed settlement of round houses has been identified on the cliff slopes above Loe Bar, discovered from the analysis of aerial photographs (MCO56214).

A watching brief carried out in 1999 along the 2.5km long route of a South West Water sewage transfer pipeline between Barlowenath Farm, St Hilary in the north to Perranuthnoe beach car park in the south identified three prehistoric flint scatters and recorded cross-sections through strongly lynchetted fields at the southern end of the pipeline, which may be of prehistoric origin. Other artefacts included three find spots of Early Iron Age pot and small amounts of medieval pot, in both cases found in similar locations to the flints and suggesting long-term preference for these locations. Post-medieval pottery, clay pipes and glass had a wider distribution (Lawson-Jones 2001).

In 1862 two circular ovens or fireplaces, about 3.5m in diameter overall, were found on the east side of Loe Bar (Fig 6.19). The ovens were filled with a charred substance, chiefly slag and sand, which appeared to be the residue of peat or turf which had been used for fuel. The only find was small iron point about two inches long. Its possible use as a smelting house was discounted because of the absence of tin or any other metal in the slag. It may have had a culinary purpose or have been used for heating cauldrons of pitch to 'pay' the bottoms of boats or for boiling 'tan-water' for steeping fishing nets (Rogers 1863).

Dines (1956, pp 240-1) suggests that the workings of Wheal Penrose, later reworked extensively, are believed to have been first exploited in Roman times. The renowned Cornish mining historian Hamilton-Jenkin recorded that the mine was first worked in the 16th century (MCO13076).

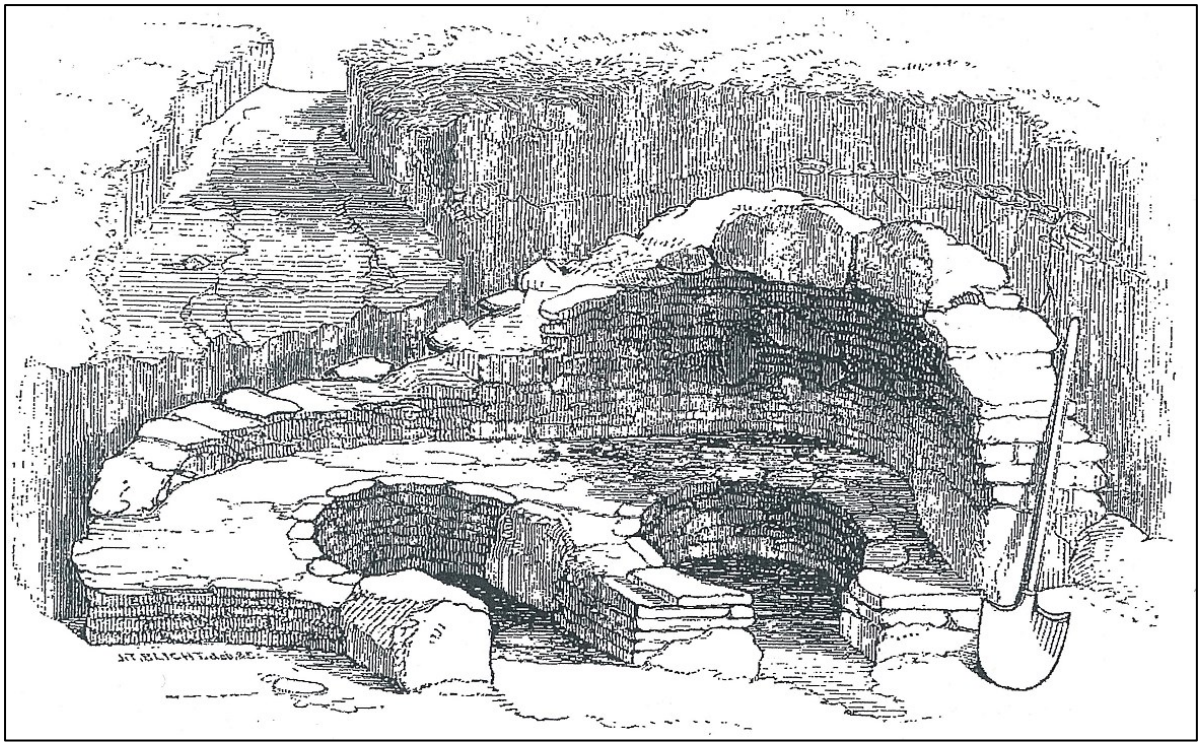


Fig 6.19 The ovens at Loe Bar (from Rogers 1863).

Early medieval

Four tin ingots found in a peat deposit at Praa Sands in 1974 may be indicative of regular smelting activity in the area during early medieval period (Biek 1994).

Medieval

Near Praa Sands is Pengersick Castle, a fortified manor house probably dating from the early 16th century, with an associated building platform possibly dating to the 14th century (NHLE 1021407). The Castle has seen considerable archaeological recording (Herring *et al* 1998; Mossop 2004; Thorpe 1996). Medieval settlement was predominantly in the form of small farming hamlets located on the coastal plateau. They were surrounded by small fields, often farmed in an inter-mixed way, with extensive areas of coastal rough ground (Dudley *et al* 2011).

Post-medieval

The WHS mining district of Tregonning and Gwinear with Trewavas is mostly an inland area but it has a small coastal section around Wheal Prosper and Trewavas Cliff. Wheal Trewavas (NHLE 1021324), with its two engine houses, was worked for copper with the workings reaching out under the sea in Mount`s Bay. This was not an uncommon practice with coastal mines, but work ended for its workforce of 161 in 1850 when the sea flooded the older lodes. The two engine houses still exist (MCO27084; MCO12718). A circular flat area beyond the boiler house is one of Cornwall's best surviving capstan platforms (MCO52428) which, due to its size and good state of repair, is regularly used by helicopter pilots from Culdrose for landing practice.

Fig 6.20 Peat exposure MCO29245 at Praa Sands (Photograph: CAU).

There are many other mining remains in the area, mostly scattered along the coastal rough ground, including adits, shafts, capstans, inclined planes, engine houses and ancillary buildings (Sharpe 2008).

During the 19th century, with the construction of a harbour to serve local mines, Porthleven grew from a small fishing village into a thriving industrial port exporting copper ore, tin and china clay. Local mining peaked in the 1870s, after which the harbour went into decline. Porthleven has a good collection of 19th century terraced houses, and religious, educational, and municipal buildings including fish cellars, lime kilns and a literary and scientific institute (The Conservation Studio and Cornwall Archaeological Unit 1999).

Modern

Almost all the 20th century sites recorded within the Cornwall HER in the area are of military origin except for a number of mining related features at Ednovean, Perranuthnoe (MCO60620-21).

Military

There are concentrations of military sites on vulnerable beaches such as Loe Bar and Praa Sands and defending the harbour at Porthleven.

Second World War defences include pillboxes, defensive lines, anti-tank walls, anti-tank traps and scaffolding. A Chain Home Low Radar Station was built at Trewavas Head (MCO35720, MCO41935) and a radar station at Gunwalloe built in the Second World War later supported Royal Navy Air Station Culdrose.

Maritime

This is an exposed and rugged coastline exposed to sizeable swells and frequent high winds. There are dozens of wrecks as sailing vessels often struggled to make Lizard Point in adverse conditions and were driven into the surrounding coast. From Gunwalloe to Cudden Point the coastline is littered with wrecks.

The *St Anthony* (NHLE 1000076) lies some 30 to 180m offshore from Gunwalloe Fishing Cove. The identification of the wreck is based on the historic record and nature and date of the finds recovered from the site; no remains of the ship's fabric have ever been located. The wreck of the *St Anthony* in 1527 at Gunwalloe is well attested by documentary sources, the result of litigation, which detail the events of her loss and includes a list of the cargo. Many of the artefacts recovered from the site can be linked to items detailed on this cargo list (Camidge 2013a).

The Loe Bar wreck (NHLE 1000067) is reportedly that of the *President*, a 500-ton English East Indiaman built in 1671. She was lost in 1684 with a cargo of 100 tons of loose pepper, Indian piece goods (i.e. textiles), assorted drugs and spices together with small leather pouches of diamonds and pearls (Wessex Archaeology 2005).

A famous wreck is that of *HMS Anson*, a Fifth Rate Frigate wrecked on Loe Bar at 1807. She stranded on Loe Bar, while attempting to return to Falmouth in inclement weather, having departed only a few days previously for Brest, where she was involved in blockading the port during the Napoleonic Wars. People lined the cliffs to watch the vessel as she got closer and was finally wrecked. One of these spectators was Henry Trengrouse, who was inspired by the event to invent the rocket-propelled life-saving apparatus. Possibly one of the best-salvaged wrecks on the Cornish coast, she was dived on frequently during the late 19th century and, in April 1905, a Penzance company raised a large cannon. Several others were raised over the years, and a ship's bell which was found is reputed to be that of the Anson. In 1964 divers of the Naval Air Command sub-aqua club found and salvaged one of her huge brass pintle and rudder supports, and two iron cannon: a thirty-two pounder and a twenty-eight pounder. The larger one weighs three and a half tons and now stands outside the Helston museum. There are still nine or ten cannon on the wreck site, but they are often buried beneath the shifting sand (MCO61017).

6.3.8 PDZ 8: Mount's Bay West (The Greeb to Point Spaniard) (Including Marazion and St Michael's Mount)

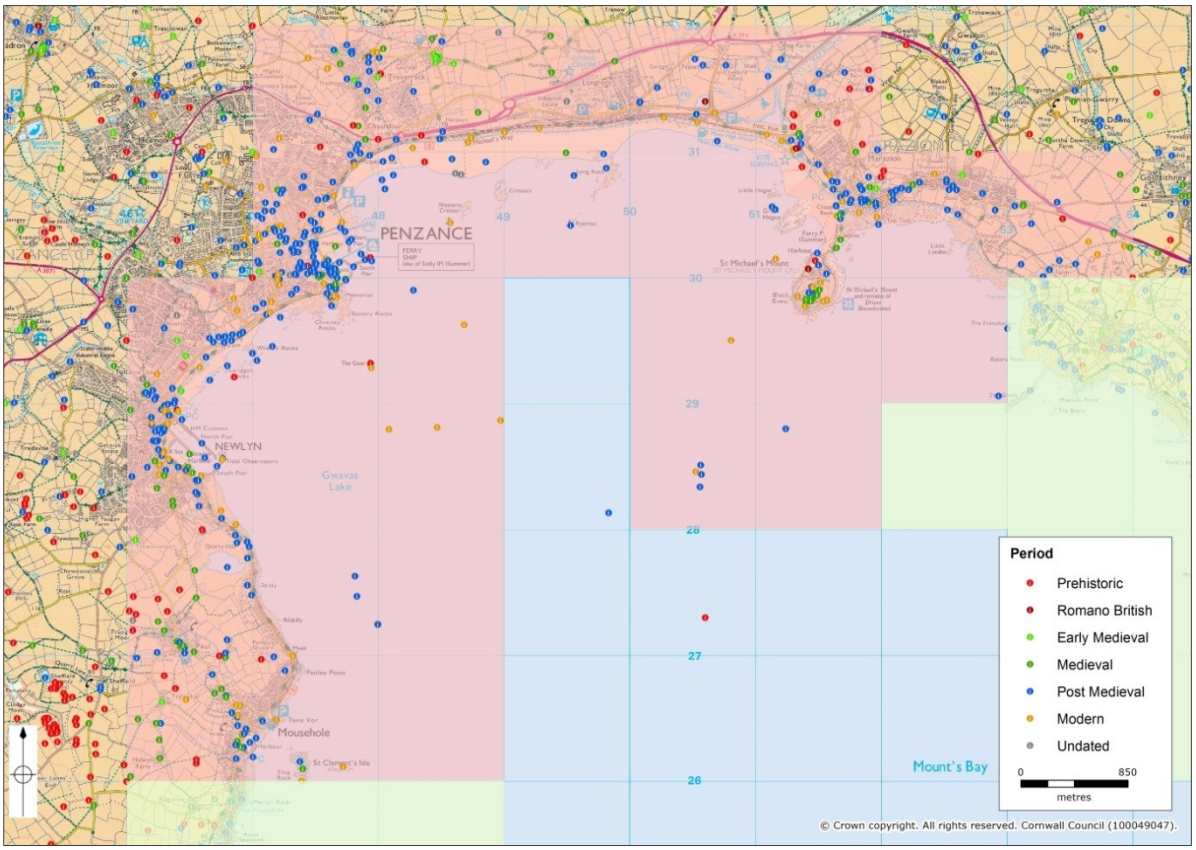


Fig 6.21 Sites currently recorded in the Cornwall HER for PDZ 8 of the RCZAS project area (Mount's Bay West: The Greeb to Point Spaniard).

Policy Development Zone 8 covers the western half of Mount's Bay from Greeb Point, near Marazion, west to Point Spaniard, to the south of Mousehole.

Much of the coastline is heavily modified to protect key infrastructure such as the mainline railway and A30 trunk road as well as the settlements of Marazion, Long Rock, Penzance, Newlyn and Mousehole. Newlyn is a nationally important fishing port and there are also smaller active harbours at St Michael's Mount, Mousehole and Penzance, the latter being the most significant of the three in terms of modern use.

An iconic landmark in the area is St Michael's Mount, a granite outcrop forming an island which at low tide is linked to the mainland via a causeway. The Mount is owned by the National Trust and is a popular attraction, being crowned by a stately home which was formerly a priory and defended site. The craggy outcrop upon which the house sits has been postulated as a Neolithic tor enclosure.

Within the RCZAS project area of PDZ 8 there are 807 Listed Buildings (with notable clusters at Marazion, St Michael's Mount, Penzance, Newlyn, Paul and Mousehole), eight Scheduled Monuments and seven Conservation Areas (St Michael's Mount, Marazion, Gulval, Penzance, Newlyn, Mousehole and Paul Churchtown) and two Registered Parks and Gardens (Morrab gardens in Penzance and the grounds of St Michael's Mount; both Grade II).

Numerous geotechnical reports and assessments relating to the proposed regeneration of Penzance harbour have been produced during the last 15 years including an Environmental Statement (Hyder Consulting 2005), and a subsequent palaeoenvironmental and geoarchaeological assessment (Wessex Archaeology 2006) was undertaken to further define archaeologically important peat deposits found in and

adjacent to the dredge area, as well as to identify their value, and any possible mitigation that might be required prior to any construction activity.

Studies of Penzance (Fleming 2016b) and Newlyn (Fleming 2016c) were carried out for the Cornish Ports and Harbours project. Urban surveys have been undertaken for Penzance (Cahill and Russell 2003) and Newlyn (Russell 2003) and there has been an archaeological assessment of St Michael's Mount (Herring 1993).

Palaeolithic and Mesolithic

The 2006 Assessment of Penzance Harbour reviewed the historic geotechnical data available within the area and identified 41 sample locations of archaeological interest. The sediments were provisionally identified as silts, clays, peats and organic material relating to Holocene palaeolandscapes (post-18,000 years BP) (Wessex Archaeology 2006, 6).

A Late Mesolithic radiocarbon date, 4960–4770 cal BC (NZA-25945; 6000±35 BP) was obtained from the base of the peat in a vibrocore (VC7A) at a depth of -7.22m OD. Three Late Mesolithic radiocarbon dates were also obtained from a bulk sample from another vibrocore (WA3) (Wessex Archaeology 2006, 13).

Evidence for Mesolithic communities using fire to manage vegetation and exploit low-lying areas and a growing intertidal zone has been observed at several places in Britain, at Goldcliff on the Welsh side of the Severn Estuary (Bell 2007) and in the Isles of Scilly (Charman *et al* 2016), for example, and also possibly at Mount's Bay (Chisham 2006).

Submerged forests and organic deposits have also been identified at Marazion Marsh (MCO29778), Chyandour (MCO55163), Ponsandane (MCO55167) and Wherry Town (MCO55164) and up to 4km offshore (MCO55166; outside the project area).

A possible Palaeolithic hand axe was found on Marazion Beach but the large nodular flint is heavily abraided and could have been brought to the area as ballast on a ship (MCO41574).

Neolithic and Bronze Age

A lithics project centred on Clodgy Moor, inland of Mousehole and just outside the project area, identified that Mesolithic activity was concentrated in well-defined areas around springheads, and that this pattern was continued and expanded upon during the Neolithic (Jones *et al* 2013).

The principal sources of greenstone on the south coast are located around Cudden Point on the eastern side of Mount's Bay (in PDZ6) and between Newlyn and Mousehole on the western side. West Cornish greenstone, including Groups I, II and III were used in the manufacture of axe-heads, which were widely exchanged, reaching Wessex, the north of Britain and even across the Irish Sea. Group I has long been thought to outcrop in Penwith, although in common with most axe sources in Britain actual production sites have remained elusive. However, the first greenstone axe working site has recently been identified at Clodgy Moor on the periphery of the project area (Jones *et al* 2013, 5).

Several greenstone artefacts have been found in the area of Clodgy Moor and Paul (MCO56368; MCO56447; MCO56448; MCO56458).

During the severe storms of February 2014 tree trunks and peat deposits associated with a submerged forest were exposed on the foreshore of Mount's Bay (Fig 6.22). This submerged forest has been exposed a number of times in the past, particularly after winter storms. There was a notable exposure in 1857 recorded by William Borlase and an even more extensive one in 1886 which was photographed by Gibson. Wood samples were taken at that time by the Royal Geological Society of Cornwall and in 1958 radiocarbon determination was obtained from a piece of oak (Thomas 1958, 281–2, figs 125 and 126). The radiocarbon determination has been calibrated using OxCal 4.2. The result is 2469–1665 cal BC (BM-29; 3656±150 BP) at the 95.4% per cent confidence level which broadly speaking spans the Early Bronze Age.

Fig 6.22 Part of the submerged forest (MCO55163) exposed by winter storms at Chyandour, Mount's Bay in February 2014 (Photograph: CAU)

Iron Age and Romano-British

Situated on the summit of ridge overlooking Mount's Bay is the Scheduled hillfort at Lescudjack (NHLE 1003270). The sites of several rounds in the area are suggested by place-name evidence (e.g. at Trungle, Paul, MCO8870) and interpretation of aerial photographs (e.g. at Trevithal, MCO51712).

It has been suggested that the tin trading station called *Ictis* by classical writers should be seen as a generic type site, a late prehistoric form of 'port of trade' which foreign traders were encouraged to use by the offer of an easily recognisable and neutral coastal site with a safe anchorage and security for both themselves and their goods. Discoveries of a copper ingot and amphora sherds dating to the 5th-6th centuries AD indicate that St Michael's Mount was an important site during the post Roman period and may have been the archetypal *Ictis* but other sites in Cornwall could include Looe Island, and cliff castle sites at Pendennis Headland, St Catherine's Castle near Fowey and Black Head in St Austell Bay on the south coast and in Devon, Mount Batten (Herring 2000, 116). A Roman coin hoard was found in Marazion Marshes (MCO27098).

Early medieval

Gulval is an early Christian site and *lann* (MCO46094). Lariggan, now part of the suburbs of Penzance, is also a lann place-name suggesting an early Christian enclosure (MCO25109). St Michael's Mount has been tentatively suggested as an early medieval Christian site based upon the interpretation of a term used in the Domesday Book (MCO27131; MCO13243).

There is an inscribed stone at Bleu Bridge, Gulval, believed to be 6th or 7th century in date (MCO7144; 1006727) and an inscribed cross shaft in Gulval churchyard, mounted on a later cross-base and with a late medieval lantern cross head (MCO7144; NHLE 1018493). The Market Cross in Penzance is believed to by 11th century in date and records a King Ricatus in its dedication (MCO5652; NHLE 1006729).

Medieval

Marazion and Mousehole were the principal towns and ports in the area in the early late-medieval period but Penzance soon eclipsed these settlements in importance. It developed as an important fishing port, departure point for pilgrims to Santiago de Compostela in northern Spain, and trading centre with other ports on the south coast, in Europe and south west Ireland. In the 14th century a planted market town was developed and Penzance became the main town in Mount's Bay and West Penwith (Cahill and Russell 2003).

Newlyn was a small fishing port at this time, however, it was a significant enough settlement by 1437 to have a quay (MCO44932; NHLE 1143190).

St Michael's Mount was granted to the Norman abbey of Mont-Saint Michel in France in 1050 and a Benedictine monastery was established there in the 12th century. It was later transferred to Bridgettine nuns of Syon, near London, before it was dissolved in the reformation (MCO13237).

Post-medieval

By the 16th century Penzance had a quay and a bulwark to defend the harbour. At this date the tidal edge was largely naturally formed, with the edge of the present Wharf Road broadly corresponding with the foreshore. In the 17th and 18th centuries the area between the cliff slope and Market Jew Street was further built-up as the town expanded. Penzance developed as an attractive town with a wide-based economy including boat-building, rope and sail making, tanning, leather and iron-making and service industries such as banking. Access to the foreshore was provided via a series of lanes which led to landing points (Cahill and Russell 2003).

Mousehole continued as a small fishing port but was substantially damaged by a Spanish raid in 1595 (MCO11193). In the 19th century Newlyn emerged as the dominant fishing port in the area and the settlement expanded rapidly. In the 1880s a large harbour was constructed to shelter the fleet and the development of the harbour was associated with a period of major changes in the fabric and topography of Newlyn including a new road layout, the construction of 'industrial' scale buildings associated with fishing, terraced housing and a new urban centre (Russell 2003).

Mining activity was concentrated in a limited number of small short-lived enterprises at Wherry Rocks (MCO13206) and Chyandour (MCO12496), both in Penzance and Wheal Darlington (also known as Wheal Bog or Bog Mine; MCO12894) and Crab Mine (MCO60286), near Marazion Marsh.

With the dissolution of St Michael's Mount as a monastery it was converted into a mansion and seat for the St Aubyn family. The house incorporates parts of the monastic buildings and was extensively altered and extended in the 19th and 20th centuries (MCO10926).

Modern

A coastguard station at West end, Marazion was built at the turn of the 20th century (MCO60287). The towns of Newlyn and Penzance continued to expand with the development of areas of villas, terraced housing, schools and drill halls (Cahill and Russell 2003; Russell 2003). A swing bridge was built at Penzance harbour and later replaced by the Ross Bridge (MCO60272). Seaman's Mission buildings were built in Newlyn (MCO58798) and at Penzance (MCO58779). In the 1930s a modern harbour commissioner's office was built at Newlyn (MCO58773).

Jubilee Pool was built on Battery Rocks at Penzance in 1935 (MCO25115; NHLE 1221190). This striking art deco lido was severely damaged in the winter storms of 2013/14 but has been restored to its former glory. A tidal observatory at the end of the South Pier, Newlyn, was used by the Ordnance Survey to establish Mean Sea Level between 1915 and 1983 (MCO60402) and has recently been Listed (NHLE 1460225).

Military

Post-medieval batteries are recorded at Carn Gwavas, St Michael's Mount and Penzance (MCO25113; MCO44160; MCO51721; MCO60494), the 17th century battery defending Penzance harbour giving its name to Battery Rocks.

In the First World War a Royal Naval Air Station for seaplanes was built on the beach south of Newlyn Harbour. It was decommissioned in 1919 and little, apart from timber foundations, remains today (MCO42269).

Being relatively sheltered and open the beaches and ports of Mount's Bay were vulnerable to attack and consequently, heavily defenced in the Second World War with the usual arrangement of pillboxes, anti-tank traps, beach scaffolding (uncovered in the 2014 winter storms), road blocks and gun batteries to form defensive lines.

Maritime

Many ships were driven into Mount's Bay during heavy south westerly winds or driven across the Bay if they broke anchor in Penzance and Newlyn.

A search for historic shipwrecks in Mount's Bay was undertaken by the Cornwall and Isles of Silly Maritime Archaeology Society (CISMAS) between 2006 and 2008 using sidescan sonar survey and diver searches. The most significant single discovery was a small 19th century composite sailing vessel (Camidge and Randall 2009).

One of the most notable wrecks in recent times is that of *HMS Warspite*. In 1947, the retired warship was being towed to the Clyde for breaking when it broke its tow lines and was driven ashore at Prussia Cove. Tugs then towed the stricken vessel to Marazion where it was deliberately beached. Over the next five years the vessel was salvaged but the scattered remains of parts of the ship have been noted by divers.

6.3.9 PDZ 9: Penwith Peninsula (Point Spaniard to Clodgy Point)

Policy Development Zone Nine covers the coastline of the entire West Penwith peninsula while the project area extends from Point Spaniard, near Mousehole, west to Land's End. This is a rocky coastline characterised by granite cliffs with small bays and narrow inlets known as zawns. It is an exposed and windswept coastline battered by swells and high winds, with increasing exposure towards Land's End.

The area is rural and dominated by small hamlets with little urban development or modification of the coast. A small harbour at Lamorna probably built for the export of granite is now largely destroyed, having taken a considerable battering in the winter storms of 2013/14 (MCO4811; NHLE 1137452).

Within the RCZAS project area of PDZ 9 there are 79 Listed Buildings (mainly crosses, farmhouses and farm buildings), 14 Scheduled Monuments and no Conservation Areas.

The SMP notes that Porthcurno is significant as the landing place of submarine telegraph cables and associated telegraph station (MCO42256).

The West Penwith surveys undertaken by CAU (in its various guises) between 1980 and 2010 were concentrated mostly on the north and west of the peninsula although the south coast features in overviews (Herring *et al* 2016). Exceptions include: The Tregothnan West Penwith Survey – survey block A covers Boscawen-Ros, Boleigh and Rosemodress and survey block B covers Bosfranken Brew, Burnewhall; Bosistow. Surveys have also been undertaken of Ardensawah and Roskestal Cliffs in St Levan (Thomas 1995); Treen and Rospletha Cliffs Penberth Valley and Cove (Ratcliffe 1998); and Watch Croft and Trevean Cliff (Thomas 1998). Treryn Dinas cliff castle has been the subject of partial recording during management works (Herring 1994). A study of Penberth Cove was carried out for the Cornish Ports and Harbours project (Johns and Thomas 2016).

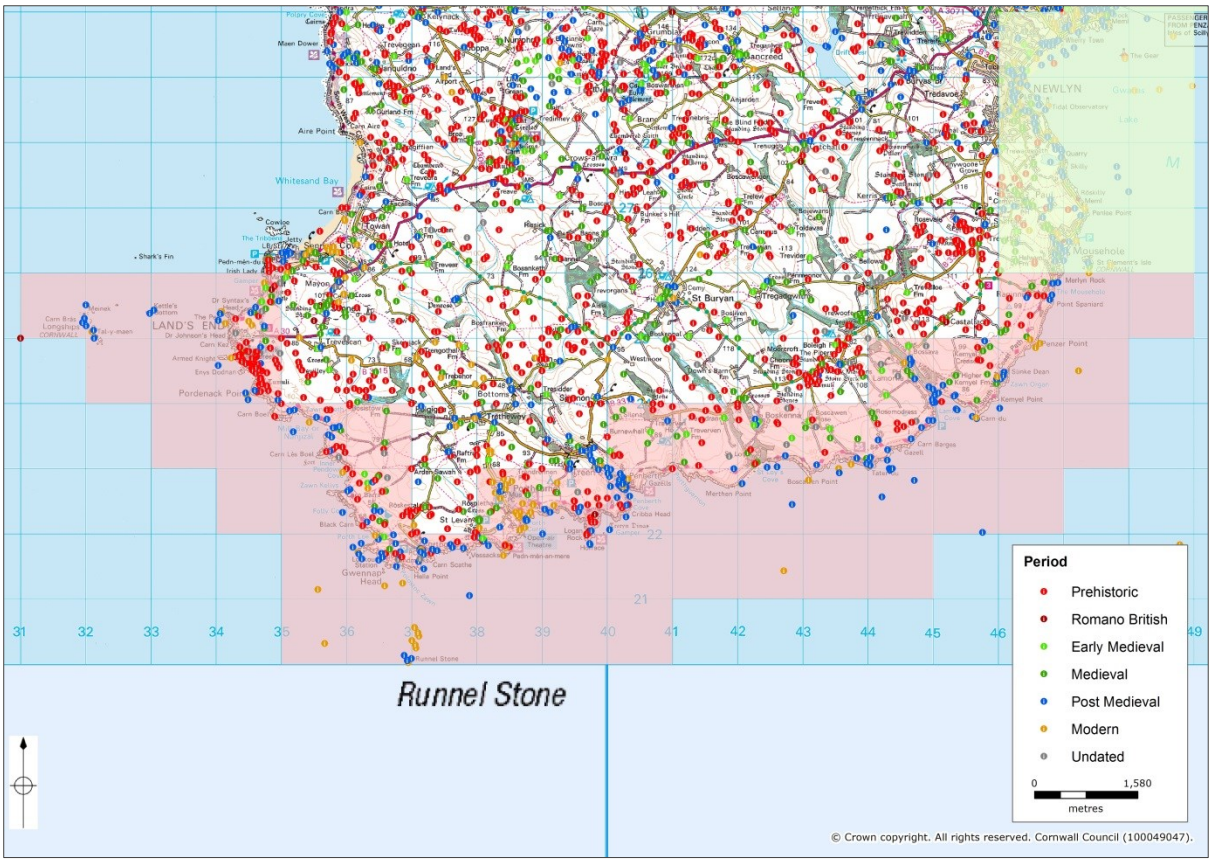


Fig 6.23 Sites currently recorded in the Cornwall HER for PDZ 9 of the RCZAS project area. The PDZ extends from Point Spaniard to Clodgy Point, St Ives (outside the project area) – this map shows Point Spaniard to Land's End.

Palaeolithic and Mesolithic

There are no recorded Palaeolithic sites or finds.

Some of the largest assemblages of Mesolithic flint from Cornwall have been identified through predominantly surface finds in the West Penwith area including: Pedn-mên-an-mere; Carn Greeb and Rosketal Cliff, all within the parish of St Levan on the south coast (Hosfield *et al* 2008, 54 and fig 2.4). However, by contrast with the north coast or the Lizard, there has been little work on the Mesolithic assemblages from Penwith and consequently this period does not feature in the West Penwith Surveys volume (Jones 2016).

Neolithic and Bronze Age

Just to the north of the project area lies the Bronze Age ceremonial complex focussed on the Merry Maidens stone circle. This area contains an astonishing range of ritual and burial monuments (Johnson and Rose 2003, 36), including entrance graves, which aside from the Isles of Scilly are only found in Penwith.

There are a number of coastal barrows including the Scheduled round barrow 160m north east of Bosistow Island (NHLE 1004236).

Nowhere is the importance of setting better illustrated than high on the cliffs at Pordenack Point, where three cairns are grouped together within a circular earthen bank near the cliff edge (NHLE 1004236), some 1km south of Land's End (Johns and Herring 87, 128–9). Also at Pordenack Point are low grass and heather covered banks which may represent the remains of a Bronze Age field system (*ibid*, 132).

There are several records for Late Neolithic and Early Bronze Age standing stones in the project area between Kemyel and Treverven including a 2.4m high stone near Merry Maidens known as the 'Longstone' (MCO7343: NHLE 1004275).

Iron Age and Romano-British

Treryn Dinas (NHLE 1006733), West Penwith's largest, most complex, and possibly most important Iron Age defended site was built on a promontory between the coves of Porthcurno and Penberth. Four massive ramparts and ditches enclose the whole of the headland. The craggy end of the headland is cut off by a single bank and ditch with hut platforms visible on each side of the entrance (Johnson and Rose 2003, 47). Using Treryn Dinas and Maen castle (outside the project area) Herring (1994) suggests that such promontory fortifications are socio-economic or ritual centres rather than defensive strongholds. There is also a promontory fort at Carn Les Boel (NHLE 1004293) which is listed by HE as 'vulnerable to coastal erosion', although it is not yet on the HAR register.

Also on the cliffs at Pordenack Point is a well preserved later prehistoric field system consisting of single and double orthostat walls (Johns and Herring 1995, 87, 132).

There are records for nine possible rounds in the project area part of PDZ 9, all suggested by field-names (e.g. MCO7640 at Boskenna).

Early medieval

There is an early Christian inscribed stone at Boskenna (MCO7200; NHLE 1018570) and above Porth Chapel, St Levan, the Scheduled St Levan's Well (MCO7093; NHLE 1004248) and chapel site (MCO10125; NHLE 1007285). The latter is on the HAR register, being described as 'vulnerable to coastal erosion'.

Medieval

Much of the southern part of West Penwith's historic character has its origins in the later medieval period when the area was a mixture of small farming settlements, often hamlets, enclosed land and rough ground. It is a landscape rich in Cornish place-names including along this stretch of coast, most of the cliffs, inlets and carns.

West Penwith is renowned for its medieval crosses and this part of the PDZ has six examples including three in St Levan churchyard (MCO5852- MCO5854 incl.; NHLE 1015816 and 1015059).

Post-medieval

At Porthgwarra there are two 'ullies' or late 19th century shellfish storage baths consisting of granite blocks cemented together with iron hinges that were formerly attached to timber lids (NHLE 1420580). These have the potential for adding to our understanding of the methods used in the 19th century shellfish industry. Porthgwarra has an extant pair of 19th century fish cellars (MCO56979; MCO57081) and an 18th century slipway (MCO56983) and capstan (MCO57225). Penberth, as a small fishing cove, has a similar concentration of monuments associated with the industry (e.g. MCO57086; MCO5708).

Between Mousehole and Penberth the south-facing coastal rough ground contains a network of precariously placed coastal market gardens, consisting of tiny enclosures, often hedged by fuchsia bushes and enclosed by high stone walls. These were used intensively for horticulture, mainly in the late 19th and early 20th centuries after the extension of the mainline railway to Cornwall (e.g. MCO41837; Johns and Herring 1995, 21, 39, 75, 89, 113).

The quay at Lamorna was probably built in association with the dimension stone quarries exploited from the mid-19th century on the slopes above the cove (MCO60223-4 incl.; MCO29169).

Modern

Porthcurno was the home of the world's largest submarine telegraph station. An undersea telegraph link between England and Bombay, India, was brought ashore in 1870. The Eastern Telegraph and associated companies went on to develop a world-wide submarine cable network. Porthcurno was the gateway to the network and in time became the world's largest cable station, with 14 cables in operation. By the 1920s the telegraph station began to be superseded by wireless services, which had become much more reliable since Marconi's early experiments at the turn of the 20th century. In 1934, the old cable companies merged with the operating side of the Marconi Company to form the new company named Cable and Wireless. The cable station at Porthcurno finally closed in 1970, by that time it had also become a telecommunications training college, which was moved to Coventry in 1993. The museum, which is underground in tunnels built into the granite cliffs during Second World War to protect the telegraph station, is run by The Trevithick Trust (Museum of Submarine Telegraphy nd).

The Minack theatre built into the cliff above Minack Point, Porthcurno, is an open air theatre carved into the rocky slopes by Rowena Cade and her gardener Billy Rawlings (Minack Theatre website).

Military

Near the cliff edge at Pordenack Point are the remains of a First World War preventative man's hut and enclosure, which re-use the early prehistoric enclosure bank. The site affords spectacular views of the coast and seaways. There is also a small lookout shelter, tucked away behind the highest carn on Boscawen Cliff (Johns and Herring 1995, 22, 89).

The coastline was defended in the Second World War with an arrangement of pillboxes and anti-aircraft batteries, with a concentration around Porthcurno to defend the telegraph station and as the only sizeable beach on this stretch of coastline. A possible Second World War RAF wireless station was recorded from aerial photographs at Land's End (MCO42487).

Maritime

The coastline is littered with wrecks in particular in the area between Gwennap Head and Carn-du and offshore, surrounding the Runnel Stone. The stone once broke the water's surface but in 1923 the SS City of Westminster struck it so hard it knocked the top of the rock pinnacle clean off before the vessel sank. All aboard were saved by the Sennen and Penlee lifeboats (Wreck site website).

At Tater-du is a fully automatic unmanned lighthouse built in 1965 following the loss of the Juan Ferrer (a Spanish cargo ship) in 1963 with 11 lives. A red light covers the Runnel Stone rock to the west of the head (MCO39031).

