Archaeological Research Services Ltd

North East Rapid Coastal Zone Assessment (NERCZA)

Skinningrove Harbour

ARS Ltd Report 2008/81
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Contents

List of figures

List of tables

Executive Summary

Between March 2007 and December 2008 Archaeological Research Services Ltd carried out, on behalf of English Heritage, a desk based rapid coastal zone assessment of the threat posed to heritage assets in the North East by rising sea level and consequential coastal erosion. The North East Rapid Coastal Zone Assessment, or NERCZA, is one of a series of projects initiated by English Heritage around the coasts of England. The brief specifically required that the assessment be undertaken with reference to Defra's *Shoreline Management Plans (SMPs). The area assessed, which extends from Whitby in North Yorkshire to the border with Scotland north of Berwick-upon-Tweed falls within SMP Cell 1. The first phase of the SMPs was completed in the 1990s (SMP1) and a second phase study (SMP2) is currently underway, the SMP2 for the coast south of the Tyne having been completed by the time the NERCZA began, while work to the north is underway at the time of writing. This has led to the assessment of the threat in the two areas being undertaken in relation to slightly different criteria. However, both the SMP1 and SMP2 documents make essentially similar policy recommendations which in most cases amount to either* Hold the Line *or* No Active Intervention. *The former case involves various mitigation strategies such as the construction of sea defences while in the latter nature is allowed to take its course. Heritage assets may be considered to be under threat from both the above mitigation strategies and from coastal erosion where no action is to be taken.*

The NERCZA study area consists of approximately 200km of coastline between the Lowest Astronomical Tide (LAT) and 1km inland from Mean High Water Springs (MHWS), and includes Coquet Island and the Farne Islands which lie offshore and Holy Island, joined to the mainland at low tide by a causeway. The review of the heritage assets has been based on a consideration of two data sets. The first consists of the Historic Environment Records (HERs) maintained by or for the Local Authorities with curatorial responsibilities for this section of the coast, namely North Yorkshire County Council, the North York Moors National Park Authority, 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 second data set consists of the aerial photograph coverage of the study area from which all archaeological features visible have been mapped to the standards of English Heritage's National Mapping Programme. Within the context of the NERCZA, this has been referred to as the Aerial Photograph Transcription Exercise (APTE). The aerial photograph coverage for 400km^2 has been examined and 968 new records have been added to the HERs while 270 exiting records have been enhanced. These two main data sets have been supplemented by reference to the National Monuments Record.

In assessing the threat to heritage assets posed by sea level rise, major sites and groups of sites are discussed individually and the threats they face evaluated. Categories of more numerous types of site are also discussed but the issue of threat is dealt with in a series of tables in which the SMP policy unit is noted, the importance of individual sites and the degree of threat are rated as high, medium or low. Nearly 75% of the sites recorded in the APTE date from the Second World War and consist of numerous categories of site such as pillboxes or anti-tank obstacles or ephemeral features such as minefields. These sites are listed in tables and the relevant SMP policy unit noted. Many are no longer extant.

The NERCZA study has established that many heritage assets in the coastal zone are under threat from rising sea level and/or the mitigation strategies proposed. The threat is particularly acute in the case of those sites currently situated between LAT and within 200m inland of MHWS. Many of these sites specifically relate to what has been defined in this document as the Coastal/Maritime Landscape such as port and harbour facilities, aids to navigation, shipwrecks and the military defence of the coast but also includes

features of the Terrestrial Landscape which happen to be close to the coast such as the North Yorkshire alum works, two multivallate forts in Northumberland, Bronze Age burials at Low Hauxley and Trow Point and early prehistoric flint scatter sites in County Durham. It is also the case that important inter-tidal peat deposits and old ground surfaces below coastal dunes are particularly vulnerable such as those at Creswell and Druridge Bay.

In carrying out the assessment it has been noted that a number of categories of asset are as yet poorly understood making an evaluation of the threat difficult. Examples include the archaeology of pre-industrial shipbuilding, the development of small harbours, the fishing and whaling industries, early land reclamation and the recreational use of the 'sea side'. It has also been noted that while on a national level over 3% of sites recorded in HERs have a measure of statutory protection this falls below 2% in the coastal zone, a discrepancy that needs to be addressed. A separate project design has been prepared for a Phase 2 of the NERCZA which includes the fieldwork priorities.

CHAPTER 1

The North East Rapid Coastal Zone Assessment (NERCZA)

1.1 Introduction

The design of this project is based on the methodology outlined in version 4 of *A Brief for Rapid Coastal Zone Assessment Surveys* (English Heritage 2005). This methodology arose and developed from the earlier English Heritage document entitled *England's coastal heritage: A statement on the management of coastal archaeology* (English Heritage & RCHME 1996). The area covered by the NERCZA project is the strip of land with a width from the lowest astronomical tide (LAT) to 1km in-land from mean high water springs (MHWS) and running from the Anglo-Scottish border in the north to Whitby in the south. The project has been undertaken as a joint venture involving partners from Archaeological Research Services Ltd, Northumberland County Council, Tyne and Wear Specialist Conservation Team, Durham County Council Cultural Services Team, Tees Archaeology, North York Moors National Park Authority, North Yorkshire County Council, the Northumberland Coast Area of Outstanding Natural Beauty and the Durham Heritage Coast. Archaeological Research Services Ltd has acted as the lead partner.

The NE Coast has long been the subject of archaeological research, particularly in relation to prehistory but more recently in relation to most periods, up to and including World War II coastal defences. Nationally important archaeological remains have been identified along this stretch of coast and the area has been identified as an area of high archaeological potential (English Heritage and RCHME, 1996, 10).

This project is a desk-based study. Its aim has been to undertake detailed desk based research, including the collation and synthesis of all existing archaeological data relating to the study area. This has included the acquisition of HER and NMR data together with data from published research projects and grey literature arising from development funded projects. This has been combined with a programme of aerial photographic transcription and analysis of all the existing aerial photographic coverage to the standards of the English Heritage's National Mapping Programme (NMP). A large amount of data has been obtained from the various sources and the systematic collation of these data into a single body has produced a valuable resource for improved management of the coastal historic environment as well as for research, education and public enjoyment.

The project has brought the following benefits:

1 SMR/HER enhancement.
2 NMR enhancement.
3 Assistance in the provision of an improved curatorial response to strategic coastal planning and development issues.
4 Facilitation of a more detailed and comprehensive analysis of areas of archaeological importance under threat from natural and human processes.
5 Production of data which will be integrated into Defra's Shoreline and Estuary Management Programme which will assist in the protection and/or mitigation of damage to historic

assets.

