

GGAT 145: Rapid Coastline Zone Assessment in Glamorgan and Gwent: Scoping for an upgrade

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A report for Cadw
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The cover photographs show damage to the historic sea wall at St Donats Castle, Vale of Glamorgan, caused by a storm surge in January 2006, and the collapse of dunes at Rhossili, Swansea, caused by storms in January 2014.

Summary

This scoping project, undertaken by the Glamorgan-Gwent Archaeological Trust with grant aid from Cadw, has examined the dataset produced by the Coastal Archaeology Survey 1995-98 (GGAT 50) in order to assess the level of work that would bring it up to the standard now required for coastal zone management. It has also examined the results of research and recording carried out in the coastal zone of Glamorgan and Gwent since the end of GGAT50, both by the Trust and by other bodies, in order to assess what needs to be done to incorporate them into the revised and updated dataset. The project has reviewed and quantified the resource, and established the form which the new upgraded desk-based Rapid Coastal Zone Assessment should take. Establishing this new RCZA will provide a tool for the effective management of change on the coast, particularly that driven by natural processes such as sea-level rise, but will also have relevance to changes caused by development.

The project established a study area from GIS datasets compiled by RCAHMW to enable an assessment of the heritage assets that would be at risk as a result of climate change associated with sea level rise along the Welsh coast, combined with Flood Zone 3 GIS polygon from the Flood Map available on the Lle Geo-Portal, which was used in order to eliminate areas where the risk was not caused by marine flooding.

The new RCZA should be linked with the HER on HEROS to ensure active management in the future and should contain:

- PRN point data with at least a summary description for each PRN and polygons where possible;
- Photographs linked to PRNs, where possible, to provide a record of the condition of the relevant site over time;
- Mapping of all recorded peat shelves and as much as possible of other intertidal features, in order to permit identification of single-point timber-feature PRNs and peat-exposure PRNs with their parent bodies;
- Shoreline management units with status information;
- Management recommendations for individual PRNs in areas of particular risk of coastal erosion.

In order to achieve this, 522 HER entries will have to be upgraded, 2,532 photographs from Cadw-funded projects in the area that were carried out before the HER had the ability to contain images will need to be assessed for inclusion, an estimated 1,311 new PRNs created, and layers mapping peats and wooden structure in the intertidal zone will have to be added to the Trust's GIS.

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Introduction

The coastal zone of Wales contains a host of historic environment features of all periods, from the Palaeolithic to the Second World War. Development pressures, and particularly climate change along with its associated and increasing frequent severe weather events, combine to make the archaeology of this area vulnerable to damage and destruction.

Sea-level rise since the prehistoric period has resulted in the inundation of the lower Severn basin, creating the Bristol Channel from what was originally a river valley. Its effects can be seen in the successive prehistoric and Roman land surfaces which are now under water; the earliest datable surfaces that are ever accessible at the most extreme spring tides are of the Neolithic period. This has been a relatively slow process, but climate change projections anticipate an increased rate of rise, which will result in these earliest levels becoming inaccessible to all but underwater archaeology, and will also result in the inundation of sites now on dry land at the water's edge. Whilst no significant sea level rise has yet been observed, recent years have seen an increase in extreme weather events believed to be associated with climate change, and these have produced not only significant erosion of intertidal and upper beach deposits, but also effects on land beyond the 20th century tidal reach. So far, the latter have resulted only in the breaching of the sea wall of the historic land reclamation at Cwm Ivy and the gradual attrition of a few sites like the Cwm Nash cemetery and the deserted medieval village buried by dunes at Rhossili, but it is necessary to anticipate that the limestone formations along the Glamorgan coast are at increasing risk of erosion. Past experience indicates that the effects of erosion are likely to take the form of catastrophic failure and the collapse of many metres of clifftop, particularly on the Lias Limestone cliffs of the Vale of Glamorgan. Erosion is also a problem in the intertidal zone, where we can expect that the higher wave energies associated with fiercer and more frequent storms will accelerate the erosion of peats and other deposits already visible on the Levels, in Swansea Bay and around the Gower peninsula.