Perhaps the most notorious of modern maritime disasters in the area is the loss of the the Irish-registered coaster, *Union Star,* and the Penlee lifeboat, *Solomon Browne*. On 19th December 1981 in force 12 gales, the engines onboard *Union Star* failed and the vessel stranded below the cliffs at Boscawen Cliff and capsized. While attempting to rescue the people onboard the coaster the Penlee lifeboat *Soloman Browne* was also wrecked. In total sixteen people lost their lives including the entire ship's crew and passengers together with the eight lifeboat men (MCO61029; MCO61060).

7 Assessment of historic sources

7.1 Historic maps

Fig 7.1 'Plat of Pymo[uth] (?pre-1549) (Reproduced from the Marquess of Salisbury)

The county of Cornwall was mapped from the mid-16th century beginning in *c*1540 with Henry VIII's Great Map of the South West which includes detailed plans of the defences of Falmouth Haven, Fowey etc. (Lysons *c*1814). Subsequent cartographers include Speed (1610), John Norden (1597), Joel Gascoyne (1699), Thomas Martyn (1748).

'*Lost Landscapes of Plymouth: maps, charts and plans to 1800'* (Stuart 1991) is a particularly useful introduction and source book for the historic maps of Plymouth (e.g. Fig 7.1, which shows the location of ferry crossings and anchorages).

In addition there are many estate maps dating from the 17th century – the Lanhydrock Atlas which includes many coastal manors is a particularly good example (Holden *et al* 2010).

The early 19th-century Ordnance Survey maps provide some useful detail and have been collected and published by Margary (1981).

The *c*1840 parish Tithe award maps and apportionments for Cornwall are particularly useful because they provide a reasonably detailed depiction of the landscape prior to later 19th-century parliamentary enclosures and are in effect maps of the medieval landscape. The Tithe maps, and the First and Second Edition large-scale OS maps record earlier patterns of land use and land holdings, and can be searched for abandoned or shrunken settlements, significant field names, industrial sites, 'antiquities' and also public buildings, military sites, ancient woodlands, orchards and historic parks and gardens. Field-names on the tithe maps can help in the search for the location of 'lost' settlements recorded in documents.

Consequently the *c*1840 Tithe maps were an important data source for the project area although their usefulness depended on the class and quality of the individual maps. For some parishes, the Tithe maps were not available digitally at the time of the project (e.g. St Anthony in Roseland) or may not have had a Tithe map (e.g. Stonehouse, Plymouth). Apportionment data, now available digitally for most parishes, was rapidly checked for field-names which could suggest the location of archaeological sites or add further details to sites already identified.

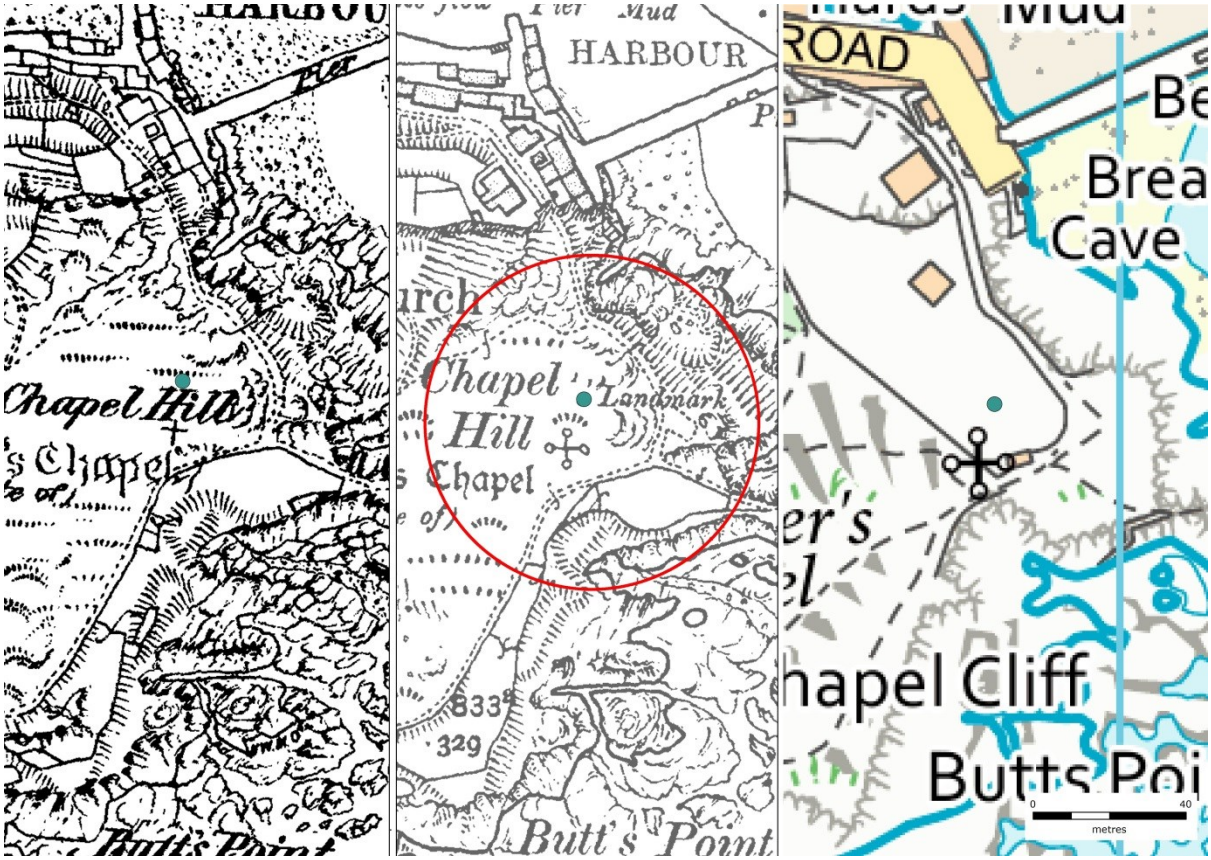


Fig 7.2 A landmark to the west of the harbour mouth at Polperro. Having the full range of OS mapping was of great help in mapping short-lived sites. The landmark was recorded on the 1907 OS map (middle) and not the 1882 edition (left) or modern map (right).

The project utilised four epochs of historic 1:2500 Ordnance Survey (OS) mapping; *c*1880, *c*1907, 1914 and *c*1930. The *c*1880 and *c*1907 maps covered the entire project area while the 1914 and *c*1930 revisions covered less extensive areas, mainly urban centres, in particular Plymouth and its surrounding area. The 1914 revision covered only the Tamar and Plymouth but the *c*1930 mapping included Mousehole to Perranuthnoe, Falmouth, St Austell, Saltash and Plymouth. Due to their extensive coverage and standard conventions these sources were the initial evidence used to build the GIS database for the addition of new records and amending and updating existing ones. In this way they were extremely useful as a starting point and consistent baseline to undertake further analysis. One issue with the historic OS maps is that the military establishments are blanked out so that building a coherent picture of the complex defences surrounding Plymouth (and Devonport dockyard) was not easy; although this is compensated for by the wealth of military maps and plans (e.g. Fig 7.3).

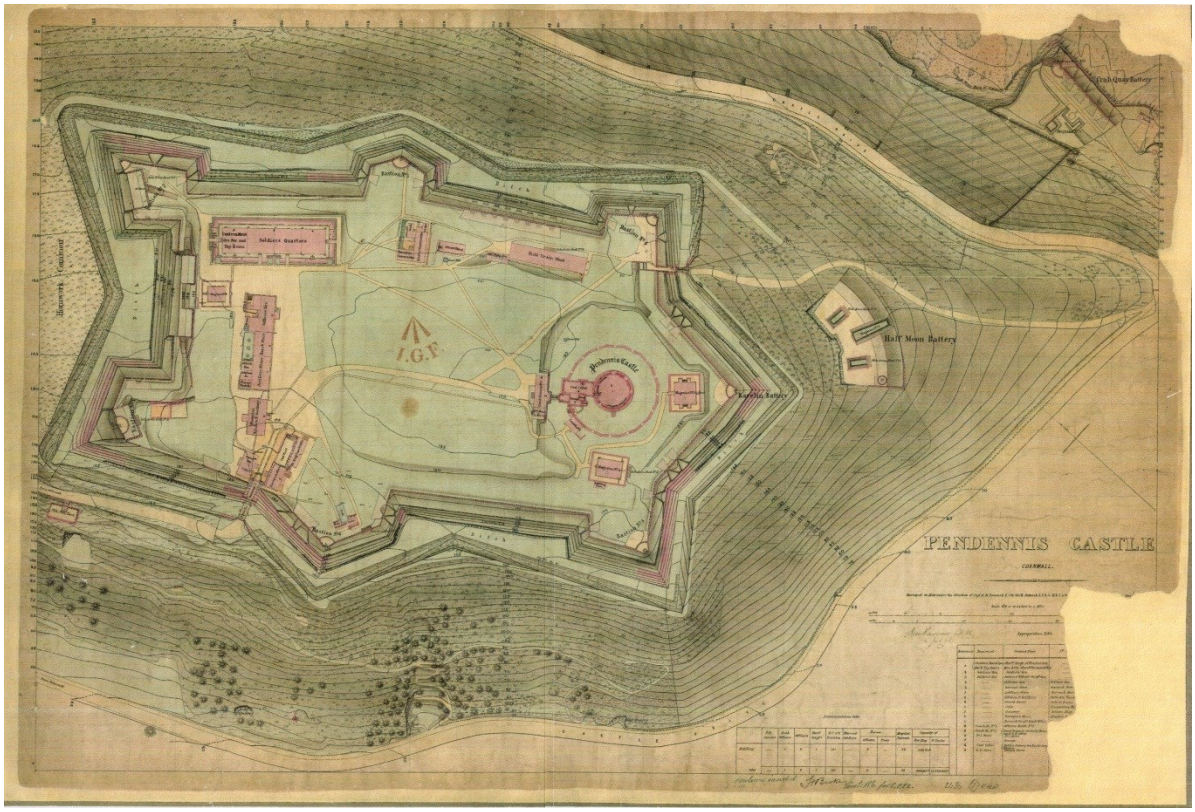


Fig 7.3 Pendennis Castle, Half Moon and Crab Quay Batteries as recorded in 1866 (PRO WO78/2636).

Fig 7.4 A coastal battery to the east of Trefusis Point was only recorded on a 1781 chart of Falmouth and the Carrick Roads (MCO59587) (United Kingdom Hydrographic Office D923.7).

7.2 Admiralty charts

Historic charts from the UK Hydrographic Office (UKHO), Taunton, were assessed as part of this study together with other charts held by CAU (Appendix 5). It should be noted that the main purpose of charts is for the safe navigation of ships and shipping at sea, with the earlier charts' coordinates fixed via triangulation and transects at sea creating an inaccuracy factor. Carr (1962) points out that charts prior to the late 18th century should be treated with the 'greatest reserve' and that even up to the mid-19th century much of the detail on historic maps and charts is inaccurate.

Appendix 5 shows the Admiralty charts inspected as part of this project. The charts added little extra detail as a lot of the project area had already been covered by estuary audits (e.g. Helford, Fal, Fowey), rapid identification surveys (e.g. Tamar, Roseland), National Trust landscape assessments (e.g. Buckland Abbey) and in depth analysis of fortifications (e.g. Plymouth and surrounding areas) which generally undertake an analysis of historic maps and charts. However, sites were identified from charts, mainly small short-lived coastal batteries (e.g. Trefusis Point, Falmouth; Fig 7.4), small quays, boat and shipyards, ropewalks (e.g. Fowey, Plymouth), ferry crossings (Hooe Lake) and fish cellars (e.g. Polvarth, St Mawes). First World War submarine booms recorded on Admiralty charts were added in Mount's Bay and Falmouth.

7.3 Topographic illustrations

In 2011, *A coastal historic resources guide for England* was published by The Crown Estate with the intention of promoting the use of historic works of art as a way of assessing and understanding coastal change (McInnes and Stubbings 2011). The guide aimed to identify which artists illustrated the coastline of England with the greatest topographical accuracy between 1750 and 1940 and thereby establish which of those artists and their works make the most significant contribution to our understanding of long term coastal change. A list of the paintings, watercolours and prints identified for south west England is listed within this guide.

Subsequently, in 2016, a report for Historic England was published*, Coastal Heritage Risk – Imagery in Support of Heritage Planning and Management in South-West England* (CHeRISH – McInnes 2016). McInnes reviews the artists, their artworks and photography of south west England. For Plymouth these include William Turner and Frederick Richard Lee, for the south coast of Cornwall: JMW Turner; William Daniell; John Brett; John Mogford; Frederick John Widgery, Charles Napier Hemy, Edward William Cook, Richard Thomas Pentreath, as well as the Newlyn School of Artists including Stanhope Forbes, Walter Langley, Lamorna Birch, Harold and Laura Knight, etc. In addition there are postcards and photographs. The Gibson Brothers photographed coastal and maritime scenes around the Penwith peninsula. One of the largest private collections is the Francis Frith Collection which contains about 125,000 images of Britain's towns, villages and landscapes dating from the mid-19th century.

Case study sites (CSS) from McInnes (2016) which are relevant to the South Coast Cornwall RCZAS project area include: Plymouth (CSS 14); Cornish harbours (CSS 16); St Michael's Mount (CSS16); Prehistoric Promontory Forts and Later Cliff Castles (CSS 17); and Mining and Engineering Heritage (CSS 19).

On account of the wealth of images produced of Plymouth, often relating to its military, maritime and naval heritage, it was possible to illustrate the chronology of development and change in CSS14. The review of Plymouth focusses on changes resulting from human activity rather than natural change. Interpreting historical images in this way provides more information on the addition, alteration or loss of heritage assets over the decades and centuries, thereby providing a more complete record of the city's past (McInnes 2016, 153).

Most of the Cornish harbour case studies were located along the south coast of Cornwall and included Polperro, Polkerris, Mevagissey, Gorran Haven, Mullion, Newlyn Harbour, Mousehole and Lamorna.

Prehistoric Promontory Forts and Later Cliff Castles (CSS 17) includes the cliff castles of Treryn Dinas and Carn Les Boel, as well as the Henrician artillery fort at St Mawes (McInnes 216, 178–83).

Mining and Engineering Heritage (CSS 19) includes detailed images to illustrate methods of civil engineering for Plymouth Breakwater, Plymouth Pier (destroyed in Second World War) and Brunel's Royal Albert Bridge at Saltash.

8 Assessment of HER, NRHE and other datasets

8.1 HER data

Sites and Monuments and Events layers were provided by the three HERs in the project area: Cornwall Council, City of Plymouth and Devon County Council. The data for Cornwall and Devon was available via an HBSMR database interlinked with GIS and Heritage Gateway whereas the data for Plymouth was stand alone, made available via separate GIS layers and accompanying excel databases.

All three HERs form comprehensive datasets and while each one had its differences in terms of the coverage of sites there was generally a good level of spatial accuracy and descriptive detail, however, there were areas where substantial improvement was made. Ferry crossings, for example, were a neglected area and each HER had a different approach. The project also improved the coverage of recorded quarries especially in the area of Cattedown, Oreston and Hooe on the River Plym, where limestone quarrying was once very important. Several records of lime kilns were also added in these areas.

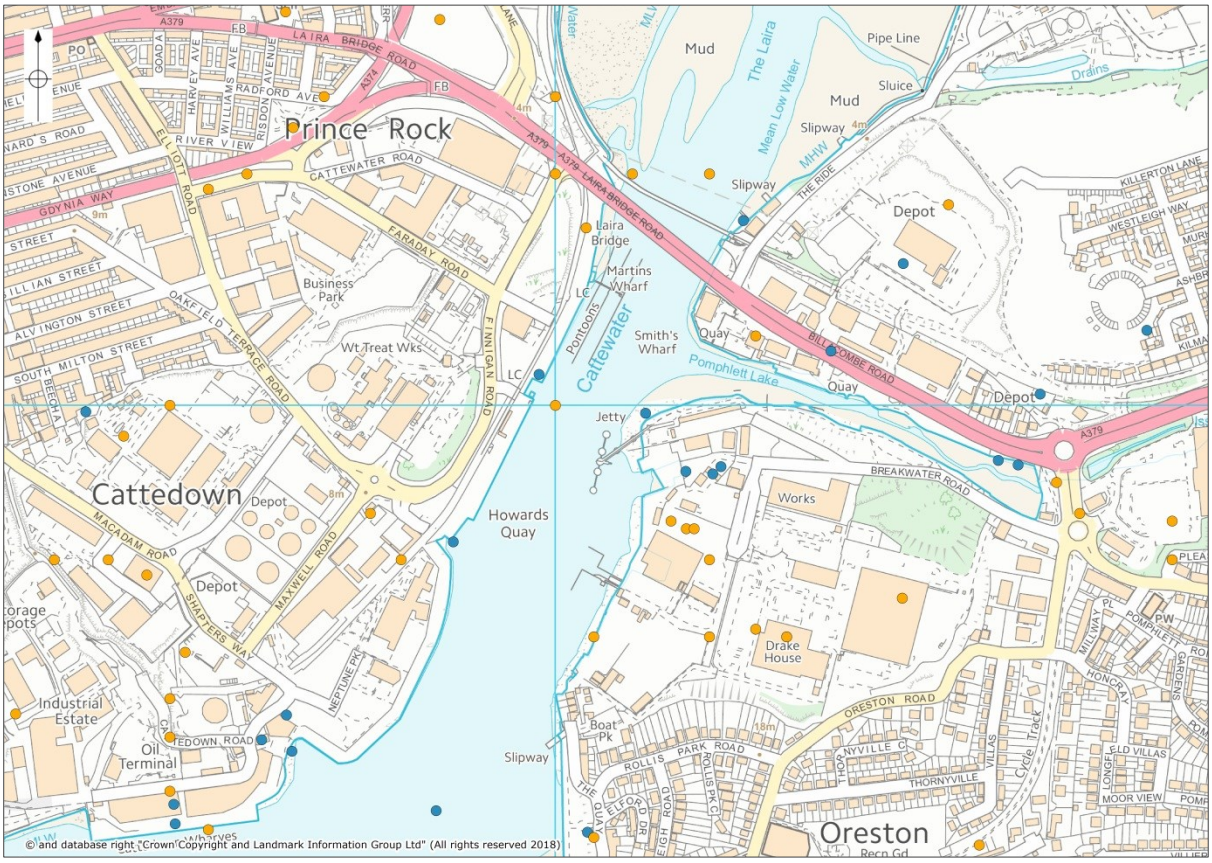


Fig 8.1 Existing sites within the Plymouth Sites and Monuments Record (orange) and new, updated and amended sites identified by the project (blue).

8.2 NRHE and NHLE data

Point, line and polygon data for monuments and events was provided from Historic England's National Record of the Historic Environment (NRHE). Data on designated sites was consulted via the NHLE pages of the HE website.

The NRHE dataset bolstered the evidence base but often had little further information compared to the HER data, especially for landward records. Where the NRHE was particularly useful was in providing further detail below Mean High Water and in particular, for wrecks (see below Section 8.4).

The NHLE data for designated sites such as Scheduled Monuments and Listed Buildings was useful because of the detailed information contained in the supporting descriptions, however, for a majority of sites this had already been incorporated into the HER.

8.3 RCZAS NMP South Cornwall Coast

Cornwall has been covered by a NMP project, and the Tamar area of Devon covered by a rapid NMP-style project, both undertaken by Cornwall Archaeological Unit.

The NMP for Cornwall was one of the first county-wide projects, started in the early days of digital transcription and being completed in 2006 before the advent of lidar (Young 2007). The dataset includes vector data but also raster data in the form of several inked-up quarter sheets. These sheets were scanned and geo-rectified as part of its incorporation into the HER. The features mapped for Devon have been transcribed to a digital dataset.

During the project a few of the geo-rectified quarter sheets were not available via the Cornwall HER, however, a majority of sites have already been inputted as records into HBSMR.

As the project areas have been comprehensively studied by NMP style projects few new sites were added from aerial photographs. Vertical aerial photography available via Cornwall Council (2000; 2005), Google Earth (various dates) and the Channel Coast Observatory (various dates) provided further descriptive detail for many new and updated records.

8.4 Wrecks

When dealing with shipwrecks it is very important to take into account historical variations in UK wreck recording. Many vessels will have been lost with no record being made. This is particularly and very obviously true of prehistoric losses. Roman loss records are extremely unusual and early medieval records are rare and often uninformative. Medieval records, particularly prior to the 13th century, are also unusual. Systematic loss recording only commenced in the 18th century with Lloyd's List, although it cannot be relied upon as a comprehensive record until well into the 19th century, and then only for larger vessels (Wessex Archaeology 2008, 23).

The NRHE dataset records wrecks as point data and records a total of 1,975 wrecks within the project area. The dataset also includes considerable descriptive information outlining the way by which the vessel was lost. The HERs contained fewer records, concentrating on locations corresponding with Protected Wreck sites and hulks abandoned in the estuaries. Large concentrations of hulked and abandoned vessels can be found in these areas, especially around Hooe Lake on the River Plym. The work of Martin Read and his students at the University of Plymouth was very helpful in identifying these hulks (see below, Appendix 7) – this work has been bolstered with the use of recent aerial photographs.

Offshore in the area of Plymouth, the survey work and recording undertaken by 'The Ships Project' (see below, Appendix 7) was also of great use in providing further evidence especially in terms of historical background and better spatial accuracy.

Spatial accuracy in relation to wreck data is one of the greatest problems and after filtering 455 wrecks were entered into the final project GIS database. While the NRHE data includes a precision field to better understand and capture this variability, this project shows that it could be improved by assessing it against current dive websites and survey work such as The Ships Project. Furthermore, local knowledge of place-names and access to digital historic maps also helped to better fine-tune the likely area of many wrecks (with all the usual caveats to wrecks that can be applied).

8.5 National Trust HBSMR data

Having a dramatic coastline, the project area contains a high number of National Trust properties. A majority have benefitted from landscape assessment and only a handful of properties are covered by the old 'greyback reports' (e.g. Erth Barton on the River Lynher) although these do contain a solid baseline of information. Therefore, a large number of sites, monuments and buildings have been identified at a fine-grained level within the Trust's properties. This data can now be inspected online via a GIS-based interface (Explore National Trust Heritage Records website).

Many of the sites identified within the Trust's properties have been added to the relevant HERs. However, recently conducted assessments on the Lizard (Parkes 2017) and at Buckland Abbey (Blaylock and Dudley 2016) had not yet been incorporated. In these areas, key monuments and buildings in relation to importance and the character of the place were added to the project GIS database.

8.6 Portable Antiquities Scheme

The high level Portable Antiquity Scheme (PAS) data was downloaded as an Excel spreadsheet, and converted to a shapefile into the project GIS, where sites falling within the project area were selected as a separate dataset totalling 2,769 records. A cautionary approach to the data, in line with the PAS, was taken in revealing the *precise* location of finds, resulting in only five sites, mainly lithic scatters, taken forward to the GIS database. Additionally, a rapid visual appraisal by the project suggested a good concurrence of PAS finds in the general areas of sites, monuments and buildings already within the HER.

8.7 Receiver of Wreck

Information on 'wreck' (recovered artefacts) declared to the Receiver of Wrecks up to and including 2011 is already in the NRHE.

8.8 Lidar

The lidar data available from the Channel Coastal Observatory was rapidly inspected for the project area. However, this contains a very limited number of visualisations compared to those that would be inspected as part of a full NMP project. There is also incomplete coverage and areas have been surveyed at different resolutions, and none of the datasets have been processed specifically for the investigation of the historic environment. The lidar data was assessed in relation to the existing HER and NMP datasets and the additional vertical aerial photographs available digitally, including those published via Channel Coastal Observatory, Google Earth and the aerial photographs held by Cornwall County Council (which also cover the coastal margin of Devon).

8.9 Borehole data

Several geological borehole logs are available for the project area from the British Geological Survey (BGS). These can be mapped into GIS using their WMS service but the associated logs are scans of paper records and would have to be manually downloaded and input into the system. These logs are described from a geotechnical viewpoint rather than a palaeoenvironmental or geoarchaeological perspective, so lack some of the detail normally required. It may be possible to reassess the cores if they are still held by the BGS.

9 Assessment of results and potential

9.1 Overview of results: new and enhanced data

Overall, the project added, updated or amended 2,737 records. The tables in Appendix 6 show the new sites created for each local authority (2,294 for Cornwall, 82 for Devon and 227 for Plymouth). The following sections provide an overview of the new sites added.

9.1.1 Prehistoric and Romano-British

Twenty-three prehistoric and Romano-British sites were identified by the project as the HERs already had extensive and thorough coverage including NMP assessment. No new prehistoric sites were added in Devon or Plymouth.

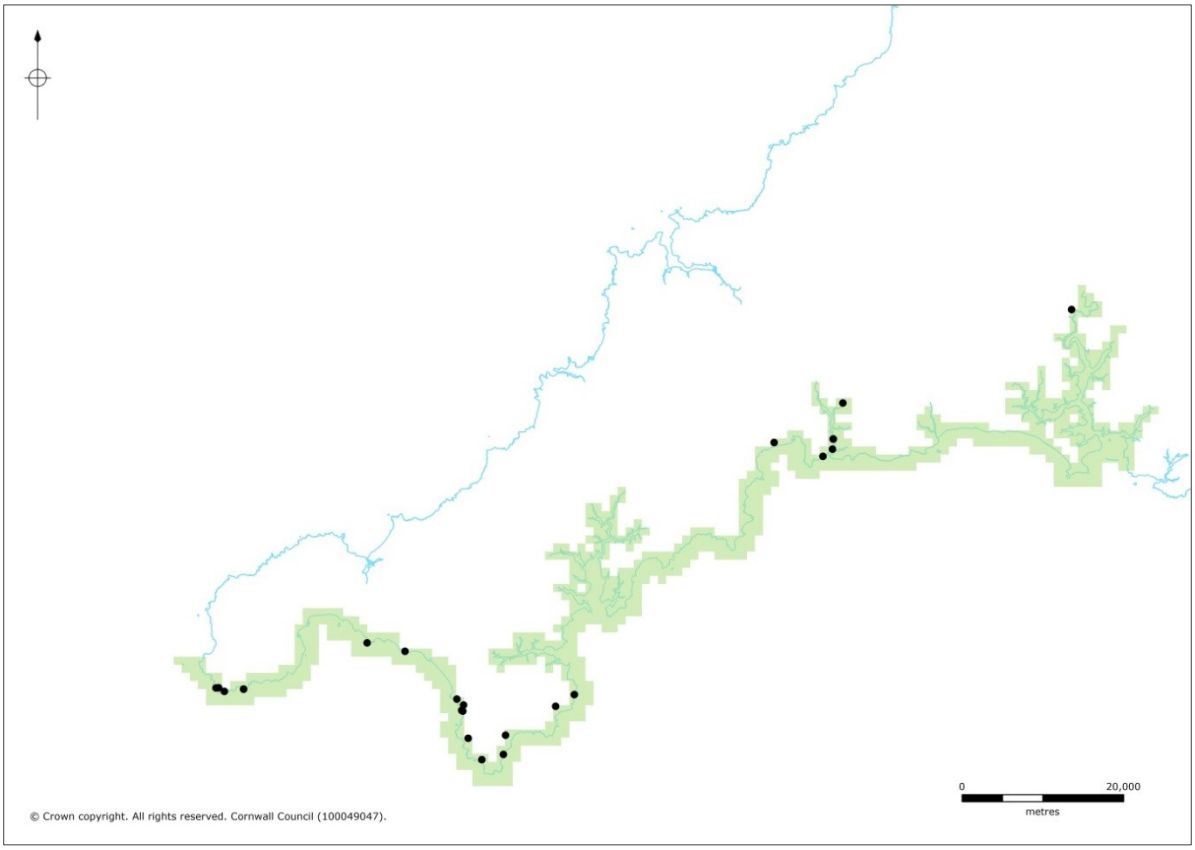


Fig 9.1 New prehistoric and Romano-British sites added by the project.

A prehistoric occupation site on Maker Heights was updated to a Mesolithic occupation site (MCO23192).

Six potential barrows were added in Cornwall, all identified by archaeological assessments of National Trust properties (MCO60503; MCO60504; MCO60652; MCO60653; MCO60663; MCO59604). Buried land surfaces, at Poldhu Cove (MCO59647) and Church Cove (MCO59646) on the Lizard were also added. These records were derived from past palaeoenvironmental work, the results of which had been collated by Vanessa Straker in the palaeoenvironmental summary of *Goon, Hal, Cliff and Croft* (Dudley *et al* 2011). Place- and field-name evidence suggested the site of four potential rounds, or prehistoric enclosures, in Cornwall. At Corgerrick, on the Lizard, assessment by CAU (Johns 2003) suggests the later medieval settlement may have been built within a round, the curvilinear enclosing bank partially preserved on the north side of the farm (MCO60682).

9.1.2 Early medieval and medieval

Only two early medieval sites were added. In Cornwall, place-name evidence together with field-names recorded on the *c*1840 Fowey Tithe Award suggests the site of the former settlement of Trewhale. The Cornish language *tre*- place-name suggests an early medieval date.

In Plymouth, analysis of historic maps suggested that the now destroyed church at Lower Ernesettle was built in a sub-circular enclosure (perhaps prehistoric?), suggesting the possible site of an early Christian site or *lann*. The site was identified by Firth *et al* (1998) but had not been entered into the Plymouth HER. It has been built over in the 20th century.

No medieval sites were identified in the Devon and Plymouth parts of the project area but 97 new sites were added in Cornwall. A majority of these were in the area of the Fowey Estuary, having been already identified by the Fowey Estuary Audit (Parkes 2000), but not previously entered on the HER. Of the 97 sites, 17 were quays (all on the River Fowey), 15 were trackways, and place-name records for 13 settlements were added, including the possible location of the 'lost' settlement of Treveglos, near Cadgwith on the Lizard.

9.1.3 Post-medieval

Monuments and buildings dating to the post-medieval period form the majority of the data recorded by the project, with 1,854 new sites added across the project area.

This included a wide range of monument types, the most common of which were wrecks. In total 389 wrecks and potential wrecks dating to the post-medieval period were added. The data was derived from a variety of sources, principally the AMIE database of the NHRE and to a lesser extent the estuary audits for the Helford, Fal and Fowey and Martin Read's surveys of hulks on the Rivers Tamar, Lynher and Plym.

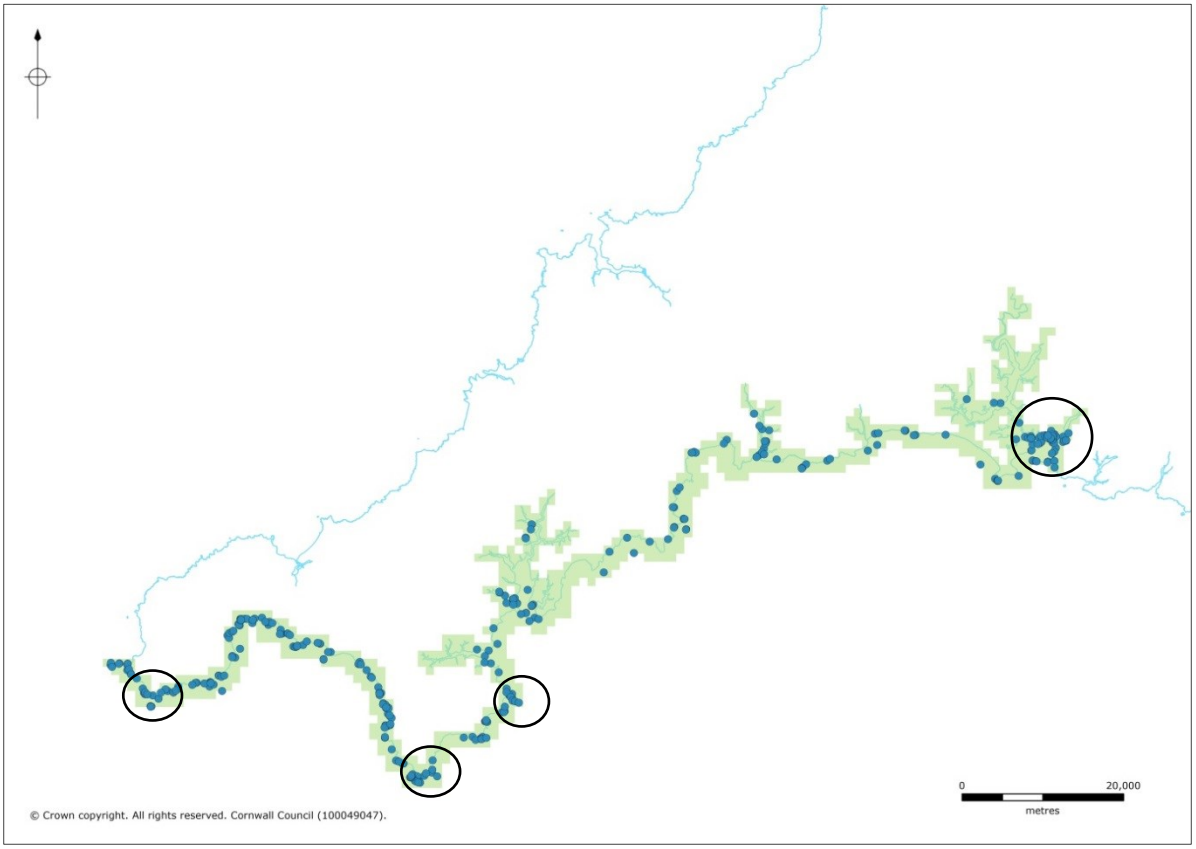


Fig 9.2 New post-medieval wrecks and potential wreck sites added by the project with concentrations of features circled.

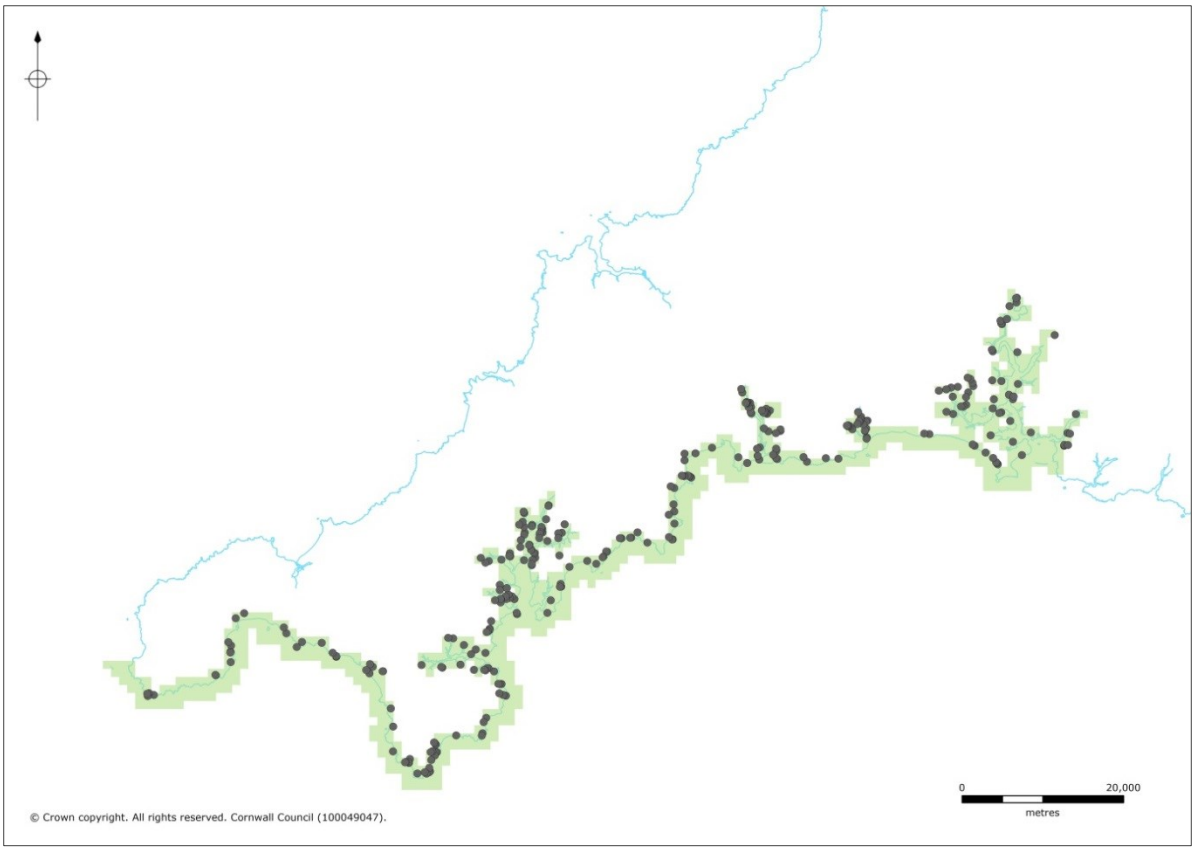


Fig 9.3 New post-medieval quarry sites added by the project. Note the concentration of features in the estuaries and on the Lizard.