6 Improvement of information available to researchers.

7 Provision of information to underpin public understanding and enjoyment of the coastal heritage.

1.2 Reasons for and Circumstances of the project

Since the last period of glaciation the sea level on the NE coast has risen by 30m as a result of melting of the ice. A recent estimate suggests that for parts of Northumberland during the Mesolithic period the coast would have been several hundred metres further offshore. However, Agar (1954) claimed that the shoreline at Saltburn in Cleveland would have been 3 miles further east than at present at *circa* 10,000 cal BC. It is clear from all the evidence that the present day coast would have been relatively high land during the early prehistoric period overlooking a low coastal plain. Evidence for this can be seen in the raised beaches in the north of the area and also in the peat beds and submerged forests which can be seen at Druridge Bay and Cresswell in Northumberland, and at Seaton Carew near Hartlepool. The discoveries of Neolithic material within these inter–tidal deposits suggest that there has been a significant rise in sea level since that period.

The North East Coast is subject to ongoing processes of erosion of two principal types:

- *Natural processes:* The east coast is subject to the combined erosion of the sea, wind and rain cutting into the cliffs of clay, limestone, shale and sandstone. The wind also causes the protective sand dunes to drift, or for 'blow outs' to occur, revealing and exposing archaeological sites to further erosion. Elsewhere, there are areas of accretion where eroded material is re-deposited at different locations along the coastline which can also mask archaeological sites.

- *Human processes:* Natural processes of erosion are only part of the threat to archaeology in the NE coast. Anthropogenic threats include footpaths and recreational activities in the sand dunes, the dumping of colliery waste, the building of sea defences, jetties and piers, pipeline construction, wind farms, mineral extraction and construction and development in the form of housing, caravan parks and recreational facilities.

In the past a range of views have been expressed about the rate of coastal erosion. Posford Duviver (1993) undertook a study of historic shoreline positions in Durham and calculated that there has been a rise in sea level of 2.5m in the last 4750 years, and that there has been an average cliff regression of 0.08m per annum. However, the Baptie Group believed the erosion rates to be higher and calculated that the coastline has receded by 380m since *c.* 2750 cal BC (Baptie Group 1995). Wherever research is undertaken, whilst there may be differences of opinion as to the extent, it is clear that there is significant ongoing erosion of the present day coastline though this is uneven due to variations in geology along the coast. The results of the NERCZA project are reviewed within the context of Defra's *Shoreline Management Plans* which also provide the most up-to-date assessments of rates of erosion while Ian Shennan and Natasha Barlow of the Department of Geography at Durham University have summarised their research into past sea levels (Chapter 3).

Archaeology under threat: The active processes of erosion highlighted above are constantly damaging and destroying archaeological sites. Shifting dunes have exposed, and in some cases destroyed, Bronze Age funerary monuments. At Low Hauxley, a programme of rescue excavations demonstrated that otherwise intact burial cairns were suffering ongoing erosion (Drury *et. al.* 1995), a situation confirmed by the further exposure of human remains and cists as the dunes continue to erode. The unstable nature of the dunes has also damaged WWII coastal defences, such as the pillboxes at Druridge Bay, Northumberland (*SCAN* 1995). Coastal erosion was responsible for the loss of a Roman signal station at Huntscliff, Saltburn, Cleveland (Spratt 1979). The recent excavation of the Mesolithic settlement at Howick on the Northumberland coast, which had been severely damaged by the effects of coastal slippage (Waddington *et. al.* 2003), is another striking example. Anthropogenic damage, such as footpath erosion, has been identified at Lindisfarne Castle (O'Sullivan and Young 1995). In Cleveland, once extensive evidence of medieval saltworking on the south side of the Tees has now been completely masked by industrial development. Industrialisation around the major estuaries of the Tyne, Wear and Tees will inevitably have masked, if not destroyed, many archaeological sites.

1.3 Previous Work and the Archaeological Resource

The NE coast has long been recognised as an area exceptionally rich in archaeological remains of all periods. From the advent of archaeological interest, the area has produced nationally important prehistoric sites through the discovery and collection of flint assemblages uncovered by erosion. Francis Buckley, who was at the vanguard of Mesolithic research in the early C20, developed his theories, in part, upon flint sites discovered on the Northumberland coast (Buckley 1922a, 1922b & 1925). Nationally important sites were discovered at Filpoke Beacon (Coupland 1948) and Crimdon Dene (Raistrick & Westoll 1933) on the County Durham Coast. Most of these sites contained lithic assemblages typical of the later Mesolithic, Neolithic and Bronze Age periods (Raistrick 1933) although Weyman (1984) has identified an assemblage from Hart, County Durham, that probably belongs to the early Mesolithic (10500–8000 cal BC.). The discovery of flint scatters along the coast has continued to the present day, although additional information such as radiocarbon dates has generally been lacking. However, the recent discovery of an *in-situ* Mesolithic hut at Howick has indicated the potential of such coastal sites, even when exposed by erosion (Waddington 2007) and has produced 33 radiocarbon dates.

From an early date there was also recognition of the importance of submerged forests and peat beds which had been identified in the inter-tidal zone off the NE coast. C.T Trechmann, who had been involved at the outset of archaeological investigation on the NE coast (Trechmann 1905, 1912), reported on flints collected from the submerged forest at Hartlepool and undertook further work on these deposits (Trechmann 1936; 1946). Artefacts and animal bones dating from the early Mesolithic, late Mesolithic and Neolithic periods have been collected from this forest bed. Significant discoveries from the peat beds include the discovery of a skeleton of Neolithic date (Tooley 1975), and a hurdle panel radiocarbon dated to c.3700 cal BC was discovered in 1984. Further work undertaken by Cleveland Archaeology Section in 1990 uncovered a line of wooden stakes in association with a small pile of domestic waste, worked flints and a cut piece of antler which may indicate the presence of a settlement. Additional investigations of the submerged forest were

undertaken by Tees Archaeology in 1995 and 2002 as part of work on the sea defences (Waughman *et. al.* 2005).

Similar remains of peat beds have been discovered preserved beneath sand dunes in Northumberland at Howick, Druridge Bay and Low Hauxley. The area at Low Hauxley has been the subject of several archaeological investigations due to the exposure of Bronze Age cairns and cists by erosion and movement of the dunes which formerly covered them. Bonsall identified a Bronze Age cairn overlying deposits of Mesolithic date. Further excavations were undertaken by Tyne and Wear Museum Service in 1992 and Lancaster University Archaeology Unit in 1995, confirmed the excellent state of preservation of the Bronze Age cemetery and extended the known area of Mesolithic activity (Drury *et. al.* 1995), as well as obtaining dates for the buried land surfaces.

Bronze Age funerary remains in the form of cists and cairns have been identified at many sites along the North East Coast. A recent excavation of a Bronze Age cemetery at Howick on the Northumberland coast revealed five stone lined cists (Waddington *et. al.* 2005). Evidence for Neolithic monuments is more enigmatic, though the Street House long cairn (Vyner 1984) and a possible causewayed enclosure at South Shields (Hodgson 2001) suggest some Neolithic monuments still remain.