Dredging for marine sand takes place in a number of areas off the coast of Glamorgan and Gwent. These are the Bedwyn Sands and Middle Ground off the Gwent Levels, Culver Sands off Porthcawl, the Helwick Bank off Gower, and the Nobel Bank further out in Carmarthen Bay. Potential impacts that may occur as a result of dredging activity are recognised as including draw-down of beach deposits into the sea, reduction in the onshore transport of sediment, alteration of tidal currents leading to changes in deposition patterns, and changes to wave refraction which have the potential to increase deposition (Halcrow 2012, 8). Claims and counter-claims have been made concerning the impact of dredging for marine aggregates on patterns of removal and deposition, but the current consensus is that there is still insufficient data available to come to any firm conclusion. It is however generally accepted that the sands affected are both naturally highly mobile and do not support the sediment and chemical conditions that favour preservation of either organic or metal remains, and there is therefore a low probability that any wrecks will be preserved within these areas (Severn Sands 2016, 2, 5-6). As the operators of these vessels are concerned to produce clean sand that can be used for building with the minimum of further processing, they have no incentive to extract from any site where the sediment particles are of finer grade and provide the anoxic environment that favours preservation (Severn Sands 2015, 16). As regards dredging operations in harbours, a review of the marine licence applications that have been received by the Trust suggest that this normally removes only very recent deposits, and takes place at installations that have been

subjected to dredging for many decades. In the event that any archaeological material should be found, all dredging operations of whatever kind are now required to abide by the *Marine Aggregate Industry Protocol for the Reporting of Finds of Archaeological Interest* which was devised by Wessex Archaeology.

In addition, there are a number of significant development projects which have either been approved or are currently under consideration in the coastal zone. These include three tidal lagoons, as well as the M4 relief road, and industrial and housing developments. The proposed tidal lagoons pose a significant potential impact on the coastal archaeological resource. The M4 will have more limited impact; other development will have variable effects.

Previous work

Previous coastal zone assessment in Glamorgan and Gwent

GGAT 50 Coastal Archaeology Survey (1995-98)

In 1994, Cadw invited grant applications from the four Welsh Archaeological Trusts to carry out Rapid Coastline Zone Assessments round the coast of Wales, and over the next three years funded GGAT to assess the whole of the coast within its home area, from Loughor to the Monmouthshire-Gloucestershire border (GGAT 50). This survey was a product of its time: the Trust did not at that time have a GIS capability, and therefore all map data had to be presented as hard copy. The Welsh surveys were some of the earlier comprehensive surveys of the coastline and the methodology was evolving. They did not therefore include techniques that are now considered essential for the management of any geographical area, some of which were in fact not available twenty years ago.

The methodology used in the survey was:

- Review of SMR data, based on the OS quarter sheet maps (scale 1:10,000) which were at the time the SMR map base. Owing to the large number of sites already in the SMR (350 sites for the initial tranche of 91km (Loughor to Sker), ‘the study necessarily concentrated on reviewing and enhancing existing records rather than finding new sites (in comparison, Gwynedd's pilot study (Smith 1995, 16) had 45 SMR sites in 139km)’ (Locock 1996, 7). Photocopies were made of the maps and a print-out from the SMR of PRN, National Grid Reference, category, date and site status for each site.
- The maps and listings were then annotated as new information became available from the NMR, National Museum, the Central Register for Air Photography in Wales,¹ the county record offices, bodies connected with shoreline management, and researchers from other organisations active in the area. In order to restrict the searches to manageable levels, only cartographic information was examined from the record office, and was mainly limited to the 1st edition OS 25" map, although the catalogue of estate maps drawn up for the two Glamorgan record offices was also checked for potentially relevant material. For air photography, at least two prints were checked for each part of the coast, drawn from the 1946-47, 1966 and 1974 groups of sorties.
- The Units defined by the Welsh Office General Level Coastal Survey were marked on the map.
- A walkover survey was carried out over the entire study area, in order to monitor evidence of erosion, to note any new sites, and to check the condition of known sites. In view of the hazards of the intertidal zone, work in this area consisted of visual inspection from the high-water mark and visits to known sites rather than extensive search of the intertidal zone. Not all the coastal islands were visited: Worms Head. This approach allowed an inspection of almost all of the sites within the study area and most were photographed. However, some of the caves on the cliffs of the southern Gower coast and some of the modern port areas were not accessible. Condition was assessed. In addition, only partial walkover was undertaken where there had been previous comprehensive archaeological work on the Gwent Levels (Locock 1998, 8).

¹ But not for the Gwent Levels, where extensive study of air photographs had already been carried out by Reading University).