While there is a good spread of post-medieval wrecks there is a notable concentration on the western Cornish coast, in particular the Lizard (especially Lizard Point and The Manacles) and in the vicinity of the Runnel Stone (a rock outcrop offshore Tater-du, West Penwith). Another concentration is within Plymouth Sound, in the anchorage off Sutton harbour and Mount Batten Point. The wrecks off the Lizard principally occurred due to navigation errors, poor visibility or a failure to 'make' around Lizard Point whereas the wrecks in Plymouth Sound are mainly ships that dragged their anchors in gales (Fig 9.2).

Industrial features also form a significant part of the data added. Quarries form a considerable portion of the new sites with 306 added. In the area of Oreston and Cattedown in Plymouth further records for limestone quarries were created, and the location of seven former lime kilns added (Fig 9.3). Other notable concentrations of quarry sites added relate to the exploitation of gabbro in the area of St Keverne on the Lizard and elsewhere, small scale quarrying activity on the edge of the upper reaches of many of the estuaries.

Mining features were principally recorded in the form of adits, mine shafts and engine houses recorded on historic Ordnance Survey maps. The OS maps were useful to add extra detail to existing monument records including a Hoffman kiln at the former Rumleigh brick works on the Devon side of the River Tamar. Within the extent of the Cornish Mining World Heritage Site, in particular the Tamar Valley and the area of Trewavas Head, Cornwall, archaeological assessments of mining landscapes were particularly helpful in identifying new sites and amending existing records e.g. Bedford Mines (Buck 2003). Outside of the World Heritage Site concentrations of mining features were added in the areas of St Austell and Perranuthnoe, both in Cornwall (Fig 9.4).

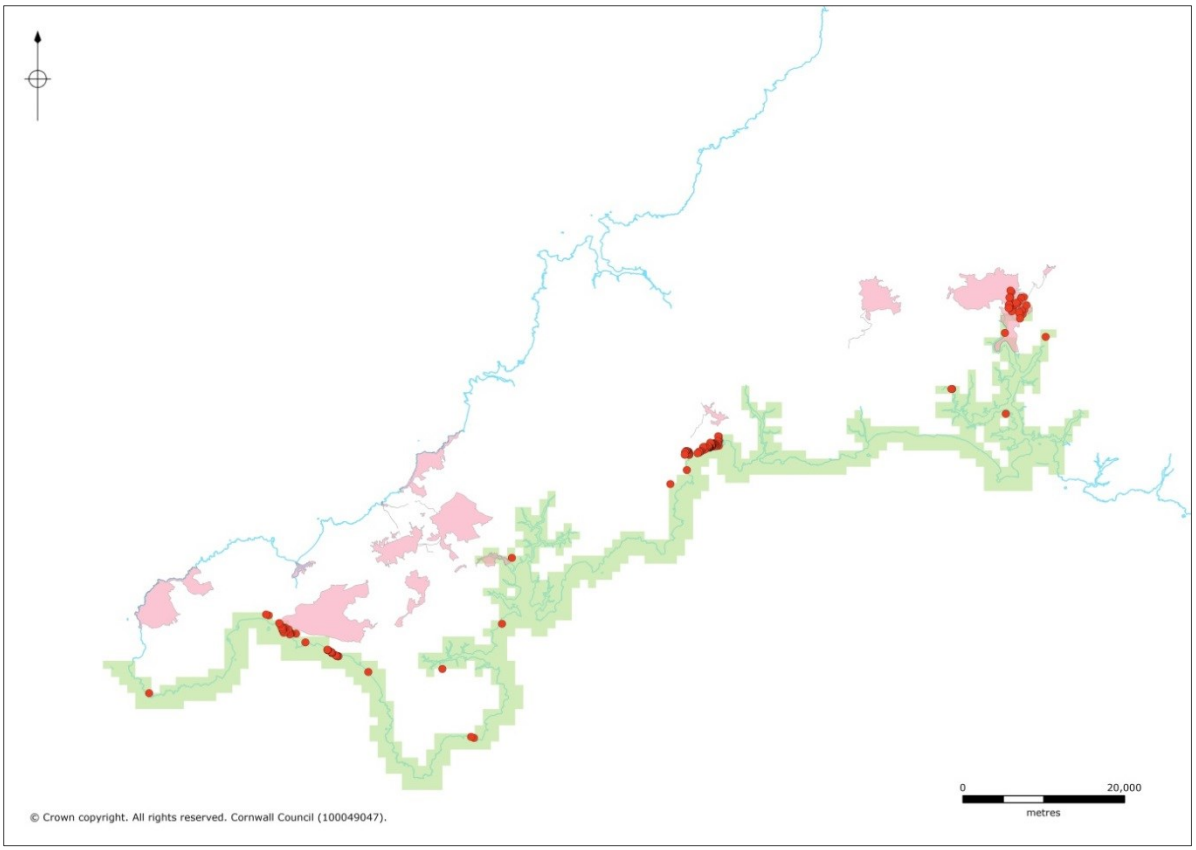


Fig 9.4 New post-medieval mining sites added by the project with the areas of the Cornish Mining World Heritage Site shown (pink).

Using a combination of the estuary audits and historic OS mapping a large number of small post-medieval quays, boat houses and landing points were added (Fig 9.5). The greatest concentrations are found on the river estuaries principally the Fal, Fowey, Tamar and Lynher including a large number of smaller quays in the port areas of Falmouth (eight added) and Plymouth (22 added), many of which are still extant. Several of the landing points added were associated with ferry crossings recorded on historic maps and charts. Overall, 13 ferry crossings were added, all but one within the Tamar, Lynher and Plym estuaries.

The historic OS maps available were generally of great use in terms of military sites, except for large military installations in the area of Plymouth, which, for publicly accessible maps, were left intentionally blank by the surveyors. Overall, a limited range of post-medieval military sites were added, predominantly batteries, firing ranges and military buildings. Where added, these were often recorded on archaeological assessments and reports where further mapping and charts had been analysed and fieldwork undertaken. The intense concentration of military sites around Plymouth made analysis complicated and time-consuming but of particular use was *The Historic Defences of Plymouth* by Pye and Woodward (1996). Overall, three new sites were added in Plymouth, four in Devon (all at Staddon Heights) and 21 in Cornwall (Fig 9.6).

A monument type which is distinctive of Cornwall, with a restricted distribution and limited numbers in south east Devon, is the fish cellar. No monuments of this type were added in Plymouth and Devon. In Cornwall, 25 new post-medieval sites were added of which 15 are either documentary sites or demolished structures. A further three existing records of post-medieval fish cellars were updated using descriptions from existing recording work or from the analysis of historic maps and charts (Fig 9.7).

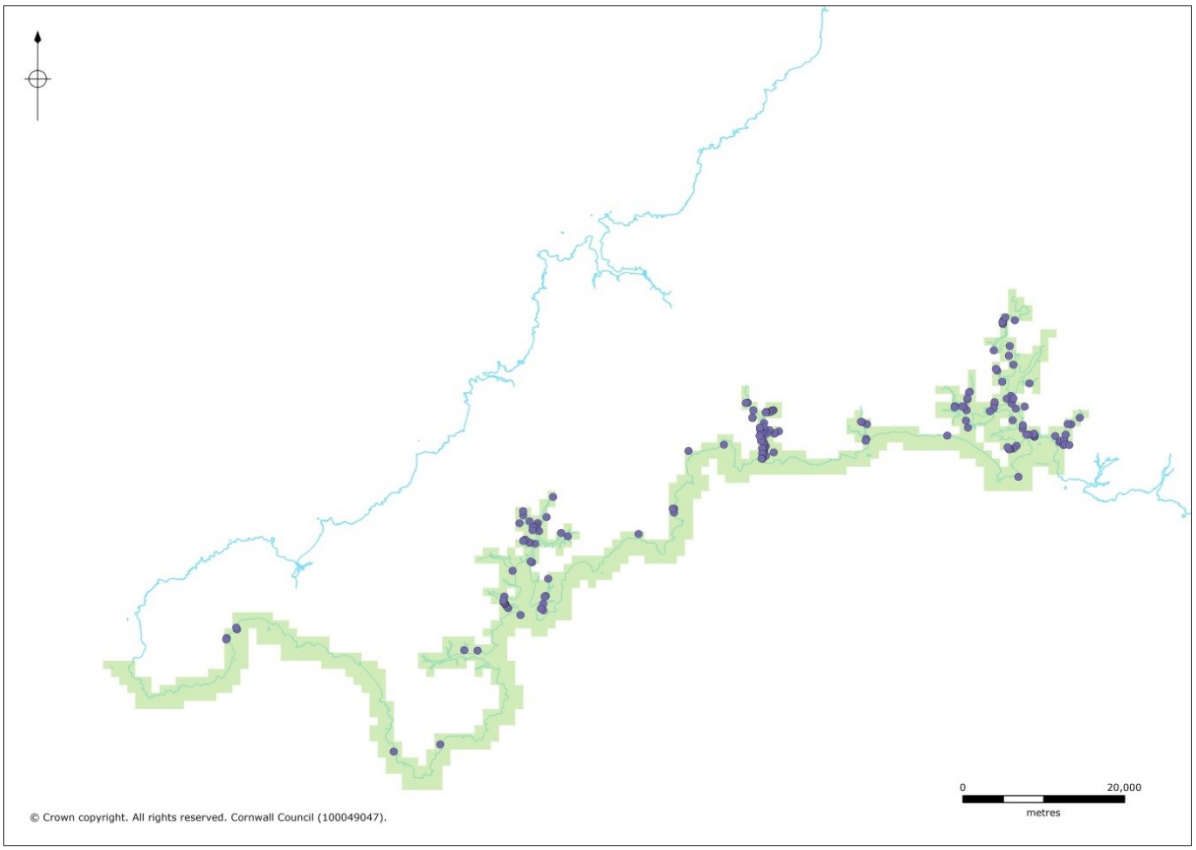


Fig 9.5 New post-medieval quays, boat houses and landing points added by the project.

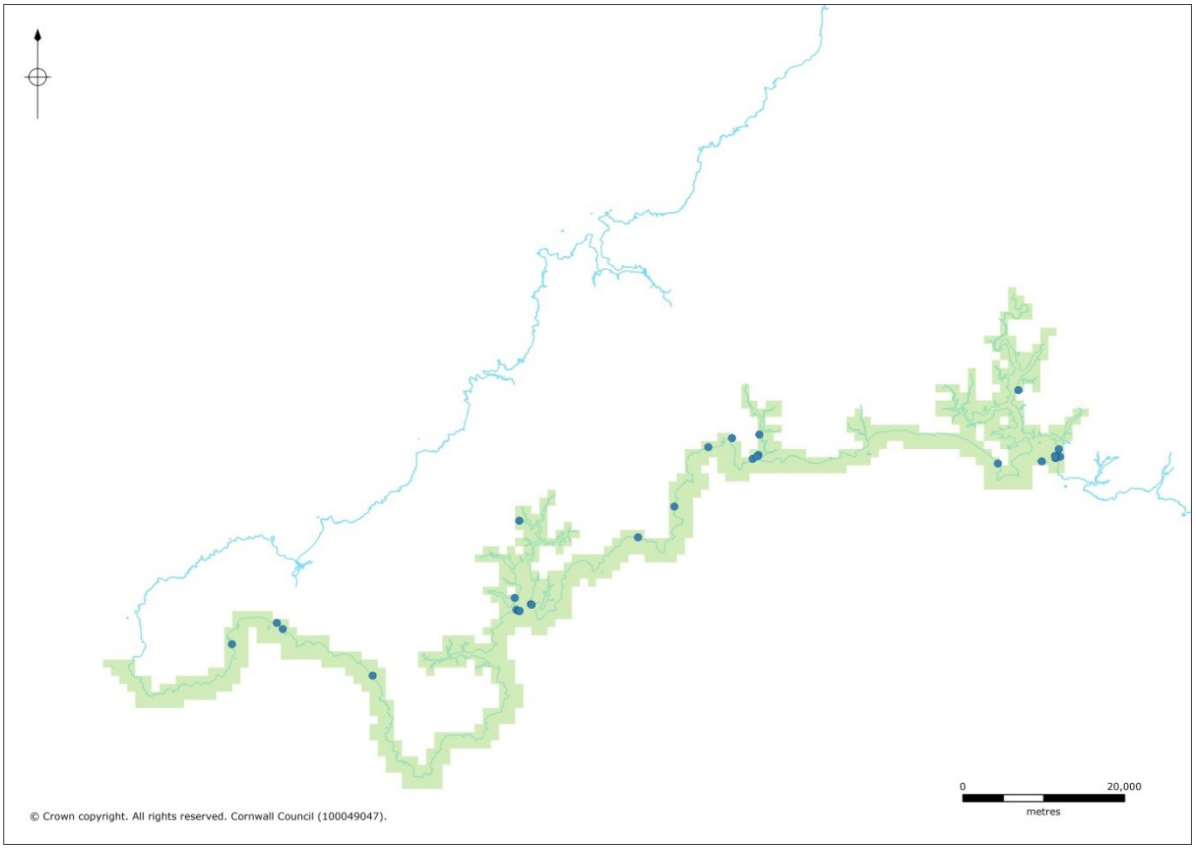


Fig 9.6 New post-medieval military sites added by the project.

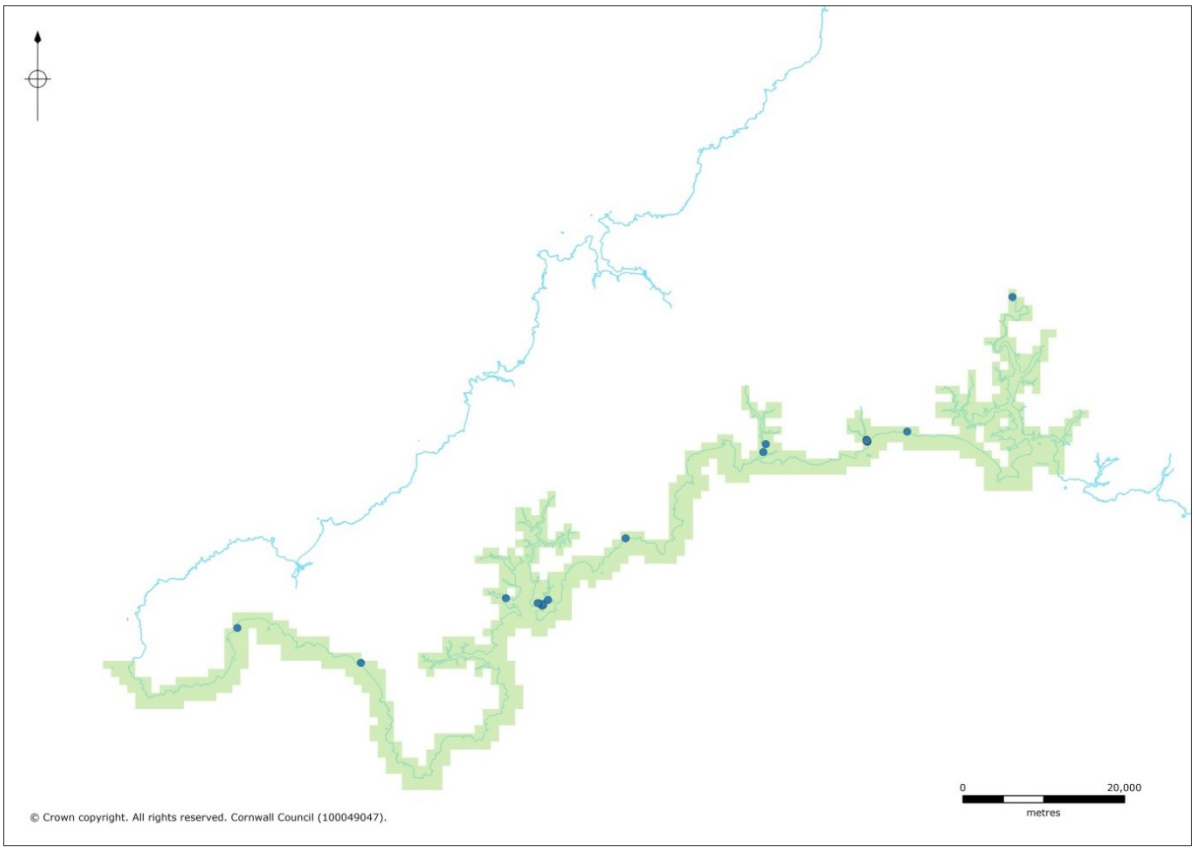


Fig 9.7 New post-medieval fish cellars added by the project.

In terms of ancillary industries associated with the naval infrastructure of Plymouth a notable documentary site identified by the project was a biscuit factory on Commercial Wharf, Barbican. The factory was recorded as a 'Biscuit Manufactory' on the c1880 OS and was operated by 'Serpell and Company' who originally made ships biscuits. The factory was still in operation on the 1933 OS map but is no longer extant.

Graeme Kirkham's unpublished research on the sanding ways and coves of Cornwall was of great help in mapping sites related to this activity as much of the reference material is taken from documentary leases (beyond the remit of this project). Graeme kindly gave the project access to his database resulting in 19 sites being added including sanding coves and sanding ways (Fig 9.8). In terms of data entered this included eight SAND WORKINGS to record sanding coves and ten TRACKWAYs to record sanding ways and a TUNNEL at Porthgwarra that was cut to help access the coast for sand. Sanding coves and sanding ways are not monument types recognised by Historic England, so in order to get these local terms into the Cornwall HBSMR they were included in the Name field e.g. PERCOLAN BEACH - Post Medieval trackway, Post Medieval sanding way.

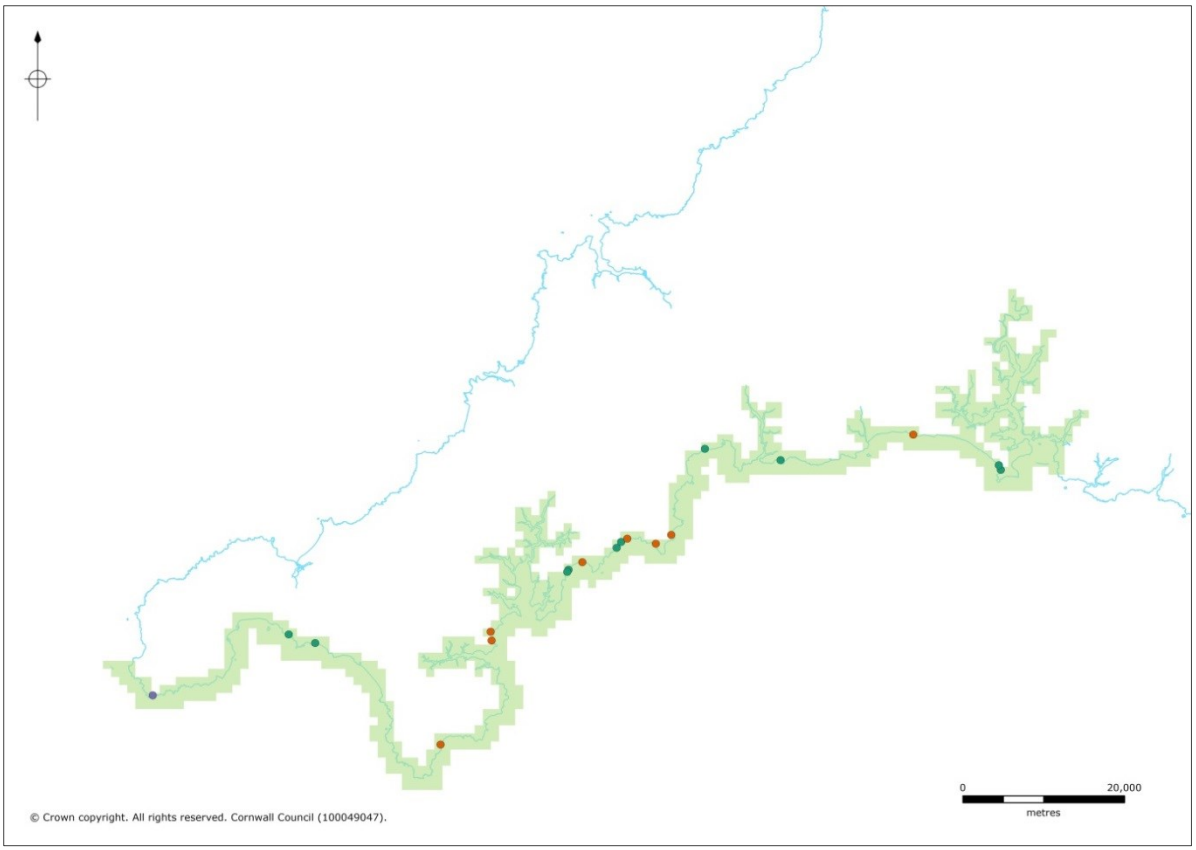


Fig 9.8 New post-medieval sanding ways (green), sanding coves (orange) and a tunnel cut to access sand (purple) added by the project.

In terms of the maritime character of Cornwall and Devon, there is a strong relationship with boat building in the post-medieval period. In total, eight new boat and shipyards were added; five in Cornwall and three in Plymouth, all within the estuaries (Fig 9.9). In Cornwall, two were added in the Falmouth area with three more at Fowey and Polruan (gleaned from the Fowey Estuary Audit and from analysis of historic maps). In Plymouth, they were at Stonehouse (extant), Turnchapel Wharf (extant) and Cattedown (demolished). Additionally, 12 documentary sites of ropewalks were identified: nine in Cornwall and three in Devon (Fig 9.10).

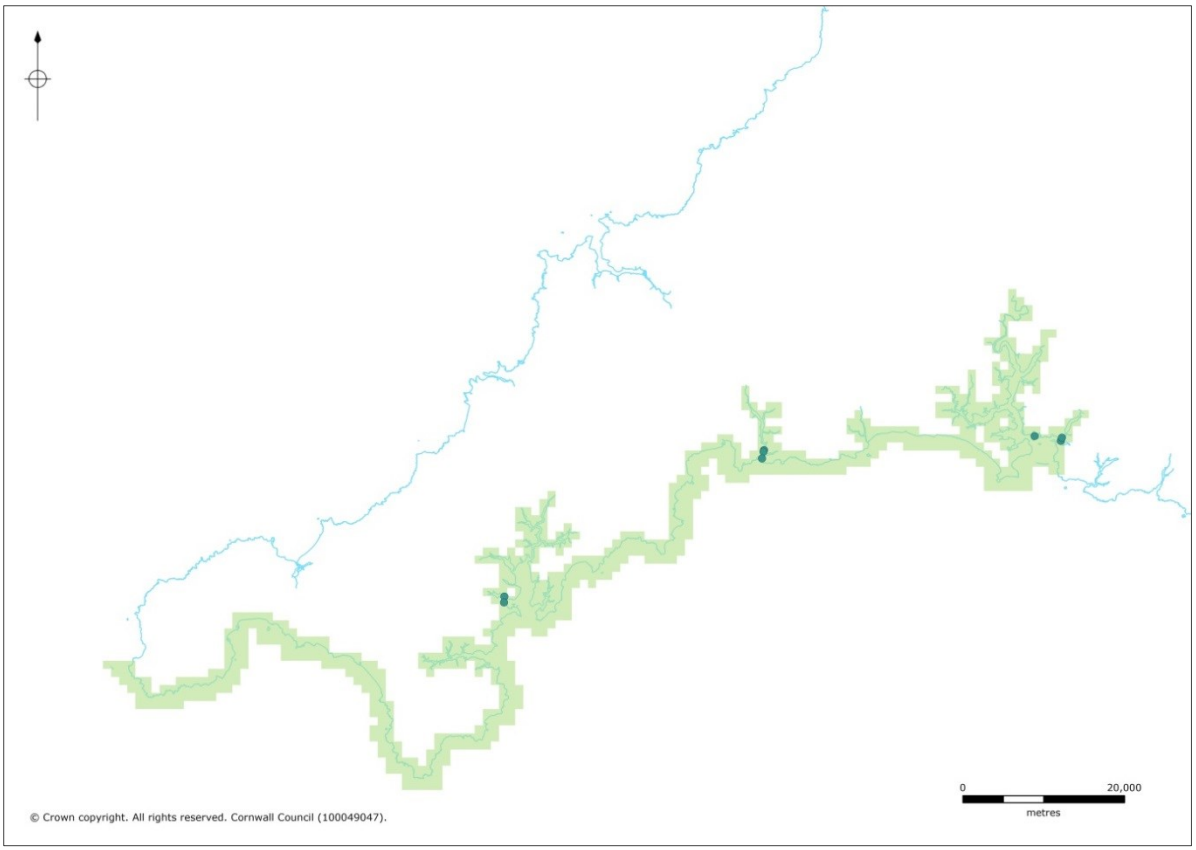


Fig 9.9 New post-medieval boat yards and shipyards added by the project.

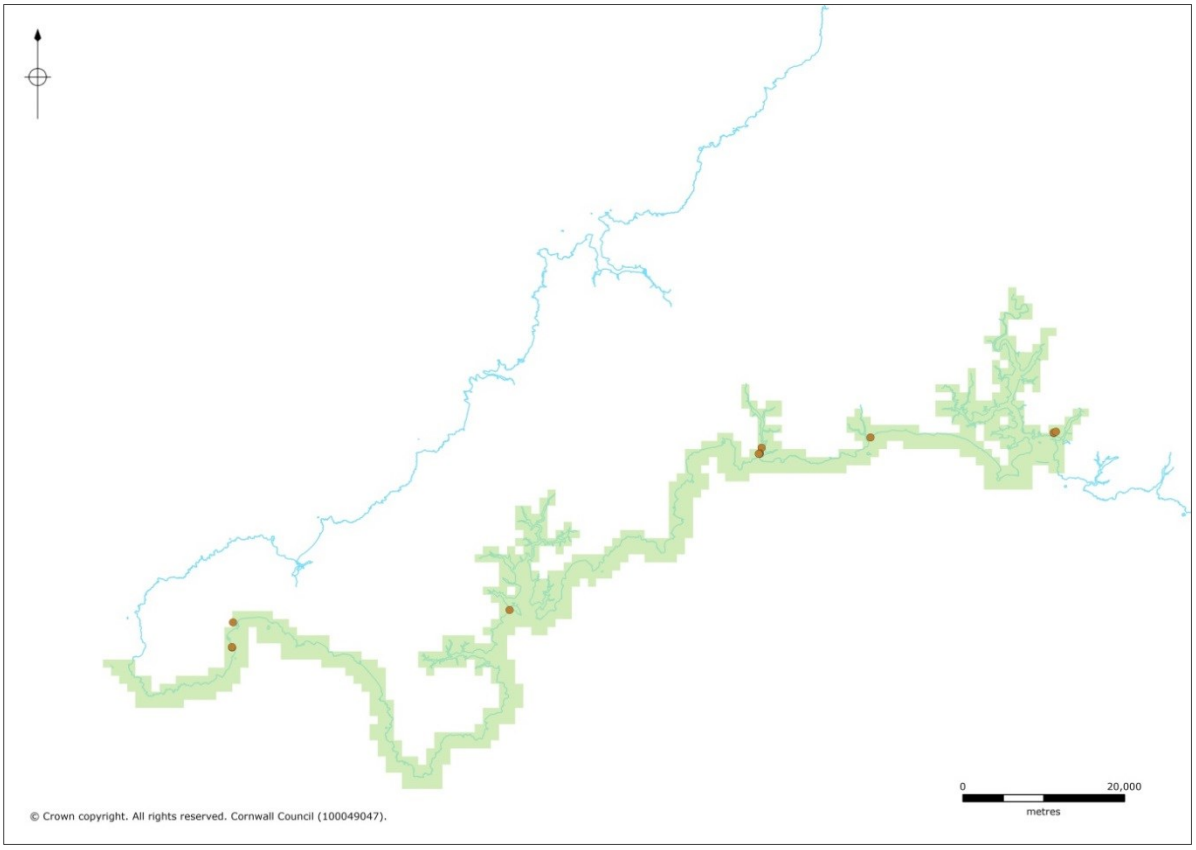


Fig 9.10 New post-medieval ropewalks added by the project.

The reclamation of the upper reaches of the estuaries in the post-medieval period is a notable feature of the project area. On landed estates several small inlets were annexed and dammed to form ornamental fish ponds. On the edges of the Tamar, areas of intertidal mudflats were embanked, and drainage systems created to help improve the ground to form meadows. In Plymouth, especially in the small tidal inlets around Devonport and Stonehouse, several tidal inlets were infilled to reclaim land for development, often the expansion of military installations and dockyards such as Devonport (Fig 9.11).

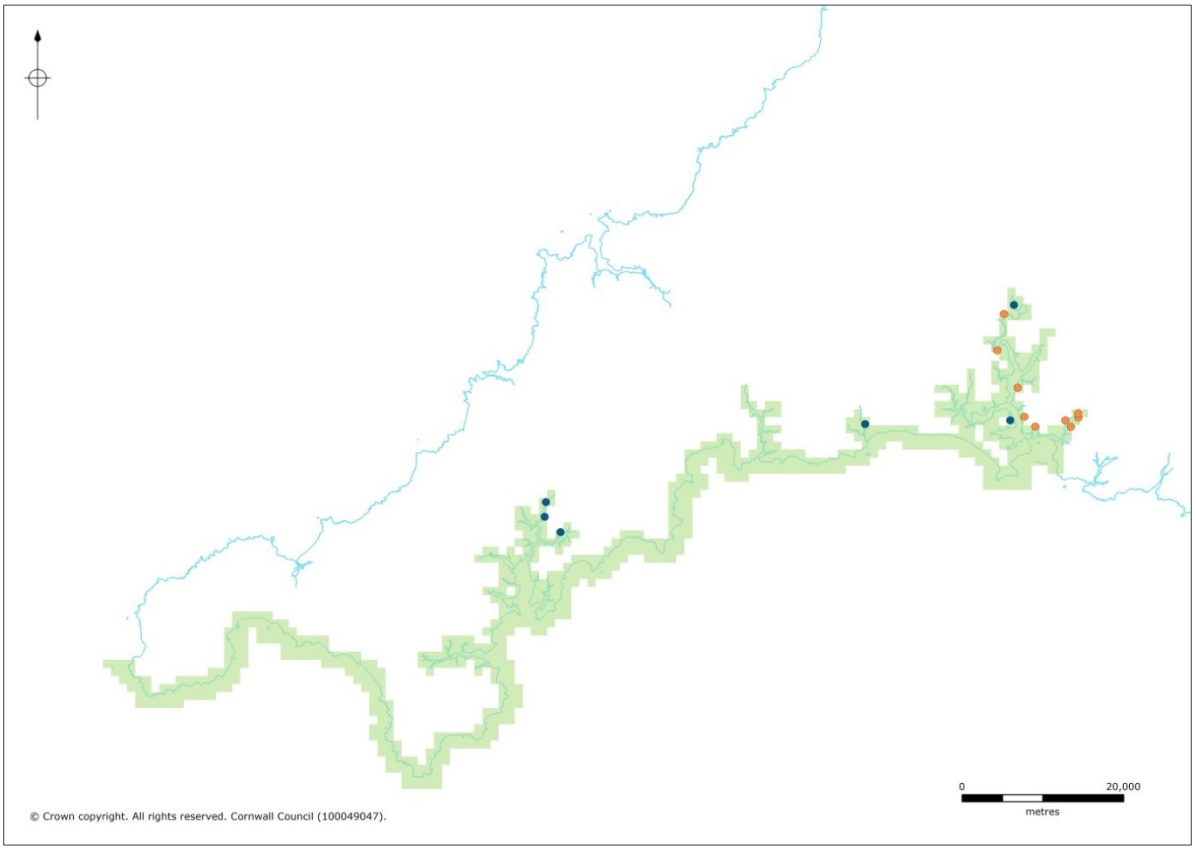


Fig 9.11 New post-medieval fish ponds reclaimed from small tidal inlets (blue) and intertidal areas reclaimed by embankments, drainage and sometimes made ground (orange) added by the project

9.1.4 **Modern**

Land reclamation continued into the modern period. At Weston Mill Lake, Plymouth, further reclamation was undertaken as part of the extension of the Keyham yard, Devonport. On the opposite bank of the Tamar, at Saltash, Salt Mill Creek was infilled as part of a refuse disposal site.

While undertaking the mapping stage it was decided to map military marker posts on the Rivers Tamar and Lynher erected in the late 19th/early 20th century to mark fouled anchorages and military sites. Many stand on the foreshore and are vulnerable to sea-level change. The principal source for recording this type of feature is the second edition 1 mile: 25-inch map dating to *c*1907. After an initial phase of mapping dozens of these features it was decided to map only those that were still recorded on modern maps. Overall, 185 Marker Post sites were added (Fig 9.12).

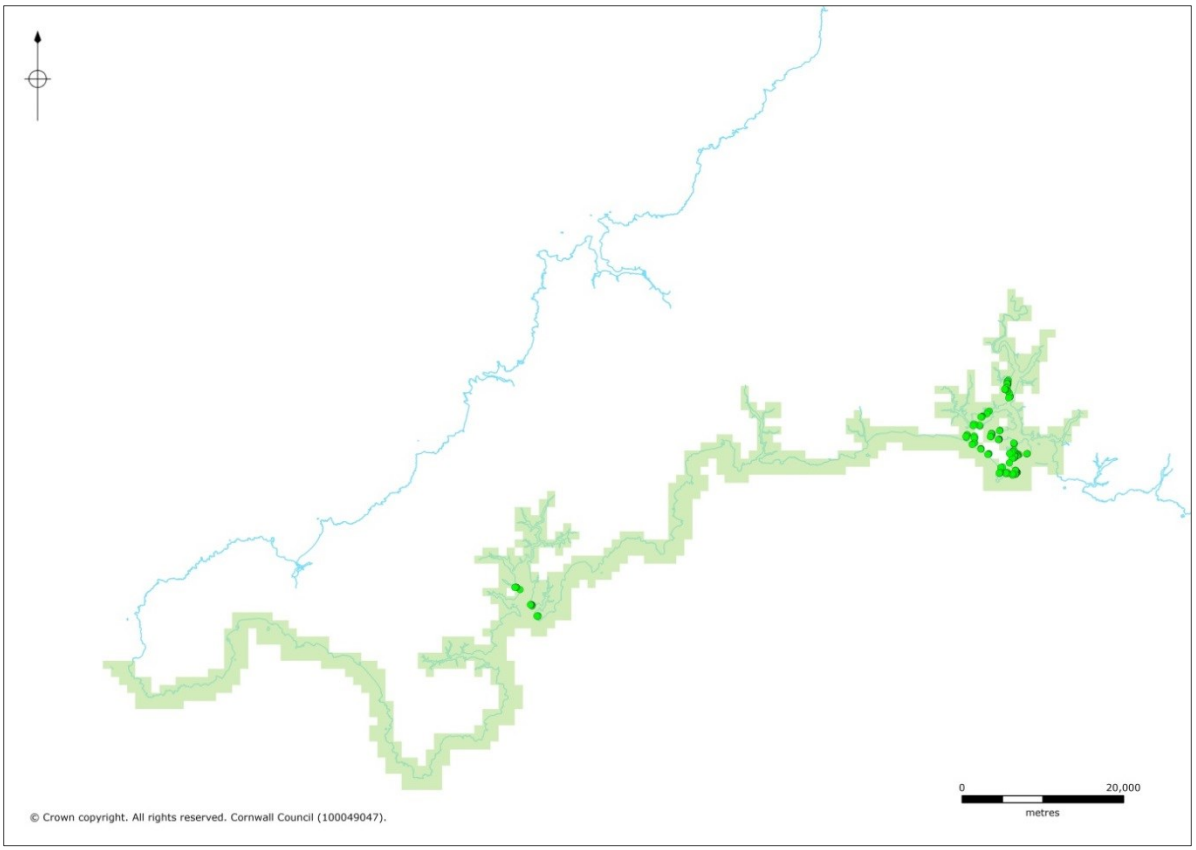


Fig 9.12 New modern marker posts added by the project.