Within the area of study there have been several long term multi-period investigations of localised areas of the landscape. On Holy Island, a detailed programme of surveying, surface collection and excavation has investigated important evidence for early Christian and medieval activity and has identified artefact scatters at Ness End of Mesolithic, Neolithic and Bronze Age date (O'Sullivan & Young 1995). In county Durham, a programme of fieldwalking revealed concentrations of prehistoric flint in the coastal region (Haselgrove *et. al.* 1988; Haselgrove and Healey 1992). A long term multi period programme of excavation has also been undertaken at Bamburgh Castle under the aegis of the Bamburgh Research Project. A further long term programme of excavation has taken place at South Shields Roman fort at the mouth of the Tyne which has revealed evidence for Iron Age and Neolithic structures beneath the Roman fort (Hodgson 1994, 2001).

Although Iron Age sites are known within the study area, relatively few of these sites have been excavated. Sites which remain unexcavated are the defended settlement at Howick Camp, Spindlestone Heughs and Craster Heugh, all in Northumberland. Iron Age remains have been discovered,in the study area as a result of the excavation of later sites as at South Shields (Hodgson 1994), and below Tynemouth Priory (Jobey 1967). Jobey also investigated numerous rectilinear enclosures in the area which were found to have long periods of occupation spanning the late Iron Age through to the Romano-British period such as those at Burradon on the coastal plain in Northumberland (Jobey 1970), and Murton High Crags near Berwick (Jobey and Jobey 1987). Furthermore, an Iron Age settlement was discovered at Catcote three miles south of Hartlepool. Excavations by Durham University in 1963 remain largely unpublished. However, further excavations by Tees Archaeology in conjunction with Durham University are currently being undertaken.

As has been mentioned above, extensive archaeological excavations have been undertaken at South Shields Roman fort on the south side of the mouth of the Tyne (Bidwell & Speak 1994). Domestic settlements of the Roman period are rare within the study area but a

midden site indicating the presence of domestic activity was excavated at Seaton Carew in the 19th Century (Middleton 1885, Swain 1986) and the Catcote site mentioned above also dates to the Roman period (Spratt 1979:20). Further to the south, the presence of a series of Roman signal stations or fortlets of the later C4 have long been known (Hornsby & Stanton 1912; Hornsby & Laverick 1932).

Work has been undertaken on the development of ports and harbours on the NE coast from the Medieval period to the present day (Daniels 2002). Examples in the study area which date from the Medieval period are Hartlepool, Berwick-upon-Tweed, Alnmouth, Beadnell and Whitby. In addition to the fishing industry, the NE coast displays evidence of many other industries, such as shipping in the form of wrecks which can be seen in the inter-tidal zone and are still being exposed by erosion. Excavation of one of these wrecks at Seaton Carew by Tees Archaeology revealed a wooden sailing collier brig dating from the late C19/C19.

Extensive remains of the coal industry, which developed from the 19th Century in the NE and had a dramatic impact on the coast, are to be found particularly in County Durham with large collieries at Easington, Whitburn and Seaham. Evidence of the alum industry, which began in the 17th Century, can be seen further south at Loftus, Kettleness and Boulby (Miller 2002). The remains of the Kettleness alum works have recently been recorded by the Aerial Survey and Investigation team at York. Extensive networks of rutways, deliberately carved into the rock on the beaches to guide carts carrying quarried material to ships at low tide, have been identified and their recording by the Nautical Archaeological Society (NAS) North-East has recently begun.

This project is similar to two pieces of earlier work undertaken in the study area. The first was a programme of work which aimed to produce a strategy for coastal archaeology in Northumberland (*SCAN* 1995). The research considered the conservation and management of archaeological remains on the coast of Northumberland, especially those exposed to processes of erosion. The second was a project undertaken by Archaeological Services of the University of Durham and was an assessment of the archaeological resource along a section of the Durham coastline as part of the *Turning the Tide* project (Carne 1998).

An extensive database of military installations along the coastline has been collated by the *Defence of Britain Project* (*DoB*), the findings of which are now presented online via the Archaeology Data Service. There are, in addition, several projects which have run concurrently with the NERCZA , the *Scarborough to Hartlepool Seascapes Project* being undertaken by Cornwall Historic Environment Service and funded by the Aggregate Levy Sustainability Fund and the *Coastal Saltmaking Project* being undertaken by Cranstone Consultants which is investigating the evidence for historic saltmaking along the NE coast.

1.4 Aims and objectives

This project is a desk based study that has aimed to collate and synthesise existing data from a variety of sources, and to undertake NMP standard transcription and analysis of aerial photographs of the study area, the Aerial Photograph Tarsncription Exercise (APTE). The

data obtained are an invaluable resource for a number of purposes.

- They provide heritage information which can be fed directly into Defra's Shoreline and Estuary Management programme at the levels of plans, strategies and schemes, thereby helping to ensure appropriate protection, or mitigation of damage, to historic assets.

- They provide enhancement to the HERs and NMR records of coastal heritage assets, to a nationally agreed common minimum data standard utilising Monument Inventory Data Standard (MIDAS) and INSCRIPTION wordlists, in order to permit an improved curatorial response to strategic coastal planning or management initiatives at a national and regional level.

- They provide an increased factual base for the initial curatorial response to individual applications for commercial developments or schemes, in advance of more detailed evaluation and mitigation related to Environmental Impact Assessments and/or planning applications.

- They provide an assessment of the likely archaeological potential and vulnerability of all stretches of the coast.

The following objectives have been met in order to fulfil these aims:

1. The production of a detailed GIS of all known archaeological sites within the study area to be fed into Defra's Shoreline and Estuary Management programme, the NMR and the various HERs of the various project partners.

2. The production of air photo mapping and interpretation to English Heritage's (NMP) standards for the whole study area.

3. The enhancement of the various HERs within the study area and the NMR by providing a comprehensive GIS which will include new data acquired through the APTE.

4. An analysis, interpretation and overview of the database by examining key themes such as those identified within the NE Regional Research Framework (NERRF), the Yorkshire Regional Framework (YRF) and other factors such as temporal, geological and spatial variation.

5. The development of archaeological research frameworks and agendas in relation to the NE coast that key in with the NE Regional Research Framework (NERRF) and the Yorkshire Research Framework (YRF).

6. The production of an assessment of the degree and nature of threat to the archaeological resource on the NE coast and produce data that will allow for the creation of management policies and mitigation.

7. An overview of coastal change from the Late Upper Palaeolithic through to modern

times.

8. The production of data that are compatible with the needs of other coastal managers, parallel coastal surveys, industry and researchers.

9. An increase in the understanding of the archaeology of the NE coast amongst the public and the research community.

10. The production of data and information to underpin the second phase of this project and support any related initiatives funded through the Heritage Lottery Fund.

In addition to this printed report, the principal output is a comprehensive GIS of all identified archaeological features within the study area. Curators and other interested parties have been provided with the project results in a GIS format together with hard and digital copies of the various reports. It is envisaged that the data obtained will be added to the databases of the various HERs within the project area.

1.5 Report structure

In addition to this introduction, the topics dealt with in the remaining nine chapters of this report are as follows:

- Chapter 2 provides an outline of the main methological components of the project; that is, the structure of the GIS data base, the aerial photograph transcription exercise (APTE) and the archaeological analysis.