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- A report was produced for each of the three years of the survey (Locock 1996). This contained tables of sites arranged by OS quarter sheets containing the PRN, NGR, site type, status, erosion class and recommended management action. Status classes (where appropriate) were SAM, LB, NNR, SSSI and AONB; assessment of importance was according to the categories then in use, of A=national, B=regional, C=local, D=low and E=unknown); erosion class; and recommended management action consisting of a choice between Mitigatory works, Research project, Evaluation, Underwater survey, Survey, Monitoring and None. The Units were classified as to overall archaeological importance according to the same set of importance criteria as used for the PRNs. A formal assessment of threat was derived from the interplay between the archaeological value for each site and the erosion class of each unit.
- The requirements for GGAT 50 were primarily to identify sites, and the project database does not include descriptions or site names. In many cases only a 6-figure grid reference was provided. In the first two years of the project, sites were individuated solely by the type/period field which at that time formed part of the HER. In the third year, the data for many sites in the intertidal zone of the Gwent Levels were supplied in a form which was limited to NGR, Broadclass and Reference number, which constituted the only information that was then available for the extensive survey work being undertaken by Reading University at that time. The 286 photographs taken during the walk-over component of the project were digitised with Cadw grant aid (GGAT 84), but have not yet been catalogued according to HER protocols and uploaded to the HER.²

Subsequent projects carried out by GGAT in the coastal zone

Over subsequent years, the Trust has carried out other work in the coastal zone, mostly in response to the threat of erosion.

GGAT 58 Swansea Bay inter-tidal survey (1997-98)

The Swansea Bay project was a spin-off from the coastal survey. The purpose of this project was to enhance the record of intertidal peats in Swansea Bay, and also to map fish weirs and other marine installations (Nayling 1998b). The aim was to record the archaeology of Swansea Bay along the lines of the work that was being carried out on the Gwent levels by Dr Martin Bell and his associates successively at University of Wales Lampeter and Reading University. The peats and features in the inter-tidal zone were mapped from air photographs taken during successive sorties from the 1940s onwards. They were traced manually onto acetate film, and the tracings were then scanned and superimposed on a base map created from scans of OS maps, as the Trust did not at that time have a GIS system capable of incorporating such data. The whole process was carried out using a graphics package but the files have now become corrupted, leaving the maps now only accessible as hard copy. The archive is no longer with GGAT.

² The HEROS module which enables photographs to be uploaded to the HER (including a new cataloguing system) was developed in 2010.

GGAT 59 Gwent Levels: Later prehistoric occupation sites and associated palaeochannels and GGAT 60 Gwent Levels Inter-tidal survey (medieval fish weirs) (1997-99)

These two projects were undertaken by Nigel Nayling, who moved to University of Wales Lampeter during the reporting period. In consequence the Trust does not retain any archive material, apart from some digital files which are in formats that can no longer be read.

The results of the surveys were published in *Archaeology in the Severn Estuary* (Nayling 1999a, Nayling 1999b). The archive is no longer with GGAT. It is possible that both these archives and the archive for GGAT 58 may have been taken to Lampeter by Professor Nayling.

GGAT 62 Sudbrook Camp (1998-2000)

As a spin-off from the coastal survey GGAT 50, the Trust undertook a programme of total station survey, geophysical survey and limited excavation between 1998 and 2000 in order to establish the extent of erosion (Barker 1999, Barker and Mercer 1999, Sell 1998, Sell 1999, Sell 2000b, Sell *et al* 2001). There are 134 photographs; these were digitised as part of a student work programme in 2016, but none have been added to the HER (see note to GGAT 50).

GGAT 70 Coastal hillforts – Glamorgan (1999)

Following on from the Sudbrook camp investigations, the Trust commissioned a programme of geophysical survey on the promontory forts at Dunraven, Cwm Bach, Whitmore Stairs, Nash Point, Castle Ditches (Llantwit Major) and The Bulwarks, Porthkerry, all of which were also assessed visually to determine the extent of the active erosion problem, looking at ploughing/reseeding, vegetation growth, animal activity, visitor pressure, groundwater and other factors as well as coastal erosion. Comparison of the results of these surveys with earlier descriptions allowed an assessment of the severity of the threat to be made, along with management recommendations and proposals for further research (Barker and Mercer 1999a, Barker and Mercer 1999b, Barker and Mercer 1999c, Barker and Mercer 2000, Sell 2000a).