Due to the widespread assimilation of the Defence of Britain (DOB) project's sites into the HERs only two modern military sites noted by DOB were added, these being an anti-seaplane obstacle on the East Looe River and a pillbox at Maenporth, near Falmouth. In terms of military sites, however, 40 sites were added (Table 9.1; Fig 9.13).

Monument Type	Cornwall	Plymouth	Devon
Anti tank wall	5		
Anti tank block	1		
Anti invasion defence site	1		
Anti seaplane obstacle	1		
Beach defence	1		
Beach scaffolding	2		
Chain home station	3		
Embarkation hard	0	2	
Gun emplacement	1		
Military buildings, camps and roads	4	3	
Officers mess	1		
Pillbox	2		
Q site shelter	1		
Radar station	4		
Royal naval base	0	1	
Royal naval hospital	0	1	

Searchlight emplacement and batteries	1		3
Slit trenches	1		
Total	30	7	3

Table 9.1 Modern military sites added by the project.

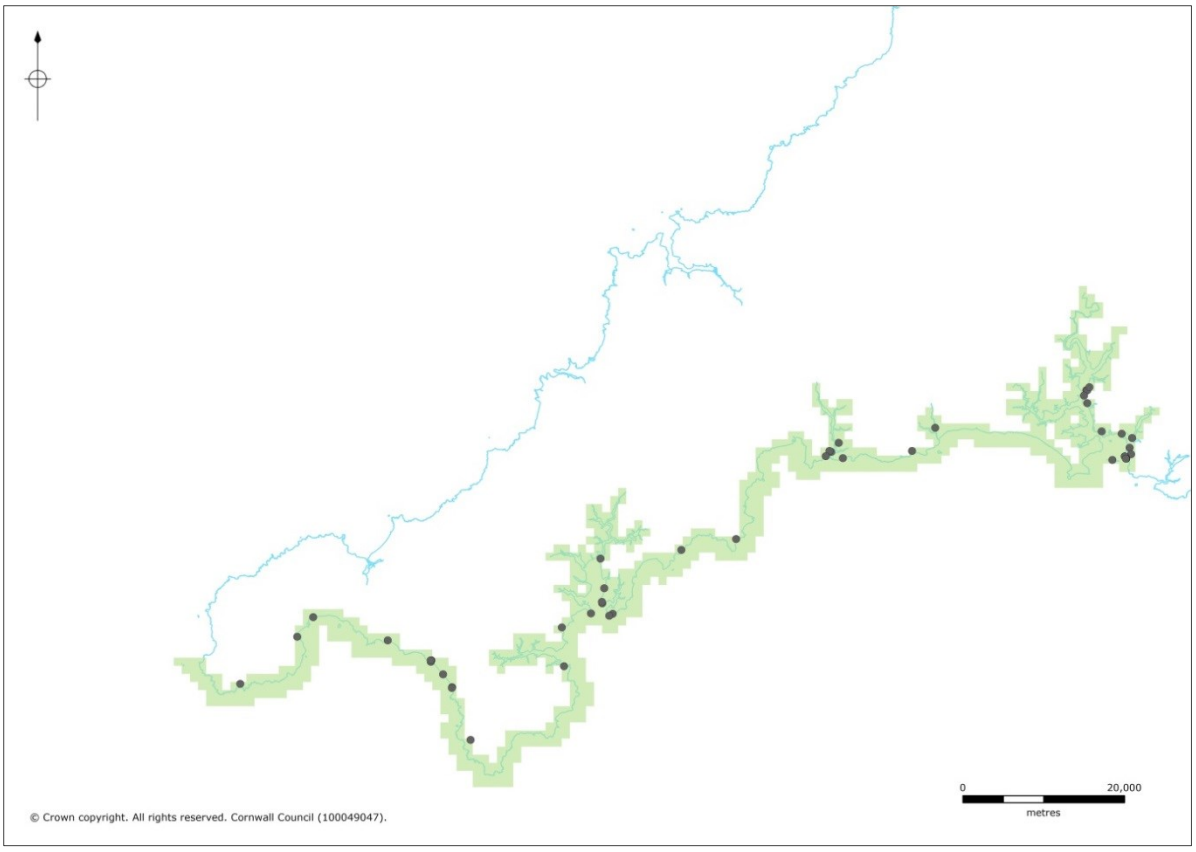


Fig 9.13 New modern military sites added by the project.

The Royal Naval Base is the Ernesettle armament depot which was developed in 1925 for the underground storage of ballistics, replacing the earlier armament depot at Bull Point (a Listed Building). The naval hospital was a small isolation hospital recorded on the *c*1907 and *c*1914 OS maps on the edge of the later Ernesettle base but has since been demolished to allow railway access to the armament depot.

In relation to wrecks, wreckage and aircraft crash sites:

Monument Type	**Cornwall**	**Plymouth**	**Devon**
Aircraft		1	
Aircraft crash site	1		
Find spot	1		
Wreck	116	11	
Wreckage			
Total	118	12	0

Table 9.2 Modern wrecks, wreckage and aircraft crash sites added by the project.

As with post-medieval wrecks there are notable concentrations on the west Cornish coast, in particular, off the Runnel Stone and Lizard Point, and in the area of Plymouth, especially around the breakwater. Until 1923 the Runnel Stone showed above the sea surface until it was struck by the *SS City of Westminster*. The ship knocked the top of

the rock but in the process sank. The wreck site of the *City of Westminster* was added as part of the project (MCO61025).

Diving websites were particularly helpful in giving more accurate locations and descriptions of wreck sites. Of particular use in the area of Plymouth was the survey work undertaken by the SHIPS project (hosted by Promare) which was used to update the location of several sites entered into Historic England's AMIE dataset.

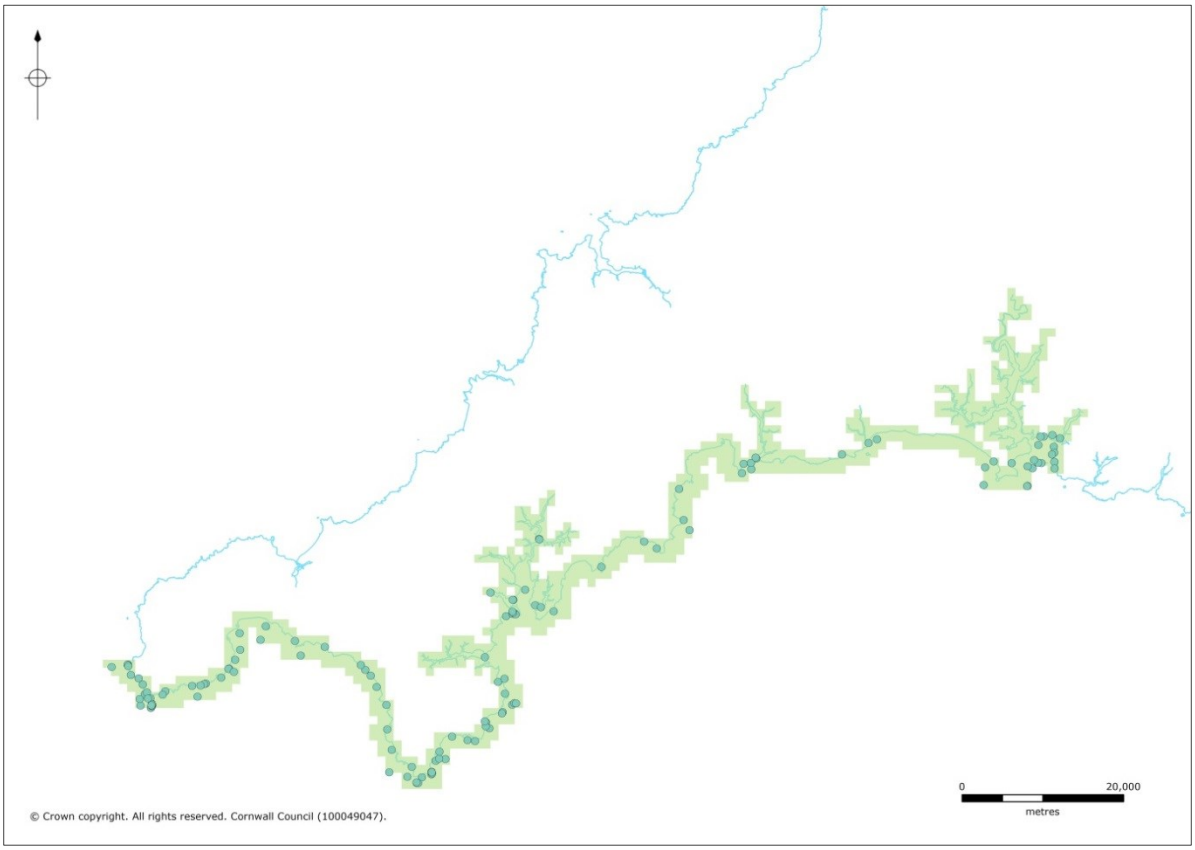


Fig 9.14 New modern wrecks and potential wreck sites added by the project.

9.1.5 Uncertain

There are 31 monuments of uncertain date, all within Cornwall. These cover a wide range of monument types. Two sites of low mounds were added, and although potentially barrows, the records were of uncertain date (MCO60778; MCO60789). Ten are earthwork features, mainly identified by landscape assessments of National Trust and Cornwall Wildlife Trust properties. Fourteen are documentary sites mainly identified from historic maps including field names. For example, field-names on the *c*1840 Tithe Award for the parish of Landulph suggest the site of a former rabbit warren although it is not clear if this was a medieval or later feature. Two of the 31 monuments are wrecks on intertidal mudflats were recorded from Google Earth aerial imagery.

9.2 Areas of greatest potential

Thematic study could focus on cliff castles to improve the understanding of these enigmatic features which are a distinctive monument of parts of this coast. Likewise, further research into rabbit warrens could help better understand how peninsula-like headlands have been used in later periods, often incorporating areas which have previously been cliff castles.

In terms of Plymouth's complex and multi-period defences there is an opportunity to produce a popular overview booklet (perhaps published as a pdf) explaining the development of the defences to the lay person. This could distil the comprehensive work

of Pye and Woodward (1996) into a well-illustrated and easy to read ebooklet or interactive pdf.

For the southern coastal edge of West Penwith there is scope for a research project to better investigate, celebrate and contrast the role of horticulture with research on the development of horticulture in the Tamar Valley, some facilitated by the Tamar Valley AONB - http://www.tamarvalley.org.uk/projects/project-archive/ This work could be broadened to investigate the history of the Kea Plum orchards in the upper reaches of the Fal Estuary.

The medieval mining activity on the Bere peninsula is already being explored by the Exeter University research project on the Tamar Valley medieval silver mines – http://humanities.exeter.ac.uk/archaeology/research/projects/title_84565_en.html but further work could usefully build on that.

There is also scope for a project to analyse sites of potential Roman activity, including potential sites of Roman signal stations (e.g. Payber Point near Gorran Haven), within the context of known Roman sites e.g. (Calstock) and potential Roman landing points and ports (e.g. Mount Batten).

Within the context of sea-level change and the future shape of the estuaries there could be further research into the history and reclamation of them. This has been a long evolving process; perhaps starting with the reclamation for quays and the creation of mill ponds for tide mills, and later, the reclamation of shallow inlets for ornamental fish ponds and inter-tidal saltings for the creation of improved pasture to, more recently, the use of intertidal areas as refuse disposal sites.

Furthermore, improving the palaeoenvironmental evidence base could give a clearer picture of past sea-level change and vegetation history. This would enable a better understanding of historic landscape change. It could also provide a more informed landscape context in which to discuss key themes and monument types e.g. Mesolithic flint scatters and Neolithic monuments.

9.3 Areas of low density

Overall, there is a good coverage of historic buildings, sites and monuments across all three HERs. It is noticeable that the density of records is heavier where there have been local studies (Hooe Lake), landscape assessments (e.g. National Trust properties), estuary audits (e.g. Helford, Fal, Fowey and Tamar) and urban surveys (e.g. Newlyn, Penzance, Falmouth, Penryn, Truro, Charlestown, Looe, Torpoint, Saltash, Calstock, Gunnislake). There are differences in the coverage of events records, with urban areas having more interventions through conditions placed on development and coastal areas having a higher density of National Trust ownership, in particular, West Cornwall. There has also been a higher density of assessments of mining landscapes and settlements in the area of the Cornwall and West Devon Mining World Heritage Site.

It seems reasonable to expect that an extensive urban survey of Plymouth would result in a higher density of heritage assets. Likewise, urban survey of smaller settlements could also have a similar result, especially long-established fishing and coastal settlements such as Cargreen, Cawsand and Kingsand, Polperro, Polruan, Fowey, Mevagissey, Portloe, St Mawes, Flushing, Marazion and Mousehole (Cornwall); Bere Alston, Bere Ferrers (Devon) and Oreston and Turnchapel (Plymouth) (see below Section 11.2.16).

10 Assessment of threats to the coastal historic environment

Archaeological remains are a finite and non-renewable resource, highly fragile and vulnerable to damage and destruction. Threats to the coastal historic environment resource can be characterised in two ways:

- coastal change through natural processes and rising sea-levels; and
- anthropogenic threats such as coastal defence schemes, infrastructure works, development, compensatory measures for habitat loss as a result of natural or anthropogenic change, increased visitor pressure and vandalism due to improved coastal access.

The threats posed by human-led development and changes to land use are largely controlled by the planning system. This allows opportunities for consultee and public scrutiny and the mitigation of potential adverse effects via conditions being placed on each application upon granting of permission. Processes, such as storm events or rising sea levels, however, bypass these ordered procedures and in these circumstances mitigation cannot always be expected to take place as it is often reactive.

Four generic options for shoreline management were considered by both SMPs and these are listed in Table 10.1. The shoreline management policies are defined by Defra (2006).

The three periods of time in which a Shoreline Management Plan is reviewed are known as 'Epochs'. The first epoch is 0–20 years (to 2025), the second epoch is 20–50 years (to 2055) and the third epoch is 50–100 years (to 2105).

Hold the line (HTL)	Maintain or upgrade the level of protection provided by defences.
Advance the line (ATL)	Build new defences seaward of the existing defence line.
Managed realignment (MR)	Allowing retreat of the shoreline, with management to control or limit movement.
No active intervention (NAI)	A decision not to invest in providing or maintaining defences.

Table 10.1 Shoreline management policies.

10.1 PSA15 Wembury Point to Rame Head including Plym and Tamar Estuaries (Policy Units 6c27–6c45)

All designated and undesignated heritage assets in the SMP area have the potential to be affected (positively or negatively) by changes in flooding or erosion. SMP policies need to be compatible with the objectives of the Cornwall and West Devon WHS Management Plan. The relevant environmental objective is to avoid loss of Scheduled and other internationally important heritage assets and features (Halcrow Group 2011, Appendix 1 Strategic Environmental Assessment).

10.1.1 Section O Wembury Point to Devil's Point (Policy units 6c27–6c30)

This stretch of coastline encompasses the large urban settlement of Plymouth, the protection of which is the key policy driver. A further requirement is the need to protect areas of active/former landfill and potentially contaminated land from increasing rates of erosion and flooding (Halcrow Group 2011).

Elsewhere, the cliffs along the eastern side of Plymouth Sound are of outstanding landscape and geological/geomorphological value and no intervention in this area would ensure that these features are maintained in the future (Halcrow Group 2011).

The preferred policy in the short term (to 2025), medium term (to 2055) and long term (to 2105) for policy unit 6c27 Wembury Point to Mount Batten Breakwater is NAI. The preferred policy during these epochs for 6c28 (Plym Estuary – Mount Batten Breakwater to Marsh Mills), 6c29 Plym Estuary (Marsh Mills to Coxside) and 6c30 (Coxside to Devil's Point) is HTL (*ibid*).

It is planned that Grade I, II* and II Listed Buildings, Registered Parks and Gardens and five Scheduled Monuments will also be protected from flooding during these epochs (Halcrow Group 2011).

As a result of the preferred policies, there are potential losses of intertidal habitat, due to coastal squeeze to the west of Mount Batten Breakwater, but potential gains in intertidal habitat to the east of Mount Batten Breakwater. There is also the potential loss of some historic heritage features but protection of a significant number of recreational and tourist related assets and other historic features in Plymouth (*ibid*).

The SMP notes that over 20 Scheduled Monuments lie within this stretch of coastline together with Registered Parks and Gardens and two Protected Wreck sites (Coronation Inshore and Cattewater) (*ibid*).

The Coronation Inshore Protected Wreck (NHLE 1000070) is a site potentially at risk, as the licenced diver for the site has noted that over 1m depth of sediment has been scoured off the wreck by storms (Martin Read, pers comm).

Boat moorings are a major feature of the Cattewater, there are at least 2,000 moorings. Jetties and wharves in Cattedown are used by commercial traffic, including small coasters and oil product tankers; there is an oil terminal at the entrance to the Cattewater. The main threat to the Cattewater Protected Wreck would be accidental damage from an oil tanker that had lost its directional bearings (Martin Read, pers comm).

On account of the nature of the solid geology and the relatively sheltered position of Plymouth and its Sound, the impacts on coastal heritage assets might be expected to be slight. However, severe storms such as those experienced in the winter of 2013/14 demonstrate that even in such locations damage to historical structures, such as the Citadel, can occur. This may be expected to increase as a result of increased frequency of storm events and rising sea levels (McInnes 2016, 161).

The Breakwater Fort (NHLE 1010910) is definitely affected by coastal erosion, however, the site has not been visited for some time and needs re-assessment (Dan Bashford, pers comm).

Damage has been reported to Drake's Island (NHLE 1010910) by a sea-kayaker who has observed the gradual and now complete collapse of the sea/cliff wall (at SX 46940 52766), which has been taken palace over a number of years. There is a more insidious problem at the Southern End of the structural wall (at SX 46869 52793), which is thought to be part of the Scheduled area, that is only apparent on close inspection. Here the sea is tunnelling under the foundations of a massive vertical wall (even with only moderate swell there is considerable turbulence around the entry to the excavation). For a time the structure above appeared to be protected by a large stone block lintel bridging the tunnel. On a recent trip, however, it was noted that this lintel has fractured and failed, and the blocks that it supported appear to be shifting (David Pedlow, pers comm to Simon Hickman, HE).

10.1.2 **Section P Tamar Estuary (Policy units 6c31–6c40)**

The Tamar Estuary contains a number of developed areas as well as large areas of natural, undefended estuary and under this plan no new defences will be constructed in

those areas. A combination of policies to either continue to protect existing defended areas or to undertake Managed Realignment within the estuary seek to take this policy recommendation forward, as these can provide some significant social and economic benefits with minimal adverse impacts on the environment (Halcrow Group 2011).

The preferred policy in the short term (to 2025), medium term (to 2055) and long term (to 2105) for policy unit 6c31 Devil's Point to Tamerton Lake is HTL. The preferred policy during these epochs for 6c32 Tamerton Lake to Gunnislake and 6c33 Gunnislake to Saltash North is a combination of NAI, MR and HTL. For 6c34 Saltash it is HTL, for 6c35 River Lynher (Saltash South to Torpoint North – Jupiter Point) is HTL and NAI, for 6c36 Torpoint North (Jupiter Point) to Torpoint South (Landing Stage) it is HTL. For 6c37 St John's Lake (Torpoint South, Landing Stage to Milbrook., Mill Farm), 6c38 St John's Lake (Millbrook Mill Farm) to Milbrook (Hancock's Lake), 6c39 St John's Lake (Milbrook, Hancock's Lake to Palmer Point and 6c40 Palmer Point to Mount Edgcumbe (Cremyll) it is a combination of HTL and NAI (*ibid*).

In locations where there is potential for Managed Realignment, opportunities for the expansion of existing wetland areas can be explored through targeting environmental schemes such as Stewardship. There are also opportunities for new areas of wetland habitat creation through the design of appropriate Managed Realignment schemes. Within these areas, the aim of Managed Realignment would be to both create habitat and reduce flood risk in other parts of the estuary (*ibid*).

It is planned that the Cornwall and West Devon Mining World Heritage Site adjacent to the River Tamar will be protected from flooding in the short, medium and long term. Grade I, II* and II Listed Buildings and Registered Parks and Gardens (e.g. Antony and Cotehele) will also be protected from flooding during these epochs (*ibid*).

Scheduled Monuments protected from flooding during these epochs will include: No 1 Basin and No 1 Dock, South Yard, Devonport Dockyard; Slip No 1 (The Covered Slip), South Yard, Devonport Dockyard; Bohetherick Lime Kiln with adjacent quay and ancillary buildings, 140m south east of Cotehele Bridge (NHLE 1021075); Gawton Arsenic Mine and Flue; and Okeltor 19th century Arsenic, Copper and Tin Mine (NHLE 1019440) – all of these are at risk from flooding (*ibid*). The Tamar Canal (NHLE 1007302) is being affected by erosion of the southern part of the island; while it is already on the HER register its principal vulnerability is deterioration rather than coastal erosion. Bohetherick lime kiln and Okeltor had been visited recently by the HE HARPO and, although vulnerable, there does not seem to be any damage yet (Dan Bashford, pers comm),

The Civil War fieldworks at Inswork Point (NHLE 1007301), the Ballast pond at Torpoint (NHLE 1007261), Budshead Manor in Honicknowle, Plymouth (NHLE 1386357) and Saltash D-Day landing craft site (NHLE 1020053) are also potentially vulnerable (Dan Bashford, pers comm).

10.1.3 Section Q Mount Edgcumbe to Rame Head (Policy units 6c41 to 6c45)

This coastline is mainly characterised by undefended, hard rock cliffs, which experience very slow retreat rates. Sediment interlinkages are weak. Impacts of defences therefore tend to be confined locally (Halcrow Group 2011).

For most of the frontage the plan is to continue to allow natural retreat of the shoreline. Due to the low rate of retreat it is unlikely to result in significant losses of heritage assets, although in some areas this may result in damage to or loss of some historic features. There would be a beneficial impact on nature conservation through a potential increase in intertidal habitat adjacent to an internationally designated conservation site (*ibid*).

The preferred policy in the short term (to 2025), medium term (to 2055) and long term (to 2105) for policy unit 6c41 Mount Edgcumbe to Picklecombe Point is NAI. The preferred policy during these epochs for 6c42 Fort Picklecombe is HTL, for 6c43

Picklecombe Point to Kingsand it is NAI, for 6c44 Kingsand/Cawsand it is HTL, and for 645 Cawsand to Rame Point it is NAI (*ibid*).

Some Grade I, II*, and II Listed Buildings are at risk from flooding or erosion in the short, medium or long term including clusters of Listed Buildings around Mount Edgcumbe Country Park. There may be possible damage or loss to a small area of the Grade-I registered Mount Edgcumbe Park and Garden in the short, medium or long term due to flooding and/erosion (*ibid*).

Cawsand Fort Scheduled Monument (NHLE 1329146; NHLE 1016102) will be protected in the short, medium and long term (*ibid*).

The Grade-II listed Kingsand Institute (NHLE 1329116) was damaged in the severe storms of winter 2013/14 and at Kingsand and Cawsand the plan is to minimise the risk of flooding and erosion to the town's assets through maintaining and strengthening existing defences (*ibid*), however, the Institute is positioned in an extremely vulnerable location, built as it is, on top of the sea wall.

Under these scenarios there is the potential loss to the ditch and rampart of promontory fort at Rame Head (NHLE 1004510) and the Grade-II* listed chapel of St Michael within it (NHLE 1159655) due to erosion (Halcrow Group 2011). Rame Head has been visited recently by the HE HARPO and, although vulnerable, there does not seem to be any damage yet (Dan Bashford, pers comm).

10.2 Rame Head to Hartland Point SMP

There are a number of key areas and locations on the south coast of Cornwall which have been identified by the SMP as being at risk of erosion and flooding.

Erosion risk: Portwrinkle, Charlestown (St Austell Bay), Pendennis, Praa Sands and Perranuthnoe, Marazion and St Michael's Mount, Penzance.

Flood risk: Looe, Fowey, Par and St Blazey, Mevagissey, Flushing, Loe Bar and Loe Pool, Penzance and Newlyn (Royal Haskoning 2011, 28).

A review of certain locations (Management Areas and Policy Units) where a change in policy is proposed at the end of the first epoch (2025) was carried out in 2016 (Royal Haskoning 2016). A further review of the SMP2 is planned for 2018. There are currently no plans for a SMP3.

10.2.1 PDZ1: Rame Head to Pencarrow Head (Management Areas 01–03)

The preferred policy in the short term (0–20 years), medium term (20−50 years) and long term (50–100 years) for policy unit MA01 Rame Head to Downderry is NAI for undefended cliffs and beach. At Portwrinkle it is HTL until 2025 and then MR.

For MA02 Downderry to Seaton it is NAI for the three epochs for Downderry East; HTL for Downderry West and Seaton until 2015 then MR; for Seaton Beach it is MR until 2025 then NAI.

For MA03 Seaton to Pencarrow Head it is NAI for the three epochs for undefended cliffs and beaches and for Millendreath and Talland; at Plaidy HTL until 2025 then NAI, for East and West Looe and Polperro it is HTL for the three epochs; at Hannafore it is HTL until 2025, MR until 2055 and then NAI.

Along the southern Cornwall Coast between Rame Head and Pencarrow Head, a frontage which includes the harbours of Looe and Polperro, the coast generally faces south or south west, and is composed of extremely hard rocky cliffs and natural inlets in which harbours were constructed. Rates of erosion are extremely slow but flooding has been noted as an issue (McInnes 2016, 161; Royal Haskoning 2011).

The Grade-II listed harbour wall at Portwrinkle (NHLE 1162071) was damaged during the extreme storms of the winter of 2013/14 (McInnes 2016, 21). The SMP policy here is to hold-the-line of existing defences to protect the harbour wall (and surrounding heritage

assets and property) in the short term, but in the medium term to longer-term this will be uneconomical. By this stage, the harbour wall will be outflanked by erosion and there will be a managed retreat of coastal defences (Royal Haskoning 2011).

The highest rates of cliff and platform retreat are likely to be at Downderry where the soft cliffs (composed of head deposits) could retreat up to 10m during the next century (Future Coast 2002). The non-designated group of Bronze Age barrows situated close to the cliff east of Downderry are accordingly vulnerable to coastal erosion (Halcrow Group 2011; MCO11011; MCO3551-3554 incl.).

10.2.2 PDZ2: Pencarrow to Gribbin Head (including Fowey Estuary) (MA04 and MA05)

The preferred policy in the short term (0–20 years), medium term (20−50 years) and long term (50–100 years) for policy unit MA04 Pencarrow Head to Gribbin Head is NAI for undefended cliffs and HTL for Fowey and Polruan. For MA05 Fowey Estuary (above Bodinnick) including tributaries it is NAI for undefended intertidal areas, Lerryn, and Golant for all three epochs and HTL for Lostwithiel until 2025 followed by HTL with localised MR.

Along the southern Cornwall Coast between Pencarrow Head and Gribbin Head, a frontage which includes the harbours of Fowey, the coast generally faces south or southwest, and is composed of extremely hard rocky cliffs and natural inlets in which harbours were constructed. Rates of erosion are extremely slow due to the high resistance of the bedrock but flooding has been noted as an issue (McInnes 2016, 161; Royal Haskoning 2011).

10.2.3 PDZ3: Gribbin Head to Black Head (MA06 and MA07)

The preferred policy in the short term (0–20 years), medium term (20−50 years) and long term (50–100 years) for policy unit MA06, Gribbin Head to Par Docks, is NAI for undefended cliffs; MR with localised HTL at Polkerris; at Par Sands NAI until 2025 then MR; and at Par Docks MR until 2025 followed by NAI. For MA07, Par Docks to Black Head, it is NAI for undefended cliffs, Carlyon Bay and Duporth for all three epochs; for Charlestown HTL/MR for all three epochs; and for Porthpean MR until 2055 followed by NAI.

Between Gribbin Head and Black Head the coastline faces south and east, and the alignment of the coast affords a degree of protection to these frontages. Despite this, erosion issues arise at Charlestown and the harbour there is vulnerable to flooding. The increased ferocity of winter storms is likely to have an impact on harbours such as Charlestown (McInnes 2016, 23).

The Scheduled promontory fort at Black Head (NHLE 1004491) is on the 2017 Heritage at Risk register, its principal vulnerability is described as scrub and tree growth but coastal erosion is also an issue here (Ann Preston-Jones, pers comm). Cornish headlands such as this, many of which are the sites of prehistoric promontory forts, are likely to be under increased attack by coastal erosion over the next century (McInnes 2016, 23; Royal Haskoning 2011).

10.2.4 PDZ4: Black Head to Zone Point (MA08, MAO9, MA10)

The preferred policy in the short term (0–20 years), medium term (20−50 years) and long term (50–100 years) for policy unit MA08 (Black Head to Dodman Point) is NAI for undefended cliffs; for Pentewan harbour and village MR until 2055 followed by HTL; for Pentewan beach NAI until 2025, MR until 2055 followed by NAI/HTL; for Mevagissey it is HTL/MR until 2055 followed by HTL; and for Portmellon HTL until 2025 followed by MR.

Between Black Head and Dodman Point the coastline faces east and south east, and the alignment of the coast affords a degree of protection to these frontages. Despite this Mevagissey and Gorran Haven are vulnerable to flooding and deterioration of the harbour at Mevagissey has been noted (McInnes 2016, 161; Royal Haskoning 2011).

Due to the existing height of its Grade-II* harbour piers and quays (NHLE 1210773), Mevagissey (MA08) will be particularly vulnerable to sea level rise and increased occurrence of storm surge. In the short to longer term the SMP suggests HTL along defended sections (presumably which means that the Listed harbour walls will need regular repairs and possible heightening and strengthening). The SMP highlights that there needs to be a more flexible approach to seaward/landward adjustment in the defence strategy stating that 'Realignment of harbour structures could form part of a future flood risk management solution' (Royal Haskoning 2011, Annex I).

The SMP suggest that the rocks, bays and peninsulas forming this stretch of coastline create discrete bays of coastal processes and, therefore, future intervention measures can be undertaken on an area by area basis to meet local objectives of coastal protection (Royal Haskoning 2011).

For MA09 Veryan Bay for undefended cliffs and for East and West Portholland it is NAI for all three epochs; for Caerhays Beach it is MR for all three epochs and for Portloe it is HTL for all epochs. The SMP suggests that there could be a 45m retreat in coastline at Carehays Beach and that the MR could result in the regeneration of coastal dunes in the area of the current car park. The SMP suggests that in the long-term the Caerhays Grade II* Registered Park and Garden will be vulnerable to a tidal flood event. However, it considers that there is no threat to the Grade I Lower Lodge and attached screen walls (NHLE 1311957) and Grade II Listed Bridge (NHLE 1144761) and that the through road is not at risk in the long-term epoch of the SMP.

For MA10 (Gerrans Bay) for undefended cliffs and coves and for Pendower West it is NAI for all three epochs; for Pendower East it is MR until 2025 and then NAI and for Portscatho it is HTL for all three epochs.

10.2.5 PDZ5: Zone Point to Nare Point (including Fal Estuary) (MA11, MA12, MA13, MA14)

The preferred policy in the short term (0–20 years), medium term (20−50 years) and long term (50–100 years) for policy unit MA11, Lower Fal, is NAI for undefended estuary banks, Restronguet Passage, Mylor Bridge and Pendennis Point; HTL for St Mawes, St Just-in-Roseland, Penryn and Falmouth; HTL for Mylor Quay until 2025 followed by HTL with localised MR and then MR; for Flushing HTL with localised MR until 2025 and then MR; and for Penryn HTL until 2025 followed by MR.

For MA12, Upper Fal, it is NAI for undefended estuary creeks and Ruan Lanihorne for all three epochs; for Calenick Creek it is MR for all three epochs; for Truro Upper Basin it is HTL/MR for all three epochs; for Tresillian it is HTL until 2025 followed by MR.

For MA13, Pendennis Point to Rosemullion Head, it is NAI for undefended cliff sections for all three epochs; for Castle Beach and Gyllyngvase it is HTL for all three epochs; for Swanpool and Maenporth it is HTL until 2025 followed by MR.

For MA14, Helford, it is NAI for Durgan, Helford Passage, and for undefended estuary banks (including undefended estuary communities) for all three epochs; for Gweek Quays (north and south) it is HTL for all three epochs; for Gweek it is MR for all three epochs.

The SMP considers that the Portscatho Formation, which forms the predominant solid geology of this zone, is largely resistant to coastal erosion, although Pendennis Point and St Anthony's Head are expected to retreat by 1–2m and 0–1m respectively over the next 100 years along the seaward side.

The Scheduled promontory fort and Civil War battery at Little Dennis Head, St Anthony-in-Meneage (NHLE 1004431) is on the 2018 Heritage at Risk Register. Scrub and tree growth is the principal vulnerability but the SMP considers that there will be limited coastal erosion and flooding risk in this area.

The increased ferocity of winter storms is likely to have an impact on sites such as the Long Platform gun battery, the wall of which is exposed in the cliff at Pendennis Point (Harris and Andrew 1985; Johns 1997), and other parts of the Pendennis Peninsula Fortifications, NHLE 1012134 (McInnes 2016, 23).

The Grade-II Registered Park and Garden at Carclew, Mylor (NHLE 10000544) is on the 2017 Heritage at Risk Register and on the 2018 register. Carclew is located within the Lower Fal Management Area (MA 11). The SMP suggests that there will be increasing flood risk along Restronguet creek but that the general policy should be NAI, bolstered with the localised upkeep of existing walls. While the SMP does not consider the potential impacts on the park at Carclew, the likely effect of NAI is to be minimal in the longer-term. Registered Parks and Gardens at Trelissick (Grade II*; NHLE 1000656) and Tregothnan (Grade II*; NHLE 1000655) lie in the Upper Fal Management Area (MA12). Much of these landscapes lie on higher ground and steep slopes protected by low, stony cliffs. The SMP suggests that future changes in the upper estuary are difficult to fully predict but that there should be a general policy of NAI along undefended estuary banks. The potential impact on the pond (at the end of Channals Creek; MCO44618) forming a small part of the Registered Park and Garden at Trelissick are not assessed by the SMP but it is likely that this feature will be under threat in the longer term.

10.2.6 PDZ6: Lizard (Nare Point to Baulk Head – Gunwalloe; MA15 and MA16)

The preferred policy in the short term (0–20 years), medium term (20−50 years) and long term (50–100 years) for policy unit MA15, Lizard East, is NAI for undefended cliffs and coves and for Porthoustock for all three epochs; for Porthallow it is HTL until 2025 followed by MR; for Coverack it is HTL until 2025 followed by HTL/MR; for Kennack Sands it is MR for all three epochs; and for Cadgwith HTL for all three epochs.

For MA16, Lizard West, it is NAI for Mullion Cove, Poldhu Cove and [Gunwalloe] Church Cove and undefended coves and cliffs for all three epochs. For Jangye-ryn/Dollar Cove it is MR until 2055 and then NAI.