- Chapter 3 is a summary of research carried out by members of the Department of Geography at Durham University into sea level change over the past 10,000 years. This chapter also includes a brief account of the geology of the coastal zone.

- In Chapter 4 the archaeology of the whole NE Region is reviewed in order to provide a context for the results of the NERCZA project.

- Chapter 5 provides general descriptions of the principal types of archaeological site encountered in the coastal zone, divided into those sites which are part of the terrestrial landscape but happen to be on the coast and those sites that are specifically part of the coastal/maritime landscape.

- Chapters 6 - 9 examine, in detail, the archaeology of the coastal zone block by block, Chapter 6 dealing with Blocks 1a-1d (Whitby to Blackhall Rocks), Chapter 7 with Blocks 3a-3b (Blackhall Rocks to South Beach, Blyth), Chapter 8 with Block 2 (South Beach, Blyth to Low Newton by the Sea) and Chapter with 9 Block 4 (Low Newton by the Sea to Marshall Meadows Point). Each chapter begins with an account of the characteristic soils and landuse patterns encountered within the Block and is followed by a discussion of the coastal erosion that is taking place, using either SMP data. The archaeological data are then reviewed, dealing first with those relating to terrestrial landscapes and second with coastal/maritime features. Within each landscape type a broadly chronological framework is followed:

Early Prehistory
The Mesolithic Period
The Neolithic Period
The Bronze Age
The Iron Age and Romano-British Periods
The Early Medieval Period
The Medieval Period
The Early post-Medieval Period
The Industrial Period

Within the context of coastal/maritime landscapes features of military coastal defence from the C16 to C20 are given specific treatment.

- In Chapter 10 sets out suggestions for further developing the research agenda.

- The final chapter is followed by the references and an appendix which provides a concordance of HER/NMR numbers and SMP management areas/units.

The results of the Aerial Photograph Transcription Exercise, with users' notes, have been supplied to the HERs on disk along with both hard copy and electronic versions of this report.

CHAPTER 2

Methodologies employed in the NERCZA study

2.1 Introduction

The research carried out for the NERCZA consisted of an evaluation of existing data sets relating to the historic environment, in particular Local Authority based Historic Environment Records (HERs) and the National Monuments Record (NMR), and the transcription of aerial photographs carried out as part of the National Mapping Programme (NMP). In addition, a number of other data sets were employed in order to place the results in context. These consisted of data on the solid and superficial geology of the study area, the soils and landuse and data on seabed topography. Ian Shennan and Natasha Barlow of the Department of Geography at the University of Durham have provided an overview of their research on sea level change, which is reproduced here in full as Chapter 3. The NERCZA has been carried out within the area covered by Cell 1 of the *Defra's* Shoreline Management Plans (SMPs), the work being carried out on behalf of central government by Royal Haskoning. With the exception of the Durham project and the SMP data, this research has been undertaken within the context of a GIS environment employing *ArcView 3.2a* and assembled by Richard Hewitt of Archaeological Research Services Ltd. In this chapter the three main methodological components of the project, the GIS data base, the aerial photograph transcription exercise (APTE) and the archaeological analysis, are described.

2.2 The GIS data base

All the data employed in the NERCZA project were either obtained as, or were converted into, GIS 'shape' files, as points, lines and polygons, from which were generated a series of GIS layers (Table 2.01).

Table 2.1 NERCZA GIS data layers

Additional data from the NMR
Aerial photograph transcriptions (APTE)
HER data
Shoreline Management Plan Management Areas or Units
Geology, soils and landuse data
Buffered study area

It will be convenient to describe these layers from the bottom upwards.

- The brief for the NERCZA defined the study area as extending from the lowest astronomical tide (LAT) to 1km inland from mean high water springs (MHWS). This was generated from the UKHO Seazone data set using Chart Datum as LAT while

MHWS was obtained from Ordnance Survey mapping and the landward extent by 'clipping' a 1km buffer onto the MHWS line. This zone is referred to as the 'buffered study area'.

- Data on the solid and superficial geology of the study area were obtained from the British Geological Survey while soils and landuse data were provided by the Soil Survey of England Wales.

- For the purposes of the SMPs the whole of the NERCZA study area lies within Cell 1, Cell 1a covering the area from St Abb's Head to the Tyne and Cells 1b-1d covering the area from the Tyne to Flamborough Head. The whole coast has been divided into a number of Management Areas, or Units. Within each the authors of the SMP have made an assessment of the degree of threat caused by coastal erosion and have made recommendations as to the policy to be adopted, usually 'Hold the Line' (HTL), 'Manage Retreat' (MR) or 'No Active Intervention' (NAI). Nationally, the production SMPs are now in the their second phase of development, SMP2 having been completed for Cells 1b-1d while work on Cell 1a is ongoing at the time of writing. For this reason and the NERCZA north of the Tyne has been undertaken within the context of the SMP1 data.

- This layer consists of the various Historic Environment Records held by the Local Authorities in the study area, namely North Yorkshire County Council, The North York Moors National Park, Tees Archaeology (on behalf of Redcar and Cleveland, Hartlepool, Stockton and Middlesborough), Durham County Council, Tyne and Wear Archaeology Service (on behalf of North and South Tyneside) and Northumberland County Council.

- Aerial photograph transcriptions (APTE) carried out as part of the NMP (described below).

- Once the HER and the APTE data layers had been generated the NMR was checked for any additional records. This occasionally involved consideration of records from the Council for British Archaeology's *Defence of Britain (DoB)* project which have been lodged with the NMR. However, these data are not consistently reliable and often record with only a six-figure NGR, making them unsuitable for the type of analysis being carried out. The *DoB* archive was usually only consulted as a means of checking existing records and obtaining greater detail.

These data sets were used to generate maps which provided the focus of the archaeological discussion in Chapters 6 to 9 and the data tables found within those chapters.

2.3 The Aerial Photograph Mapping to NMP Standards

by Cinzia Bacilieri, David Knight and Sally Radford

2.3.1 Introduction

This aerial survey mapping project of the (NERCZA), was undertaken by Archaeological Research Services Ltd (ARS Ltd) in partnership with English Heritage. The aerial survey

mapping component of the project was carried out by ARS Ltd Investigators based with EH's Aerial Survey team in York. The aim of the aerial survey mapping element of the project was to produce accurate mapping and a record of all archaeological features from all periods that could be identified within the study area. Within the context of the NERCZA