GGAT 76 Urban waterfronts (2003-06)

Between 2003 and 2006 the Trust was grant-aided to produce a study of historic port and harbour facilities in existence before c1850, mainly as an aid to informing the archaeological planning management process as these areas are increasingly under threat from waterfront redevelopment, particularly in towns and cities. The first year of the project focussed on the four major ports of Cardiff, Chepstow, Newport and Swansea (Dunning and Howell 2004), whilst the second year looked for evidence for smaller harbours and beaching points at other locations along the coast (Dunning and Howell 2005). These were Tintern, Hunger Pill, Mathern and St Pierre, Black Rock, Caldicot, Styne Pill, West Pill, Collister Pill, Magor Pill, Cold Harbour Pill, Goldcliff, Caerleon, the mouth of the River Ebbw, Peterstone Wentloog, the mouth of the River Rumney, Penarth, Sully, Barry, Aberthaw, Col-hugh and Llantwit Major, Ogmere, Porthcawl, Aberavon and Port Talbot, the mouth of the River Neath and Baglan Bay, Black Pill, Oystermouth, Pennard Pill, Nicholaston, Oxwich, Port Eynon, Wormshead, Burry Pill and Great Pill, Llanrhidian Pill, Salthouse Pill, Penclawdd, and Loughor. Eighteen of these sites are included among the ‘portes and creekes’ mentioned in the Tudor Welsh Port Books, whilst the remaining nineteen were identified from cartographic sources and the coastal survey GGAT 50. By this time the Trust had a GIS capability enabling much more efficient mapping. A database was constructed from sites in the SMR and NMR, which were already tied into the SMR GIS system. A search of documentary material was then carried out. Historic mapping was geocoded into the system as accurately as possible, although

the quality of this data depended on the extent to which the historic mapping had been drawn in the first place. Following the assessment of this information, the waterfronts of the first year's study were zoned into areas of high, medium and low potential. An additional category of 'known or established potential' was applied to areas such as the medieval castles of the towns. These zones did not relate to the general archaeological potential of the areas, but specifically to the potential for the discovery of unexpected archaeological remains of maritime nature. The second year also included site visits to see whether there were any preserved remains, and if so to assess their potential for scheduling. The mapping included the creation of polygons thought to be of particular potential and/or at greatest risk. A gazetteer with full site descriptions and photographs was produced as a supplementary volume to the Year 2 report. However, the photographs were not uploaded to the HER as the relevant module had not been developed at the time (see note to GGAT 50). There are a total of 507 photographs taken during site visits. In addition, a further 106 photographs were scanned from a collection of slides taken from a microlight flying around the coast of Gower in 2005, donated to the Trust by the photographer (inclusion depending on assignment of rights), together with another 28 born-digital photographs of the intertidal area of Swansea Bay taken in 2006.

GGAT 88 Kenfig Sands upper peat shelf (2008)

Following exposure of an upper and a lower peat shelf after storms in January 2007, the Trust carried out a Total Station survey of the limits of the exposed section of the upper peat, superimposing a photomosaic recording the animal hoof-prints it bore (Evans and Higgins 2008). There are 74 photographs in addition to the photomosaic, none of which have been added to the HER (see note to GGAT 500).

GGAT 94 Brynmill and GGAT 101 Trackways in Swansea Bay and GGAT 116 Emergency recording at Oystermouth (2009-12)

In 2009, the Trust carried out a salvage excavation of a section of wooden trackway on the foreshore at Brynmill, Swansea, that had been exposed the previous autumn (Sherman 2009). Further salvage excavation of trackways in Swansea Bay were carried out by the Trust, recording two exposures on the foreshore at Oystermouth in 2010 (Sherman 2010, Sherman 2011). Following renewed exposure, a second campaign of salvage excavation was undertaken in 2012 as a spin-off from the Arfordir project (Graham 2012). There are 194 photographs that have not yet been added to the HER (see note to GGAT 50).

GGAT 103 Arfordir

The purpose of the Arfordir project was to engage interested local individuals and community groups to identify new sites, monitor and record archaeological sites in the dynamic environment of the coastal zone under threat of tidal erosion, or other forms of damage, such as pressure of visitor numbers or livestock trampling. It was envisaged that, following initial training, these participants would be working on a largely independent basis with little support or input from professional archaeologists. Emphasis was placed on recruiting and training local people and residents who regularly use the coastal areas for recreational leisure and/or work purposes, as these were judged to be best-placed to notice change and undertake regular site monitoring. The study area, comprised the intertidal area and a 500m band inland of Mean High Water. Over a four-year period, groups were established along the coast between North Gower and Penarth: the project was not extended west of the River Taff because of the dangers involved in working in the inter-tidal zone of the Levels and the existence of the sea wall. Areas most vulnerable to erosion on the rest of the coast were identified and prioritised for further

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and more intensive monitoring work, and several sites were selected which would most benefit from investigatory work (Bowden 2013, Graham 2011, Graham 20012, Huckfield 2014, Huckfield 2015).