The low-lying soft cliffs around Lowland Point and Trebarveth are particularly subject to coastal erosion. About half of the Romano-British salt works at Trebarveth has been lost since Peacock's excavation in 1969. The cliff edge section there was recorded by CITiZAN and the Meneage Archaeological Group in 2015. This site is part of a Scheduled Monument 'settlement sites 500 yards (460m) south-south-east of Trebarveth' (NHLE 1004319) which is on the 2017 Heritage at Risk Register. The principal vulnerability is described as scrub and tree growth but coastal erosion is also a serious issue here.

On the western side of the Lizard peninsula the coastline faces the open Atlantic Ocean and is often exposed to storm waves. Mullion Cove is one of Cornwall's fishing harbours most at risk. It is owned by the National Trust and, as part of the Trust's coastal policy for its landholdings, a policy of 'no maintenance or repair to the Grade-II listed harbour wall (NHLE 1158181) has been agreed'. The area behind the harbour is also prone to coastal landslips. The objective, in the long term will be to allow the harbour to return to a natural cove (McInnes 2016, 161; The National Trust 2014).

Also particularly vulnerable to rapid coastal erosion is the Scheduled cliff castle (NHLE 1004265) at Gunwalloe which is on the 2018 Heritage at Risk register, and the adjacent early medieval settlement on the cliff edge at Dollar Cove (Wood 2013). Analysis of historic map data suggests the cliff here has receded in places by as much 30m in the past 150 years (Fig 10.1).

Fig 10.1 Rate of coastal erosion at Dollar Cove, Gunwalloe, based on historic cartographic sources and GPS survey in 2014 (Reproduced, by permission, Wood 2013, fig 4).

10.2.7 PDZ7: Mount's Bay East Baulk Head to (Baulk Head (Gunwalloe) to Marazion) (MA17 and MA18)

The preferred policy in the short term (0–20 years), medium term (20–50 years) and long term (50–100 years) for policy unit MA17, Baulk Head to Trewavas Head, it is NAI for Gunwalloe Fishing Cove and for undefended cliffs and coves for all three epochs; for Loe Bar and Loe Pool it is MR for all three epochs; for Porthleven it is HTL for all three epochs.

For MA18 (Trewavas Head to The Greeb) it is NAI for Perranuthnoe and undefended cliffs and coves; for Praa Sands east it is MR until 2055 then NAI; for Praa Sands west (Sydney Cove) it is MR for all three epochs.

Unusually for Cornwall, there are some extended lengths of coastline in this zone under significant erosion pressures due to the erosion of low soft cliffs composed of head deposits, most notably at Praa Sands and Perranuthnoe. There are also erosional pressures at Gunwalloe Fishing Cove and inundation risks at Loe Bar and Porthleven. Discrete lengths of defensive revetments in these locations will also constrain the shoreline in places while recession continues along the undefended sections. The narrow buffer line (which contains the South West Coast Path) separating the natural cliff from agricultural fields may come under increasing pressure along the Perranuthnoe to Marazion stretch (Royal Haskoning 2011). The Revised HLC for Lowland Cornwall has plotted parts of this vulnerable area as 'Altered Prehistoric Enclosed Land' HLC Type (MCO51730; MCO6883).

10.2.8 PDZ8: Mount's Bay West (The Greeb to Point Spaniard) including Marazion and St Michael's Mount) (MA19, MA20, MA21, MA22)

The preferred policy in the short term (0–20 years), medium term (20–50 years) and long term (50–100 years) for policy unit MA19, Marazion to Long Rock, is NAI for Marazion east (Vinton Cove and undefended cliffs (including the southern part of the Mount)) for all three epochs; for Marazion Town St Michael's Mount harbour, Marazion

Marsh and Marazion west (Chapel Rock to Marazion Bridge) it is HTL for all three epochs; for St Michael's Mount causeway it is HTL until 2025 and then NAI.

For MA20 Longrock to Penzance it is HTL until 2025 for Long Rock and Eastern Green and then MR; for Chyandour it is HTL for all three epochs.

For MA21, Penzance and Newlyn (Albert Pier to Sandy Cove), it is HTL for Penzance Harbour and Docks and Newlyn for all three epochs, for Sandy Cove it is NAI for all three epochs and for Wherry Town it is HTL until 2025 followed by MR.

For MA22, Mousehole (Sandy Cove to Point Spaniard), it is HTL for Cliff Road and Mousehole for all three epochs.

The coastline from Marazion to Point Spaniard is almost continually defended and for that reason is one of the most pressurised lengths of shoreline in Cornwall. Although it is more sheltered than the eastern part of Mount's Bay, the constraints placed upon it by hard defences mean that it is likely to display high sensitivity to sea level rise and increased storminess. Although it receives less wave energy than the coastline to the east of Marazion, the Long Rock to Penzance harbour frontage still displays a sandy intertidal area in common with much of the high energy Cornish coast, and it does periodically receive large amounts of wave energy during storm events which originate from due south to the south east. Mount's Bay does have significant accumulations of beach material compared to adjacent sections of the coast, but a trend towards beach-lowering has been observed. This can lead to the exposure of heritage assets on the sea bed and renders the frontage more vulnerable to the impacts of coastal storms (McInnes 2016, 174; Royal Haskoning 2011).

The storms of 2013/14 highlight the potential future risks to the causeway leading to St Michael's Mount and the instability of the western harbour arm (Grade-II* listed; NHLE 1143786) at the Mount (McInnes 2016, 174; Royal Haskoning 2011).

The harbours of Newlyn and Mousehole face to the east and are therefore offered a degree of protection from the prevailing storm waves. However, the severe storms of February 2014 caused structural damage at Penzance and Newlyn and exposed tree trunks and peat deposits associated with a submerged forest on the foreshore of Mount's Bay and at Wherry Town, as well as other features such as wrecks and Second World War beach defences.

10.2.9 PDZ9: Penwith Peninsula (Point Spaniard to Clodgy Point) (MA23)

The preferred policy in the short term (0–20 years), medium term (20−50 years) and long term (50–100 years) for policy unit MA23, Point Spaniard to Land's End, is NAI for Lamorna Cove and for undefended cliffs.

The solid geology of the Land's End peninsula consists largely of igneous granites of the Permian and Carboniferous periods. Despite the perceived resilience of the cliff-line, there are numerous examples of significant failures comprising rock falls and landslide toppling which have occurred over the last 10–15 years. These events have usually been preceded by prolonged rainfall, which is the preparatory factor prior to activation during or soon after severe winter storms (McInnes 2016, 178).

Lamorna Cove is vulnerable to wave attack as well as flood risk, and the privately owned quay structures (Grade II; NHLE 1137452) are in need of repair (McInnes 2016, 161; Royal Haskoning 2011). The severe storms during the winter of 2013/14 caused structural damage here.

The Scheduled St Levan Chapel site (NHLE 1007285) is on the 2017 Heritage at Risk Register, principally for vulnerability to coastal erosion. Also on the register is Treryn Dinas cliff castle (NHLE 1006733) with its principal vulnerability described as scrub and tree growth but it is also at risk of costal erosion (Ann Preston-Jones, pers comm).

11 Recommendations and proposed further work

11.1 Research priorities and themes

In this section research priorities and themes identified by the DBA are presented in the context of the regional themes and research aims set out in the South West Archaeological Research Framework (SWARF) (Webster 2008).

SWARF Research Theme: Spatial and Temporal Biases

Research Aim 3: Address apparent 'gaps' in our knowledge and assess whether they are meaningful or simply biases in knowledge.

SWARF Research Theme: Public Interest

SWARF Research Aim 4: Encourage wide involvement in archaeological research and present modern accounts of the past to the public.

SWARF Research Theme: Recording

Research aim 5: Encourage the study of artefact scatters using innovative methodologies both in the field and on previous collections.

SWARF Research Theme: Methodology — Hidden Resources

SWARF Research Aim 4: Encourage wide involvement in archaeological research and present modern accounts of the past to the public.

SWARF Research Theme: Transitions

SWARF Research Aim 10: Address our lack of understanding of key transitional features; c. When and under what conditions did field systems and traditions of roundhouse settlement begin? Did field systems begin in the early 2nd millennium BC?

SWARF Research Theme: Science — Past Environments

SWARF Research Aim 23: Improve our understanding of past climate and sea level changes together with their effects on people's relationships with landscapes and the sea.

SWARF Research Theme: Religion

SWARF Research Aim 54: Widen our understanding of monumentality in the Neolithic and Early Bronze Age.

SWARF Research Themes: Settlement and Trade, Transport and Communications

SWARF Research Aim 29: Improve our understanding of non–villa Roman rural settlement.

SWARF Research Aim 46: Assess the information for Roman ports.

SWARF Research Theme: Mineral extraction

SWARF Research Aim 38: Widen our understanding of the extraction, processing and transportation of minerals, stone and aggregates.

SWARF Research Theme: Maritime and Fishing

Research Aim 37: Increase our knowledge of maritime archaeological sites.

SWARF Research Theme: Production and trade

Research Aim 47: Assess the archaeological potential for studying medieval economy, trade, technology and production.

11.2 Overview of research themes and priorities

11.2.1 Mesolithic sites on the south coast of Cornwall

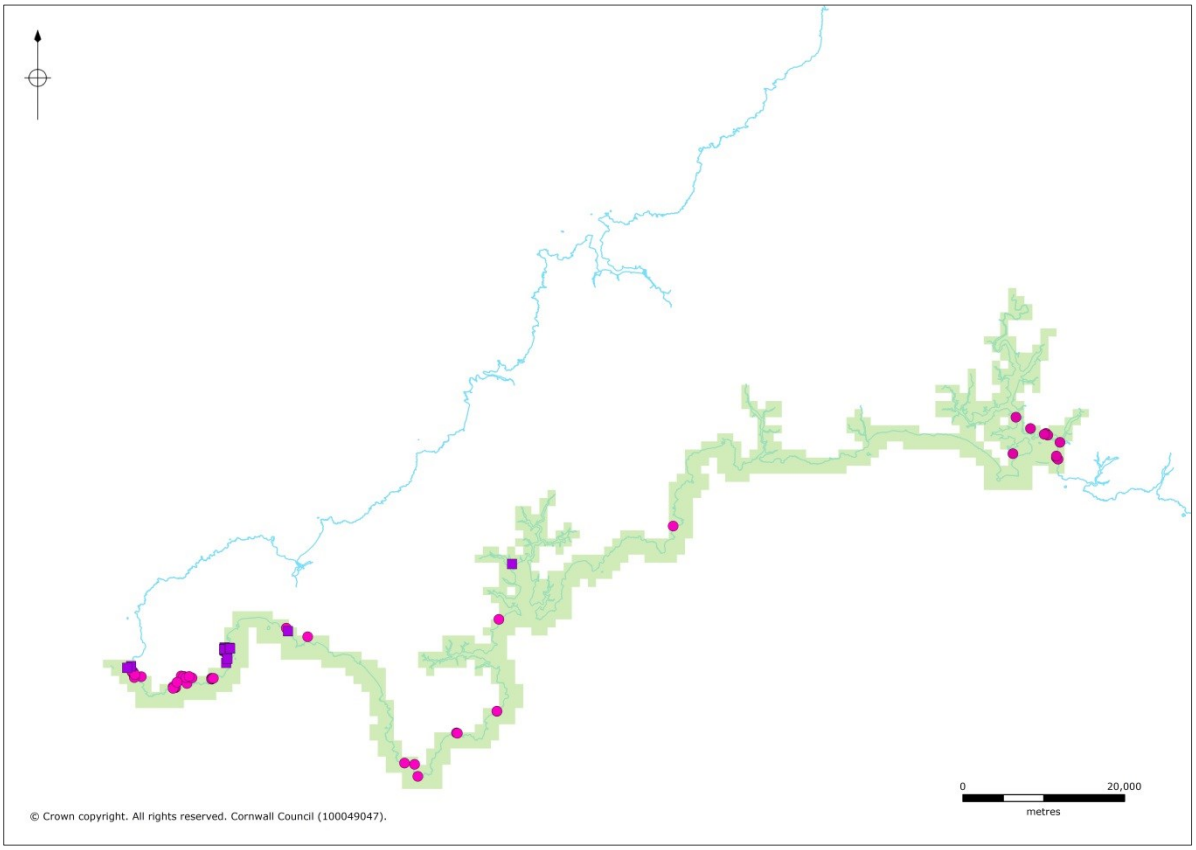


Fig 11.1 Distribution of Mesolithic sites within the project area. Purple squares are PAS finds of flint tools believed to be Mesolithic in date; sites recorded in the HERs are dark pink dots.

Between the Tamar and the Helford River there is a conspicuous gap in the distribution of known Mesolithic sites (Fig 11.1). This is in sharp contrast to the pattern seen on the northern coast where considerable evidence of Mesolithic activity has been found, continuing further up the coast into Devon. The nature of the two coastlines is clearly a critical factor in this distribution, with the relatively rapid erosion in the north causing the regular exposure of material. By contrast the southern coastline is more protected and less subject to erosion. There is, however, evidence that some real differences may exist based on fieldwork on the northern side of the Helford River, where two collections of lithic material were recovered by field walking during the 1980s. Artefacts from both collections appeared to have Mesolithic traits but diagnostic forms such as microburins and microliths were absent. This is in contrast to the Lizard peninsula which has long been known to contain sites of Mesolithic age including Poldowrian, Croft Pascoe and Windmill Farm (Berridge and Roberts 1986; and see above Section 6.3.6).

The artefactual evidence had not increased greatly since the Mesolithic period review by Berridge and Roberts in the Silver Jubilee volume of *Cornish Archaeology* (cf Jones and Quinnell (2011). Whether the apparent lack of unequivocal Mesolithic evidence holds true for the rest of the south Cornish coast is unclear due to lack of relevant work. Mesolithic flint has been found from Maker (Brent 1886; Berridge and Roberts 1986; Hosfield *et al* 2008, fig 2.4) but little else has yet been found along the southern coast.

The Cornwall and Scilly HER only records two Mesolithic sites between Rame and the Helford: a flint scatter at Trewollock near Gorran Haven, found by Philip Steele while field walking in January 1983 (MCO6842) and a tranchet axe, now in Plymouth Museum, which was found in Falmouth (MCO595; Wymer 1977).

Consequently the south coast should be high priority for further work to identify Mesolithic sites (cf Berridge and Roberts 1986). This work might include library research, examination of private collections, systematic field walking, coastal fieldwork and targeted evaluation/excavation of selected sites.

This will also contribute to SWARF Research Aim 23: Improve our knowledge of past climate and sea level changes together with their effects on the peoples' relationship with landscapes and the sea; and Research Aim 25: Improve our understanding of Palaeolithic and Mesolithic landscapes.

11.2.2 Analysis of artefact scatters

'Many of the archaeological resources of the region lie not in the ground but in the stores of museums, archive offices, contracting units, individuals and HERs. Study of these records and artefacts can be far more cost-effective than excavation or other fieldwork' (Webster 2008, 271).

It has been noted that the majority of flint scatters in Cornwall have not seen any kind of analysis, let alone publication, making it difficult to make meaningful comparisons between recently discovered microliths from Scilly with possible Continental affinities (Anderson-Whymark *et al* 2015) and potentially contemporary assemblages on mainland Cornwall (Andy Jones, pers comm). Much of this material appears to be in private collections. It is important to locate and record these sites and finds and to enhance the HER (see below Section 11.3.1).

11.2.3 Middle Neolithic cursus and oval barrow at Triffle

The identification of a cursus at Triffle (MCO43628) in an area which is devoid of linear Neolithic monuments is of particular importance and if proven to be of Middle Neolithic date, would be a site of national importance. The cursus is of especial importance because of its relationship to another likely Neolithic monument, the Triffle long barrow. This barrow, though not Scheduled, would, if correctly identified as Neolithic, also be of National importance. This proposed project would increase knowledge and understanding of the landscape context of this enigmatic group of features. The project will also provide an opportunity to recover the first dating information from two monuments that are not well understood; in particular cursus sites generally are poorly dated.

11.2.4 West Cornwall hoards from the Bronze Age to the Roman period

Cornwall has long been known to be a source of copper, gold and especially tin, which was widely circulated across the United Kingdom and the Continent throughout the Bronze Age and beyond. Indeed, Mount's Bay has frequently been suggested to be the *Ictis*, tin trading island, and Penwith the land of Belerion mentioned by the Greek traveller Pytheas in the 4th century BC. Cornwall's association with the production and circulation of metals is being increasingly demonstrated by the rapidly growing number of individual finds and metalwork hoards dating to the Bronze Age and coin hoards of the Roman period. The distributions appear to show a concentration of metalwork hoards and find-spots along the coastal zone (within a mile of the sea) and in the western half of Cornwall, where finds occur in large numbers. This raises the strong possibility of there being significant patterning in the choice of locations for metalwork deposition, as for example can already be observed around the area of Marazion, where significant hoards of Bronze Age metalwork and Roman coins have been found. A project to examine investigate the find-spots could establish whether there is evidence that some places in the landscape became 'persistent' places for deposition over extended periods of time.

11.2.5 Study of the locales of Mesolithic and Early Neolithic activity

'Most of what we study is visible to archaeological research because it has changed from a previous state; the periods that cause us most trouble are characterised to a large extent by a lack of change. Large-scale transitions are used too often as academic boundaries between one period and another. Study across boundaries should be

encouraged to define and explore the changes that occur in these transitional periods' (Webster 2008, 271).

The Clodgy project, looking at nearly 8,000 prehistoric artefacts from ploughed fields across Clodgy Moor in West Penwith, identified long-term patterns of landscape inhabitation during the Mesolithic and Neolithic periods. It was found that Mesolithic activity was concentrated in well-defined areas around springheads, and that this pattern was continued and expanded upon during the Neolithic, extending out from core areas further across the landscape. Although the chronology was not well-defined, it seems that earlier Neolithic communities inhabited the same locales as Mesolithic groups, and this might imply some continuity in occupation (Jones *et al* 2013, 24). There is potential for extending this study to compare the locales of Mesolithic and Early Neolithic activity across Cornwall.

11.2.6 Field systems on the south east Lizard peninsula

Establishing the origins of field systems has been identified as a key research objective in SWARF and further research should be undertaken on the origins of the coastal 'Celtic' field systems of West Penwith as well as the development of linear (co-axial?) field systems and associated roundhouses extending inland from the coast between Lowland Point and Trevalsoe on the south-eastern coast of the Lizard peninsula (see below Section 11.3.1).

11.2.7 Submerged forests and palaeolandscapes

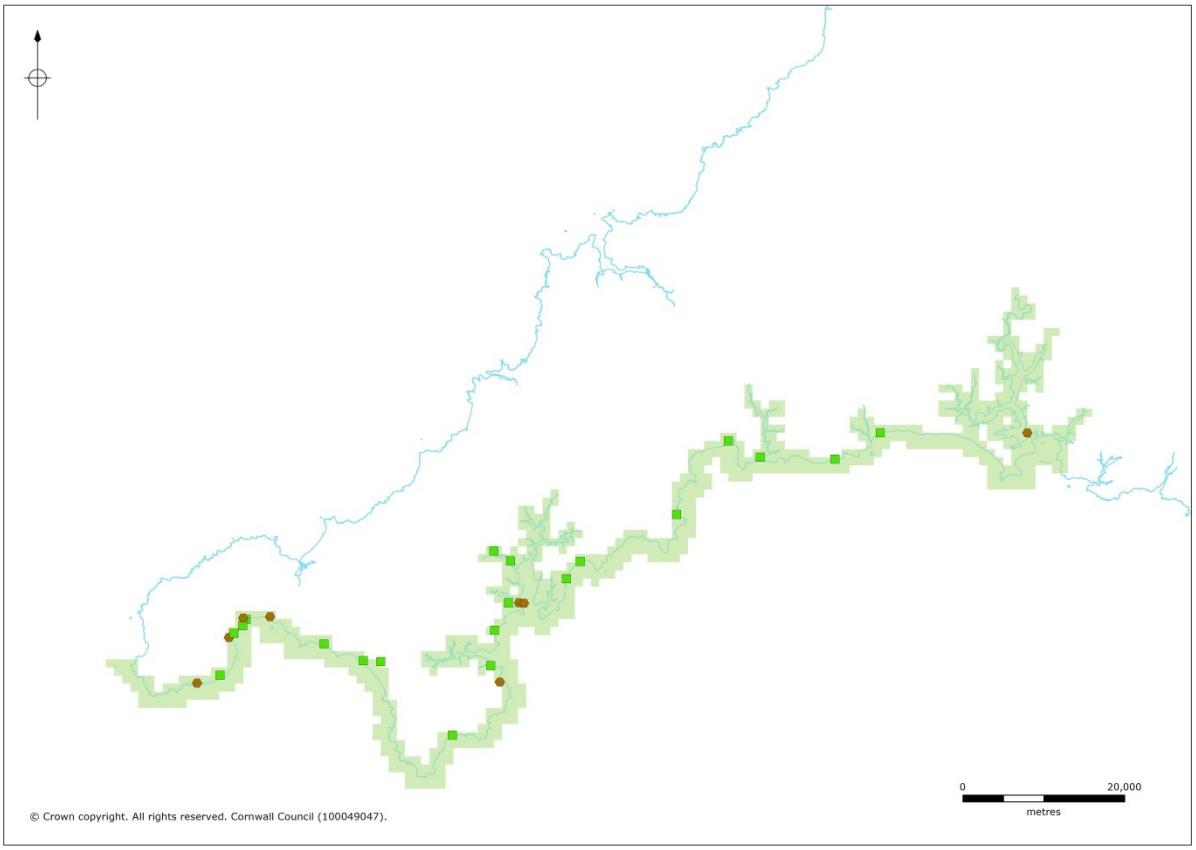


Fig 11.2 Distribution of submerged forests (green squares) and peat deposits (brown points) within in the project area.

Organic deposits associated with submerged forests and palaeolandscapes have often been reported as being at risk of damage as a result of coastal erosion, flooding associated with sea level rise, and extreme storm events. The deposits have been highlighted by the Local Authority curators in Cornwall as an understudied area of special interest. The Cornwall and Scilly HER records 17 intertidal and/or submerged forests and

eight intertidal and/or submerged peat formations within the project area. There is an organic deposit recorded in Plymouth (within the project area) (Fig 11.2).

Further work within this area would therefore help to improve understanding of Palaeolithic and Mesolithic landscapes, including the character of the contemporary environment, through the study of preserved land surfaces (SWARF Research Aim 25). This could also help to address regional biases such as those relating to the lack of archaeology dating to the Lower and Middle Palaeolithic within Devon and Cornwall (SWARF Research Aim 3). Above all, further work will contribute to SWARF Research Aim 23 'Improve our knowledge of past climate and sea level changes together with their effects on the peoples' relationship with landscapes and the sea'.

Future work associated with submerged forests and palaeolandscapes could address the need to improve consistency in sampling, assessment and analysis for all types of palaeoenvironmental evidence (SWARF Research Aims 17 and 18).

Further evaluation of intertidal and submerged prehistoric land surfaces that are already considered to be high potential will help determine the value of such work and will help to address the need for a better understanding of the extent and chronology of coastal change within the Mesolithic-Neolithic transition (SWARF Research Aim 10). Subsequent landscape and regional-level reconstruction may prove an appropriate framework for analysing prehistoric contexts (Dix and Sturt 2013, 8).

The potential project we propose to explore this theme would be based on the methodology developed by the Lyonesse Project in the Isles of Scilly to study the evolution of the coastal and marine environment of the archipelago. The first stage of the project would be a review of previous work and an audit of all known submerged forests and palaeolandscapes on the south coast of Cornwall. The second, fieldwork stage would involve auger and GNSS surveys and targeted palaeoenvironmental sampling. The third stage would comprise assessment and analysis of the data with the aim of identifying sea-level index points to produce a new sea-level rise curve and vegetational history.

11.2.8 Cognitive landscape studies

There are many examples of early ceremonial landscapes along Cornwall's coastline. The spectacular clifftop locations of barrows at Pordenack Point etc. make these sites ideal subjects for cognitive landscape studies which could be combined with reconstructions of the contemporary coastline, along the lines of the South East Kernow Archaeological Survey (SEKAS) focussing on the monumental landscape around Pelynt, between Looe and Fowey (Frieman and Lewis 2016).

11.2.9 Roman settlements and harbours

The discovery of a new Roman fort at Calstock (Rippon 2008; Claughton and Smart 2008; Smart 2014) and another at Restormel, Lostwithiel (Thorpe 2007; Hartgroves and Smith 2007:2008) to add to the one previously known site at Nanstallon, near Bodmin, suggests a far greater Roman military presence in Cornwall than previously realised although the implications are still far from clear. In addition a number of possible Roman signal stations have been identified on the south coast e.g. Payber Point (MCO24016) and St Anthony Head (MCO18669). Along with being located on navigable routes the sites at Calstock and Restormel are located close to rich metal mineral resources and this is likely to be significant with implications for control of metal resources. Exploring the socio-economic relationships between a Roman military presence and local communities will be key in future research. Aside from creating opportunities for market exchange, opportunities for social interaction will have offered new contexts for the introduction of new technology, ideas and even changes in fashion (Nowakowski 2011, 256).

Roman ports are poorly known in Britain, yet the wider South West region has many potential sites, both on the Channel coast (Hamworthy, Seaton, Topsham and Plymouth) and on the banks of the Bristol Channel (Oldbury-on-Severn, Sea Mills, Clevedon,

Crandon Bridge, Combwich and the Camel Estuary). Despite the obvious importance of the sea in the region, very few of these sites have been studied. Work on sea-level change may also be of value in understanding the Roman coastline. There has been some work on this topic in Poole Harbour but little elsewhere (Webster 2008, 291).

There is a need for a project to consider and review the evidence for Roman occupation in Cornwall and to explore for potential new sites, including settlements and ports, harbours and landing places.

11.2.10 Coastal salt production

There are three recorded Romano-British salt working sites recorded in the Cornwall and Scilly HER, all on the Lizard peninsula: Carngoon Bank (MCO23515); Ebber Rocks (MCO6646); and Trebarveth (MCO23588). There is also evidence for salt production at Porth Godrevy on the north coast (Nowakowski *et al* 2007) (Fig 11.3).

There are also three post-medieval salt works recorded: Carne, on the Lizard, (MCO26398), Par (MCO 29713) and Antony Park (MCO23246).

It seems probable that there must have been more than this handful of small salt working sites around the Cornish coast. What is required is a closer examination of the coast, particularly where there are low cliffs and access to/from the sea would have been possible. There may have been processes which we cannot see today – salt can precipitate out of rock pools in hot weather for instance. Systematic field walking to identify artefact scatters is also recommended as is a consideration of the wider contemporary context.

This work will contribute to SWARF Research Aim 38: 'Roman salt production is another area where there is good evidence from the South West (Somerset and Dorset) and the potential for wider (technological, social, trade, etc.) studies. However, later salt making has been little studied, even the range of technologies employed in the region, and their chronology and distribution, being poorly understood'.

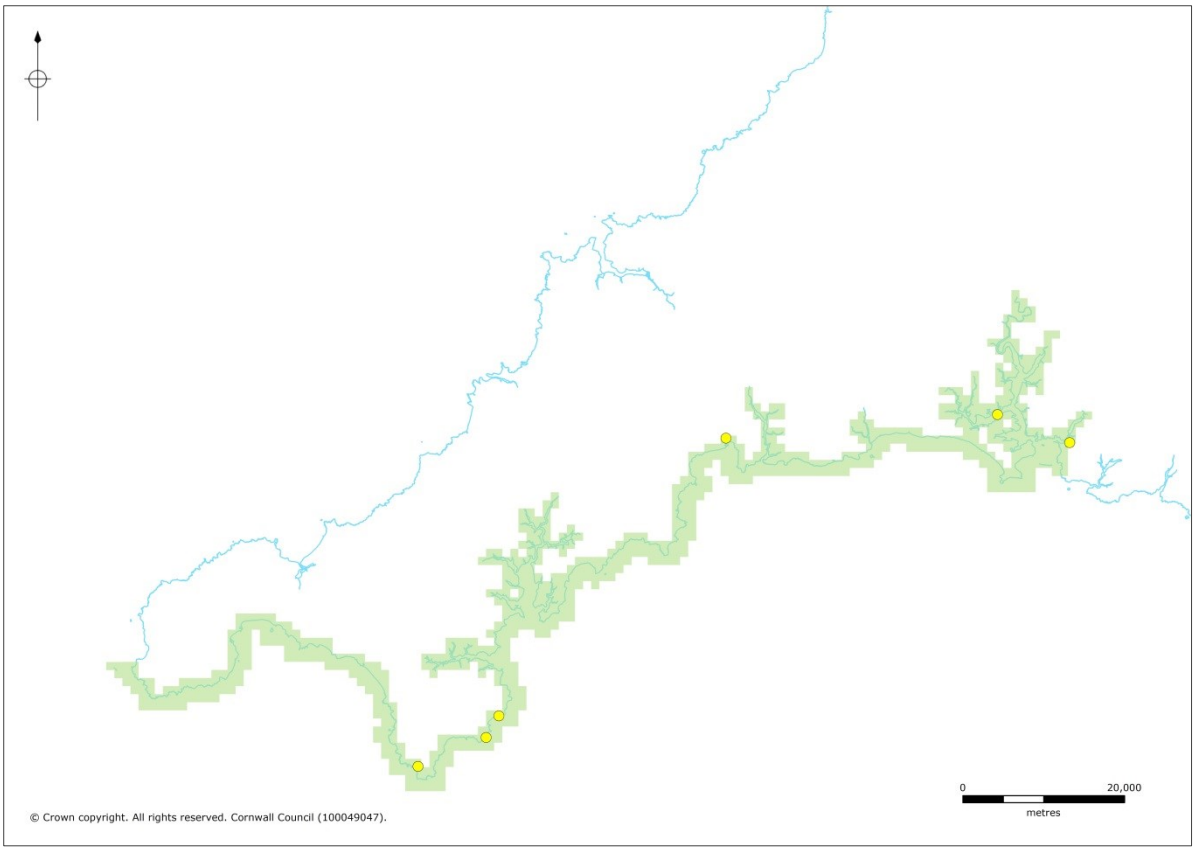


Fig 11.3 Distribution of salt production sites within the project area.

11.2.11 Intertidal wreck sites

Indirect evidence indicates that the seas around the region were busy with shipping in the past and this must have led to a large number of wrecks. However, many of these are likely to have been lost in waters that are not frequented by sports divers because of low visibility or high energy currents. How can we access this resource (Webster 2008, 288)?

The potential exists for archaeological evidence of maritime sites of all periods from the Mesolithic to the present day to be recoverable along the south Cornwall coast and inshore waters. Maritime sites consist of either vessels (wrecks) or debris accidentally or deliberately lost overboard from a vessel (Wessex Archaeology 2007, 23).

This potential cannot be reliably quantified at the present time, although it is reasonable to expect it to be related to the number of vessel movements during any particular period, the length of time that the evidence is likely to survive and the likelihood of the evidence being discovered. The potential for evidence of maritime activity from the post-medieval and modern periods can be expected to be greatest because of the increasing volume of trade and other marine activities in the area during these periods, and because of the relatively short period of time since its deposition on the seabed. Potential for the survival of evidence of medieval or earlier date is likely to be low, although certain classes of evidence, such as stone ballast and cargoes of inorganic materials (pottery and metalwork), can be expected to survive for very long periods and the survival of more vulnerable organic material can occur in the right circumstances (*ibid)*.

Wreck recording using volunteer groups has formed an important component of the CITiZAN project – the project has funding for another three years after recieving renewed HLF support in December 2018.

We need the resources to respond rapidly to record wreck sites when they are exposed by extreme weather events on the foreshore and intertidal areas, as in the winter of 2013/14. Drone photography is an effective way of doing this.

11.2.12 The Cornish fishing industry

SWARF notes that 'the archaeology of fishing has received little attention and cross-cuts the maritime/land divide. As well as the strictly maritime resource there is also a considerable intertidal resource, notably fish-weirs, fish traps and netting installations existing from (at least) all post-Roman periods. Onshore assemblages of structures, artefacts, and fish-bones, and isotopic studies of human remains, also need to be integrated into any understanding of fishing and its importance' (Webster 2008, 273).

Nine fish traps have been identified on the south Cornish coast, all located within the estuaries (the River Fal, Helford River, Gillan Creek and the Tamar Estuary). Mostly are recorded by documentary or conjectural evidence but a series of stony linear banks have been recorded from aerial photographs at Gillan (MCO49796) and the remains of stone-built fish traps survive at Anderton, Millbrook (MCO53789) and nearby, at Smith's Quay, St John's Lake (MCO53790). A further surviving example at Shallowpool, on the West Looe River, is thought to be an 18th or 19th century salmon trap (MCO56738).

The Cornish fish industry is worth further study because it followed a pattern of pre-industrial methods and techniques into the 20th century, whereas, broadly speaking; Devon fishing was generally on a large scale with more investment in developing new technology and methods. In Cornwall, the traditions of small locally built boats and two- or three-man crews were handed down through the generations (Wheatley 2000, 121).

11.2.13 Sea stacks, rocks and islets

Sea stacks, rocks and islets, from Lizard Head to Gribbin Head near Fowey, include internationally notorious hazards to shipping, such as the cluster called the Manacles off the Lizard peninsula – a name suitably menacing in English, yet derived from Cornish

roots – and smaller local features like the prosaically named Shit Rock. Often considered simply natural, they have names, records, associations with historic sites and landscape and archaeological remains of their own; all showing how they have figured as resources, landmarks, and seamarks, shaping people's exploitation and experiences of the coast, from prehistory to today. Further work is required to reveal and explore this resource, its meaning for coastal heritage, and its potential for contributing to the understanding, management and enjoyment of Cornwall's historic coast.

Methods would include rapid 'walk-over' and selected boat trips to survey rocks and their viewsheds, informed by analysis of historic maps and archives, and by results of the Phase 1 DBA. The team would combine historic landscape analysis, interpretation of existing publically available records, a place-name expert, and local historians.

Results will contribute impetus and innovative direction for holistic coastal management. We will increase awareness of how Cornwall's coast may be considered, valued and conserved as a highly complex and dynamic, yet powerfully distinctive and legible place, where anthropogenic and natural changes interact, often spectacularly.

Such a project would deliver local events for Cornwall's residents and visitors which, when presented in an engaging and well-illustrated way, would deliver the environmental, social and economic benefits sought by the RCZAS. We will increase public support for, and active engagement in, coastal management, through appreciation of meanings, value and change. Expanding and deepening interest in the coast beyond its beaches and best-known cliffs, it will contribute also to its sustainable popular exploration, helping address the risk of degradation from concentrated visitor pressure and erosion.

This project would also contribute to the RCZAS aims to 'Enhance public understanding and enjoyment of the coastal heritage' and our 'understanding of England's development as a maritime nation', as well as fuller experience and appreciation of the local coastal landscape and its changes.

11.3 Specific sites and areas that would benefit from further work

11.3.1 Scheduled Monuments

Trebarveth and Lowland Point, St Keverne

The Scheduled 'Settlement sites 500 yards (460m) south-south-east of Trebarveth' (NHLE 1004319) are on the 2017 Heritage at Risk register and includes the Romano-British salt works on the cliff edge which is eroding at an alarming rate.

We propose a project to reassess earlier excavations and recording in the area, followed by scrub clearance and a detailed GNSS survey of the associated co-axial field system. The project would involve excavation and preservation by record of the remaining part of salt working site which would help understand its structure and relationship to the field system. This will help to assign a secure date to the latter and contribute to a more complete understanding of the archaeology and history of the St Keverne area and Cornwall generally. The area is of particular archaeological importance because most prehistoric Cornish pottery is made from gabbroic clay, the only known source of which is in St Keverne parish, yet no pottery production or clay extraction sites have been discovered.

This would help assess SWARF Research Aim 10: Address our lack of understanding of key transitional features; c When and under what conditions did field systems and traditions of roundhouse settlement begin? Did field systems begin in the early 2nd millennium BC?

