

EXECUTIVE SUMMARY

This document reports on the Phase 2 Rapid Coastal Zone Assessment for North-East England based on the methodology outlined in version 4 of 'A Brief for Rapid Coastal Zone Assessment Surveys' (English Heritage 2005). The project was undertaken by Archaeological Research Services Ltd for English Heritage with the project data fed back into the HERs of the various local authority partners. These included the North York Moors National Park Authority, North Yorkshire County Council, Tees Archaeology (for Redcar and Cleveland, Middlesbrough, Stockton-on-Tees and Hartlepool), Durham County Council, Tyne and Wear Specialist Conservation Team (for South Tyneside and North Tyneside) and Northumberland County Council.

The project aimed to rapidly survey all extant archaeological features visible at each of ten survey locations identified by Phase 1 of the project and survey and sample inter-tidal peat deposits at an additional four locations. The results of this survey and sampling can then be utilised to enhance the existing HER and NMR record and provide a useful tool to feed back to the Shoreline Management Plans and better inform the management of the archaeology of coastal margin in future. The results and outputs of the NERCZA project can also be used to help local communities better engage with their coastal heritage in future.

During the course of this project some unexpected discoveries were made including most notably the identification and recording of burials falling out of the cliff face at Low Hauxley and an area of human and animal footprints impressed within a previously unknown inter-tidal peat also at Low Hauxley. Both of these sites were drawn to the attention of ARS Ltd staff by a local amateur archaeologist. A separate report has been prepared for the excavation of the two burials. The footprints and associated peat are discussed in detail in Chapters 5.10 and 6.4 of this report. A further separate condition report that summarises the results of previous archaeological interventions at Low Hauxley and future management options for the site has also been produced as part of this project. This report forms the main project report and contains the results of the field survey that formed the bulk of this phase of the NERCZA project.

The project has delivered the following outputs:

- *Updated Phase 1 report and Executive Summary document in the light of the new SMP2*
- *Enhancement of six local authority HERs*
- *A project GIS that contains surveys, photographs and records of threatened sites and inter-tidal peat*
- *Phase 2 project report (this document)*
- *A standalone Phase 2 Executive Summary*
- *Talks to local societies (e.g. Druridge Bay Liaison Group, Architectural and Archaeological society of Durham and Northumberland)*
- *Articles for local magazines and short academic article (e.g. Low Hauxley newsletter, archaeology in Northumberland, Archaeology County Durham, and Journal of the Fortress Study Group)*
- *Forthcoming academic article for IfA journal The Historic Environment: Policy and Practice*
- *Excavation and report on a rescue excavation at Low Hauxley*
- *A review of archaeological interventions and site condition at Low Hauxley*
- *An A4 fold-out leaflet*
- *A report on the rapid survey of WWII remains within the Northumberland Coast AONB*

The Phase 2 survey identified and surveyed 609 features and added 135 new records to the HERs of Northumberland, Teesside, North Yorkshire Moors National Park and County Durham. Any repetition of existing or known sites within the HER provided significant enhancement to the current

record due to the detailed current condition statement provided as part of the survey. A total of 5 extant peat beds were mapped at Low Hauxley and all of these were radiocarbon dated as well as samples taken from organic layers observed in the inter-tidal zone at Hartlepool Bay and Crimdon Dene in County Durham, the results of which have been fed into English Heritage's national inter-tidal peat database.

The project area comprised a strip of land from the lowest astronomical tide (LAT) level to 1km in-land from Mean High Water Springs (MHS). The study area ran from Whitby in the south to the Anglo-Scottish border in the North, an area of approximately 200km that falls within SMP2 for Northumberland and SMP2 for North East England which replaces SMP Cell 1.

Phase 2 of the NERCZA carried out field survey of fifteen threatened areas between September 2009 and February 2010. Each site was investigated and surveyed utilizing mapping grade Global Positioning System (GPS) equipment, with extensive digital and paper records maintained along with extensive site photography. A digital photo archive of 2733 JPEG images was amassed during the project, as well as additional detailed imagery of eroding peat layers at Low Hauxley, Northumberland. Upon completion of the initial fieldwork more than 500 sites had been recorded, of which 115 were new records and the remainder provided significant enhancement to existing records. Along with this a further 100 Second World War sites have been identified within the Northumberland Coast Area of Outstanding Natural Beauty as part of a separate survey project which focussed only on the remains surviving from the Second World War. This project was undertaken on behalf of the Northumberland Coast AONB and undertaken after the completion of the NERCZA Phase 2 fieldwork. The same methodology was employed by Archaeological Research Services Ltd in the course of this survey during February 2010. This additional work provided an additional 20 new records. The data from this survey has been added to the project GIS along with the photographic and paper archive, increasing the scope of the NERCZA Phase 2 field survey. This gave a total of 609 records for the project with 135 of these being new records not previously incorporated into the regional HER data.

At least 75% of sites recorded at these locations related to the defence of the coastline during the Second World War. Pillboxes, gun emplacements, anti-tank defences, and observation posts were all observed and recorded. A great number of these sites had been known previously and recognised on wartime aerial photography; however some sites were new discoveries. The remainder of previously known sites recorded by the survey provided significantly enhanced records. The level of survival of earthwork military remains, such as trenches and weapons pits, as well as remains of mine fields was particularly notable. The temporary nature of these structures make the large number identified during the fieldwork surprising and potentially important, as many are preserved in a thin strip of land between the retreating coastline and inland development. Earthwork remains from the Second World War represent some of the most commonly encountered archaeology along the North East Coast and also some of the most exposed to marine transgression and development. Concentrations of Second World War military earthworks were identified at Bamburgh, Dunstanburgh, Boulmer, and Beadnell in Northumberland and at Greatham Creek and North Gare on Teesside.

Results from the survey of these sites show that many sites that have been previously identified which were thought to have disappeared are still extant in some form. For example a pillbox recorded by Phase 1 that has been thought to have been removed or eroded away may still survive as earthworks or as buried foundations partially visible. Other remains identified as at risk range from the Mesolithic period to the Cold War and all now have an assessment of the level of threat that they face, along with accurate positional information to within 0.5m, a significant improvement for many records. This information base compiled into the project GIS will form a useful tool for land management, local planners and help to adapt the Shoreline Management Plans to take into account management of high risk archaeological assets and better identify those of significant special interest. Specific site by site recommendations on

management can now be made using SMP2 as a reference point and the archaeological and environmental evidence from NERCZA Phase 2 can be used to support or challenge the current policy based on the threat to any heritage assets. This assessment has been undertaken by the project team following subjective scoring of the 70 sites of special interest on 5 key criteria; threat, condition, significance, potential and rarity. This produced a ranked list of sites. The top threatened sites of special interest were then evaluated and possible management strategies proposed for each and these are discussed further in Chapter 7 of this report. This assessment does not provide definitive answers for management but clear proposals have been made in order to provide a basis for future discussion of the management of coastal heritage assets.