GGAT 45 and GGAT 115 Cwm Nash Cemetery Excavations (1993 and 2011); GGAT 128 Cwm Nash Cemetery Survey (2013)

There has been a history of human remains eroding out of the cliff from a cemetery at Cwm Nash on the Glamorgan Heritage Coast. The Trust carried out two small salvage excavations to deal with graves that had been exposed (Dunning and Bowen 2012, Locock 1993), and a geophysical survey in an attempt to discover the extent of the cemetery (Hart and Young 2013). Unfortunately, conditions were not conducive for geophysics, and it was not possible to identify graves.

GGAT 140 North Gower coast community survey

This project was a spin-off from the Arfordir project, to examine further the archaeology of the western section of the coast of North Gower. It consisted of a topographic survey of the visible remains of the submerged forest and the surrounding exposed peat shelves at Whitford Beach, and an audit and appraisal of the surviving remains of the Burry Inlet Firing Range (Huckfield 2016).

In addition, the Heritage Management team has also responded to call-outs to the intertidal zone and other coastal sites under the Regional Heritage Management project GGAT 1. Many of these have generated limited amounts of written or pictorial data without necessarily having required formal reporting (as in *eg* Hughes 2008).

Work carried out by other organisations

Within the Glamorgan-Gwent area, the most extensive work has been carried out on the Severn Levels by Dr Martin Bell and Professor John Allen (Reading University). This has generated two major publications (Bell *et al* 2000, Bell 2013), besides a host of shorter articles many of which are published in *Archaeology in the Severn Estuary*. Other parts of the South Wales coast are less well studied. An exposure in 2007 of the lower peat shelf at Kenfig which bore human footprints was recorded and published by a team from Liverpool John Moores University (Bennett *et al* 2010).

There are three pieces on ongoing research taking place within the coastal zone of Glamorgan and Gwent. Archaeologist Rhiannon Philp, a PhD research student at Cardiff University, is studying the prehistoric archaeological features of the south Wales coastline aiming to reconstruct the environmental context in which these sites were created, used or abandoned. This has involved fieldwork and palaeoenvironmental sampling at specific sites to identify and date prehistoric sea level changes and past land use patterns. From this evidence the project ‘Changing Tides’ also aims to produce a comprehensive map of intertidal peats (<https://changingtidesproject.wordpress.com/>). Geographer John Cooper, as an associate of Swansea University, is currently engaged in a three-year project to survey the caves of Gower. The research aims of ‘The Lost Caves of Gower’ are to establish a biostratigraphy framework for the last 200,000 years of the Gower peninsular, record palaeo-environmental changes and terrain modelling, and to update information on known caves and add new sites to the record. The Department of Archaeology at Reading University has been carrying out research on the

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intertidal zone of the Severn Estuary since the 1990s. The most significant piece of work at the moment is a study of Mesolithic footprints by PhD student Kirsten Barr.

RCAHMW has mapped the fishtraps as three datasets: point data, polylines and polygons.

Criteria for a new Rapid Coastal Zone Assessment

The purpose of the coastal survey carried out under GGAT 50, and of its various spin-off projects, was to inform management decisions that need to be made in the light of the dynamic conditions on the coast which affect the integrity of the historic environment. However, both the methodology of GGAT 50 and the data captured as a result of the project were of their time. GGAT's involvement in the management of the Severn Estuary has highlighted the fact that the methodology used in England for its later programme of Rapid Coastline Zone Assessment (RCZA), undertaken under the auspices of English Heritage (now Historic England) is now far in advance to that used in Wales, having been upgraded as work progresses (most recent published methodology, Version 10 dated 2007: <https://historicengland.org.uk/images-books/publications/rczas-brief/>) . Consequently the study of the English side of the estuary is able to provide management information which is of much greater value than that which can be given in Wales. The time has now come to upgrade the information available on the Welsh side.