Gunwalloe

The Scheduled cliff castle west of Gunwalloe Church, Gunwalloe (NHLE 1004265), is also on the 2017 Heritage at Risk register. Below the cliff castle, on the low cliff edge at the back of Dollar Cove, is a Bronze Age barrow and midden, and early medieval settlement

(MCO18368; MCO47025; MCO58625). Due to the location, topography, geology and visitor pressure of these sites they are particularly vulnerable.

Archaeological excavation at the back of Dollar Cove was undertaken in 2012 (Wood 2013). This started as a 2m wide trench but, once the complexity of the archaeology and depth of stratigraphy became apparent, was reduced to a 0.50m sondage. The interior of the bank was not completely excavated and the sondage was dug down to the depth of a hill wash deposit dating to the Romano-British period. It is estimated that there is potential for an additional 0.4m-0.5m depth of stratigraphy (Imogen Morris, pers comm).

The Late Bronze Age midden was not fully excavated (this contained worked antler, wild pig bones and pottery) and the possible second satellite cist burial under the barrow was not excavated and is at risk of erosion from the footpath. In addition, because of the truncation caused by the construction of a golf tee in the 1900s the ditch (which is visible in the cliff section) at the base of the promontory revetment has been covered up, so the bottom end of the trench needs extending to establish if the ditch is contemporary with the cliff castle. Because of the unexpected discovery of the barrow the team did not excavate to the base of the burnt layer of stones which formed the presumed Iron Age bank, so we have yet to establish if the bank was a revetment or if there were any wooden structures to retain the bank. There is a wealth of information to be gathered from this relatively small trench, which would significantly contribute to not only our understanding of how promontory forts were constructed and used but also their relationship to Bronze Age monuments, which often feature in these sites, such as Trevelgue Head, near Newquay. The incorporation of the Middle/Late Bronze Age barrow and accumulation of Late Bronze Age midden material into a presumably Iron Age fortification has the potential to answer some of these questions (Imogen Morris, pers comm).

Following Imogen Wood's work in 2013 it is understood that the National Trust has obtained funding for further work on the midden and barrow but not the Scheduled cliff castle.

11.3.2 Protected Wreck Sites

A Conservation Statement and Management Plan has been completed for the Royal Anne Galley (Camidge and Johns 2016). Conservation Statements and Management Plans should be prepared for the other Protected Wreck Sites in the project area: Coronation Inshore (NHLE 100070); the Coronation Offshore (NHLE 1000069); the Cattewater Wreck (NHLE 1000065); Rill Cove (NHLE 1000046); *Schiedam* (NHLE 1000049); *St Anthony* (NHLE 1000067); and the Loe Bar Wreck (NHLE 100076).

This would contribute to SWARF Research Aim 37: increase our knowledge of maritime archaeological sites.

11.3.3 Registered Parks and Gardens

A survey should be undertaken of the small area of Mount Edgcumbe Registered Park and Garden (1000134) which has been highlighted at risk due to erosion or flooding by the Durlston Head to Rame Head SMP in order to ascertain its present condition.

The Registered Park and Garden at Carclew, Mylor (NHLE 10000544) is listed on Historic England's 2017 Heritage at Risk Register with extensive significant problems other than coastal erosion and flooding, and would also benefit from a survey to ascertain its present condition.

11.3.4 Cliff castles/promontory forts

Various promontories along the coast have been used to site ceremonial monuments, cliff castles (Fig 11.4), for occupation and coastal defence and as signal stations or hazard warnings; Rame Head is a good example. An overview landscape project detailing the history, use and development of these promontories would help to build up

a picture of the changing uses of the coast which could be extended to cover the whole south coast region.

There are eight Scheduled cliff castles within the project area Cliff (Fig 11.4): Rame Head; Dodman Point; Black Head: Chynalls, Lankidden and Gunwalloe on the Lizard: and Treryn Dinas and Carn Les Boel on the coast of West Penwith. Most are on land owned by the National Trust. Several of these are on the HAR register and are vulnerable to scrub and tree growth. These sites would benefit from drone or lidar surveys which would provide baseline information on their current condition against which future monitoring could be carried out. Such surveys would also help to understand these monuments in their wider context and have considerable educational potential for public interpretation and engagement.

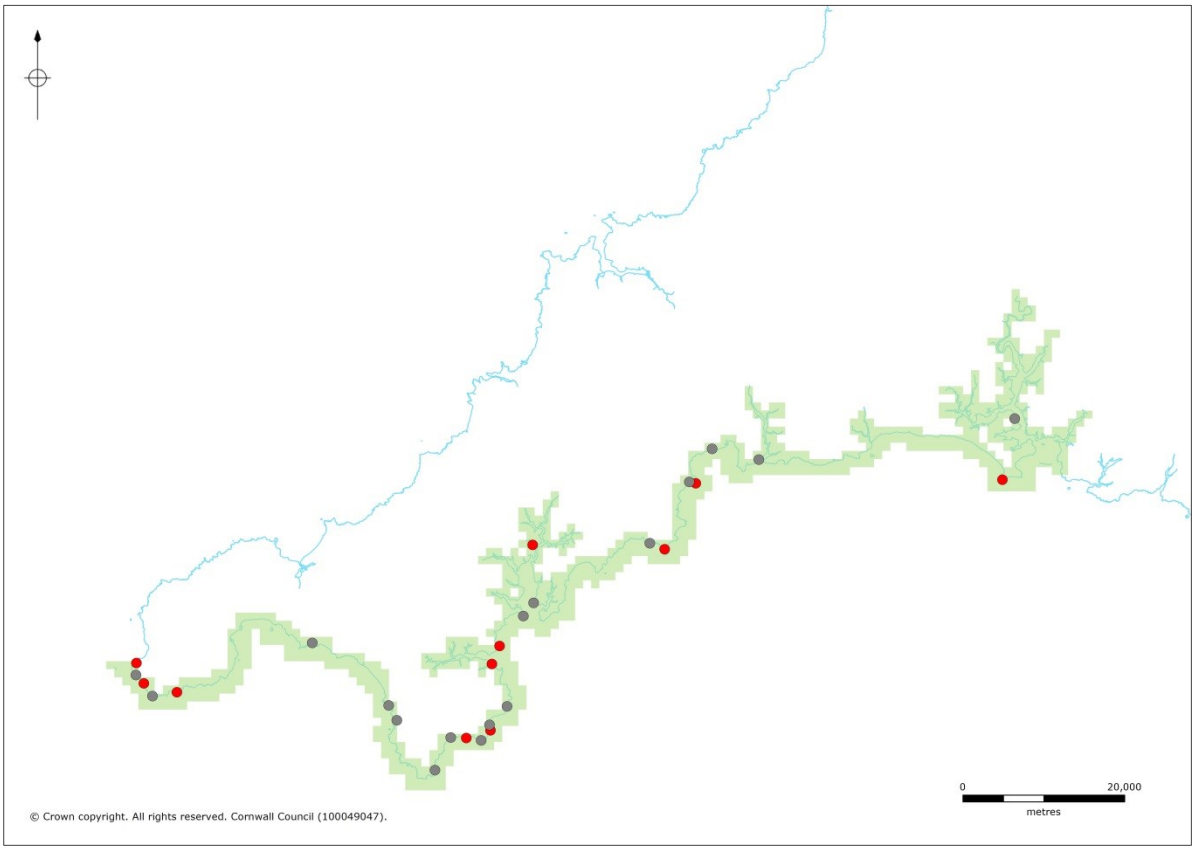


Fig 11.4 Cliff castles within the project area. Red dots represent confirmed sites and grey dots possible ones.

11.3.5 World War II defences

Analysis of the sites that are most likely to be affected by erosion as a result of SMP policy have shown a high proportion of sites related to Second World War coastal defence. Records relating to these assets have been enhanced by the NMP and the Defence of Britain Project, as well as site specific recording and condition surveys undertaken at coastal batteries and radar stations. Field assessment should be undertaken on sites identified by the DBA that fall within this category to determine their present condition.

11.3.6 Estuarine quays

The gazetteers of the Helford, Fal and Fowey Estuary Audits include many quays (Reynolds 2000; Ratcliffe 2001; Parkes 2001), however, no further work has been done apart from development-led recording at Scott's Quay (Mossop *et al* 2013) and a community project at Withan Quay (Gossip 2018), both on the Helford River. We propose a project to assess the condition and management requirements of each quay –

this could be done using a site recording *pro forma* similar to that developed by the Cornwall Archaeological Society supported by illustrative photographs; the results to be presented in a separate report for each of the three estuaries.

Fig 11.5 Second World War beach defences at Long Rock near Penzance, exposed by storms in February 2014 (Photograph: CAU).

11.3.7 **Tamar Sailing Barges and Brixham Trawlers**

There are many hulks of historic craft in Tamar, Fowey, Fal and Helford Estuaries which have the potential to yield important data on ships, trade and material culture on archaeological evaluation (Webster 2008, 228).

In fact, some types of boat are now better represented by hulks than by floating vessels – one example is the different types of Brixham Trawler. All those still afloat were made by one yard. However, the *Antelope*, on the estuary of the River Plym, was built by another yard (possibly Jackmans). There is also the remains of the *Wendew* (a mule class Brixham Trawler) in Hooe Lake.

Another example is the Tamar Sailing Barges. There is only one still floating – the *Shamrock* – and that was a hulk in Hooe Lake (described in the Lost Ships) which was restored by the National Maritime Museum and National Trust. The *Shamrock* is currently undergoing major restoration by the National Trust at Cotehele Quay, replacing the extensive rotten timbers and inserting an engine to enable river trips for visitors (http://shamrock-cotehele.blogspot.com/). This boat is actually untypical of the majority of Tamar Sailing Barges. The *Lynher*, which was more typical, only has about one original piece of timber retained during its restoration.

Martin Read estimates that there are either six or nine Tamar Sailing Barges listed as hulks in the Lost Ships book - substantially the largest resource for this vessel type and most of these are in Cornwall (see Appendix 7).

A survey of these hulks of Tamar Sailing Barges and Brixham Trawlers would contribute to SWARF Research Aim 37: increase our knowledge of maritime archaeological sites and

Research Aim 48: Widen our understanding of Post-medieval and Modern transport and communication.

11.3.8 Tide mills

Tide mills are an important component of the coastal historic environment. There are 13 around Plymouth alone and eight in Cornwall, mostly around the Fal Estuary (Fig 11.6). Many of these have been looked at individually, but they have not been surveyed or assessed as a group and were last considered in 1971 (Minchinton and Perkins 1971).

This would contribute to SWARF Research Aim 43: Address the lack of knowledge of post-medieval to modern food production; Research Aim 44: Develop an understanding and identification of early medieval technologies; b. Classes of sites such as mills (wind, river, tide and animal) and fish traps need to be sought out; Research Aim 45: Broaden our understanding of post-medieval to modern technology and production; and Research aim 47: Assess the archaeological potential for studying medieval economy, trade, technology and food production.

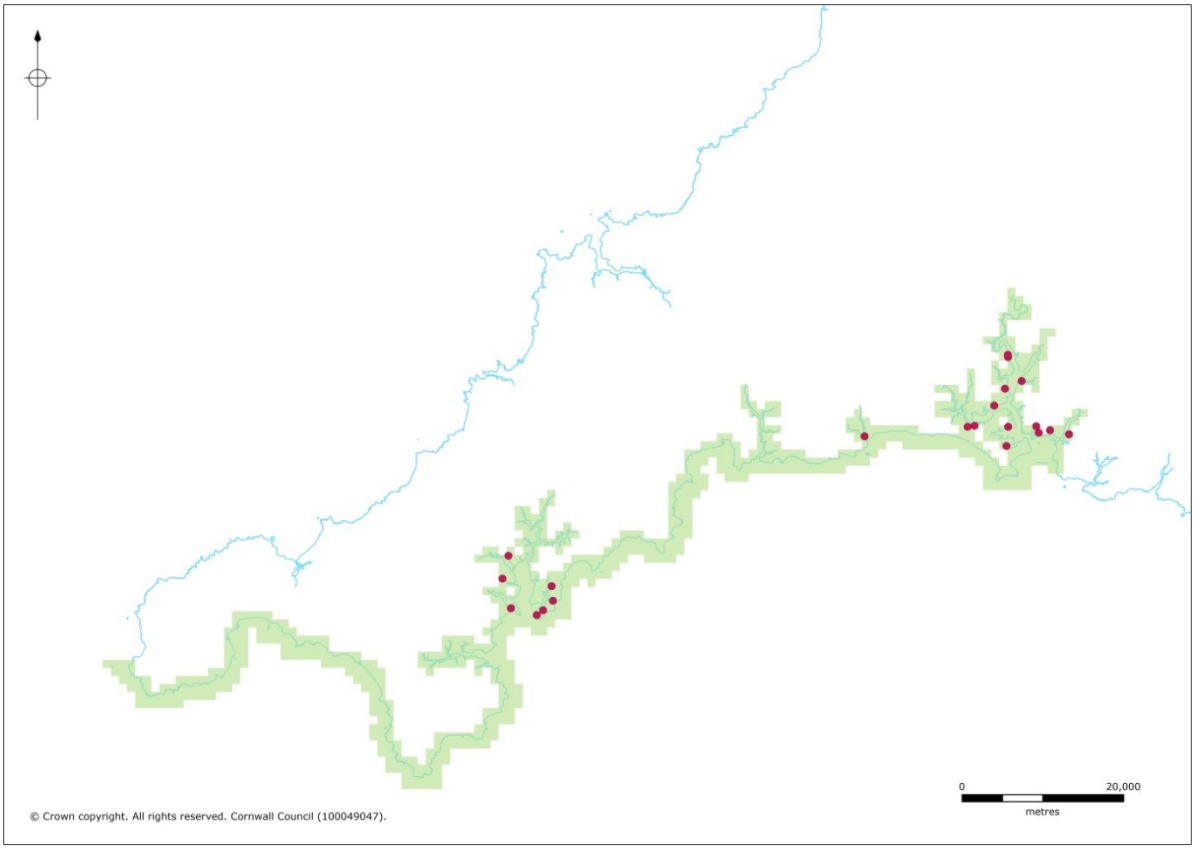


Fig 11.6 Tide mills recorded in the HERs (including records added by this project).

11.3.9 Land reclamation

Within the context of sea-level change and the future shape of the estuaries there could be useful further research into the history and reclamation of them. This has been a long evolving process; perhaps starting with the reclamation for quays and the creation of mill ponds for tide mills, and later, the reclamation of shallow inlets for ornamental fish ponds and inter-tidal saltings for the creation of improved pasture to, more recently, the use of intertidal areas as refuse disposal sites.

11.3.10 Ropewalks

Martin Read has listed 18 ropewalks in Plymouth (and knows of a couple more) and assessed that, in additional to upstanding built remains, there likely to be surviving below-ground archaeological remains on some sites.

Ropewalks in the project area have seen little research and a desk-based assessment would help to better understand the industry, identify sites of significant extant remains (including those that have the potential for designation) and short-list sites that could yield significant evidence from archaeological excavation.

This would contribute to SWARF Research Aim 45: Broaden our understanding of post-medieval to modern technology and production.

11.3.11 Coastal industry, quarrying and quays

An assessment is required of the full range of historic quarrying and industrial activity on the south Cornwall and Devon coast, in particular on the Bere peninsula, around Pentewan, on the Lizard Peninsula and Penlee Quarry, and in urban centres such as Penzance. Identification and recording of sites at threat from coastal erosion should be prioritised; in particular the extensive soapstone workings between Lizard Point and Mullion Cove.

During the 18th century soapstone was quarried at Gew Graze (Soapy Cove), a small valley about 1 mile north of Kynance Cove and used in the manufacture of porcelain before the discovery of china clay (kaolin). Extant sites associated with the industry include numerous quarries, sites of buildings and a rock-cut quay at Pengersick Point (new site added to the HER by the RCZAS) but what is not known is the extent of the mining or quarrying activity which took place along the coastal stretch from Caerthillian Cove in the south to Mullion Cove in the north (Felce 2011).

The proposed project will consist of an audit of the known, or suspected, sites; a systematic walkover survey and detailed GNSS survey of the remains the industry. This work will contribute to SWARF Research Aim 38: Widen our understanding of the extraction, processing and transportation of minerals, stone and aggregates and Research Aim 45: Broaden our understanding of post-medieval to modern technology and production.

Further documentary research into the medieval mining activity on the Bere peninsula could help better understand the early history of the silver mines. This would also contribute to SWARF Research Aim 45.

11.3.12 Coastal horticulture

For the southern coastal edge of West Penwith there is scope for a research project to better investigate and celebrate the role of horticulture and contrast it to research on the development of horticulture in the Tamar Valley, some facilitated by the Tamar Valley AONB - http://www.tamarvalley.org.uk/projects/project-archive/

This work could be broadened to investigate the history of the Kea Plum orchards in the upper reaches of the Fal Estuary. This would contribute to SWARF Research Aim 43: Address the lack of knowledge of post-medieval to modern food production.

11.3.13 Coastal settlements

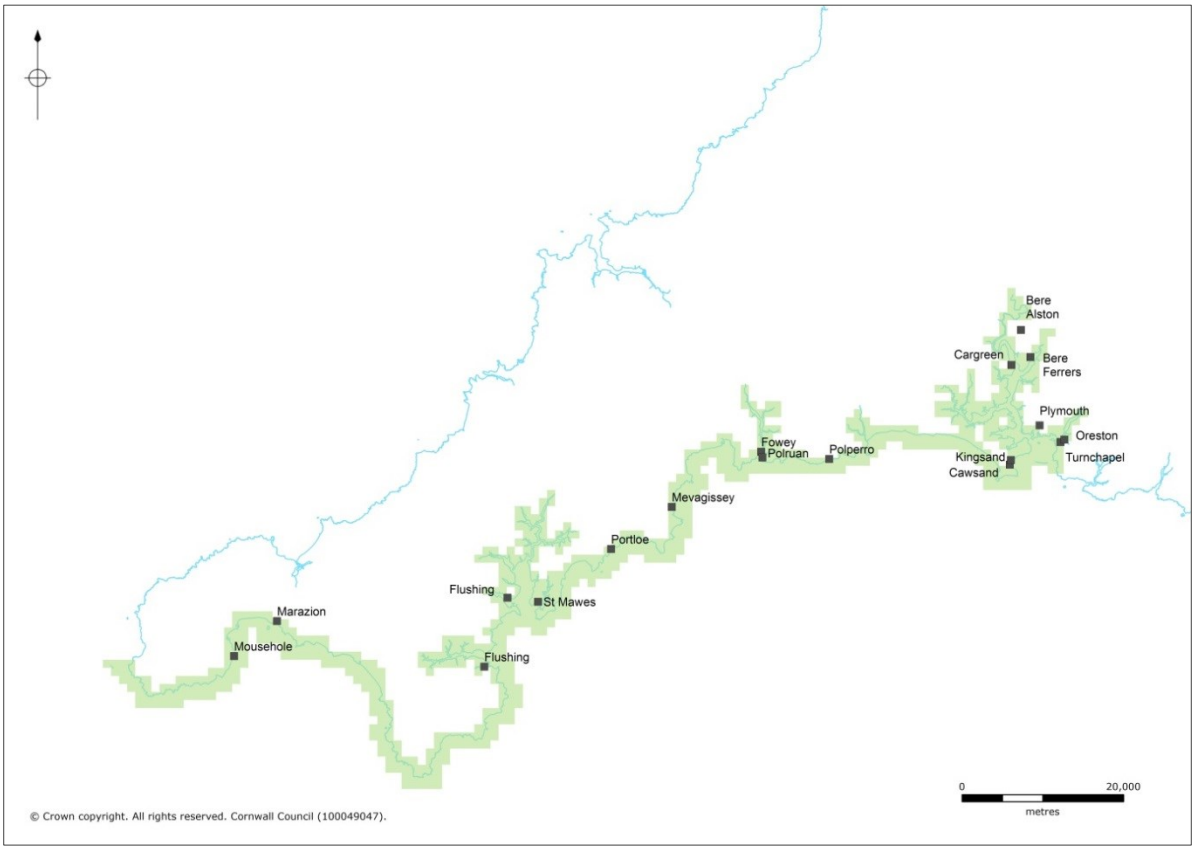


Fig 11.7 Coastal settlements that could be studied as urban surveys.

Urban survey of smaller, under-studied, coastal settlements is likely to result in a higher density of recorded heritage assets, especially long-established fishing and coastal settlements such as Cargreen, Cawsand and Kingsand, Polperro, Polruan, Fowey, Mevagissey, Portloe, St Mawes, Flushing, Marazion and Mousehole (Cornwall); Bere Alston, Bere Ferrers (Devon) and Oreston and Turnchapel (Plymouth) (Fig 11.7).

This would contribute to SWARF Research Theme: Identities and Interactions – *Research Aim 52: Use archaeological evidence to better understand identities, such as Cornish, through time. b … Other intra-regional and cross regional identities would also benefit from research; examples include …occupational communities such as mining and fishing settlements*.

11.3.14 Sites identified by the DBA component

The new prehistoric/Roman sites identified by the DBA which include seven possible barrows and five potential rounds should be verified by field visits and survey during Phase 2, if appropriate.

11.3.15 Surveys within areas of low monument density

Rapid identification surveys across targeted areas of low record density could significantly enhance the HER. A project to identify Mesolithic sites between Rame Head and the Helford Estuary is outlined above in Section 11.1.1.

11.3.16 Sites proposed for Designation Assessment

If verified by field visits and surveys, the new prehistoric/Roman sites identified by the DBA should be considered for designation assessment as should the possible Neolithic long barrow/ Bronze Age barrow at Triffle/St Germans Beacon as this potentially has an interesting relationship with the Triffle Cursus (MCO43628). The sites include:

Num.	Location	NGR	Monument Type	HBSMR ID
1	Triffle/St Germans Beacon	SX 33367 54114	Barrow	MCO11011
2	Roskestal West Cliff	SW 36587 22147	Barrow	MCO60504
3	Ardensawah Cliff	SW 136251 22126	Round Barrow	MCO60503
4	Angrouse Farm, Mullion	SW 166828 19254	Barrow?	MCO60652
5	Angrouse Farm, Mullion	SW 166697 19353	Barrow?	MCO60653
6	Predannack Airfield	SW 167498 15901	Barrow?, Mound	MCO60663
7	Cotehele	SX 42228 68955	Barrow?, Mound	MCO59604
8	Corgerrick	SW 72123 16290	Round?	MCO60682

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13 Project archive

The CAU project number is **146658**

OASIS online references: Cornwall HER (cornwall2-279811); Plymouth HER (cornwall2-279821); Devon HER (cornwall2-279831)

Appendix 1: Scheduled Monuments within the project area

Schedueled Monuments within the project area listed by local authority.

NHLE no.	Name	NGR
1004292	Two barrows and circular enclosure on Pordenack Point	SW 34617 24193
1004293	Promontory fort at Carn Les Boel	SW 35615 23239
1004236	Round cairn 160m north east of Bosistow Island	SW 35801 23296
1015059	Churchyard cross in St Levan churchyard, 10m south of the church	SW 38037 22197
1015816	Wayside cross in St Levan churchyard, 10m north east of the church	SW 38043 22224
1016965	Cross 150m south west of Rospletha	SW 38203 22332
1006733	Promontory fort known as Treryn Dinas	SW 39753 21951
1018570	An early Christian memorial stone at Boskenna	SW 42252 23667
1004275	Standing stone 410m south east of Boskenna Cross	SW 42816 23938
1016156	Wayside cross in Newlyn churchyard, south of the church	SW 46142 29077
1015067	Churchyard cross-head in wall of Paul churchyard	SW 46428 27072
1010322	Medieval wayside cross at Paul	SW 46536 27037
1006729	Market cross	SW 47023 30038
1003270	Round called Lescudjack Castle	SW 47539 31034
1006727	Early Christian memorial stone beside Bleu Bridge	SW 47662 31794
1018493	An inscribed cross shaft, a lantern cross head and a cross-base in Gulval churchyard	SW 48461 31744
1006656	Four crosses on St Michael's Mount	SW 51494 29881
1021407	Pengersick Castle and associated building platform	SW 58190 28414
1021324	Wheal Trewavas copper mine 310m south of Trewavas	SW 59936 26551
1004264	Two round barrows on Pedngwinian Head	SW 65365 21119
1004265	Cliff castle W of Gunwalloe Church	SW 65953 20469
1015627	Medieval wayside cross base, 10m south of Gunwalloe church	SW 66029 20537
1015063	Wayside cross in Gunwalloe churchyard, 0.75m east of the church	SW 66035 20547

NHLE no.	Name	NGR
1004432	Stone hut circle settlement with irregular aggregate field system at Kynance Gate, 935m south east of Kynance Farm	SW 68681 13896
1010854	Medieval wayside cross at Tregaminion	SW 70774 12617
1006753	Holy well known as St Ruan's Well, 160m south east of Bruggan Farm	SW 71515 14675
1006675	Two wayside crosses, south and east of Bonallack Barton	SW 71904 26414
1004430	Slight univallate hillfort immediately south west of Gear	SW 72093 24805
1006659	Three rectangular defended enclosures 460m north east of Merthen Manor	SW 73078 26655
1004271	Round 205m south of Goongillings	SW 73469 28076
1004332	Hut circle with associated field system 100yds (90m) NNW of Poldowrian Farm	SW 74950 17002
1004340	Round 600yds (550m) WNW of Helford	SW 75246 26242
1004328	Promontory fort at Lankidden	SW 75549 16517
1006686	Round 250m west of Flushing Cove	SW 78167 25247
1006687	Round 240m south east of Norways Farm	SW 78225 29330
1007260	College known as Glasney College, Penryn	SW 78501 34225
1020451	Fish Cross: standing cross immediately east of the Town Hall	SW 78510 34395
1003103	Promontory fort at Chynalls Point	SW 78539 17444
1004431	Part of a promontory fort with Civil War fieldworks known as Little Dennis	SW 78740 25659
1020815	Jewish and Congregationalist cemeteries at Ponsharden	SW 79460 33840
1004272	Cliff castle on Rosemullion Head	SW 79667 27872
1004319	Multi-period archaeological landscape of settlements, field systems, flint working, salt working and pottery production 450m SSE of Trevarbeth	SW 79725 19649
1015066	Wayside cross in St Peter's churchyard, Flushing	SW 80735 34005
1020050	D-day landing craft maintenance site at Mylor harbour	SW 82021 35360
1015065	Churchyard cross in St Mylor churchyard	SW 82026 35236
1012134	Pendennis peninsula fortifications	SW 82415 31877
1015071	Churchyard cross in Feock churchyard	SW 82484 38420

NHLE no.	Name	NGR
1020557	Standing cross at High Cross, 30m west of Truro Cathedral	SW 82564 44920
1019847	Multiple enclosure fort at Round Wood	SW 83713 40384
1020103	Standing cross 300m south east of Trelissick	SW 83975 39303
1013807	St Mawes Castle	SW 84096 32739
1013808	Early 20th century gun battery 150m north of St Mawes Castle	SW 84103 32907
1020452	Holy well of St Mawes, 80m east of St Mawes Methodist Church	SW 84710 33098
1019062	The Cregou or Cregon bowl barrow and enclosure 900m south east of Park Farm	SW 84889 43332
1020713	Holy well 80m east of St Just Church	SW 84924 35692
1015459	Early Christian memorial stone and wayside cross in St Clement's churchyard	SW 85067 43866
1016285	Fentongollan Cross, 620m north west of St Michael Penkevil Church	SW 85554 42731
1020714	Round 450m south of Tregeagle	SW 86693 46566
1015072	Wayside cross in St Gerran's churchyard	SW 87267 35167
1015625	Churchyard cross in Lamorran churchyard	SW 87861 41762
1019742	Dingerein Castle small multivallate hillfort and annexe, 240m north west of Curgurrel Farm	SW 88203 37544
1019746	Veryan Castle multiple enclosure fort and annexe 500m south west of Churchtown Farm	SW 90927 38786
1019745	Carne Beacon round barrow 320m north of Carne Farm	SW 91263 38647
1006757	Cliff castle known as Maen Castle	SW 34767 25763
1420580	Porthgwarra Ullies	SW 37180 21687
1004248	Holy well 30m north west of St Levan's Chapel	SW 38081 21927
1007285	Medieval chapel and hermitage called St Levan's Chapel	SW 38111 21912
1004396	Three bowl barrows 350m north of Poldhu Cove	SW 66247 20182
1004398	Bowl barrow 280m NNW of Southernwood	SW 66856 17183
1004420	Round 260m south of Tenament Farm	SW 70450 26178
1004370	Bowl barrow 210m NNE of Holifield Farm	SW 71197 26929
1004270	Round 220m south east of The Level House	SW 74320 28957

NHLE no.	Name	NGR
1001726	Cast iron footbridge at Perran Mill	SW 77553 38420
1020865	Later prehistoric cliff castle, two prehistoric round barrows, medieval field system, and associated remains on Dodman Point	SX 00150 39562
1004470	Bowl barrow 875m SSE of Bodrugan Barton	SX 01986 42721
1014226	Wayside cross in Tregaminion chapel yard, 3m north west of the chapel	SX 09657 51913
1014227	Wayside cross in Tregaminion chapel yard, 8m south of the chapel	SX 09667 51898
1006669	Two wayside crosses in the park surrounding Menabilly	SX 10140 51182
1019677	Lantern cross and grave slab immediately south of St Bartholomew's Church	SX 10431 59784
1013664	St Catherine's Castle 16th century blockhouse, 19th century gun battery and 20th century gun emplacement at St Catherine's Point	SX 11879 50938
1019057	Fowey Blockhouse	SX 12178 51332
1019056	Polruan Blockhouse	SX 12336 51085
1019055	St Saviour's Chapel, Polruan	SX 12519 50791
1010859	Medieval wayside cross on Fore Street, Polruan	SX 12761 50732
1004361	Chapel at Hall	SX 13318 52095
1020811	Lerryn Bridge	SX 14082 57155
1014012	Medieval churchyard cross in Lanteglos by Fowey churchyard, 2m south of the church	SX 14470 51510
1014013	Medieval wayside cross in Lanteglos by Fowey churchyard, 20m south east of the church	SX 14485 51503
1006681	Linear boundary called the Giant's Hedge	SX 17149 57451
1014235	Wayside cross in Lansallos churchyard	SX 17195 51593
1004513	Old Guildhall	SX 25586 53212
1010858	Stump Cross, 600m west of Sheviock Barton	SX 36292 55036
1004346	Tregantle Fort	SX 38629 53339
1004347	Scraesdon Fort	SX 39243 54920
1004664	Whitesand Bay (or Tregonhawke) battery	SX 40841 51489
1004384	Trematon Castle, a shell keep built on a motte and bailey castle	SX 41036 57964

NHLE no.	Name	NGR
1004510	Promontory fort, medieval chapel of St Michael's and Second World War radar station at Rame Head	SX 41795 48284
1007299	Royal Commission Fortification: unfinished battery at Knatterbury	SX 42138 50064
1021075	Bohetherick lime kiln with adjacent quay and ancillary buildings, 140m south east of Cotehele Bridge	SX 42279 67904
1003095	Inswork Chapel	SX 42646 52739
1004254	Two batteries and part of a third at Maker Heights called Redoubt No1, Redoubt No2 and Redoubt No3	SX 43277 51522
1016102	Cawsand Fort	SX 43325 50385
1020053	D-Day landing craft maintenance site, 170m north of Saltash Pier	SX 43333 58868
1007302	Canal, lock, island and salmon keeping pond known collectively as the Tamar Canal	SX 43592 70974
1007301	Civil War fieldworks at Inswork Point	SX 43819 53353
1007261	Ballast pond at Torpoint 690m west of North Corner Quay	SX 44083 54679
1019440	Okeltor 19th century arsenic, copper and tin mine	SX 44543 68927
1004496	Bowl barrow immediately south of the cricket ground and pavilion in Mount Edgcumbe Park	SX 44962 52688
1004391	Promontory fort at Black Head	SX 03933 48001
1003094	Round on Berry Down	SX 37613 55442
1003048	Medieval chapel at Erth Barton	SX 38137 56326
1004363	Medieval chapel in the grounds of Shillingham Manor	SX 40738 57244
1004447	Civil War battery at Wearde Quay	SX 42458 57700
1004255	Battery with Royal Commission fortifications called Redoubt No.5 at Maker Heights	SX 43818 51959
1003114	Battery and Royal Commission fortification called Grenville Battery	SX 43851 51126
1004344	Holy well called St Julian's Well	SX 44652 52172
1004497	Blockhouse at the Garden Battery	SX 45611 53172
1003059	Bullpoint gunpowder magazines and camber	SX 43456 57837
1003193	Ernesettle battery	SX 44846 59197
1002574	Slip No 1 (The Covered Slip), South Yard, Devonport	SX 45157 53983

NHLE no.	Name	NGR
	Dockyard	
1002573	The West Ropery (site of), South Yard, Devonport Dockyard	SX 45176 54196
1003849	Western Kings artillery tower	SX 45946 53346
1002614	Knowle battery	SX 46303 59556
1003848	Firestone Bay artillery tower	SX 46377 53518
1002643	Eastern King battery	SX 46616 53591
1010910	The coastal fortifications of Drake's Island	SX 46943 52829
1002615	Woodland fort	SX 47039 59241
1002623	Breakwater fort	SX 47161 50486
1012943	The Royal Citadel mid 17th century bastioned artillery defence, incorporating late 16th century artillery fort and 18th century statue, on the Hoe	SX 48057 53879
1003833	Plymouth Castle (remains of)	SX 48289 53959
1017599	Mount Batten: 17th century artillery tower, Civil War breastwork, and World War II remains	SX 48587 53222
1018732	Resolution Fort: Civil War town defences at Friary Court	SX 48700 54678
1017598	Mount Batten: prehistoric and Romano-British settlement	SX 48760 53196
1002544	Fort Stamford	SX 49338 52730
1021406	Worth's Cattedown Bone Cave 150m north of Cattedown Wharves	SX 49464 53615
1020686	Laira Emplacement, immediately south west of Laira Battery	SX 51291 56201
1021135	Efford Fort and Efford Emplacement	SX 51374 56419
1021134	Laira Battery	SX 51469 56285
1003850	Stonehouse Town Wall	SX 46212 54205
1002637	Lee Moor Tramway Bridge	SX 51997 56835
1002585	Staddon Heights Defences including Fort Staddon Fort, Brownhill Battery, Watch House Battery, Staddon Heights Battery, Staddon Battery and associated features and structures	SX 49358 51371
1021461	Morwellham Quay: transport infrastructure, part of the water control system and a manganese mill	SX 44574 69640
1002667	Gawton arsenic mine and flue	SX 45252 68851

NHLE no.	Name	NGR
1018366	Buckland Abbey	SX 48707 66811
1002584	Fort Bovisand	SX 48772 50706

Appendix 2: Grade I and Grade II* Listed Buildings within the project area

Grade I and II* Listed Buildings within the project area listed by local authority.