1. INTRODUCTION

1.1 Project Outline

This report documents the Phase 2 of the Rapid Coastal Zone Assessment for the North East Coast of England from Whitby in the south to the Anglo-Scottish border just north of Berwick upon Tweed in the north. Phase 1 comprised an aerial photographic transcription and desk based assessment of the same area, which commenced in March 2007 and was completed in December 2008 (Tolan-Smith 2008) and updated in the light of the publication of Shoreline Management Plan 2 in early 2009, with Phase 2 of the project commencing in May 2009.

During the course of the desk based assessment and aerial photography transcription exercise 968 new records were added to North East HERs and 270 existing records were enhanced. Phase 1 of the project also identified numerous archaeological sites in the study area which are facing imminent threat from natural processes such as coastal erosion and rising sea levels (Chapter 10 of Phase 1 project report). Further damage could be caused to such sites by the construction of sea defences as a result of the recommendations from the Shoreline Management Plans (SMP2 for Northumberland and the North East) which aim to manage such threats. The archaeological sites under threat were identified as being in urgent need of rapid ground surveys and recommendations and prioritisation for their future management and conservation. The Phase 1 survey initially highlighted ten areas for further rapid field survey which were undertaken as part of Phase 2, together with five additional locations that were added as further areas of interest or threatened sites were identified and surveyed opportunistically. In addition, to this rapid survey work four locations were selected for survey and sampling of inter-tidal 'peat' layers.

The rapid field survey examined the fifteen highlighted locations in greater detail, recording the visible archaeological remains and taking field notes (Fig 1.1). All of these locations are at risk from some form of ongoing erosion, whether immediately or in the long term, and the specific site reports include assessments of the level of threat to historic assets at each survey location visited.

In Phase 2 of the project rapid field survey recorded 609 archaeological features at the fifteen locations, approximately 30% of which were new records or rediscovered features thought to no longer exist. All records collected by NERCZA Phase 2 contained detailed condition statements in the form of attached data tables. These contained data on threat, condition, site type, period and coastal setting and this information can now be used to significantly enhance any existing records in the HER and NMR. Newly identified archaeological features included prehistoric human and animal footprints at Low Hauxley, surviving graded earthwork remains of a prehistoric enclosure at Fenham and numerous Second World War military sites all along the coast. Approximately 75% of the features recorded by the Phase 2 fieldwork dated to the Second World War. This can be accounted for due to the excellent survival of many earthwork remains that were recorded for the first time and the addition of data from the Northumberland Coast AONB military survey project data, also undertaken by Archaeological Research Services Ltd using the same methodology as NERCZA.



Fig 1.1 Remains of Tudor period fort overlooking Holy Island harbour, with Lindisfarne castle in the background

The detailed location reports summarise the archaeological features recorded at each site, discuss and evaluate the threats that they face with consideration of current SMP2 policy. This information is compiled in section 5 of this report. This section covers each of the fifteen sites surveyed and a description of the Second World War military sites recorded as part of the Northumberland Coast AONB military survey undertaken by Archaeological Research Services Ltd are also included.

The palaeoenvironmental sampling element of the project was undertaken at five key sites identified by Phase1. Suitable samples with enough material for radio carbon dating were obtained from three of these. Low Hauxley (Fig 1.2), Crimdon Dene, and Hartlepool Bay all successfully yielded enough material for dating and pollen analysis. The results of this are discussed further in Section 6 of this report.



Fig 1.2 Investigating a layer of inter-tidal peat at Low Hauxley, Northumberland

Chapter 7 of this report deals with the key management issues relating to each of the locations surveyed. This was done using an onsite assessment of threat by the project team, considering coastal erosion, potential for future flooding and land use. The assessment was undertaken in a subjective manner and is intended only to propose possible strategies for further discussion in the future. The outcomes of this are not intended to provide definitive proposals for what should be done to manage these sites for the future. The assessment of threat to each site was used together with an assessment of special interest using criteria outlined in English Heritage's guidance for Scheduled Ancient Monuments (formerly Annexe 4 of PPG 16). This allowed each site to be given a score out of fifty and ranked accordingly. The results of these risk assessments were tabulated and the most threatened sites of special interest are discussed in greater detail in Chapter 7 of this report. This process enabled proposals for the management of the archaeological resource at each site to be put forward for discussion by the project team and these are also discussed in Chapter 7.

The project has produced this full report, along with a non-technical executive summary document outlining all of the sites recorded and possible management options. This will be produced alongside the project GIS which has allowed dissemination of the information recorded at each of the 609 sites to the Historic Environment Records. Also the project archive of 2,773 digital images along with an additional 694 non archived supplementary photos has been made available for the use of the regional Historic Environment Records.

In addition to the Phase 2 project report and the executive summary document NERCZA has produced supplementary reports for the excavation at Low Hauxley (Waddington 2009), the Northumberland coast AONB military survey (Burn 2010) and a summary of previous work at Low Hauxley (Waddington

2010). Specialist reports concerning worked wood, palaeoenvironmental samples and radiocarbon dates have also been produced. All of these reports will form a part of the project archive along with the paper records and field notebooks. All data collected in the field as a part of these subsidiary projects has been included in the NERCZA project GIS.



Fig 1.3 Remains of a chapel on St Cuthbert's Isle, seen eroding as a result of wave action.

A full list of the 609 sites recorded by the rapid field survey can be found as a separate gazetteer document accompanying this report and are also summarised separately in the updated project executive summary. These records from the field survey form the core data recorded by the project and can be directly referenced with the archived photo records also included in the gazetteer.

2. AIMS AND OBJECTIVES

2.1 Project Aims

This Phase 2 of NERCZA is primarily focused around rapid field survey which aims to substantiate and complement the results of the desk-based study undertaken as Phase 1 of this project. This survey focused on areas identified in Phase 1, especially in the inter-tidal zone where historic assets were identified as being under threat. The overarching aims of this project are as follows:

- Provide further heritage information which can be fed directly into Defra's latest Shoreline and Estuary Management programme, thereby helping to ensure appropriate protection, or mitigation of damage, to historic assets.
- Provide further enhancement and additional information to the HERs and NMR record of coastal heritage assets. This will enable an improved curatorial response to strategic coastal planning or management initiatives at both a national and regional level
- Enhance the factual evidence-base for the curatorial response to individual applications in advance of developments or coastal protection schemes.
- Provide further information on the likely archaeological potential and vulnerability of the coast.