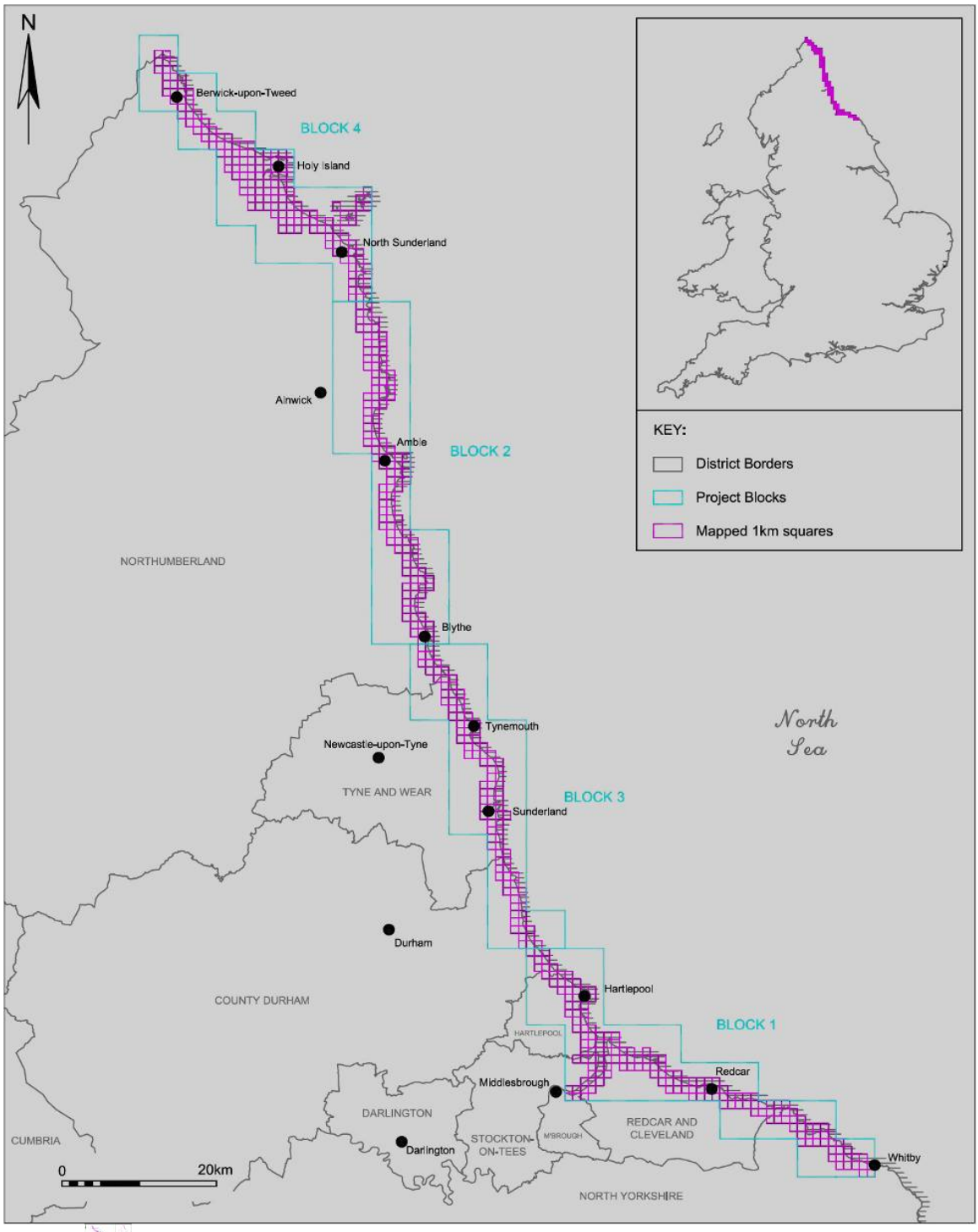

Figure 2.1 OS quarter sheet map showing the 1km squares mapped

this was referred to as the Aerial Photograph Transcription Exercise (APTE) as this acronym is used through this report.

The aerial survey area consists of complete 1km squares which cover a strip of land from the Lowest Astronomical Tide to within 1km inland of Mean High Water Springs (MHWS), along the coast between Whitby and the Anglo-Scottish border (fig.2.1).

Digital maps at a nominal scale of 1:10,000 and supporting records were produced to NMP standards for an area of 560km² (62 part Ordnance Survey 1:10,000 quarter sheets) of which only 402km² covers exposed land. This project deviates from normal NMP practice, as it has only mapped a narrow corridor along the coast, rather than whole 1:10,000 map quarter sheets. Mapping started on 1st March 2007 and was completed by 22nd July 2008.

The project mapped and recorded archaeological sites varying in date and type from prehistoric enclosures to twentieth century military remains. Records for 968 new sites, with a further 270 enhancements to existing records, were input to the National Monuments Record (NMR) database AMIE.

All probable and possible archaeological features visible on air photographs as cropmarks, soilmarks, parchmarks, earthworks and structures were identified, interpreted, mapped and recorded.

- *Earthwork archaeology:* All extant earthworks identified as archaeological in origin were mapped. All available Royal Commission on Historical Monuments in England (RCHME)/EH ground survey plans were used to assist and enhance the air photograph interpretation and mapping. If the quality of photography was not sufficient to depict individual earthwork features the latter were mapped as an extent of area.

- *Levelled archaeology:* All cropmarks, soilmarks and parchmarks identified as archaeological in origin were mapped.

- *Post medieval and modern field boundaries:* Field boundaries that have been removed (upstanding or levelled), but are depicted on First Edition Ordnance Survey or later edition maps, were generally not mapped.

- *Medieval and post Medieval ridge and furrow:* Ridge and furrow was mapped, using a simple graphical depiction, delineating the extent of area and direction of the furrows. The difference between levelled and earthwork ridge and furrow was distinguished. The state of preservation of the latter was evaluated from the latest photography, which in the case of this project was mainly from vertical photographs.

- *Industrial features and extraction:* Widespread and common small-scale (less than 2 hectares) extraction of stone resources was not mapped unless it directly impinged on archaeological features. Large-scale quarries (greater than 2 hectares) were mapped and recorded, irrespective of whether they were depicted on any Ordnance Survey map. Coal mining and associated features, such as tramways, were mapped and recorded. Large collieries or open cast mining complexes were mapped generally as an extent of area.

- *Post Medieval and C20 military features:* Former Post Medieval, First and Second World War (WWI and WWII) military sites and installations were mapped. Extensive military complexes and sites were outlined as an extent of area as were anti-landing obstacles and tank traps. Installations such as pillboxes and coastal gun or searchlight batteries were mapped. 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 barbed wire fences and local trackways. Significant features within outlined areas were mapped either "as seen" or schematically, according to the quality of the available photography.

- *Buildings:* The foundations of buildings visible as cropmarks, soilmarks, parchmarks, earthworks, or ruined stonework were mapped, except when they were depicted on First Edition Ordnance Survey or later edition maps. Standing roofed or unroofed buildings or structures were generally not recorded unless they had a particular association in the context of industrial or military remains. Medieval castles and monastic sites previously recorded and extensively surveyed and mapped by the Ordnance Survey were mapped generally as an extent of area.

- *Geomorphological features or natural deposits:* Geomorphological features and natural deposits were not mapped. When such features occurred in the context of archaeological sites they were noted within the monument data text. This is in line with normal NMP methodology. Organic sediments and palaeochannel fills were not mapped.

- *Maritime Features:* Ship wrecks and fish traps visible in the inter-tidal zones were mapped. If it was not possible to position these features accurately due to a lack of reference points on the source photograph, only a circle on the extent of area layer with a diameter of 100m, 500m or 1km (the radius depending on the control points on the source photograph) was drawn. The centre of this was the grid reference obtained from the source photograph.