NHLE no.	Name	Grade	NGR
1096159	SOUTH PIER	II*	SW 47790 30044
1115115	CHURCH OF ST CLEMENT (METHODIST)	II*	SW 46865 26179
1140616	TEMPLE OF MILTON	II*	SX 45714 52625
1140716	CHURCH OF ST MARY AND ST JULIAN	I	SX 44633 51992
1140579	CHURCH OF ST MARY	I	SX 37017 55092
1140711	DOVECOT ABOUT 60 METRES NORTH OF ANTONY HOUSE	II*	SX 41788 56377
1138043	RETAINERS COURT AND SCREEN WALL ATTACHED TO NORTH	I	SX 42209 68593
1140179	CHURCH OF ST LEONARD AND ST DILP	I	SX 43112 61512
1140189	PENTILLIE CASTLE	II*	SX 40998 64557
1140219	CHAPEL OF ST GEORGE AND ST THOMAS A BECKET	II*	SX 42524 68552
1140248	MODITONHAM HOUSE	II*	SX 41344 61283
1140255	COTEHELE HOUSE	I	SX 42240 68618
1140258	BARN ABOUT 25 METRES SOUTH EAST OF COTEHELE HOUSE	I	SX 42287 68556
1140259	DOVECOTE ABOUT 80 METRES EAST OF COTEHELE HOUSE	II*	SX 42339 68620
1140349	PAVILION TO WEARDE FARMHOUSE	II*	SX 42140 58145
1140379	CHURCH OF ST STEPHEN	I	SX 41700 58334
1140384	PARISH CHURCH OF ST NICHOLAS AND ST FAITH	I	SX 43108 58813
1140409	HIGHER LODGE AT TREMATON CASTLE	II*	SX 41028 57960
1140516	PORT ELIOT HOUSE	I	SX 35960 57793

1140517	ORANGERY WITH URN ABOUT 12 METRES TO NORTH AND BUSTS ARRANGED TO SOUTH, PORT ELIOT	II*	SX 36043 57690
1140544	CHURCH OF ST GERMANUS	I	SX 35942 57751
1140548	SIR WILLIAM MOYLE'S ALMSHOUSES	II*	SX 35469 57922
1140571	HESKYN MILL AND CHIMNEY	II*	SX 34271 59598
1140743	CHURCH OF ST TALLANUS	I	SX 22859 51629
1138329	CALSTOCK VIADUCT	II*	SX 43356 68641
1140252	CHURCH OF ST ANDREW	I	SX 43648 69255
1140311	CHURCH OF ST CIRICUS AND JULITTA	I	SX 14004 54993
1144230	EDGCUMBE HOUSE	II*	SX 10358 59816
1146471	PALACE PRINTERS THE OLD PALACE	II*	SX 10467 59688
1146531	8 AND 9, QUAY STREET	II*	SX 10471 59707
1140332	CROSS 2.3 METRES TO SOUTH OF SOUTH PORCH OF CHURCH OF LANTEGLOS BY FOWEY	II*	SX 14474 51510
1144272	27 AND 29, FORE STREET	II*	SX 12626 51777
1144302	WALLS AT PLACE HOUSE	II*	SX 12507 51723
1144292	WESLEYAN CHAPEL AND ATTACHED SCHOOLROOMS	II*	SX 03778 51807
1138159	HIGHER LODGE	I	SW 96304 41731
1144759	SERVICE BUILDINGS ATTACHED TO SOUTH WEST OF CAERHAYS CASTLE	I	SW 97074 41590
1144760	GARDEN WALL WITH GATEWAYS AND FOLLY TOWER ATTACHED TO WEST AND EAST OF CAERHAYS CASTLE	I	SW 97178 41652
1144785	CHURCH OF ST JUST	II*	SX 01270 41613
1141078	THE IGNIOC STONE 2 METRES SOUTH OF ST CLEMENT CHURCH	II*	SW 85066 43869
1141632	CHURCH OF SAINT MYLOR	I	SW 82026 35242
1142128	MERTHEN	II*	SW 72713 26411
1142132	POLWHEVERAL BRIDGE	II*	SW 73710 28449
1141687	CHURCH OF SAINT ANTHONY	I	SW 78289 25666

1141732	KESTLE BARTON FARMHOUSE AND KESTLE COTTAGE, INCLUDING ADJOINING GARDEN WALLS	II*	SW 75347 25469
1141916	CHURCH OF ST RUMON	II*	SW 72100 15224
1141920	CHURCH OF ST WINWALAUS	I	SW 71142 12672
1141938	CHURCH OF ST GRADE	I	SW 71220 14297
1142154	BONALLACK BARTON COTTAGES	II*	SW 71856 26453
1143756	GUN BATTERY NORTH-NORTH WEST OF ST MICHAEL'S MOUNT QV.	II*	SW 51398 29861
1143767	THE MANOR OFFICE	II*	SW 51730 30793
1143785	FRIENDS MEETING HOUSE	II*	SW 51849 30701
1143786	THE HARBOUR WALLS AND BOLLARDS	II*	SW 51452 30153
1143795	ST MICHAEL'S MOUNT	I	SW 51467 29843
1143144	CAMELOT RESTAURANT	II*	SW 47137 30283
1143147	EGYPTIAN HOUSE	I	SW 47307 30181
1143151	METHODIST CHURCH INCLUDING RAILINGS	II*	SW 47383 30092
1143152	THE VICARAGE	II*	SW 47466 30054
1143157	WEST PENWITH RDC OFFICES INCLUDING RAILINGS	II*	SW 47493 30077
1143190	THE OLD HARBOUR PIER AND WALLS	II*	SW 46476 28515
1143962	THE UNION HOTEL	II*	SW 47334 30204
1143967	BAPTIST CHURCH AND ATTACHED SCHOOLROOM AT REAR	II*	SW 47106 30350
1137280	BOSKENNA	II*	SW 42286 23671
1143207	KEIGWIN	II*	SW 46890 26266
	LITTLE KEIGWIN		
1143872	CHURCH OF SAINT LEVAN	I	SW 38032 22213
1136691	BRAGANZA HOUSE	II*	SW 84740 33178
1136705	ST MAWES CASTLE, GATEHOUSE, BLOCKHOUSE, MAGAZINE AND OUTER DEFENCES	I	SW 84104 32752
1140987	ROUND COTTAGE	II*	SW 87096 39370
1141006	CHURCH OF SAINT JUST	I	SW 84845 35690

1141012	ROSTEAGUE HOUSE AND STABLE BLOCK	II*	SW 87343 33547
1141017	TREWINCE HOUSE	II*	SW 86740 33827
1141029	CHURCH OF ST FELIX	I	SW 87116 39461
1141049	CHURCH OF SAINT ANTHONY	II*	SW 85485 32035
1141056	CHURCH OF ST MOREN BELFREY	II*	SW 87838 41756
1141064	CHURCH OF ST MICHAEL	I	SW 85792 42156
1141069	TREGOTHNAN	I	SW 85767 41571
1141070	CLOCKTOWER WITH STABLE YARD AND OFFICE YARD ADJOINING TREGOTHNAN TO THE NORTH EAST	II*	SW 85701 41626
1142231	OUTBUILDINGS AND ADJOINING WALLS AT APPROXIMATELY 30 METRES NORTH WEST OF PENGERSICK CASTLE	II*	SW 58153 28441
1143755	PORTH-EN-ALLS LODGE	II*	SW 55821 27942
1141586	CHURCH OF SAINT PIRAN	II*	SW 77926 38930
1141602	OFFICES	II*	SW 77594 38449
1141603	DRY SAND SHOP AND GREEN SAND SHOP	II*	SW 77616 38429
1141642	WAREHOUSE	II*	SW 77560 38479
1141643	ENGINEERS SHOP	II*	SW 77573 38408
1141656	TOWER OF FORMER CHURCH OF SAINT KEA	II*	SW 84423 41701
1141659	CORDYS CLOSE	II*	SW 78933 38245
1141660	THE COACH HOUSE	II*	SW 78854 38011
1159655	CHAPEL OF ST MICHAEL	II*	SX 41814 48328
1161267	TUDOR BLOCK HOUSE	II*	SX 45611 53173
1159513	MARYFIELD HOUSE	II*	SX 42356 56196
1161834	CHURCH OF ST JOHN	I	SX 40791 53692
1162315	TOR HOUSE AND TERRACE WALLS AND PIERS	II*	SX 43897 55051
1158784	TREDUAN FARMHOUSE	II*	SX 34455 59929
1159090	GRANITE ARCHWAY AND WALL TO NOS 15 AND 17 (KINGSLEIGH HOUSE) FRONTING ROAD	I	SX 42936 58782

1159153	ERTH BARTON	II*	SX 38112 56334
1158982	CHURCH OF ST SAMPSON	I	SX 12056 55163
1161760	CHURCH OF SAINT MAWNAN	II*	SW 78774 27234
1157975	CHURCH OF SAINT WINWALOE	I	SW 66020 20548
1159421	THE OLD MANOR HOUSE OR CHY-AN-EGLOS AND STABLES AT REAR	II*	SW 51990 30600
1160515	ACTON CASTLE	II*	SW 55152 28445
1161301	PORTH-EN-ALLS	II*	SW 55837 27953
1159398	TRELISSICK HOUSE AND WALLS SURROUNDING	II*	SW 83755 39518
1159675	CLOCK TOWER AND ADJOINING BUILDING AT APPROXIMATELY 15 METRES SOUTH WEST OF CALENICK HOUSE	II*	SW 82077 43168
1160291	REMAINS OF CARCLEW HOUSE	II*	SW 78967 38159
1160542	FOOTBRIDGE	II*	SW 77553 38420
1161008	TULLIMAAR	II*	SW 78248 38853
1187644	CELTIC CROSS ADJACENT TO THE TOWN HALL	II*	SW 78508 34397
1201112	THE FISHERMAN'S ARMS	II*	SX 25594 53231
1201113	THE OLD GUILDHALL (NOW MUSEUM)	II*	SX 25592 53213
1201132	CHURCH OF ST NICHOLAS	II*	SX 25402 53201
1201442	THE CITY HALL	II*	SW 82685 44781
1196347	PENROSE MANOR HOUSE	II*	SW 64125 25775
1210654	FRENCHMAN'S CREEK	II*	SX 12622 51661
1210657	FOWEY MUSEUM	II*	SX 12592 51674
1210721	THE SHIP INN	II*	SX 12561 51674
1210574	MENABILLY HOUSE	II*	SX 10027 51171
1212500	TREGAMINION CHURCH	II*	SX 09670 51911
1210661	CHURCH OF ST PETER	II*	SX 01257 45248
1210773	HARBOUR PIERS AND QUAYS	II*	SX 01652 44796
1210790	LAWN HOUSE	II*	SX 01310 45101

1205377	TRURO CATHEDRAL	I	SW 82634 44916
1205930	PENHALIGON HOUSE, PRINCES STREET FRONT	II*	SW 82791 44775
1206030	OLD MANSION HOUSE	II*	SW 82829 44775
1205597	CHURCH OF ST GLUVIAS	II*	SW 78738 34662
1208344	METHODIST CHURCH AND FORECOURT WALL, RAILINGS AND GATEWAY	II*	SW 62964 25923
1218869	PLACE HOUSE	I	SX 12517 51756
1218875	ST CATHERINE'S CASTLE	II*	SX 11871 50934
1220507	PARISH CHURCH OF ST MARY	II*	SW 47528 30027
1220707	53, CHAPEL STREET	II*	SW 47378 30152
1221062	MARKET BUILDING	I	SW 47274 30293
1219071	HARBOUR PIERS AND WALLS	II*	SW 47001 26266
1236766	TREVIADES BARTON INCLUDING GARDEN AREA WALLS ADJOINING SOUTH	II*	SW 74789 28811
1269983	CUSTOM HOUSE QUAY KING CHARLES QUAY NORTH QUAY QUAY WALLS AND STEPS	II*	SW 81105 32609
1270039	51, HIGH STREET	II*	SW 80631 33138
1270048	CHURCH OF ALL SAINTS	II*	SW 80309 32441
1270061	ARWENACK HOUSE ARWENACK MANOR	II*	SW 81228 32310
1270068	THE OLD TOWN HALL	II*	SW 80608 33130
1270078	54 AND 55, CHURCH STREET	II*	SW 80915 32793
1270080	CHURCH OF KING CHARLES THE MARTYR THE CHURCH INSTITUTE	II*	SW 80965 32631
1270096	PENDENNIS CASTLE	I	SW 82430 31783
1270099	LITTLE DENNIS BLOCKHOUSE, PENDENNIS CASTLE	I	SW 82740 31546
1270101	THE STOREHOUSE, PENDENNIS CASTLE	II*	SW 82328 31898
1270107	POLYTECHNIC HALL	II*	SW 80912 32686
1270121	48, ARWENACK STREET	II*	SW 81092 32491
1270122	CUSTOM HOUSE AND REAR COURTYARD WALLS	II*	SW 81095 32527

1270126	1, 2 AND 3, BANK PLACE	II*	SW 81122 32455
1280647	YE OLD COTTAGE YE OLDE COTTAGE	II*	SX 25536 53248
1282823	LANTAU	II*	SX 25578 53189
1282854	CHURCH OF ST MARTIN BY LOOE	I	SX 25992 55032
1282859	THE GOLDEN GUINEA RESTAURANT	II*	SX 25532 53336
1280474	THE MANSION HOUSE AND ATTACHED FORECOURT RAILINGS	II*	SW 82743 44787
1282621	PRINCES HOUSE	II*	SW 82772 44778
1282638	LANDER'S MONUMENT	II*	SW 82358 44400
1280314	THE TOWN HALL, MUSEUM AND ATTACHED WALLS AND RAILINGS	II*	SW 78488 34403
1289905	ENGINE SHEDS, STACK AND TURNTABLE	II*	SX 07327 53722
1289977	27, POLKIRT HILL	II*	SX 01510 44679
1310051	CHURCH OF ST GERMANUS	I	SX 42626 49150
1310227	TRIUMPHAL ARCH AT HIGHER LODGE	II*	SX 44907 52930
1310634	POLHAWN FORT	II*	SX 42054 49224
1311081	ANTONY HOUSE	I	SX 41760 56303
1311300	TOWN LODGE	II*	SX 35860 57753
1311985	THE PROSPECT TOWER	II*	SX 42198 68926
1311893	ETHY HOUSE, INCLUDING GARDEN WALLS TO NORTH AND EAST	II*	SX 13348 57231
1311942	CHURCH OF ST WINNOW	I	SX 11537 56971
1312492	CHURCH OF ST WILLOW	I	SX 14469 51523
1311957	LOWER LODGE WITH ATTACHED SCREEN WALLS	I	SW 97455 41429
1309989	BAREPPA HOUSE	II*	SW 78147 29757
1310590	CROSS AT APPROXIMATELY 2 METRES SOUTH OF SACRISTY OF CHURCH OF SAINT MYLOR	II*	SW 82026 35233
1310625	PORLOE FARMHOUSE	II*	SW 81583 35048
1310674	THE FRENCH GUN BATTERY (NORTH WEST CORNER)	II*	SW 51427 29859
1310728	THE CHURCH OF SAINT MICHAEL	I	SW 51450 29841

1310512	THE CHURCH OF ST PIRAN AND ST MICHAEL	II*	SW 53752 29551
1311147	PENGERSICK CASTLE	I	SW 58178 28410
1329099	GUARD HOUSE, BOUNDARY WALL AND ATTACHED ANCILLARY BUILDINGS, MAKER HEIGHTS BARRACKS	II*	SX 43528 51370
1329133	CHAPEL ST SX 426527	II*	SX 42646 52738
1329142	ORANGERY IN THE ITALIAN GARDEN	II*	SX 45471 53274
1329144	ST JULIAN'S WELL	II*	SX 44645 52165
1329073	CHURCH OF ST PHILIP AND ST JAMES	II*	SX 42389 56125
1329109	FORECOURT BUILDINGS, WALLS AND PIERS, ATTACHED TO SOUTH EAST OF ANTONY HOUSE	I	SX 41783 56280
1329181	ELIOT TERRACE	II*	SX 35588 57840
1329204	STABLES AND GATE PIERS, PORT ELIOT	II*	SX 35802 57971
1329256	CHURCHYARD CROSS IMMEDIATELY SOUTH EAST OF CHURCH	II*	SX 41689 58325
1329258	CHAPEL IMMEDIATELY TO EAST OF SHILLINGHAM FARMHOUSE	II*	SX 40739 57245
1329260	INCE CASTLE	I	SX 40135 56514
1329359	MAUSOLEUM OF SIR JAMES TILLIE, MOUNT ARARAT	II*	SX 40678 65121
1329382	HALTON BARTON FARMHOUSE	II*	SX 41006 65624
1327324	LOSTWITHIEL BRIDGE	I	SX 10615 59809
1327326	FREEMASONS' HALL	I	SX 10480 59724
1327333	CHURCH OF ST BARTHOLOMEW	I	SX 10440 59797
1329264	LERRYN BRIDGE	II*	SX 14087 57153
1327314	CHURCH OF ST FIMBARRUS OR ST NICHOLAS	I	SX 12528 51706
1327315	CASTLE REMAINS AT HARBOUR MOUTH	II*	SX 12177 51334
1329297	POLRUAN CASTLE	II*	SX 12336 51085
1327290	HARBOUR PIERS AND QUAYS INCLUDING INNER BASIN	II*	SX 03877 51631
1327045	CLIFF COTTAGE STEP COTTAGE	II*	SX 01274 41598
1327071	CAERHAYS CASTLE	I	SW 97124 41638

1328900	CHURCH OF ST CLEMENT	I	SW 85060 43876
1328411	HEYLE (NAK CENTRE)	II*	SW 76112 26996
1328581	BARN AT APPROX 20M SOUTH OF KESTLE BARTON FARMHOUSE AND KESTLE COTTAGE	II*	SW 75352 25448
1328596	CHURCH OF SAINT MAUGAN	I	SW 70955 25094
1327556	CROSS NEAR SOUTH EAST CORNER OF ST MICHAEL'S MOUNT	II*	SW 51440 29813
1327572	GUN BATTERY WEST OF ST MICHAEL'S MOUNT QV.	II*	SW 51398 29822
1327573	THE SENTRY BOX	II*	SW 51427 29880
1327829	CHURCH OF ST GULVAL	II*	SW 48466 31754
1327838	THE OLD STANDARD	II*	SW 46902 26275
1327894	CHURCH OF POL DE LEON	I	SW 46454 27082
1328931	CHURCH OF ST MOREN	II*	SW 87860 41774
1328938	THE GLEBE COUNTRY HOUSE	II*	SW 87141 39335
1328952	CHURCH OF ST GERRANS	I	SW 87276 35176
1328968	THE RECTORY	II*	SW 84798 35631
1328668	NEW PATTERN SHOP	II*	SW 77681 38490
1329009	CHURCH OF SAINT FEOCK	II*	SW 82483 38430
1329027	CALENICK HOUSE AND GARDEN WALLS TO SOUTH AND NORTH	II*	SW 82093 43178
1365628	CHURCH OF ST ILDIERNA	I	SX 17242 51589
1375582	BARRACK BLOCK, MAKER HEIGHTS BARRACKS	II*	SX 43493 51396
1375676	CREEKVEAN AND ATTACHED ENTRANCE BRIDGE AND WALLS TO ROAD	II*	SW 82678 38668
1386515	TRINITY METHODIST CHAPEL	II*	SW 46194 28830
1392862	WORLD WAR II TUNNELS AT PORTHCURNO TELEGRAPH STATION	II*	SW 38441 22742
1449048	Pillwood House	II*	SW 82593 38639
1159292	ROYAL ALBERT BRIDGE AND SEVENTEEN APPROACH SPANS	I	SX 43372 58769
1105738	MORWELL BARTON	I	SX 44565 70790

1105454	TOWER AND ADJOINING OUTBUILDING APPROXIMATELY 40 METRES TO NORTH OF BUCKLAND ABBEY	II*	SX 48723 66825
1105493	TITHE BARN DIRECTLY TO EAST OF BUCKLAND ABBEY	I	SX 48767 66778
1162274	WARLEIGH HOUSE	II*	SX 45677 61706
1162231	MARISTOW HOUSE	II*	SX 47359 64542
1163103	CHURCH OF ST ANDREW	I	SX 45935 63413
1163369	BUCKLAND ABBEY	I	SX 48725 66783
1318245	THE INFIRMARY	II*	SX 48818 66789
1326389	BERE BARTON	II*	SX 45881 63400
1379615	FORT BOVISAND	II*	SX 48755 50663
1067143	ROYAL CITADEL GOVERNOR'S HOUSE AND STEPS TO DOORWAYS	II*	SX 48008 53878
1067144	ROYAL CITADEL GREAT STORE	II*	SX 48114 53763
1113296	FORMER ROYAL NAVAL HOSPITAL THE QUADRANGLE CENTRE	II*	SX 46593 54661
1113325	FORMER ROYAL NAVAL HOSPITAL WATER TOWER	II*	SX 46761 54819
1117102	CHURCH OF ST PAUL	II*	SX 46424 53757
1117103	ROYAL MARINE BARRACKS ARCHWAY BLOCK	II*	SX 46364 54053
1117106	ROYAL MARINE BARRACKS EAST BARRACK BLOCK AND FORECOURT RAILINGS	II*	SX 46450 54068
1130019	CHURCH OF ST AUBYN INCLUDING ATTACHED WALLS AND WALLS TO NORTH AND SOUTH	II*	SX 45459 54697
1130021	CHARLES CHURCH	I	SX 48216 54605
1244639	ROYAL MARINE BARRACKS NORTH BARRACK BLOCK AND ATTACHED BASEMENT RAILINGS	II*	SX 46391 54128
1244640	ROYAL MARINE BARRACKS OFFICERS MESS	II*	SX 46438 53969
1244642	ROYAL MARINE BARRACKS SOUTH WEST BLOCK AND ATTACHED FRONT BASEMENT RAILINGS	II*	SX 46374 53978
1244644	ROYAL MARINE BARRACKS SOUTH BLOCK AND ATTACHED BASEMENT RAILINGS	II*	SX 46405 53976
1244646	ROYAL MARINE BARRACKS THE LONGROOM	II*	SX 46516 53804
1322006	ODDFELLOWS HALL	I	SX 45370 54405

1322008	DEVONPORT COLUMN	I	SX 45316 54401
1322009	DEVONPORT GUILDHALL AND ATTACHED WALLS	I	SX 45332 54378
1378503	WHITE YARN HOUSE (S 135)	II*	SX 45185 54296
1378504	TARRED YARN STORE	II*	SX 45217 54200
1378505	TARRING AND WHEEL HOUSE (S 136) AND TARRED YARN HOUSE (S 137)	II*	SX 45205 54238
1378525	OFFICERS CO TERRACE WITH ATTACHED OFFICE WING ANDBASEMENT AREA RAILINGS	II*	SX 44962 54546
1378526	CLARENCE STEPS, SOUTH WEST QUAY WALL AND 2 BOLLARDS, ROYAL WILLIAM VICTUALLING YARD	I	SX 45951 53405
1378527	CLARENCE STORE, ROYAL WILLIAM VICTUALLING YARD	I	SX 45971 53460
1378528	BREWHOUSE, ROYAL WILLIAM VICTUALLING YARD	I	SX 46010 53570
1378529	DOCK BASIN WALLS AND 6 ASSOCIATED BOLLARDS, ROYAL WILLIAM VICTUALLING YARD	I	SX 46122 53626
1378530	MAIN GATE, ROYAL WILLIAM VICTUALLING YARD	I	SX 46260 53635
1378531	MELVILLE, ROYAL WILLIAM VICTUALLING YARD	I	SX 46122 53545
1378532	MILLS AND BAKERY, ROYAL WILLIAM VICTUALLING YARD	I	SX 46170 53639
1378533	NORTH EAST QUAY WALL AND 2 BOLLARDS ROYAL WILLIAM VICTUALLING YARD	I	SX 46124 53658
1378534	POLICE BUILDINGS, ROYAL WILLIAM VICTUALLING YARD	I	SX 46256 53615
1378535	SLAUGHTERHOUSE AND ATTACHED YARD WALL, ROYAL WILLIAM VICTUALLING YARD	I	SX 46220 53649
1378536	OLD COOPERAGE, ROYAL WILLIAM VICTUALLING YARD	I	SX 46042 53476
1378537	DOCKYARD WALL EXTENDING APPROXIMATELY 300 METRES TO SOUTH EAST SIDE, ROYAL WILLIAM VICTUALLING YARD	II*	SX 46323 53542
1378538	OFFICERS HOUSE NUMBER 1 AND ATTACHED WALLS AND RAILINGS, ROYAL WILLIAM VICTUALLING YARD	II*	SX 46281 53548
1378539	OFFICERS HOUSE NUMBER 2 AND ATTACHED WALLS AND RAILINGS, ROYAL WILLIAM VICTUALLING YARD	II*	SX 46264 53575
1378540	SWING BRIDGE, ROYAL WILLIAM VICTUALLING YARD	II*	SX 46088 53631

1378541	REAR RETAINING WALL EXTENDING APPROXIMATELY 400 METRES, ROYAL WILLIAM VICTUALLING YARD	II*	SX 46180 53488
1378549	MORICE GATE, TWO GATEHOUSES (MO 39 AND 65) AND ATTACHED DOCKYARD WALLS	II*	SX 44966 54893
1378550	NUMBER 2 STORE AND FORMER FURBISHERS SHOP (MO 68)	II*	SX 44850 54781
1378551	NUMBER 4 STORE (MO 70)	II*	SX 44816 54792
1378552	NUMBER 12 THE PAINTED CANVAS STORE (MO 46)	II*	SX 44870 54880
1378553	NUMBER 16 STORE THE POWDER HOUSE (MO 42)	II*	SX 44905 54958
1378554	STEPS DWARF WALLS LAMPS AND RETAINING WALL TO GARDENS FRONTING OFFICERS TERRACE	II*	SX 44882 54834
1378564	THE OFFICERS TERRACE (MO 63) AND ATTACHED RAILINGS, REAR WALLS AND OUTBUILDINGS	II*	SX 44912 54833
1378566	THE QUADRANGLE (N 173-177, 186-191, 203)	I	SX 44902 55661
1378569	WALLS AND BOLLARDS TO NUMBER 3 BASIN	II*	SX 44874 55635
1386272	NOS. 17 AND 18 NEW STREET	II*	SX 48263 54071
1386279	ELIZABETHAN HOUSE MUSEUM	II*	SX 48253 54060
1386281	34, NEW STREET	II*	SX 48235 54063
1386283	36, NEW STREET	II*	SX 48222 54070
1386299	ST DUNSTANS ABBEY AND ATTACHED ROAD FRONTAGE WALLS	II*	SX 46939 54980
1386300	ST DUNSTANS ABBEY SCHOOL AND ATTACHED ROAD FRONTAGE WALLS	II*	SX 46879 54927
1386305	CHURCH OF ST ANDREW, STOKE DAMAREL	II*	SX 46330 55001
1386309	DEVONPORT HIGH SCHOOL FOR BOYS	II*	SX 46379 54932
1386410	THE DISTILLERY PUBLIC HOUSE, FORMER COATES GIN DISTILLERY	II*	SX 48053 54159
1386456	OLD CUSTOM HOUSE	II*	SX 48146 54174
1386460	CUSTOM HOUSE	II*	SX 48179 54221
1386461	ARMADA MEMORIAL	II*	SX 47779 53903
1386462	DRAKE STATUE	II*	SX 47700 53902
1386463	ELLIOT TERRACE NUMBERS 1 TO 8 INCLUDING 6A AND WALLS AND GATE PIERS	II*	SX 47523 53946

1386464	Plymouth Naval War Memorial	I	SX 47740 53940
1386468	THE ESPLANADE NUMBERS 1 TO 8 AND FORECOURT WALLS AND RAILINGS	II*	SX 47594 53944
1386470	THE SMEATON TOWER	I	SX 47762 53799
1386483	FORMER PALACE THEATRE AND GREAT WESTERN HOTEL	II*	SX 46950 54399
1386376	HMS DRAKE WARDROOM, OFFICERS QUARTERS AND MESS	II*	SX 44997 56685
1386208	36, LOOE STREET	II*	SX 48129 54369
1386231	AMPHITHEATRE IN GROUNDS OF SALTRAM HOUSE	II*	SX 51333 55640
1386234	GARDENHOUSE AT SALTRAM HOUSE	II*	SX 51587 55692
1386235	GARDEN TEMPLE (KNOWN AS FANNYS BOWER) IN GROUNDS OF SALTRAM HOUSE	II*	SX 51940 55763
1386238	ORANGERY AT SALTRAM HOUSE	II*	SX 51905 55723
1386253	MOUNT BATTEN TOWER	II*	SX 48644 53251
1388400	EAST ROPERY, FORMERLY SPINNING HOUSE (S 132), AND ATTACHED RETAINING WALLS	I	SX 45188 54215
1388402	NORTH SMITHERY (SO 23)	II*	SX 44862 54618
1388408	DOCKYARD MUSEUM, FORMER OFFICE (SO 32)	II*	SX 44972 54625
1388409	No 1 Basin and No 1 Dock, including associated bollards and capstans	II*	SX 44806 54422
1388413	SOUTH SAW MILLS (S 128, 148, 149, 150)	II*	SX 44986 54180
1388417	Devonport Dockyard: The Scrieve Board (S 162)	II*	SX 44869 54149
1388429	RAILINGS, PIERS AND GATEWAY TO KINGS HILL GAZEBO	II*	SX 45176 54045
1388430	KINGS HILL GAZEBO (S 186)	II*	SX 45164 54042
1388431	COVERED SLIP (S 180)	II*	SX 45151 54007
1392692	SOUTH SMITHERY (BUILDING S126)	II*	SX 44935 54234
1393253	BUILDING 13 (RECEIPT AND ISSUE MAGAZINE), RNAD BULL POINT	II*	SX 43446 57824
1432153	No 2 Dock, including bollards and capstans	II*	SX 44809 54422
1432208	No 3 Dock, including bollards and capstans	II*	SX 44785 54556
1432211	No 4 Dock, including bollards and capstans	II*	SX 44809 54422

Appendix 3 Registered Parks and Gardens within the project area

NHLE no	Name	Grade	NGR
1000134	Mount Edgcumbe	I	SX 44741 51992
1000345	Trebah	II	SW 76889 27346
1000426	Port Eliot	I	SX 35300 58944
1000448	Caerhays Castle	II*	SW 9691 442068
1000538	Heligan	II	SX 00316 45854
1000544	Carclew	II	SW 78851 38209
1000545	Tregrehan	II*	SX 05192 53547
1000647	Antony	II*	SX 42164 56453
1000648	Cotehele	II*	SX 41922 68123
1000649	Glendurgan	II	SW 77263 27657
1000651	Menabilly	II	SX 09638 51904
1000654	St Michael's Mount	II	SW 51478 29972
1000655	Tregothnan	II*	SW 85876 41258
1000656	Trelissick	II*	SW 83325 39051
1000699	Saltram House	II*	SX 52200 55636
1001294	Trelowarren	II	SW 71994 23745
1001492	Morrab Gardens	II	SW 47220 29980
1001579	Falmouth General Cemetery	II	SW 80289 31700
1001635	The Hoe	II	SX 47771 53862
1001657	Devonport Park	II	SX 45477 55189

Appendix 4: Protected Wreck sites within the project area

NHLE no	Name	NGR
1000065	The Cattewater wreck	SX 48725 53519
1000069	Coronation Offshore	SX 43393 47889
1000070	Coronation Inshore	SX 43900 58597
1000068	Royal Anne (Galley)	SW 69392 11383
1000046	Rill Cove	SW 67750 13450
1000049	Schiedam	SW 65643 20616
1000067	St Anthony	SW 65184 22477
1000076	The Loe Bar wreck	SW 64594 23336

Appendix 5: List of UKHO charts relevant to the project area

UKHO ref	Date	Surveyor	Title	Notes
B886	1681–1688	G Collins	Fowey and Mount's Bay	
g80	1774	M Murdoch	A Chart of Fowey Harbour	
B21	1780	R Cowl	A Plan of the town, citadel, dock, and sound of Plymouth with their environs	
c88	1779	M MacKenzie	Plymouth Sound, Hamoaze, Cawsand Bay and Catwater	
B923.7	1781	M MacKenzie	A Chart of Falmouth Harbour	
A669	1786	J Cook	A Plan of the Road and Harbour of Fowey or Foy	
k19	1791	J Smith & S Hemmans	Chart of Salcombe River to Looe Bay including Eddystone, Hand Deeps and Rutts.	
E991	1793	J Thomas, J Nancarrow & D Williams	Chart of Mount's Bay and the adjacent coasts, from the Lizard Point to Cape Cornwall	
I34	1811	G Thomas	A Plan of Fowey Harbour	
A511	1813	J T Austen	A Survey of Fowey Harbour	
L1592	1826	G Thomas	Falmouth town and inner harbour	
L1420	1838	P Samball	Map of Truro River from the Quays and Bridges to Malpas Reach	
L6845	1848	G Williams	Plan of Looe River and Estuaries	
L7984	1851	G Williams & J P Wells	Plan of Mount's Bay from Lizard Point to the Runnelstone	
D1208	1854	G Williams & J P Wells	The Lizard to Black Head	
D3418	1857	G Williams & J P Wells	Plan from Black Bottle to Polperro	
D3419	1857	G Williams	A Chart of Par Harbour	
D4019	1858	H L Cox	Barn Pool to Laira	
B3055	1891	R G Roe	Plan of The Royal William Victualling Unit, Plymouth	

C7872	1917	—	Admiralty chart, Penzance Submarine Defences.	
C7873	1919	—	Admiralty chart, Falmouth Submarine Defences	
Sheet F.04	1931	—	Admiralty chart, Chart of Hamoaze, South Coast, England.	

Appendix 6: New sites by period and monument type

Summary statistics listed for each Local Authority for NEW sites added by the project. In total, across the entire project area, 2603 new sites were added by the project.