2.2 Specific Objectives

2.3.1 Upgrade the Phase 1 report in the light of the completion of SMP2, the draft of which has recently been completed by Royal Haskoning for the area north of the Tyne.

2.3.2 Provide more detail on archaeological sites under threat within the study area which will be feed into Defra's Shoreline and Estuary Management programme, the NMR, the various HER of the various project partners and recommendations to EH of sites to consider for designation.

2.3.3 Verify site identifications made during Phase 1 of the Project, particularly those identified as part of the aerial photograph transcription work.

2.3.4 Locate and characterise sites and features undetected during Phase 1 of the Project.

2.3.5 Determine the geomorphological/sedimentary context for features.

2.3.6 Assess whether features are eroding.

2.3.7 Selectively sample features with particular attention to the inter-tidal peat layers to ascertain their extent and date range.

2.3.8 Identify sites in urgent need of additional recording, dating or characterisation work at specific sites to take place after the completion of the Phase 2 survey.

2.3.9 Test fieldwork methodologies and assess the practicalities and logistics of future fieldwork including any required mitigation measures and/or required additional recording, dating or characterisation work at specific sites to take place after the Phase 2 survey.

2.3.10 Produce data that can be used to inform the North East Regional Research Framework (NERRF) and the Yorkshire Research Framework (YRF).

2.3.11 Provide data that will be of assistance to other coastal managers, other coastal surveys and researchers.

2.3.12 Increase the understanding of the archaeology of the North East coast amongst the public and the research community through varied dissemination.

2.4 Project Integration

As an adjunct to this project a ground survey of the military archaeological remains surviving within the Northumberland Coast Area of Outstanding Natural Beauty was also undertaken. This has provided additional data for this project and has provided further assistance in enhancing the Northumberland HER, as well as the NMR. A separate standalone report has been produced for this sub-project (Burn 2010).

A further additional sub-project was also undertaken during the course of this project. This comprised a detailed review of the archaeology, condition and history of previous interventions and location of archives for the eroding Mesolithic and Early Bronze Age site at Low Hauxley. This site has a complex history and this site-specific study has assisted in focusing in on the key management issues and options for the future. A separate standalone report has been produced for this sub-project (Waddington 2010).

2.4.1 SMP's and Conservation

The project has produced survey data that has enhanced the various HER's within the study area, which will enable an evidence-based response within the planning process. The project has provided heritage information that has been made available to Defra's Shoreline and Estuary Management Programme (SMP2) which will help to ensure protection and management and/or mitigation of damage by natural processes. The project has also informed other bodies, such as the Northumberland Coast AONB and Durham Heritage Coast, and has contributed to the aims set out in their respective Management Plans.

2.4.2 Research Frameworks

The project has contributed detailed condition assessments for all of the features recorded. Also updated or proposed alternative interpretations for previously recorded features were included within the field survey. These new archaeological records, include military features such as weapons pits and trenches, rock cut features on the foreshore, industrial remains and human and animal footprints preserved in exposed inter-tidal peat. The expansion of the number of records and improvement of existing records provided by the project has contributed significantly to the regional research framework. In particular the area in the research framework of Defence and Fortification has been contributed to by the volume of Second World War and earlier defensive features recorded by the project.

Maritime and coastal archaeology (Petts and Gerrard 2006) has also been contributed to by the recording and assessment of features such as the Amble hulks and rock cut fish traps by Phase 2 of the NERCZA project. The increased understanding of the Bronze Age and earlier archaeology at the site of Low Hauxley that has come as a result of the NERCZA Phase 2 investigation has also contributed to the relevant section of the research framework.

2.4.3 Future Research Possibilities

During Phase 2 of the project further avenues have been explored for a HLF project given the rejection by Northumberland County Council to running such a project through the Northumberland Coast AONB on 'purchasing' grounds resulting from EU legislation. A project proposal has been made to the

LEADER and also to the EH regional office for a local capacity building grant to assist local communities on the North-East Coast to engage with their built and natural heritage on the coast and to monitor impacts over the medium term. This project takes the form of a proposed evaluation followed by full excavation at Low Hauxley with community involvement, allowing local communities to further engage with their coastal heritage. This project will involve the provision of archaeological training opportunities, installation of interpretative material and educational and access opportunities for young people and communities. It will have the added potential to fit directly into the Coal and Coast project proposed by the Northumberland Wild Life Trust as well as meeting the needs of the regional research framework (see section 2.4.2).

Phase 2 of the NERCZA project identified several locations of which the site either requires further work to fully understand the nature of the archaeology or to preserve eroding remains through record. For example the site at Crimdon Dene has the potential to yield further information on the Mesolithic activity if further work is undertaken to relocate the lithic scatter on the County Durham coast, however further investigation work is required to fully understand the location and realise the full potential of the site. Also the site at St Cuthbert's Isle in Northumberland is fairly well understood archaeologically, however the imminent nature of the threat from erosion and visibly eroding archaeological deposits. Here further work is required to record rapidly eroding remains of potentially significant archaeological deposits.

All of the proposals for further work that have been identified by Phase 2 of this project are discussed further in Chapter 7. Proposals for further work have been based on the special interest of the site along with the immediate level of threat faced by the surviving archaeology. Using this evaluation process for each of the top sites of special interest identified in Chapter 7, three options for further work and management of these sites have been proposed. These are only proposals intended to promote discussion on the future management of these key sites and not a definitive guide for what must be done.

2.4.4 Project Outputs

Phase 2 of the NERCZA project has produced the following outputs as a direct result of the field survey work:

- Project Report (this document)
- Executive Summary document summarising cumulative results of Phase 1 and Phase 2 of the project (Burn and Johnson 2010)
- Low Hauxley Excavation report (Waddington 2009)
- Low Hauxley summary of archaeological interventions report (Waddington 2010)
- Northumberland Coast AONB survey of military archaeology report (Burn 2010)
- Integrated project GIS database containing 609 records plus additional records for sample locations and all data from phase I of the project
- Digital photographic archive of 2,773 JPEG images
- Approximately 135 new HER records based on the data used in Phase 1, although this does not account for HER records updated during the course of the NERCZA project (2008 -2010)

- 609 enhanced HER records as current survey has assessed threat level and condition for every site recorded
- Guided walk with Architectural and archaeological society of Durham and Northumberland, project update talks to NYM archaeology group and North East Maritime Forum.
- 2 articles to be published in 2010 in *Archaeology in Northumberland*, *Archaeology County Durham*, and 1 in 2011 in *Casemate* (Fortress study Group Journal). A third academic article is currently in preparation for the *IfA* journal; *The Historic Environment: Policy and Practice*.
- Project leaflet summarising results for distribution to the public and local authorities
- Proposed inset days for teachers from local schools in Northumberland, allowing them to engage further with coastal heritage. This has yet to be confirmed and finalised.