Aims of RCZA

The English Heritage brief lays down the following broad aims for RCZA:

- Provide an enhanced SMR/HER and NMR record for coastal heritage assets, to a nationally agreed common minimum data standard, in order to permit an improved curatorial response to strategic coastal planning or management initiatives at a national and regional level;
- 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 EIAs and/or planning applications;
- Provide data which is compatible with the needs of other coastal managers, parallel coastal surveys, industry and researchers;
- Provide an overview of coastal change from the Late Upper Palaeolithic onwards;
- Provide an assessment of the degree and nature of threat to coastal historic assets which has regard to the models of future coastal change presented in Defra's Futurecoast study (2002), and relevant Shoreline Management Plans;
- Provide a broad assessment of the likely archaeological potential and vulnerability of all stretches of the coast;
- Provide a sound basis for developing management and research priorities in respect of sites and areas of potential with different levels of importance and under different levels of threat, based on:
 - a. The identification of areas or sites meriting further survey or evaluation;
 - b. The identification of areas or sites requiring positive management action;
 - c. The identification of significant historic assets meriting consideration for protection by means of statutory designation (listing or scheduling);
 - d. The identification of areas where heritage assets may be at high risk of damage or destruction;
 - e. The establishment of future research priorities for the coast;
- Enhance public understanding and enjoyment of the coastal heritage.

Content of upgraded desk-based RCZA

The new RCZA should consist of the following components

1. Integrated GIS containing:

- PRN point data with at least a summary description for each PRN and polygons where possible;
- Photographs linked to PRNs, where possible, to provide a record of the condition of the relevant site over time;
- Mapping of all recorded peat shelves and as much as possible of other intertidal features, in order to permit identification of single-point timber-feature PRNs and peat-exposure PRNs with their parent bodies;
- Shoreline management units with status information;
- Management recommendations for individual PRNs, with an emphasis on those that are in areas of particular risk of coastal erosion.

The GIS will form part of HER on HEROS. This will ensure that it can be actively managed in the future, thus securing the project legacy by avoiding the obsolescence which has affected most of the datasets created in previous work. All records that will form a part of this GIS will be tagged as Coastal Zone Management data so that they can readily be identified if needed for external use. This will apply to all records within the study area, both those created as part of the project and those which already form part of the HER. As well as the core record set of child fields visible in the basic HER view (Map base, Google Earth imagery, Core/event cross-reference, Location, Site type and period, Artefacts, Condition and evidence, Images, Bibliography, Cross-reference, and Status) it will also include the child fields Threats, Risks, Potential, Management agreements, Management record, C 14 dating, and Dendro dating.

2. A technical report containing:

- An explanation of the decisions made in compiling the project data;
- A guide to the GIS layers;
- Identification of areas and sites particularly at risk;
- Recommendations for fieldwork needed to upgrade management data for at-risk sites;
- Recommendations for providing an online interface for public access to an appropriate level of data (excluding any sensitive material), and how it should be linked to Archwilio, and potentially also the English CITiZAN website.

The English Heritage brief also specifies that RCZA should include an overview of coastal change. We do not plan to incorporate a new version of this within the current revision, since this aspect was treated, on a thematic basis, in the previous RCZA. We therefore do not feel that further elaboration is necessary in order for the archaeology of the coastline to be managed effectively, particularly since we are mindful of the constraints imposed by current financial conditions.

Selection of study area

Figure 1

The methodology approved by Cadw for GGAT50 included the provision that the study area should extend from the low-water to 150m inland of the high water mark, and that tidal rivers should be surveyed as far as the lowest historic bridging point. The report on the first year's work contained two suggestions for the modification of these criteria, which were not taken up by Cadw at the time since it was considered that uniformity of result throughout the whole

programme took priority. One of these suggestions was that, since these criteria excluded ‘large areas of dune formation whose development and management is indivisible from that of the foreshore...it may be advantageous to include in future study areas parts of geomorphological units which extend inland from the boundary’. The other suggestion was that it had been observed for the Rivers Loughor, Neath and Tawe that riverside sites ‘for some distance inland fall logically within the sequence of use and industrialisation of the coast, and although they may not suffer from direct erosion, probably have related management problems and potential’. In future, it was suggested, ‘the study area should be taken further upriver (perhaps to the last settlement on a tidal stretch)’ (Locock 1996, 46).

The area examined in the RCZA on the English side of the Severn Estuary was everything between Lowest Astronomical Tide (Chart Datum) and 1km on the landward side of Mean High Water, although it was decided that built-up urban areas within this zone could effectively be excluded. We recognise that the resources needed to expand our landward boundary from 150m above MHW to 1km would make this project prohibitively expensive and would also, where there are cliffs, include sites where there would be unlikely to be a threat for centuries to come.