2.3.2 Sources of Air Photographs

All readily available air photographs were consulted, which effectively means those held in seven main collections. The National Monuments Record (NMR) was the prime source. Photographs were provided by the NMR in blocks. Block 1 extended from the west bank of the River Esk at Whitby to Blackhall Rocks in County Durham. Because of the density of sites in this area Block 1 was subdivided into four smaller units, recorded as 1a, 1b, 1c and 1d. Block 3 extended from Blackhall Rocks to South Beach at Blyth and was subdivided into units 3a and 3b. Block 2 covered the coastline from Blyth to Low Newton and was not subdivided, as was also the case with Block 4 which extended from Low Newton to Berwick-upon-Tweed. A search for photographs identified 4066 specialist obliques and 14,227 vertical prints for the project area. For the purposes of mapping, the area was divided into four blocks to facilitate loans from the NMRC library. Additionally, 484 specialist oblique and 427 vertical prints were consulted from the Photograph Library of Cambridge University Unit for Landscape Modelling (ULM). Aerial photograph collections of North Yorkshire County Council, North York Moors National Park, Tees Archaeology, Tyne and

Wear County Archaeology and Durham HER were also consulted but only a handful of these latter photographs were used for the project.

The vertical photographs held by the NMR comprise mainly RAF and Ordnance Survey sorties with some Meridian Airmaps Limited photographs, which range in date from 1940 to 1999. The specialist oblique photographs range in date from 1940 to 2006, which includes specialist military photographs and those from recent reconnaissance.

The ULM collection's holding for this project were quantified using the online catalogue (www-arcis.geog.cam.ac.uk) and the ULM then kindly loaned the relevant photographs. Yvonne Boutwood (EH's Aerial Survey) and Sally Radford (ARS Ltd) administered the loan liaison between the project and ULM.

Other forms of remote sensing imagery (e.g. Lidar) were not used during the mapping phase of the project. Lidar data in JPEG format for the whole NMP project area was provided by the Environment Agency. However, a review of a sample area suggested that because a proportion of the data was collected at high tide Lidar was of limited use in identifying features in the inter-tidal zone. Where the tide was low, the resolution was too low to show small discrete feature like wrecks but showed major features. As the majority of the archaeological features encountered in the project was military in origin these already appeared with extraordinary clarity on 1940s air photographs and did not need further aerial evidences. Consequently it was not felt that this was the most appropriate project in which to test the potential of this data to its fullest. This is not to say that Lidar data does not have a contribution to make to future coastal or inland archaeological surveys.

2.3.3 Sources of monument data

The NMR's database AMIE was consulted as was the relevant HERs for each quarter sheet during the course of transcription and recording. This process was assisted by the output from EH's GIS Data which facilitates graphic representation of the records with attached summary data. Where possible, concordance between HER datasets and AMIE was made.

2.3.4 Mapping Methods

Mapping methods were in accordance with practices developed for the NMP. All air photographs were examined under magnification and stereoscopically where possible. Oblique and vertical photographs were scanned at a suitable resolution, normally between 350-400dpi, and rectified using appropriate software (AERIAL 5.29). Ordnance Survey NTF (Block 1 and 3) and MasterMap (Block 2 and 4) 1:2,500 maps were used for control and as a base for mapping in AutoDesk Map 2004 and AutoDesk Map 3D 2007. Where appropriate, topographic information was derived from Ordnance Survey Land-Form PROFILE (5m vertical interval, scale 1:10,000) and the height data used to create Digital Terrain Models to improve the accuracy of the photo rectification.

Accuracy for the Ordnance Survey map is in the range of ± 8m and rectification of photographs is normally within ± 2m. The latter mismatch may increase up to ± 4m in the inter-tidal areas where the lack of control points on the available source photograph makes a more accurate rectification impossible. Rectified images were output from AERIAL in uncompressed TIF format at a resolution of 300dpi and a scale of 1:10,000. A World file

(.TFW) was created alongside each TIF file and the control information was retained in the AERIAL RDA file (RDA).

2.3.5 Recording Practice

All mapped features were recorded in the English Heritage NMR database, AMIE. This was routinely consulted and data from EH's GIS was downloaded for use in the AutoDesk Map environment. New records were created (968), or existing monument records were amended (270), following NMR Heritage Datasets:Monument Recording Guidelines. Within the AutoDesk Map drawing files data was also recorded in an attached data table.

2.3.6 Copyright

Copyright of the aerial survey mapping and associated AMIE records produced by the project resides with EH. As project partners, ARS Ltd is also licensed to use the data under the terms of the latter agreement.

2.3.7 Project Archive

This project produced 56 AutoDesk Map drawing files, one for each part 1:10,000 quarter sheets. The parent collection number is EHCO1/094 and copies of the digital drawing files are deposited in the archive of the NMRC. Aerial Survey York and Swindon also retain copies of the digital files, for day to day access. The newly created and amended text records form part of the NMR database, AMIE

.

2.3.8 Project Dissemination

Copies of the AutoDesk Map drawing files have been incorporated within the wider NERCZA project results and shared with HERS and project partners. The final product of the NERCZA, which includes the aerial survey mapping, will have a wider distribution to the local authority project partners. All AMIE records have been supplied to ARS Ltd in Portable Document Format (.pdf). This project also used Oracle Discoverer Plus Version 9.0.4.45.04 to output the AMIE record data in EXCEL spreadsheet format. A copy of this aerial survey mapping report has been deposited within the NMR in Swindon.

2.4 Archaeological Analysis

2.4.1 Analytical procedures

For the purposes of the NERCZA the archaeological analysis of the various data sets adopted the following procedure, undertaken for each block.

The first step was to generate the buffered study area for the block in question. The geology, soils and landuse data were then reviewed and summarised. The next step involved the identification of the SMP Management Areas or Units. In the case of the coastline in SMP Cells1b-d (Blocks 1 to and 3) the SMP2 document has subdivided the Management Areas into Policy Units with an assessment of the threat identified in each and the management policy recommended (Royal Haskoning 2007). Work on Cell 1a, north of the Tyne, is

ongoing at the time of writing and assessments on this part of the coast have been made within the context of the SMP1 data (Posford Duvivier 1998) which are more limited than those provided by SMP2, but nevertheless include policy recommendations. Account has also been taken of a *Strategy for Coastal Archaeology in Northumberland (SCAN)* produced by Northumberland County Council (Hardie 1995)..

When this initial stage of analysis had been completed for a block the HER data were plotted within the buffered study area, either in point, line or polygon form. The query facility in *ArcView 3.2a* was then used to generate chronologically or thematically specific plots. Examples might be 'Mesolithic sites', 'Bronze Age barrows', 'Iron Age enclosures', 'salterns and/or salt works', 'WWII sites', 'gun emplacements' or 'pillboxes'. The data structures of the various HERs in the NERCZA area are not consistent and it proved necessary to adapt the form of the queries as the project moved from one area to another.