3. SCOPE OF THE SURVEY

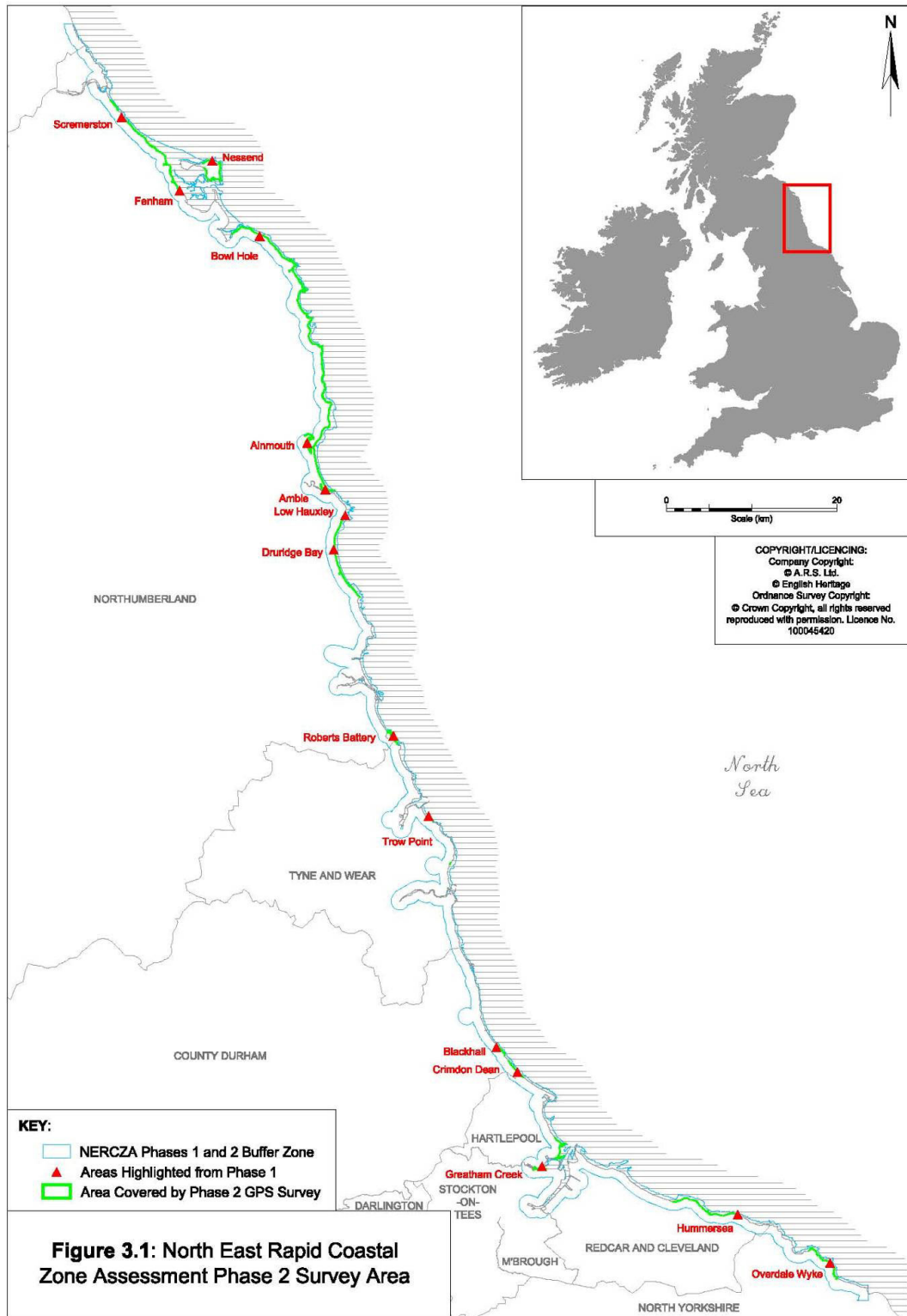
3.1 Geographical Scope

The aim of the aerial survey mapping element of the project was to produce accurate mapping from aerial photographs and a record of all archaeological features from all periods that could be identified within the study area as part of an in-depth desk-based assessment. The Phase 2 field survey of the locations identified during Phase 1 aimed to ground truth and expand upon the archaeological features mapped by the aerial photography and enhance these surveys with metric survey data. The aerial photography transcription data was employed in the field during the course of the survey. It was used to help interpret newly identified archaeological features and to re-evaluate interpretations of those that had been previously recorded.

The project area extends across the following local authorities (from north to south): Northumberland County Council, Tyne and Wear Metropolitan Borough Council, Durham County Council, the unitary authorities of Hartlepool, Middlesbrough, Stockton-On-Tees, Redcar and Cleveland and North Yorkshire County Council. With the exception of Whitby, the majority of the project area that runs through North Yorkshire lies almost wholly within the North York Moors National Park Authority. The fifteen sites identified for further work subsequent to Phase 1 represent each of these local authority areas.

The field survey focused on fifteen sites identified within the strip of land mapped in Phase 1, from the lowest astronomical tide (LAT) to a width of 1km in-land from the high tide level (MHWS) and running from the Anglo-Scottish border in the North to Whitby in the South (Figure 3.1). The project area falls over an area of 560km² but only c. 402km² extends over exposed land; the remainder falls within the inter-tidal zone. The field survey was carried out to Level 2 standard (Ainsworth *et al* 2007) and covered a length of 142km of this coastline, although this figure does not account for the coverage of foreshore, cliff top dunes and estuarine hinterland that was covered during the investigation.

In February 2010 an additional area was also surveyed and added to the project GIS as part of the sub-project, the Northumberland Coast AONB military archaeology survey. It was felt that Phase 2 of the NERCZA project would benefit from extra coverage in this area even though this sub-project was targeted at specifically Second World War military remains. This additional work was funded separately by the Northumberland Coast AONB but the results have now been integrated into the wider NERCZA project, thus enhancing the project GIS and providing important value-added benefits for this area of coastline.