Following consultation with Jon Dollery of RCAHMW, who is taking a lead in the Spatial Mapping Steering Group (established to inform the HEG Climate Change subgroup), we uploaded the GIS datasets he had compiled to enable an assessment of the heritage assets that would be at risk as a result of climate change associated with sea level rise along the entire coast of Wales. However, as this did not differentiate between flood risk caused by inland flooding from that caused by sea level rise and associated storm surges, we then selected the Flood Zone 3 GIS polygon from the Flood Map available on the Lle Geo-Portal established by Welsh Government and Natural Resources Wales and incorporated that in order to eliminate areas where the risk was not caused by marine flooding. This was in line with the recommendation made in the report of the first year’s work on GGAT 50 to survey further upriver than was possible in the earlier project. The final polygon can be seen on Figure 1.

HER upgrade required

New PRNs should be added from the following sources:

- Unpublished academic work for which reports have not yet been incorporated into the HER;
- Commercial work which is ongoing, but from which basic information can be released without infringing upon other research requirements or commercial confidentiality;³
- *Archaeology in the Severn Estuary* and other relevant published material;
- Air and satellite photographs;
- LiDAR;
- Historic mapping.

³ We anticipate that commercial confidentiality means that while information will be made available to the regional curatorial service within a reasonable timescale (see CIfA *Code of Conduct* principles 1, 10 and 4.7, *Standard and guidance for desk-based assessment* 3.6.1, *Standard and guidance for archaeological field evaluation* 3.7.4), this may not be during the period at which the new RCZA is being prepared.

Whilst recent Cadw-funded projects have included a requirement to enhance the HER with both point and polygon data, this was not the case with earlier projects. The following information (where not already on the HER) should be added to the PRNs generated by the previous coastal survey GGAT 50:

- Name;
- Description;
- More precise NGR;
- Photographs;
- Reference;
- Polygon (where possible).

Description of new data sources

Grey literature reports

The selection criteria for the 2013 – 2016 grey literature reports to be examined were:

- All grey literature reports sent in to the Archaeological Planning Management team from the beginning of 2013 that lie within the study area;
- All grey literature desk-based assessment reports sent in to the Archaeological Planning Management team from the beginning of 2013 whose centres lie within 1km outside the border of the study area.

A total of 98 reports satisfied one of these two criteria. This was a considerable increase from the number expected, due in at least part to the decision as to where to place the inner limit of the study zone. The number of individual new PRNs with each report is extremely variable. Statistics from previous data entry indicate that it can range from 1 to nearly 700: the average is 17, but this includes large areas of industrial archaeology where there can be hundreds of features that need to be catalogued separately. For a project of this nature, the norm could be as low as one per report.

Unpublished academic work

Requests for information have been sent to researchers known to us at the universities of Cardiff, Reading and Swansea (see above, pp10-11). We have also been in discussion with palaeo-environmentalists at the universities of Aberystwyth and Trinity St Davids to try to ascertain whether there are any other workers in the area that are known to them, but they have not identified any other fieldwork projects to us.

The Trust has been promised data from the Cardiff, Swansea and Reading researchers. The Cardiff data and Reading Mesolithic footprints data may or may not be available during the financial year 2016-2017, depending upon whether the researchers finalise their PhD dissertations at the end of their three-year terms or whether their work is still ongoing after that. Data from the Swansea researcher has been promised on an ongoing basis, so at least some of it should be available within the financial year.

Ongoing commercial work

Two pieces of work were identified that might produce additional sites. One is being carried out on behalf of Natural Resources Wales at the mouth of the Waycock River, and the other between Crymlin Burrows and Aberavon Beach, in connection with the new university campus. The Trust's Archaeological Planning Management team are of the opinion that the first might possibly produce new material, but it now seemed unlikely that the second would. There is as yet no indication as to when the reports on the proposed course of the M4 relief

road will be available (see note on p13). Therefore for the purposes of scoping the project, we estimate a total of 50 new sites/events.

Relevant published material.

All volumes of *Archaeology in the Severn Estuary* have been checked. A search of material in other periodic literature and edited volumes was carried out by checking through the annual lists 'Recent literature relating to Wales' published in *Archaeology in Wales*, and then accessing those papers that looked as though they could potentially contain information about new sites. The majority of potential new sites were found in *Archaeology in the Severn Estuary*, but it is impossible to be certain whether all these are actually new until they have all been mapped and a detailed comparison has been carried out with existing PRNs, a time-consuming task which was beyond the scope of this year's work. For the same reason it is not possible to know how many of the sites published in Bell 2013 are either already on the HER or have been published in *Archaeology in the Severn Estuary*. Only four sites were identified from other sources.

Air and satellite photography

Digital satellite coverage since 1997 has been viewed via Next perspective and Google Earth. Very few sites were discovered by these means. Given the restricted timescale available for the work, we did not plot all the contemporary drainage systems visible in fields on the Levels as archaeological sites, unlike on the English side of the Bristol channel.