These plots generated from the HERs were then overlain by equivalent plots generated from the APTE data sets in order to identify newly discovered sites and those where aerial photographs have enhanced the record. The final stage was to superimpose on these records those generated from the NMR. By using different colours for the HER, APTE and NMR data sets, and by switching sets on and off, it was possible to identify sites which had not been picked up by either the HER or the APTE.

Once a category of site had been identified and isolated, either by date or type, these were then written-up for each area. The approach adopted in writing up these results is set out in Chapter 5 while their wider context is provided in Chapter 4 by a general account of the archaeology of NE England.

2.4.2 Assessment of the threat

The NERCZA has been tasked with assessing the threat to historic assets arising from coastal erosion, accelerated by sea level rise consequent upon global warming. This threat can take one of two forms. First, assets may be modified, truncated or completely destroyed by erosion or inundation. Second, damage may occur as an unintended consequence of various mitigation strategies adopted by national and local government. In reviewing the historic assets on the NE coastal zone, these threats have been taken into account in a variety ways.

First, in cases where a specific level of threat has been identified in relation to a specific asset or group of assets this is drawn attention to in the body of the text dealing with the block in question. The convention adopted has been to indent and italicize a paragraph to this effect. For example, in the case of two multivallate forts on the Northumberland coast (Chapter 9.2.3) the entry is as follows:

> "*The multivallate forts at Fenham and Scremerston are situated on the cliff edge and both are being actively eroded. These sites are in SMP1 Units 14 and 11 respectively and in both cases the 'Perferred Strategic Option' is 'Selectively hold the line'. In the case of the Scremerston site this is probably due to the proximity of the main line railway while the section of the coast affecting the Fenham site is unlikely to be selected for mitigation.*"

Second, while specific sites and threats may be individually discussed, the general level of threat to distinct categories of asset is set out in a series of tables. These can take two forms. For assets other than ship wrecks and anti-invasion sites of WWII the tables, in addition to locational details and HER number, also include the SMP Management Area or Unit and assessments of the importance of the asset and the degree to which it is at risk. The following is an extract from table 9.5 in which the multivallate forts referred to above feature:

NGR	Name	HER	SMP	Importance	Risk
NU15253392	Spindlestone Heughs multivallate fort	NH 5242	15	High	Low
NU105374	Middleton multivallate fort	NH 5074	14	Medium	Low
NU09134013	Fenham multivallate fort	NMR 1474811	14	Medium	High
NU01834968	Scremerston multivallate fort	NH 3969	11	Medium	High
NU00115064	Spittal multivallate fort	NH4131	10	Medium	Low

The column dealing with 'importance' takes account of the status of the site in question (all Scheduled Ancient Monuments are afforded a 'high' level of importance), its rarity and its state of preservation. Few cropmark sites, by definition already denuded, are rated higher than of medium importance. The column dealing with 'risk' takes account of the proximity of the asset to the coast and the degree of threat indicated by the SMP documentation. In the example above, the Spindlestone hillfort is situated well away from the coast whereas the two multivallate forts are being actively eroded.

The tables providing details of shipwrecks between LAT and MHWS take a different form. In addition to providing locational details and HER numbers, where it is known the name of the vessel and the date lost are also provided. A final column records the SMP Management Area or Unit in which the wreck lies. By cross referring to the SMP table found in the introduction to the chapter dealing with each block the recommended policy options can be ascertained. No attempt is made to grade the importance of individual wrecks or to assess the level of risk. In the absence of detailed information, all are treated as important and being between high and low water, all are vulnerable and clearly at risk. The following is an extract from table 9.7:

NGR	Name of vessel	Date lost	HER	SMP
NU23773844	*Forfarshire*	1838	NH 5885	Farnes
NU01045262	HMS *Ben Heilem*	1917	NMR 943573	9
NU00005444	*Oscar den Forste*	1848	NMR 1434785	8

Major sites dating from WWII are dealt with in the same way as other assets whereas a modified treatment has been adopted for the numerous anti-invasion features identified by the APTE. These sites have mainly been recorded from aerial photographs taken during or shortly after the war and, within the context of a desk-based study, it has not been possible to establish which remain extant. Many are known to have been ephemeral. Data on this category of assets have been derived from the APTE and consist of the OS quarter sheet, the NGR eastings and northings, the NMR number and the SMP Management Area or Unit. The following is an extract from table 9.8 dealing will pillboxes in Block 4.

OS Sheet	Eastings	Northings	NMR	SMP
NU 04 NE	05129	46292	1421689	13
NU 04 NE	055	457	1472613	13
NU 04 NW	0412	4705	1472872	13
NU 04 SE	0652	4280	1421569	14
NU 04 SE	0798	4318	1474720	14

Given the questionable status of these sites, i.e. many might not survive, no attempt has been made to assess their individual importance or to evaluate the extent to which they may be under threat. This situation is discussed section 10.4.8 where the view is taken that such assessments and evaluations can only be made on the basis of field visits.

The data in the various tables are also presented in the Appendix where, for ease of reference they are sorted by HER and NMR number and grouped according to HER area.

CHAPTER 3

An Overview of Holocene Coastal Change From Berwick-upon-Tweed to Whitby

By Natasha Barlow and Ian Shennan[1]

3.1 Introduction

The coast of North East England contains a diverse range of environments, providing suitable resources and locations for human occupation since the retreat of the last British ice sheet, more than 16000 years ago. It is important to consider relative sea level (RSL) change and coastal evolution of the North East coast to understand how changes in the palaeocoastline affected coastal communities since the Late Upper Palaeolithic. The British Isles ice sheet stored <1 m equivalent sea level at the Last Glacial Maximum but post-glacial isostatic adjustment processes produced vastly contrasting relative sea-level changes at different locations around the coastlines of the UK. The effects of these processes change considerably along the coast of NE England.

The plan of the report is therefore as follows. In Section 3.2 we review the mechanisms of Holocene RSL change and the archives of past sea level change to provide a framework to consider the data collected in the NE. Section 3.3 reviews the solid and drift geology and geomorphological processes as important parameters in understanding the temporal and spatial patterns of Holocene coastal change. Section 3.4 provides detailed examination of Holocene RSL change and coastal evolution from Berwick to Whitby, divided into the individual sections of the Shoreline Management Plan (SMP) Cells 1a-1d.

Table 3.1 SMP Cells for the NERCZA study area

SMP Cell	Northern Extent	Southern Extent
1a	Berwick-upon-Tweed	River Tyne
1b	River Tyne	Seaham
1c	Seaham	Saltburn
1d	Saltburn	Whitby

Due to the nature of the environmental records of Holocene RSL change, there are areas, particularly on stretches of high-energy coast, in which knowledge of past coastal change is limited. To provide a regional-scale context of the evolution of the coast of NE England Section 3.5 contains summaries of modelled results of the palaeogeography of the North Sea. In Section 3.6 we make recommendations for possible future research and summarise our main conclusions in Section 3.7. All ages quoted are in calendar years before 0 BC (yrs BC) unless otherwise indicated (where ages are stated as years before present (yrs BP), present is defined as AD 1950).