3.2 Geology

The solid geology of the study area is reviewed in detail in Chapter 3 of the Phase 1 report (Tolan-smith 2008) and so does not need to be repeated here, but can be broadly summarised as follows. In County Durham, the principal rock exposed by processes of erosion is Magnesian limestone while to the north the Northumberland coast is more varied with localised exposures of limestone, sandstone and occasionally coal. Around Teesside and North Cleveland the

coastline is relatively featureless where the wide estuary of the Tees reaches the coast. However, to the south the coastline becomes the most dramatic of the study area with high, rugged cliffs around Saltburn and Boulby Head, in North Yorkshire where Liassic shales and sandstones are exposed (Kent 1980). Along the coast drift deposits, principally tills but also sand and gravels, cover the underlying bedrock. It often comprises a combination of clay resting on limestone or sandstone which meets the coast in the area under study (Beaumont 1970). In some areas the clay can reach considerable depths as, for example, at Whitley Bay, where the clay has a depth of 6m (Spratt 1979).

3.3 Archaeological Scope

3.3.1 Earthwork archaeology

All extant earthworks identified as archaeological in origin on aerial photographs were mapped as part of the Phase 1. Available RCHME /EH ground survey plans were used to assist and enhance this mapping. The data from Phase 1 was used on the GPS display in the field to identify previously known earthwork remains some of which were then re-interpreted. The field survey recorded using mapping grade GPS all earthwork remains encountered (Figure 3.2) in basic plan form utilising lines and polygons were appropriate as required by a level 2 survey (Ainsworth *et al* 2007). If earthwork sites had already been recorded as part of a recent detailed level 3 survey, for example Kettleless alum works, then they were recorded as a basic polygon with an attached condition statement rather than in detailed so that there was no repetition of survey work.



Fig 3.2 Graded extant earthwork remains of the buildings of a former medieval grange farm of Lindisfarne priory at Fenham looking south from the hamlet of Fenham

3.3.2 Levelled archaeology

All crop marks, soil marks and parch marks identified as archaeological in origin were mapped by Phase 1 and three crop mark sites in particular at Fenham, Scremerston and Overdale Wyke were identified for field survey on the ground

as part of Phase 2. The data collected from Phase 2 was used to precisely re-locate the position of these sites to see if there were any extant features visible on the surface (Chapter 5.2). In addition to crop mark sites the flint scatters at Crimdon Dene and Ness end were also targeted for further investigation. The same methodology was undertaken using known positional information on the GPS with field reconnaissance to attempt to relocate the extent of these features.

3.3.3 Post medieval and modern field boundaries

Field boundaries that have been removed but are still extant, and depicted on first edition Ordnance Survey or later edition maps, were generally not surveyed by phase 2. This was unless they formed a key component of another significant archaeological feature that was identified as under threat from erosion. An example of this can be seen in the possible medieval or post medieval plough headlands identified on the cliff edge at Saltburn (Chapter 5.3)

3.3.4 Medieval and post medieval ridge and furrow

Ridge and furrow (Figure 3.3) was mapped using the GPS where it was either newly recognised, identified as being under threat or presented an exceptional example of preservation. It was also recorded if there was clear or imminent threat of erosion or the site could be used as a case study for management such as the graded ridge and furrow seen at Alnmouth (Chapter 5.). The ridge and furrow fields were recorded as polygons with the GPS using a simple graphical depiction, delineating the extent of area and direction of the furrows.



Fig 3.3 Crop marks visible on the ground revealing the trace of medieval broad ridge and furrow at Overdale Wyke, north Yorkshire, view looking West.

3.3.5 Industrial features and extraction

Large and small-scale quarries were mapped with the GPS and recorded as polygons, irrespective if they were depicted on any Ordnance Survey map or within the Phase 1 data. Detail was then picked out within these polygons using

“dumb data” i.e. lines with no attached data tables. Coal mining and associated features, such as tramways, were mapped and recorded as with other features. Large collieries or open cast mining complexes were also mapped generally as an extent of area as with those seen at Blackhall as there was no scope within this project for undertaking further detailed survey.

3.3.6 Post Medieval and 20th Century military features

Former Post Medieval, First and Second World War military sites and installations were mapped. Extensive military complexes and sites were outlined as an extent of area with descriptive data attached. Anti-landing obstacles and tank traps were recorded as lines to show their alignment. Surviving installations such as pill boxes and coastal gun/searchlight batteries were also mapped (Figure 3.4). As many sites of this period and function were by nature short lived and transitory emphasis was placed on the identification and general extent of activity when appropriate, rather than the accurate depiction of single features such as local track ways although in some cases this was also necessary to interpret the nature of the surviving remains. Significant features within these outlined areas were mapped either “as seen” or schematically as dumb data, according to the visible extent on the ground and the size of each feature. Where such remains were fragmentary or insubstantial, a single point was used to record their position.



Fig 3.4 Unusual double pillbox on the shore at Goswick, survey by the Northumberland coast AONB survey, linked by underground access, see section 5.16

3.3.7 Buildings

The foundations of buildings visible as earthworks, or ruined stonework were surveyed using the GPS, regardless of if they were depicted on first edition Ordnance Survey or later edition maps. Standing roofed or unroofed buildings or structures such as the Knights Hospitaller Preceptory at Low Chibburn (Figure 3.5) were also recorded if they had a particular association in the context of

industrial or military remains identified by the field survey. Medieval castles and monastic sites previously recorded and extensively surveyed and mapped by the Ordnance Survey were generally already mapped by Phase 2 as an extent of area if they were relevant to the context of the site being investigated, e.g. Bamburgh castle and Lindisfarne Priory, and so were not recorded by Phase 2.



Fig 3.5 The Knights Hospitaller preceptory at Low Chibburn that became a dower house of the Widdrington Castle estate and was later re-used as a WWII pillbox (see Chapter 5).

3.3.8 Geomorphological features or natural deposits

Geomorphological features when encountered in association with known archaeological deposits were recorded. For example the collapsing dune cliff seen at Crimdon Dene, was recorded in basic plan form as it directly threatened surviving military archaeology. Also any visible peat layers were recorded as part of the palaeoenvironmental sampling element of Phase 2. For example the extent of visible peat at Low Hauxley was recorded in plan form using the GPS and also a full photographic survey of the cliff face undertaken to serve as a future monitoring tool. The peat that contained human and animal footprints, possibly of prehistoric date also was recorded in plan form.