Cornwall

Period

MESOLITHIC (-10,001 to -4,001)	3
BRONZE AGE (-2,350 to -801)	9
IRON AGE (-801 to 42)	9
ROMAN (43 to 410)	2
EARLY MEDIEVAL (410 to 1065	1
MEDIEVAL (1066 to 1539)	97
POST MEDIEVAL (1540 to 1900)	1617
MODERN (1901 to present)	525
UNCERTAIN	31
Total	2294

Monument Type

ADIT	7
ADIT, CULVERT	1
ADIT, PROSPECTING PIT	1
ALLOTMENT	1
ALMSHOUSE	1
ANTI INVASION DEFENCE	1
ANTI SEAPLANE OBSTACLE	1
ANTI TANK BLOCK	1
ANTI TANK WALL	5
BAND STAND	1
BANK (EARTHWORK), POND	1
BARK HOUSE?	1
BARN	3
BARRAGE BALLOON MOORING SITE	1
BARROW	2
BARROW?	1
BARROW? MOUND	3
BATH HOUSE	1
BATH HOUSE, OUTDOOR	1
BATTERY	4
BATTERY?	2
BEACH DEFENCE	1
BEACH DEFENCE?	1
BEACH SCAFFOLDING	2
BEACON	4
BEACON?	1
BELL MAST	1
BISCUIT FACTORY	1
BLACKSMITHS WORKSHOP	22
BLOWING HOUSE, STREAMWORK?	1
BOAT HOUSE	26
BOAT HOUSE, SLIPWAY	1
BOAT HOUSE, SLIPWAY, QUAY	1
BOAT HOUSE, WORKSHOP?	1
BOAT HOUSE; GRANARY	1
BOAT HOUSE; SAIL LOFT	1
BOAT HOUSE; SLIPWAY	1
BOAT YARD	2
BOATHOUSE?, BUILDING	1
BONDED WAREHOUSE	1

BOOM	2
BOUNDARY BANK	8
BOUNDARY BANK, CLIFF CASTLE	1
BOUNDARY BANK; BEACH DEFENCE?	1
BOUNDARY STONE	8
BOWLING GREEN	2
BREAKWATER	1
BREAKWATER, TRAINING WALL	1
BREASTWORK?, FIELD SYSTEM?, ENCLOSURE?, HUT CIRCLE?	1
BREWHOUSE?	1
BRICKFIELD?	1
BRIDGE	1
BRIDGE?	1
BUILDING	31
BUILDING PLATFORM	1
BUILDING, BARN	1
BUILDING, BOAT HOUSE	1
BUILDING, BOAT HOUSE?, STOREHOUSE?	1
BUILDING, ENCLOSURE	2
BUILDING, FISH CELLAR?	1
BUILDING, FOOD PRESERVING FACTORY?	1
BUILDING, HOUSE?	2
BUILDING, LINHAY?	1
BUILDING, MILITARY BUILDING?	1
BUILDING, MILL	1
BUILDING, PUBLIC HOUSE	1
BUILDING, ROPEWALK	2
BUILDING, STOREHOUSE	4
BUILDING, TRACKWAY, LOOK OUT	1
BUILDING; ENCLOSURE	1
BUILDING; TRACKWAY; SLIPWAY	1
BUILDING?	1
BUILDING?, CHIMNEY?	1
BUILDING?, ENGINE HOUSE?	1
BUILDNG, BOILER HOUSE	1
BUILDNG, COUNTING HOUSE	1
BURIED LAND SURFACE	3
Bathing stage	1
CAIRN	1
CALCINER	1
CANAL	1
CAPSTAN	5
CAPSTAN, PLATFORM	1
CAR PARK; POND	1
CARPENTERS WORKSHOP	1
CELLAR, WAREHOUSE, HOUSE	1
CEMETERY	1
CHAIN HOME STATION	3
CHAPEL	4
CHAPEL?	1
CHARCOAL BURNING PLATFORM	2
CHIMNEY	8
CHIMNEY, CONDENSING FLUE	1
CHIMNEY, MINE	1
CHIMNEY, MINE SHAFT?	1
CHURCH	1
CIDER HOUSE	1
CINEMA	1
CLEARANCE CAIRN?	1
CLIFF CASTLE	1
COAL DEPOT	2
COAL SHED	1
COAST ARTILLARY BATTERY	1
COAST ARTILLARY SEARCHLIGHT	1
COASTAL BATTERY	1
COASTGUARD COTTAGES	1
COASTGUARD STATION	7
COASTGUARD STATION, SIGNALLING STRUCTURE	1
COASTGUARD TOWER	7
COASTGUARD TOWER, FLAGPOLE	1

COASTGUARD TOWER, SIGNAL STATION	1
COASTGUARDS COTTAGE	3
COMMEMORATIVE MONUMENT	1
COPPICE	1
CORN MILL	3
COTTAGE, SCHOOL HOUSE	1
COTTAGE; LANDING POINT?	1
COUNTRY HOUSE	1
COUNTRY HOUSE, HOTEL	1
CRANE	3
CROSS	1
CULVERHOUSE	2
CULVERT	1
CUSTOM HOUSE	6
CUSTOM HOUSE, DOCKMASTERS OFFICE	1
DAM	1
DAY MARK	1
DAY MARK?	2
DECOY POND	4
DEER PARK	1
DEER PARK?	1
DEFENCE WORK	1
DOCK; QUAY	1
DOCKMASTERS OFFICE	1
DRAINAGE SYSTEM	2
DRAINAGE SYSTEM, LAND RECLAMATION?	1
DRESSING FLOOR	1
DRESSING FLOOR?, TRACKWAY?	1
DRILL HALL	2
DRIVE	3
DRY DOCK	3
EARTHWORK	1
EARTHWORKS	1
EMABANKMENT, DRAINAGE SYSTEM	1
EMBANKMENT	1
EMBANKMENT, DRAINAGE SYSTEM	3
EMBANKMENT, FLOOD DEFENCES?	1
EMBANKMENT, TOW PATH	1
ENCLOSURE	7
ENCLOSURE; FIELD SYSTEM	1
ENCLOSURE; SETTLEMENT?	1
ENCLOSURE?	1
ENGINE HOUSE	5
ENGINE HOUSE, CHIMNEY	1
ENGINE HOUSE?	1
ENGINE SHED	5
EXTRACTIVE PIT	1
EXTRACTIVE PIT, SPOIL HEAP	2
EXTRACTIVE PIT?	1
FARM BUILDING	3
FARM BUILDING, THRESHING BARN?	1
FARMHOUSE	2
FARMSTEAD	7
FERRY CROSSING	8
FERRY CROSSING?	1
FERRY TERMINAL	1
FIELD BOUNDARY	7
FIELD BOUNDARY?; JETTY?	1
FIELD SYSTEM	16
FIELD SYSTEM, MARKET GARDEN	5
FIELD SYSTEM, MARKET GARDEN?	1
FIELD SYSTEM, STRIP FIELD	1
FIND SPOT; BUILDING?	1
FIRING RANGE	2
FIRING RANGE, BUTT?	1
FISH CELLAR	12
FISH CELLAR, HOUSE	1
FISH CELLAR, WAREHOUSE	1
FISH CELLAR, WAREHOUSE, HOUSE	1
FISH CELLAR; SAILING CLUB	1
FISH CELLAR?	3

FISH FACTORY	2
FISH MARKET	2
FISH POND	14
FISH POND, SLUICE	1
FISH POND, WEIR	1
FISH POND?	1
FISH TRAP?	1
FISHERMANS HOUSE	1
FISHING SITE, NET MAKING SITE	1
FLAGPOLE	8
FLINT SCATTER	1
FLOOD DEFENCES, DRAINAGE SYSTEM	2
FLOOD DEFENCES, SLUICE	2
FLOUR MILL	1
FLUE	2
FORD	8
FORD, STEPPING STONES	1
FORD; BRIDGE	1
FORD; FOOTBRIDGE	1
FORD; TRACKWAY; HOLLOW WAY	1
FOUNDRY	1
FUEL STORE	2
Folklore Site	2
Folklore Site, WELL	1
GARDEN	1
GARDEN TEMPLE	1
GOLF LINKS	1
GOODS SHED	1
GRAIN WAREHOUSE	1
GRANARY	1
GRAVEL PIT	7
GRIDIRON	1
GUARDHOUSE	1
GULLY	1
GUN EMPLACEMENT	1
GYMNASIUM (SPORTS)	1
HANGER	1
HOLLOW WAY	1
HOLLOW WAY; TRACKWAY	2
HOLLOW, STREAMWORKS?	1
HOMESTEAD	1
HOP GARDEN; SETTLEMENT?	1
HORNWORK	1
HORSE ENGINE HOUSE, FARM BUILDING	1
HORSE WHIM	1
HOSPITAL	2
HOUSE	11
HOUSE, ALMSHOUSE	1
HOUSE, CUSTOM HOUSE	1
HOUSE, FISH CELLAR	5
HOUSE, FISH CELLAR?	1
HOUSE, GARDEN	2
HOUSE, ORCHARD	1
HOUSE, TRAM SHED	1
HOUSE; WAREHOUSE	1
HOUSE?	1
HUT PLATFORM	1
HUT PLATFORM, HUERS HUT?	1
INCINERATOR, CHIMNEY	1
INCLINED PLANE	4
INCLINED PLANE, TRAMWAY	1
INFECTIOUS DISEASES HOSPITAL	1
INN?	1
IRON FOUNDRY	1
JETTY	6
JETTY; STEPS	1
JETTY?	1
KENNELS	1
LABOUR EXCHANGE	1
LAND RECLAMATION	1
LANDING POINT	13
LANDING POINT, LANDING STEPS	2
LANDING POINT, LANDING STEPS, MOORING BOLLARD	1
LANDING POINT; FORD?	1

LANDING POINT; STEPS	1
LANDING POINT?	2
LANDING STAGE	5
LANDING STEPS	3
LANDMARK TOWER	1
LEAT	6
LIFEBOAT STATION	3
LIFEBOAT STATION, RAILWAY TURNTABLE	1
LIFEBOAT STATION, ROCKET HOUSE, BOAT HOUSE	1
LIGHTHOUSE	2
LIME KILN	3
LIME KILN; FOUNDRY?	1
LIME KILN; QUAY	1
LOCK	1
LODGE	5
LODGE, WELL	1
LOOKOUT	1
LYNCHET	2
LYNCHET; BOUNDARY BANK; TRACKWAY	1
LYNCHET; FIELD SYSTEM	2
MALT HOUSE	2
MANOR FARM	1
MANORIAL FARM	2
MANSION HOUSE	1
MARKER POINT, BOUNDARY STONE	1
MARKER POST	184
MARKER POST?	1
MARKET GARDEN	3
MILESTONE	2
MILITARY BUILDING	2
MILITARY CAMP; COASTAL BATTERY	1
MILITARY HEADQUARTERS	1
MILITARY ROAD	1
MILL	2
MILL HOUSE	1
MILL POND	9
MILL POND, BOATING LAKE	1
MILL POND, DRAINAGE SYSTEM	1
MILL POND; MILL RACE	1
MILL RACE	2
MILL?	1
MINE	2
MINE SHAFT	102
MINE SHAFT, BUILDING	1
MINE SHAFT, SPOIL HEAP	3
MINE SHAFT?	1
MINE, OPENWORK	1
MINE?	1
MINERAL EXTRACTION SITE?	1
MINERAL RAILWAY	1
MONUMENT	1
MOUND, BANK BARROW	1
MOUND, SPOIL HEAP?	1
MOUND, Sand heap	1
MUSEUM	1
NET LOFT	1
NON-CONFORMIST CHAPEL?, MEETING HALL?	1
NONCONFORMIST CHAPEL	3
NONCONFORMIST CHAPEL, SUNDAY SCHOOL	1
NURSERY GARDEN	1
OBSERVATION POST	1
OBSERVATORY	1
OFFICERS MESS	1
OPEN CAST MINE	1
OPEN CAST MINE, PROSPECTING PIT	1
ORNAMENTAL GARDEN	1
ORNAMENTAL GARDEN; DRIVE	1
ORNAMENTAL GARDEN; LANDSCAPE PARK	1
OSIER BED	1
OYSTER BED?	1
OYSTER BEDS	5
OYSTER BEDS, FISH TRAP	1

PADDOCK	1
PARK PALE	1
PATH; STEPS	1
PEAT STAND	1
PIER	10
PIER, FERRY CROSSING	1
PIER, WET DOCK, CAPSTAN	1
PILLBOX	2
PIT	1
PLATFORM	2
PLEASURE GARDEN	2
POND	16
POND, DAM	1
POND, EXTRACTIVE PIT?	1
POND; RIVER	1
PORT AUTHORITY OFFICE	1
POTTERY	1
POWDER MAGAZINE	1
PROMENADE	1
PROSPECTING PIT	5
PUBLIC HOUSE	3
PUMP HOUSE	2
Q SITE SHELTER	1
QUARRY	284
QUARRY, ADIT	1
QUARRY, BUILDING	3
QUARRY, EXTRACTIVE PIT	1
QUARRY, QUAY	1
QUARRY, QUAY?	1
QUARRY; BUILDING	1
QUARRY; FIELD SYSTEM	1
QUARRY; SPRING	1
QUARRY; TRACKWAY	2
QUARRY?	6
QUARRY?, BUILDING?	1
QUAY	94
QUAY, BOAT YARD	1
QUAY, HARD?	2
QUAY, QUARRY	4
QUAY, SLIPWAY	3
QUAY, TIMBER POND	1
QUAY; BOAT HOUSE; SLIPWAY	1
QUAY; CUSTOM HOUSE; STABLE; BOAT HOUSE	1
QUAY; DOCK	1
QUAY; JETTY	1
QUAY; LANDING POINT	2
QUAY; LIME KILN	1
QUAY; ROAD	1
QUAY; SHIPYARD; BOAT HOUSE; SKITTLE ALLEY?	1
QUAY; SLIPWAY	2
QUAY; SLIPWAY; TRACKWAY	1
QUAY; TRACKWAY	5
QUAY; WHARF	1
QUAY?	9
RABBIT WARREN?	2
RADAR STATION	4
RADIO TELEGRAPHY MAST	1
RAILWAY BRIDGE	5
RAILWAY HOTEL	1
RAILWAY STATION	2
RAILWAY, FIRING RANGE	1
RAMP, INCLINED PLANE	1
REFUSE DISPOSAL SITE, PUBLIC PARK	1
RESERVOIR	8
RESERVOIR, DAM, MILL POND, LEAT	1
RIDGE AND FURROW	1
RIFLE RANGE	3
RING CAIRN?, BATTERY?	1
RIVER PORT	1
ROAD	1
ROMAN CATHOLIC CHURCH	1
ROPEWALK	5
ROPEWALK?	2
ROUND BARROW	1
ROUND HOUSE	1
ROUND?	4

SAIL LOFT, WAREHOUSE	1
SALT BATHS	1
SAND WORKINGS	9
SAW MILL; MILITARY HEADQUARTERS	1
SCHOOL	1
SEA DEFENCES	3
SEA DEFENCES; ORNAMENTAL POND; WINCH	1
SEA MARK	2
SEARCHLIGHT BATTERY	1
SEAT	2
SEAT, LOOKOUT?	1
SEAT, SHELTER	2
SETTLEMENT	20
SETTLEMENT, FARMSTEAD	1
SETTLEMENT, MOUND	1
SHAFT	2
SHAFT?	1
SHED; ENGINE SHED?	1
SHELL MIDDEN	1
SHELTER	3
SHIP FIGUREHEAD	1
SHIP GRAVEYARD	1
SHIPYARD	5
SHIPYARD; BOAT YARD	1
SHIPYARD; ENGINEERING WORKS	1
SHIPYARD; TIMBER POND?	1
SIGNAL STATION	4
SIGNALLING STRUCTURE	1
SLAUGHTERHOUSE	1
SLIPWAY	38
SLIPWAY, BOAT HOUSE	1
SLIPWAY, JETTY	1
SLIPWAY, QUAY	1
SLIPWAY, TRACKWAY	3
SLIPWAY; FERRY TERMINAL	2
SLIPWAY; SEA DEFENCES	1
SLIPWAY; TRACKWAY	5
SLIPWAY; TRACKWAY; QUAY?	3
SLIPWAY?	1
SLIPWAY?, LANDING POINT	1
SLIT TRENCH	2
SLUICE	1
SMELTING WORKS	1
SPOIL HEAP	2
SPOIL HEAP, MINE SHAFT	2
SPORTS PAVILLION	1
STABLE; COACH HOUSE	1
STABLES, BARN	1
STAMPS	1
STANDING STONE	1
STANDING STONE, Propped stone	1
STEAM WHIM	1
STEPS, TUNNEL	1
STOCK ENCLOSURE, Folklore site	1
STONE GRUBBING SITE	1
STONE STORE	1
STORAGE TANK, Hully	1
STOREHOUSE	3
STOREHOUSE, BOAT HOUSE?	1
STOREHOUSE, FERRY TERMINAL	1
STOREHOUSE, FISH CELLAR?	1
STOREHOUSE, STABLE	1
STREAMWORKS	1
STRUCTURE?	2
SUBMARINE CABLE STATION	2
SUMMERHOUSE	2
SUMMERHOUSE, BOWLING GREEN	1
SUMMERHOUSE?	2
SUNDAY SCHOOL	1
SWING BRIDGE	1
TANNERY	2
TEA ROOM	1
TELEGRAPH STATION	1
TEMPERANCE HALL, CHURCH	1

TENNIS COURT	1
TIDAL SWIMMING POOL	1
TIDE GUAGE	1
TIMBER POND	2
TIMBER POND; RESERVOIR	1
TIMBER POND?	2
TIMBER YARD	3
TOLL HOUSE	1
TRACKWAY	35
TRACKWAY, HOLLOW WAY	1
TRACKWAY, HOLLOW WAY?	2
TRACKWAY, SLIPWAY	2
TRACKWAY, TRAMWAY	1
TRACKWAY; HOLLOW WAY	5
TRAINING WALL	1
TRAMWAY	6
TRAMWAY, QUARRY	1
TUNNEL	3
VICARAGE	1
WAITING ROOM	1
WALL	1
WALL, STABLE	1
WALL; BREASTWORK	1
WALLED GARDEN	5
WAR MEMORIAL	1
WAREHOUSE	15
WAREHOUSE, HOUSE	2
WARREN?	1
WATCH HOUSE	4
WATCH HOUSE, LOOK OUT	1
WATCH TOWER	1
WATCHHOUSE; BATTERY	1
WATER COURSE	1
WELL	5
WELL, HOLY WELL?, POND	1
WELL, SPRING	1
WET DOCK	1
WHARF, QUAY	1
WIER	1
WINCH HOUSE	1
WINDLASS, SIGNAL POST	1
WINDMILL; DAY MARK?	2
WINDMILL?	2
WOOD BANK; BOUNDARY BANK	1
WORKHOUSE	1
WORKSHOP	1
WRECK	422
WRECK; HIDE	1
WRECK?	32
WRECKS	2
YACHT CLUB; BOATYARD	1
YARD, COURTYARD PLAN?	1
AIRCRAFT CRASH SITE?	1
CANNON	2
CANNON, WRECK	2
CANNON, WRECK?	2
FINDSPOT	3
FINDSPOT, WRECK?	2
WRECK, FINDSPOT	1
Total	2294

Devon

Period

POST MEDIEVAL (1540 to 1900)	69
MODERN (1901 to present)	13
Total	82

Monument Type

ADIT?	1
BATTERY	4

BUILDING	3
BUILDING?	1
CANNON, WRECK?	1
CAUSEWAY	1
CLAY PIT	1
COURTYARD PLAN, MANSION HOUSE	1
DAY MARK	3
DEER PARK?	1
ENGINE HOUSE	1
FERRY CROSSING	4
FERRY CROSSING, SLIP	1
FLOOD DEFENCES	2
FLOOD DEFENCES, LAND RECLAMATION	2
FOOTBRIDGE	1
HARD, FERRY CROSSING	1
HARD?	3
HOFFMAN KILN	1
HORSE ENGINE HOUSE	1
HOUSE	1
LANDING POINT	1
LEAT	2
LIME KILN	3
MINE SHAFT	3
MINE SHAFT, ADIT?	1
MINE SHAFT, SPOIL HEAP	1
MINE, ADIT	1
POND	2
POND, EMBANKMENT	1
POND?	1
POWDER MAGAZINE	1
QUARRY	6
QUAY	3
QUAY?	1
RAILWAY STATION	1
RESERVOIR	2
RESERVOIR, WELL	1
RESERVOIR?	1
SEARCHLIGHT EMPLACEMENT	5
SHIPPON, CALF HOUSE, STABLES	1
STABLES	1
WHEEL PIT	3
WHEEL PIT, LAUNDER?	1
WREck	4
Total	82

Plymouth

Period

EARLY MEDIEVAL (410 to 1065)	1
POST MEDIEVAL (1540 to 1900)	168
MODERN (1901 to present)	58
Total	227

Monument Type

AIRCRAFT	1
ALMSHOUSE	1
BARRACKS	1
BATHS	1
BEACH HUT, STEPS	1

BISCUIT FACTORY	1
BOAT HOUSE	1
BOUNDARY BANK	1
BUILDING	1
BUILDING, MILITARY BUILDING	1
BUILDING, WAREHOUSE?	2
CANNON, WRECK?	1
CEMETERY	1
DOCK	3
DOCK?	1
DRY DOCK	3
DRYING GROUND	1
EMBARKATION HARD	2
ENCLOSURE, LANN?	1
ENGINE SHED	1
FERRY CROSSING	5
FERRY CROSSING, LANDING POINT	3
FIRING RANGE	1
GRIDIRON?	2
HARD, FERRY CROSSING	1
JETTY	1
KILN?, CHIMNEY	1
LAND RECLAMATION	5
LAND RECLAMATION, FLOOD DEFENCES	1
LAND RECLAMATION?	1
LANDING POINT	2
LIDO	1
LIDO, QUAY	1
LIME KILN	6
MAGAZINE	1
MARINE LABORATORY	1
MAST POND	1
MILITARY BUILDING	1
MILITARY BUILDING?	2
MINE SHAFT	1
MOORING BLOCK? DOLPHIN?	1
PIER	3

PLEASURE PIER, PIER PAVILION	1
POWER MAGAZINE	1
PUBLIC HOUSE	1
QUARRY	10
QUARRY, TARGET	1
QUAY	16
QUAY, OBSERVATION POST?	1
QUAY, SHIPYARD	1
QUAY, WHARF, SHIPYARD	1
RACE COURSE, LAND RECLAMATION	1
RAILWAY STATION	1
RESERVOIR	3
RESERVOIR, WELL	1
ROPEWALK	4
ROYAL NAVAL BASE, ARMAMENT DEPOT	1
ROYAL NAVAL HOSPITAL, ISOLATION BLOCK	1
SEWAGE WORKS, POND	1
SHIP REPAIR WORKS	1
SHIPYARD	1
SIGNAL STATION, COASTAL BATTERY	1
SLIPWAY	1
SLIPWAY, BOAT HOUSE	1
SWING BRIDGE	1
TARGET	1
TOWER	1
TUNNEL	1
WAREHOUSE	3
WEIR	1
WET DOCK	2
WET DOCK, QUAY	1
WHARF	4
WHARF, DOCK, PIER	1
WHARF, VICTUALLING YARD	1
WHARF?	1
WRECK	73
WRECK, QUAY	1

WRECK?	16
Total	227

Appendix 7: A Survey of Hulks in the Tamar

Martin Read, Plymouth University

Students from Plymouth University's marine school have carried out hulk recording as part of their fieldwork since 2002 under the supervision of Martin Read (Read 2017). This started following requests from the County archaeologists of both Devon and Cornwall for the University to look at the hulks remaining in the Tamar and the surrounding rivers (Plym, Tavy, Lynher and Yealm). They were getting significant numbers of planning applications from developers to remove hulks, but had no information on which they could assess their importance. This was called the Survey of Hulks in the Tamar, but was later called the Survey of Hulks in the Plymouth System (the SHIPS Project, though this acronym has recently been loaned to another group).

These surveys were originally carried out as final year group projects which looked at the archaeology of areas of the Tamar System and included other site types such as lime kilns, tide mills (the subject of a future article), fish traps, etc. More recently the hulk recording has been carried out as final year individual projects (including recent ones on Pomphlett Lake and Hooe Lake). The theoretical and pedagogic background to these projects, as well as other student surveys of the South Hams and the Exe Estuary, have recently been written up in as a chapter for a book on The Archaeology of Watercraft Abandonment (Read and Magne 2013). This article seeks more to show some of the results of the surveys.

So far over 50 hulks have been located by the surveys and many of them identified, though there is very little information about many of them, sometimes only their name and what sort of vessel they were. A few more hulks may remain to be recognised and some may have been cleared from Anthony Passage and the Plym since the survey started during reclamation and development. Several hulks are now totally buried, such as the three vessels captured by RAF aerial photos in the late 1940s/early 1950s at Cargreen. These are no longer visible above the intertidal mud and have become fully archaeological.

From the information available, 14 are known to have been built in the 19th century and 11 were built in the 20th century, before the Second World War. Hulks continue to be added to the system and, for instance, two former French trawlers have been abandoned in Hooe and St Johns Lakes since the survey started.

Only one vessel is located on the main channel of the Tamar, *Merganser* at Hole's Hole. The rest are to be found on rivers which feed into the Tamar and the tidal creeks (known as Lakes locally).

Hooe Lake contains approximately 35% of the hulks on the Tamar system and also contains some of the earliest hulks recorded, such as the Jersey trawler *Amazon* of 1866. Several vessels are known to have been abandoned in the 1920s/1930s and hulks continue to be added. Hooe Lake has also suffered in recent years from reclamation and 'tidying up', resulting in damage or complete burial of some hulks.The hulks at the eastern end of Hooe Lake have been described in an on-line article (Read 2011).

Thirteen hulks were built in the Tamar system (mostly in Plymouth and Calstock) or in Devon, 11 others were originally from elsewhere in Britain (including three from the Channel Islands). Other countries of origin include Belgium (*Rodger* a 1947 trawler now in Hooe Lake, which was built in Nieuport), Netherlands (*Two Brothers*, a Dutch Barge with some remains in Hooe Lake), Denmark (*Maline*, a 1912 fishing ketch abandoned at Skinham Point on the River Tamar, originally from Bornholm), France (the remains of a steam pinnace from a French battleship *Paris* lie in Frenchman's Creek, close to Wearde Quay on the River Lynher) and the USA (such as the remains of a Second World War landing craft now buried under reclamation near Antony Passage).

There are the remains of possibly six Tamar Sailing Barges in the Tamar System *(Saltash, Bertie, Pearl, Edith, ?, George Murray*). Two former hulks have been restored, *Lynher*, a single-masted smack-rigged (with gaff and a large boom) Tamar barge built at the James Goss shipyard, Calstock in ?1896 was previously lying abandoned at Poldrissick quarry, on the River Lynher, before being rescued and restored in the 1980s and was kept afloat at Morwellham Quay. More recently she has been undergoing extensive repairs in Mashfords Boatyard at Cremyll. The ketch-rigged Tamar sailing barge *Shamrock* was built in Devonport in 1899 and abandoned in Hooe Lake in the later 1960s from where she was rescued by the National Trust and National Maritime Museum in the early 1970s and restored at Cotehele Quay, near Calstock (Viner 1983). The *Shamrock* is undergoing major restoration in 2017-19 by the National Trust at Cotehele Quay, replacing the extensive rotten timbers and inserting an engine to enable river trips for visitors (http://shamrock-cotehele.blogspot.com/).

Tamar barges were a type of wooden merchant sailing vessel of simple hull form and rigging (round bows with no overhang, shallow draught and a flat transom stern, usually smack-rigged, but some ketch-rigged). They operated both within the Tamar system and along the south coast of Devon and Cornwall between Salcombe and the Lizard. They were built at ports along this coast and in Plymouth, Stonehouse, Devonport and Calstock on the Tamar system.

Those which survived after the First World War were fitted with an auxiliary engine and many ended up transporting roadstone and gravel until replaced by lorries after the Second World War and broken up or abandoned.

The commonest roles for vessels before they became hulks were as trading vessels (40%), followed by trawlers (20%). Other roles include yachts, houseboats, tugs and a ferry. Often a vessel had several roles in its active life, perhaps starting as a trawler or trading vessel and ending up as a houseboat or yacht before being abandoned. Trading vessels and trawlers tend to have been abandoned in the area close to Sutton Harbour and the Cattewater, where they would have been loaded/unloaded and moored, with several present in Hooe Lake.

Some craft had interesting careers, such as the ketch *Alfred Rooker*. Built in Plymouth in 1876 and used initially in the Corunna cattle trade and then in the Newfoundland Cod trade, the vessel ended up as a coaster before being abandoned in Hooe Lake in 1934 (Langley and Small 1988).

Six vessels were of military origin including landing craft and ammunition barges. As would be expected these tend to have been abandoned in the creeks and rivers around Devonport Dockyard.

Most of the hulks were built of wood, though one was made of concrete (*Cretabode*, a World War One barge in St Johns Lake) and many were originally sail or probably sail powered, though several were dumb barges (such as the *Arthur,* a lighter owned by Bayly's timber importer now abandoned in Hooe Lake) and one was possibly rowed.

Many boats seem to have been abandoned between the wars, some were tied up and left to rot (e.g. *Amazon*, *Bulla* and *Alfred Rooker* in Hooe Lake), while others had all their marketable fittings removed before being abandoned (such as the Brixham trawler *Antelope* on the River Plym, noticeable as one enters Plymouth along the Embankment). At the same time their hull was often also damaged to allow the tide in and ensure they would not float off and obstruct the waterway.

There are several threats to this resource, many of them are natural such as the decay of wood and metal, attack by marine organisms and tidal and river action. However, reclamation and development also pose a threat, such as those buried by Neptune Park (beside the River Plym), the reclamation on the north side of Hooe Lake, at Carbeile Creek (St Johns Lake) and at Anthony Passage (River Lynher).

Clearance or 'tidying up' has removed or damaged many hulks. The River Yealm has been deliberately kept clear by the Harbourmaster, resulting in possibly only a couple of hulks remaining. Salvers were employed to clear the *Plough* from Millbrook Lake (though they only removed half of it, including the engine, before abandoning the rest). Locals in Forder Creek, off the River Lynher, regularly burn fragments of abandoned vessels, particularly around Guy Fawkes Night. The houseboat *Roge*r and an abandoned French trawler in Hooe Lake have both been burnt by vandals, resulting in the local Fire Brigade having to be called out.

Appendix 8: GIS Method

Introduction

All GIS work followed the latest guidelines for Historic England projects involving GIS (Historic England 2015).

GIS and accompanying excel tables (lined by a unique number) were used to build the gazetteers for each local authority. The gazetteers provided a structured way to update and create records and to enable later update to HBSMR for Cornwall and Devon and joining the excel tables used by the Plymouth SMR.

The work was undertaken by Carolyn Royall, Peter Dudley and Fiona Fleming.

CAU were ESRI ArcGIS version 10.2.2 GIS software.

There are two work stages to the GIS method-

1. GIS and Excel (CAU system) – update existing records and creation of new records using ArcGIS.
2. Update HBSMR (working directly into the Cornwall & Scilly HBSMR). HER staff from Plymouth City Council and Devon County Council updated their own SMR/HBSMRs.

Work Stage 1

Export and preparation

The existing HER data from the Cornwall & Scilly, Plymouth City Council and Devon County Council for the entire project area were exported. A copy of these shapefiles and tables were kept as a reference.

Methodology for mapping in Stage 1

Records were spatially plotted in GIS and the details added to a gazetteer in excel, the two linked by a unique gazetteer number.

Assessment started at one end of the project area. Peter Dudley covered Plymouth, Devon and East Cornwall to Talland Bay and the Fal Estuary and Falmouth Bay (to Rosemullion Head). Fiona Fleming covered Talland Bay to St Anthony's Head and Carolyn Royall Rosemullion Head west to Land's End.

In addition to the Cornwall & Scilly, Plymouth City Council and Devon County Council HBSMR data the standard map/data sources were –

- National Trust SMR
- NRHE records (as shapefiles)
- The Portable Antiquities Scheme (PAS) database
- Defence of Britain records
- Ordnance Survey Master Map
- Early OS map editions
- *c*1840 parish Tithe Award maps and apportionments
- Estate maps
- Early Admiralty charts held by the UK Hydrographic Office
- The SMPs for Durlston Head to Rame Head and Rame Head to Hartland Point.

Additional, local datasets

- Updates from journals, books;
- Charts;
- Events.

Consistency in data entry was an important focus. For example, a single record was created where there are a lot of related features in a close concentration e.g. a group of small quarries within 50m of each other would get one point, centrally located in the group. Quarries separated by over 50m in distance in a linear arrangement got single entries.

Group features together will not be over-recorded. For example, a group of field boundaries surviving as earthworks will, if the field shape and size can be identified, be recorded as a field system (single entry).

This was a general rule and there may be exceptions but generally mapping was kept simple and straightforward.

There was no deletion of existing records - only amendment of existing and creation of new.

Existing records

If records needed to be reallocated by the HBSMRs due to duplication DUPLICATE was added to UPDATE field. If an NGR was out of place AMEND NGR was added to the UPDATE field and the new NGR co-ordinates recorded.

New features

In terms of new records and their geo-location, for buildings and features the NGR was centrally placed. For linear features the NGR given was a central location along length of feature and in the description the length of feature (metres) and start and finish points (start in the south and working to the north, e.g. SW to NE) were added.

Documentary sites were located against the modern map when possible. If not possible, then a note was added to the description indicating that it is an approximate location.

Add monument details (see section for rules and lists).

Rules for each gazetteer field

GAZ_REF

Unique ID for each record linking the GIS to the excel table for each local authority.

RECORD TYPE [RECD_TYP]

Text. Dropdown (xls). ONE of the following –

BLD (BUILDING)

FS (FINDSPOT)

HDG (HEDGEROW)

LND (LANDSCAPE)

MAR (MARITIME)

MON (MONUMENT)

NF (NATURAL FEATURE)

PLA (PLACE NAME)

RT (ROUTE)

NAME

Lower case, text, short, concise, type of feature and its location eg, Bowl barrow, one of the Southover Heath Group, Tolpuddle or Coastguard Station, St Aldhelm's Head

MONTYPE

Use http://thesaurus.historicengland.org.uk/thesaurus.asp?thes_no=1&thes_name=FISH%20Thesaurus%20of%20Monument%20Types FISH Thesaurus of Monument Types

Upper case, text. For multiple features use a comma and space eg, SETTLEMENT, COUNTRY HOUSE

For possible site add a question mark e.g. SETTLEMENT? Or POSSIBLE SITES, MANOR?, SETTLEMENT?

PERIOD

Upper case, text. Dropdown list (xls). Broad period only, reflecting the chronology and terminology expressed in the summary text. Used to aid retrieval. (Following values and ranges from Cornwall & Scilly, Plymouth City Council and Devon County Council HBSMR).

PALAEOLITHIC (-5mya to -10,001)

LOWER PALAEOLITHIC (-5mya to -150,001)

MIDDLE PALAEOLITHIC (-150,001 to - -40,001)

UPPER PALAEOLITHIC (-40,000 to -10,001)

MESOLITHIC (-10,001 to -4,001)

EARLY MESOLITHIC (-10,001 to -7,001)

LATE MESOLITHIC (-7,000 to -4,001)

NEOLITHIC (-4,000 to -2,351)

EARLY NEOLITHIC (-4,000 to -3,001)

MIDDLE NEOLITHIC (-3,000 to -2,701)

LATE NEOLITHIC (-2,700 to -2,351)

BRONZE AGE (-2,350 to -801)

EARLY BRONZE AGE (-2,350 to -1,501)

MIDDLE BRONZE AGE (-1,501 to -1,001)

LATE BRONZE AGE (-1,000 to -801)

IRON AGE (-801 to 42)

EARLY IRON AGE (-801to -401)

MIDDLE IRON AGE (-400 to – 101)

LATE IRON AGE (-100 to 42)

ROMAN (43 to 410)

EARLY MEDIEVAL (410 to 1065)

MEDIEVAL (1066 to 1539)

POST MEDIEVAL (1540 to 1900)

MODERN (1901 to present)

UNCERTAIN

FORM

Upper case, text. Dropdown list (xls). See HE Evidence thesaurus for further info and options

http://thesaurus.english-heritage.org.uk/thesaurus.asp?thes_no=92&thes_name=EH%20Evidence%20Thesaurus

ARCHITECTURAL COMPONENT

ARTEFACT SCATTER

BOTANICAL FEATURE

BURIED VESSEL STRUCTURE

COHERENT VESSEL STRUCTURE

COLLAPSED VESSEL STRUCTURE

CONJECTURAL EVIDENCE

CROPMARK

DOCUMENTARY EVIDENCE

DEMOLISHED STRUCTURE

DEMOLISHED BUILDING

DESIGNED LANDSCAPE

DESTROYED MONUMENT

EARTHWORK

ENHANCED NATURAL FEATURE

EXTANT STRUCTURE

FIND

LEVELLED EARTHWORK

MOVED BUILDING

MOVED STRUCTURE

ORAL EVIDENCE

RUINED BUILDING

RUINED STRUCTURE

SUB SURFACE DEPOSIT

SCATTERED VESSEL STRUCTURE

STRATIFIED FIND

SUBMERGED MONUMENT

SUB SURFACE DEPOSIT

UNSTRATIFIED FIND

VESSEL STRUCTURE

WRECKAGE

SUMMARY [SUM]

Short text

Lower case, free text. The summary text was written to be succinct and clear summary no more than 254 characters in length. Abbreviations and acronyms were not used.

LONG DESCRIPTION [LONG_DESC]

Free text. A full description of the feature with reference to the sources.

SOURCES [SRCE1, 2, 3, 4]

SRCE1 – dropdown list of main map sources e.g. Ordnance Survey, *c*1880. First edition 1 mile:25-inch mapping.

SRCE2 – dropdown list of main map sources as above.

SRCE3 – free text.

SRCE4 – free text.

Further references were added in the Notes section when required.

MON UID/SYSTEM ID (Plymouth)

Numeric.

Unique identifier in HBSMR (for existing sites) e.g. MCOXXX, MDVXXX. If there were multiple sites considered by the record each unique identifier was separated by a comma.

UPDATE record (including duplicates and amend NGRs) [UPDATE]

Upper case, text. Added to all sites updated or created to enable a record of type of work undertaken and to enable creation of gazetteers.

Select one of the following – note the description in brackets. Use copy and paste to ensure data consistency.

NEW (newly created feature)

DUPLICATE (for potential reallocation by the HER)

UPDATE (further detail to be added)

AMEND NGR (a record where the NGR is misplaced)

NOTES

Free text to add extra details and sources.

Results

At the end of the GIS stage we had an updated shapefile(s) containing new and amended data (including those recommended for NGR update and probable duplicate records) with an accompanying excel sheet.

Work stage 2

HBSMR update stage

This utilised the products of work stage 1.

Peter Dudley of CAU worked directly into the Cornwall & Scilly HBSMR. Staff from the Plymouth City Council and Devon County Council HERs updated their own HBSMR/SMRs.

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CORNWALL COUNCIL