LiDAR

LiDAR proved disappointing. The material available to us is on a relatively coarse scale (mainly 2m) and only a few new sites showed up. We have contacted our coastal unitary authorities to see whether they have commissioned any LiDAR on a finer scale, and if so whether they can make it available. The LiDAR produced for the proposed route of the M4 relief road has already been studied by Wessex Archaeology, and any features recognised as a result will be incorporated in the M4 relief road report.

Historic mapping

The 1st, 2nd, 3rd and 4th edition of OS 25" mapping were consulted as GIS layers.

Quantification of new entries to HER

Quantification of new events to be added

Whilst it was possible to establish the exact number of sites that would need to be entered onto the HER from some of these sources, for others it was only possible to make an estimate due to the following factors:

- Lack of certainty as to how many new sites there would be in each of the published and grey literature reports to be searched;
- The fact that some of the research we hope to be able to include is still ongoing.

Source	New PRNs	Notes
Grey literature	490	Estimate
Unpublished academic research	120	Estimate
Published material	200	Estimate
Air/satellite photography, LiDAR and historic mapping	280	
ESTIMATED TOTAL	1,090	

Quantification of new events to be added

The number of known events to be added is 98 from grey literature and 43 from published literature. To these need to be added the currently ongoing academic work, where we have estimated 30 new events. Total = 171.

Quantification of PRNs added in GGAT 50 which should be upgraded

<i>Area</i>	<i>PRNs to be upgraded</i>
Year 1 Loughor – Sker	130
Year 2 Sker – Rumney	133
Year 3 Rumney – Wye	259
<i>TOTAL</i>	<i>522</i>

Quantification of photographs from previous Cadw projects.

These were photographs that were taken during previous projects before facilities were available that would have allowed them to be uploaded to the online HER database (see p 6). All of them will need to be assessed for their suitability for inclusion in the online HER digital database. However, we anticipate that the number eventually uploaded will be smaller, as the collections will include duplicate shots and other frames that may be unsuitable for other reasons.

<i>Project</i>	<i>Number of photos to be assessed for inclusion in HER</i>
GGAT1 site visits	1,231
GGAT 50	286
GGAT 62	134
GGAT 76	613
GGAT 88	74
GGAT 101 and GGAT 116	194
<i>TOTAL</i>	<i>2,532</i>

We have not included photographs from developer-funded work as a task for the project. Many of these have been carried out by other contracting organisations, and the Trust does not have access to their photographic archives.

Mapping

Many PRNs in the intertidal zone are records of individual wooden elements that will not necessarily have been apparent as part of more extensive structures when they appeared. As already noted, detailed examination of the record is required to sort out which features are already on the HER and which are new. As noted above, RCAHMS has mapped fish-traps and we expect to be able to include their data as a GIS layer. Hopefully this will enable us to locate many single-point timber-feature PRNs within parent body fish-traps and will enable us to identify other features where this type of mapping is required. Location of single-point timber-feature PRNs within their parent bodies will reduce the confusion that currently exists in the record, as well as assisting Arfordir volunteers and other fieldworkers with establishing which features have previously been recorded.

Tasks to bring the current data up to the required level

1. Upgrade HER records to meet current standards.
2. Insert into the HER a series of GIS layers arranged according to type (peat shelves, fish traps, wharfs and jetties etc) and draw intertidal features from all previous GGAT Cadw-funded projects onto them.
3. Assess photographs taken as part of previous projects for suitability to include in HER. Catalogue selected photographs to HER protocols and upload to HER.
4. Create core HER records for all new sites identified during the scoping project.
5. Create event records for the activities that lead to the creation of the new and (where appropriate) upgraded PRNs, and cross-reference PRNs to them.
6. Integrate mapping with NRW's high coastal erosion risk areas.
7. Link SMP Policy Areas & Options to important archaeological sites or high potential for sites.
8. Review condition of individual PRNs in areas of high risk for coastal erosion, update where information is available, prepare management recommendations where possible, and recommend sites for further investigation where desirable.
9. Ensure all records within the project GIS are tagged as Coastal Zone Management.
10. Translate summary fields of new records into Welsh.
11. Scope new online interface for public access, including recommendations as to how it should be linked to the Archwilio and CITiZAN websites.
12. Prepare report.
13. Prepare archive.

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Figure 1: The coast of Glamorgan and Gwent showing the area selected for study in blue.

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**Glamorgan-Gwent
Archaeological Trust Ltd**



QUALITY CONTROL

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