Where significant organic deposits such as these were identified in association to significant archaeological remains, a program of sampling was undertaken. This was the case most notably at Crimdon Dene and Low Hauxley but also at the harbour entrance at Hartlepool.

3.3.9 Parkland, landscaped parks, gardens and country houses

None of these features were encountered within the project area as part of the field survey.

3.3.10 Maritime Features

Ship wrecks and fish traps visible in the inter-tidal zones were recorded if visible on the foreshore (figure 3.6). They were fixed more accurately than Phase 1 data would allow utilising the GPS equipment.



Fig 3.6 Recording of a rock cut feature with the Magellan GPS equipment, possibly a fish trap or “hulley”, on the foreshore at Hummersea, North Yorkshire (see Chapter 5).

4. METHODOLOGY AND RECORDING PRACTICE

4.1 Survey Methodology for field survey of threatened sites (Objectives 4.2.2-4.2.6, 4.2.8-4.2.12)

4.1.1 Introduction

Phase 1 of this project identified fourteen locations where coastal erosion is currently degrading heritage assets and to this was added a fifteenth at Whitburn that was subsequently identified as being in need of survey on account of reported past erosion. These are detailed in Chapter 10 of the Phase 1 study, whilst the detailed survey reports can be found below in Chapter 5 of this report. Each survey location had specific issues and reasons for instigating rapid survey and these area covered in more detail in the site descriptions contained in Chapter 5 of this report.

4.1.2 Summary of targeted sites

A summary of the sites targeted and surveyed as part of Phase 2 is listed below, from South to North:

- Overdale Wyke prehistoric enclosures, North Yorkshire.
- Hummersea and Saltburn alum works, North Yorkshire.
- Greatham Creek Second World War defence area, Teeside.
- Crimdon Dene Mesolithic flint scatter, County Durham.
- Roberts Battery, Seaton sluice, Northumberland.
- Druridge Bay Second World War defence area Northumberland.
- Low Hauxley Bronze Age cemetery and Mesolithic site, Northumberland.
- Amble 19th century hulks, Northumberland.
- Alnmouth oyster ponds, Northumberland.
- Bamburgh bowl hole, Northumberland.
- Fenham multivallate enclosure, Northumberland.
- Scremerston multivallate enclosure, Northumberland.
- Nessend Mesolithic flint scatter, Holy Island, Northumberland.
- Northumberland Coast Area of Outstanding Natural Beauty (surveyed as a separate Archaeological Research Services Ltd project recording all Second World War archaeology within the AONB, using the same methodology).

All the above locations were identified as being in urgent need of a field visit and rapid survey in order to assess the condition of the surviving remains and the extent to which these remains are exposed to on-going erosion. Any surviving remains that were then identified and recorded by the field survey were then assessed in terms of special interest and threat and this assessment has been used to put forward possible options for discussion of their future management (see Chapter 7). This was a subjective basement undertaken by the project team and intended to put forward initial ideas and allow discussion of the possible future management of these heritage assets.

4.1.3 Survey Methodology

The survey of archaeological remains involved surface identification of surviving features followed by rapid detailed recording. This entailed the digital

photography of the remains, along with extensive notes on nature and extent of survival, dimensions, interpretation, setting and additional environmental information. This information was also recorded digitally directly onto the GPS equipment as attached data for each record. This allowed direct download of field data into the project GIS without an extensive data entry exercise. Additional data was also recorded on pro forma recording sheets, although this was not always practical due to adverse weather conditions such as high wind, heavy rain and even snow making detailed paper recording impossible. In these situations the pro forma were abandoned in favour of a weather proof notebook, the data then transcribed onto pro forma at a later date. A weatherproof notebook was used at all times during the fieldwork to keep track of the numbering of features and photographs.

Each targeted survey location was expanded upon to add context to the archaeological records for the targeted sites. This provided a much wider assessment of the target locations and eventually covered 142km of coastline. Each site was broken down into manageable sections with the foreshore, cliff tops, dunes and estuarine locations all investigated. For example the survey would initially progress along the foreshore and then back along the cliff top or through the dunes to cover as much of the threatened area as possible.

The survey recording procedure adopted involved the use of a handheld DGPS unit and digital photographic equipment. The handheld DGPS unit, a Magellan MobileMapper CX with post-processing hardware kit, offers real-time sub-metre accuracy and sub-foot post-processed accuracy using MobileMapper Office, running on Microsoft Windows CE. NET 5.0. The equipment provides both vector and raster map support through Digiterra 5 software, including datasets in ESRI .shp file format as well as MapInfo and Autodesk file format support. Relevant information (e.g. AP transcriptions, OS base mapping) from the project GIS will be loaded onto the GPS unit to inform the fieldwork.

The direct entry of field data into the GPS unit in a format that could be directly downloaded into the project GIS had the added benefit of using drop down lists to select from for each column heading. These drop down lists were MIDAS compliant and used the INSCRIPTION wordlists. This meant that the data entry across the project was much more consistent no matter which surveyor was using the GPS as there was set parameters to choose from.

This allowed the use of Ordnance survey, NERCZA Phase 1, NMR, HER and SMP2 projected coastline data to be used in the field. This aided the interpretation and assessment of threat of each feature in the field as part of the survey process. The GPS was found to consistently offer accuracy within 0.4m without post processing, and the post processing software rarely improved on this level of accuracy. For this reason after the initial survey days the GPS was used in handheld mode only, and this subsequently increased productivity and allowed further length of coastline to be covered opportunistically by the project.

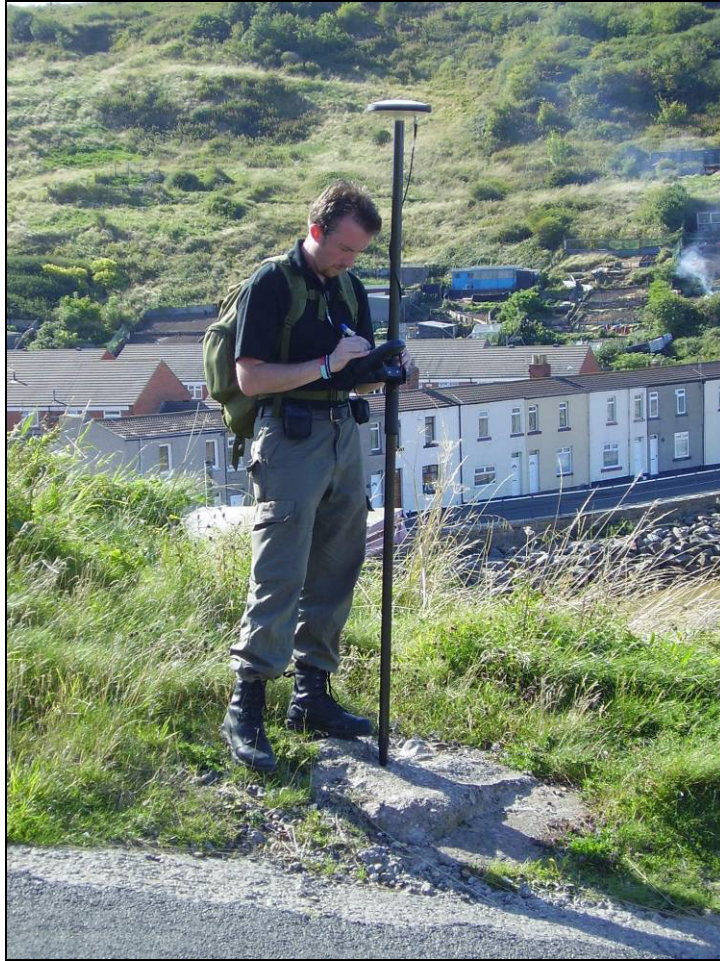


Fig 4.1 Utilising the Magellan CX mapping grade GPS with external antenna for post processing, at Skinnigrove.

Data collected in the field was logged directly to the GPS unit in a data entry form format to collect data which is MIDAS Heritage standard compliant and uses the INSCRIPTION wordlists. This dataset is based on the compliance tables presented in section 4 of *MIDAS Heritage - a data standard for the historic environment* (English Heritage 2007) and was entered directly on the GPS into the following form:

Column heading	Data to be entered (Example)
<i>UID</i>	601
<i>Site Type</i>	Defence
<i>Period</i>	WW2
<i>Description</i>	Pillbox
<i>Notes</i>	Hexagonal pillbox, surviving mostly intact
<i>Erosion Notes</i>	eroding at base of cliff face
<i>Coastal Setting</i>	Embayment
<i>Inter-tidal Setting</i>	Sand Beach
<i>Estuarine Setting</i>	
<i>Onshore Setting</i>	Rock Cliffs
<i>Geology</i>	Till
<i>Weather</i>	Calm and Clear

<i>Surveyor</i>	AB
<i>Photo</i>	796
<i>Level of risk</i>	Imminent
<i>Type of Natural erosion</i>	Bedrock cliff retreat
<i>Type of Artificial erosion</i>	Other
<i>Tidal level</i>	Low
<i>Easting</i>	414858
<i>Northing</i>	636945

Table 4.1 Mocked up example of a completed data table attached to each recorded feature

The data has been downloaded from the GPS unit and integrated into the project GIS as a database. This now includes data from NERCZA Phase 1, HERs, NMR, Ordnance survey 1st edition coastline, SMP2 projected coastlines with preferred policy and No Active intervention for 20, 50 and 100 year periods and the Phase 2 survey data. Fieldwork also involved the completion of a written pro-forma (also MIDAS Heritage compliant and use the INSCRIPTION wordlists) which provide comprehensive information on each of features surveyed. The pro-forma no longer need to be digitised as this will duplicate the information on the digital form and supplementary sketches can be replaced by the survey data and hyper-linked digital photography.

4.1.4 Collection/Excavation Strategy

The aim of Phase 2 of the project was not to excavate features or collect artefacts. However, during the survey several artefacts were identified which would otherwise have been lost to erosion. These were collected and their precise location recorded. For example, flint, pottery and metal artefacts were all identified in positions where they would imminently be subject to erosion. A full 12 figure grid reference was recorded for each with the GPS as detailed above. Following completion of the project an archive including these finds will be deposited with the appropriate museum. 19th/20th Century structural remains such as bricks/concrete were not collected but small and significant objects such as metal military artefacts, e.g. preserved picket wire, were collected. Brief reports and specialist's assessment reports have been included as an Appendix of this report.



Fig 4.2 Cleaning the buried organic land surface at Crimdon Dene, County Durham.

4.2 Survey methodology for field survey of peat shelves and ‘submerged forests’, or other organic deposits (Objectives 4.2.2, 4.2.7-4.2.11)

Inter-tidal peat has been identified at a number of locations along the NE coast, notably at Hartlepool Bay, Whitburn Bay, Cresswell and Low Hauxley. Crimdon Dene has subsequently been added to this list as organic layers were recognised exposed in the vicinity of a known lithic scatter. At Hartlepool these are associated with archaeological deposits dating from the Mesolithic, Neolithic and Romano-British periods (Waughman 2005) while artefacts and palaeofunal remains have been recovered at the other localities. Access to these deposits is generally difficult and only possible at low tide. However, at Low Hauxley the peat deposits and land surface preserved beneath extend to the coastal cliffs below a later dune system from where Bronze Age burials continue to emerge. At Low Hauxley it was also possible to photograph the visible extent all the way along the cliff face from south of the Bondicarr burn to Low Hauxley itself and this photography forms part of the final photographic archive.

It was identified in Phase 1 that such deposits are particularly vulnerable to alterations in the wave regime that can be brought about by the construction of sea defences. In order to assess the threat to such deposits posed by various mitigation strategies their full extent was established, together with dating evidence and assessment of their archaeological and palaeoenvironmental potential.

The survey has recorded the aerial extent where possible, utilising the GPS, of the surviving peat. Using the same methodology as for the archaeological features the extent of the deposits, their condition of preservation, their potential to contain palaeoenvironmental resources and resistance to erosion were all recorded. Survey of the peat deposits listed above was undertaken in order to

accurately identify their precise location and extent. The depth of the peat deposits will be measured by an auger survey although this only met with success at Hartlepool and Low Hauxley. Following consultation with the Regional Science Adviser, the technique employed was to establish the stratigraphy of the inter-tidal peat using hand-operated gouge augers which facilitated the rapid identification of the depth and character of sedimentary sequences.

Sampling and analysis of pollen/¹⁴C was then undertaken on representative sediment cores extracted from Hartlepool and Low Hauxley using a Russian peat corer. Works have been undertaken at Hartlepool (Waughman 2005) and at Low Hauxley (Drury et al 1995) but the precise extent and depth of the deposits were not recorded. The auger survey was undertaken in the form of regular spaced transects across areas of peat with the position of the auger points accurately recorded by GPS (see above). The survey has provided details of the depth of the exposed peat deposits that will provide a reference against which future measurements can be taken to confirm the rate at which the deposits are eroding and these are discussed further in Chapter 6 of this report. The basal and uppermost deposits have been examined by Charlotte O'Brian at Durham University who has identified the appropriate samples for dating and provide confirmation of the potential for the peat to provide information by determining the survivability of pollen *etc.* These samples were then sent to the English Heritage Scientific dating team for C14 dating of the peat layers.



Fig 4.3 Investigating peat layers at Low Hauxley Northumberland

The English Heritage Science Adviser has recommended that as part of the survey it would be advantageous to obtain radiocarbon dates for the uppermost and basal deposits of the peat beds as it is not known how synchronous they are. This has now been undertaken by the English Heritage Scientific dating team and

all information obtained has been supplied to the National database for inter-tidal and off-shore peat and is included in Chapter 6 of this report.



Fig 4.4 Undertaking sediment coring at Hartlepool Bay, Teeside.

4.3 Sample Walkover Survey of sites identified from aerial photographic survey in Phase 1 (Objectives 4.2.3, 4.2.4, 4.2.6, 4.2.8-4.2.11)

Phase 2 of the project was designed to be flexible to take into account difficulties of access to features such as the inter-tidal peat deposits. Alternative survey work was pinpointed in advance in order to avoid wasted survey days due to inaccessibility of proposed targets for survey. For example the identification of an additional site at Whitburn and the expansion of some survey areas where additional potential had been recognised was undertaken when the inaccessibility of peat layers at Cresswell and Whitburn originally proposed in the project design became an issue.

When time was available for alternative work a sample walkover survey was undertaken to identify the presence, nature and extent on the ground of features identified from aerial photographs. This led to natural expansion of each of the proposed survey areas in order to cover more of the overall coastline and surrounding environs of each site. This involved the investigation of a large

number of World War 2 military features which represented 74% of all features recorded in the aerial photographic survey undertaken as part of Phase 1 of this project. Priority was given to the two WW2 defence areas within the study area at Greatham Creek and Druridge Bay and a representative sample of other features identified during Phase 1 were surveyed within the environs of each targeted survey location.

The survey was undertaken to the same level as outlined in Phase 1 and detailed proposals made for the future management of each site are made in the Chapter 7 of this report

4.4 Production of data from the surveys in a form compatible with HER and NMR database systems (Objectives 4.2.2, 4.2.11)

The data produced has now been incorporated into the existing project's GIS. Output is in ESRI shape files which have now been incorporated into all the project partners HERs following on from the outputs already delimited during Phase 1. HERs have been consulted on the incorporation of data prior to dissemination and some of the key sites surveyed discussed. The data will also be provided to the SMP consultants (Royal Haskoning) and Defra and allocated to the relevant Policy Unit for SMP2 for the North East and Northumberland. The NMR has been consulted (Martin Newman) and data will be provided to them in ESRI shape files in a form that will be both MIDAS and INSCRIPTION compliant.

4.5 Reporting (Objectives 4.2.2, 4.2.10-12)

This will take the form of this internally produced integrated report (including the various specialist reports) (A4 spiral bound or similar) which is provided on CD. The report will be distributed to EH, the project partners, Natural England, the National Trust, Royal Haskoning and Seazone and to consultants and developers upon request. The report (or a synthesis depending on available file space) has also been uploaded on to the OASIS system where it can be consulted on-line by the public and the project data has been archived with the ADS and incorporated within the various HERs.

This report contains a detailed account of the methods used and constraints experienced (see above). It summarises the principal results of survey, sub-divided in terms of coastal Policy (Management) Units. It includes a preliminary assessment of the regional (and, where appropriate, national) significance of sites recorded (Chapter 5), and their vulnerability to erosion. It indicates areas meriting further survey, assessment, recording and monitoring (Chapter 7) and identifies sites, structures or buildings potentially meriting protective legislation. It includes an assessment of the archaeological potential of samples taken and artefacts collected, and their potential for further analysis (Chapter 6). The report also attempts to broadly classify the archaeological potential of the coast, consider the implications of the survey in terms of the relevant Shoreline Management Plans or strategy documents and include an executive summary suitable for circulation to non-archaeological coastal managers and planners (Chapter 7).

In addition to this report a detailed executive summary has been produced and will be provided to the SMP consultants, Natural England and the Coastal group. This has tabulated all records from Phase 2 (this output has already been

completed for Phase 1), sub-divided in terms of SMP2 policy units and includes appraisals of significance and vulnerability, defined by objective criteria as much as possible. This also includes much of the assessment included within Chapter 7 of this report.

4.6 Outreach (Objectives 4.2.10-4.2.12)

The reports now produced by this part of the NERCZA project will be available to the public and research institutions on-line via OASIS and the ADS. The conclusion of the project has also been marked by talks to organisations such as the North York Moors Archaeology Group, North East Maritime forum and a guided walk of Druridge Bay for the Architectural and Archaeological Society for Durham and Northumberland. Additional talks are proposed for key groups such as Natural England, Northumberland wildlife trust and other local groups as well as relevant county Archaeology Days, learned and local societies and other useful/appropriate conferences as available. Local societies have been contacted as appropriate for further talks and the publication of 10000 A4 fold-out leaflets summarising the results and contribution of the project is at the draft stage at the time of writing. It is proposed that the latter will be distributed at county Archaeology Days, with county archaeological magazines and learned society newsletters, and at Tourist Information Centres along the North East coast, as well as direct mail shots to consultancies and internally within the various County Halls and English Heritage. This will raise awareness of the project and the availability of enhanced HER /NMR records and improved understanding of coastal heritage assets and their risk from erosion.

4.7 Copyright

All outputs will be the copyright of Archaeological Research Services Ltd and licence to use the data will be extended to English Heritage and the project partners.

The project partners will have unrestricted use of all aspects of the data produced by the project for the purposes of research, education and non-commercial publication.

4.8 Project Archive

On completion of the project all files created during the project will be copied to DVD and passed to the ADS who will apply for a separate archiving grant. A project summary will be uploaded to the OASIS system. The GIS will be placed on the computer system of the various SMR and HER together with backup copies on disk.

The results of this project will be archived with English Heritage's National Monuments Record (NMR) and the respective SMR/HER as appropriate. The air photographic datasets, for which English Heritage will have sole responsibility for the curation and archiving of, will consist of the NMP map data (layered AUTOCAD MAP drawing with attached data tables) and entries to the English Heritage's AMIE database.