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3.2 Holocene Relative Sea Level Changes

In its simplest form, relative sea-level changes are a function of fluctuations in both ocean and crustal elevations. For each geographical location (φ), the change in relative sea level RSL (τ,φ) at time (τ) can be expressed schematically (Shennan and Horton, 2002) as:

> RSL (τ,φ) = Eustatic function (τ) + Isostatic function (τ,φ) + Tectonic function (τ,φ) + Local factors (τ,φ)

This is a complex relationship as most variables vary in both time and space (fig.3.1). The solely time-dependent eustatic function over the last 16,000 years is the change in global volume of water in the oceans due to meltwater discharge from land-based ice sheets and glaciers. The isostatic function is the rebound process including both ice (glacio-isostatic) and water (hydro-isostatic) load contributions. Any tectonic effect is usually considered negligible on the millennial timescale in most studies of Great Britain to date (c.f. Kiden, 1995). Local factors include tidal regime, meteorological and hydrological factors, such as changes in air pressure and river discharge, and sediment compaction. All of these may change through time and may potentially alter how RSL is recorded at each site.

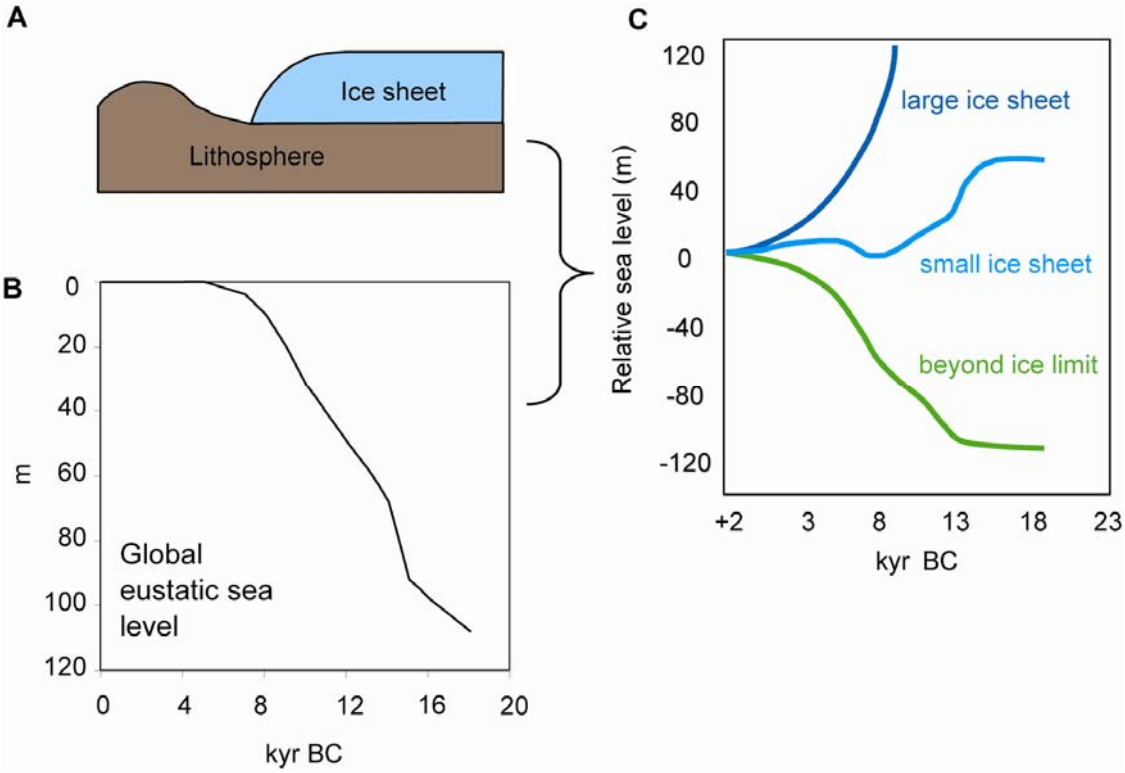


Figure 3.1 During the last glacial maximum, ~22,000 years ago, ice from Scandinavia and the British Isles extended beyond the present coastline onto the continental shelf. Increased mass of ice caused deformation of the Earth's crust (fig. 3.1A). As global climate warmed, great ice sheets then present across much of North America, Northern Europe, parts of Asia and South America and Antarctica started to melt, causing global, or eustatic, sea-level rise (fig. 3.1B). Patterns of sea-level rise vary from region to region in response to changing distributions of ice and water. Termed relative sea-level change for any particular location on the Earth's surface, the pattern depends on distance from the ice

sheet, size of nearby ice sheets and glaciers, their rates of retreat and the structure of the Earth's crust in the region (fig. 3.1C).

Environmental records of Holocene RSL change and coastal evolution have not been destroyed by the series of glacial and interglacial cycles that characterised the Pleistocene and hence can provide a quite detailed record of RSL change. Prior to ~9,050 yr BC there are few records of RSL change as the coastline was offshore from its present position following deglaciation after the Last Glacial Maximum (LGM) ~18-20 kyr BC, with time-transgressive deglaciation following (Evans *et al.*, 2005). The global eustatic sea level curve is largely derived from coral records at locations far from the former ice sheets of the LGM, following model corrections for tectonic and hydo-isostatic effects (Bassett *et al.*, 2005), for example Barbados (Fairbanks, 1989); Huon Peninsula, Papua New Guinea (Chappell and Polach, 1991) and Sunda Shelf (Hanebuth *et al.*, 2000). These records indicate that since the LGM global eustatic sea level has risen 120-125m reaching near present levels ~4050 years BC during the mid Holocene highstand. Since 2050 yr BC there has been minimal polar deglaciation resulting in limited global eustatic sea level change (Peltier, 2002).

Environmental records also capture the effects of the isostatic and local variables of RSL change. Along the coast of NE England lithology, coastal geomorphology and biological proxies provide elevation and age information allowing reconstruction of local and regional RSL histories. In particular, lithology and micropalaeontological evidence at the contact between intercalated marine and terrestrial sediments at low energy coasts can provide sea level index (SLI) points; indicating the tendency and elevation of sea level change at a given time (Shennan et al., 1983). Over 12,000 SLI points now exist to constrain RSL since the LGM in Great Britain (Shennan and Horton, 2002). Biostratigraphy may also record more subtle changes, for example a transition in the pollen record from a salt marsh assemblage to a freshwater vegetation community (Innes and Frank, 1988). Combined with radiocarbon dating such records can provide limiting dates where the palaeoenvironment indicated by the biostratigraphy is not clearly related to a fossil tide level; at which point sea level must have been at or below that record (Shennan *et al.*, 2000a). Such information helps to constrain SLI points. Combining the environmental evidence of past RSL change with geophysical modelling allows predictions of isostatically-induced sea level changes, improving understanding of the spatial and temporal patterns of RSL change (Shennan and Horton, 2002). In addition, Shennan *et al.* (2000b) combined geophysical, field and bathymetric data to produce reconstructions of Holocene palaeogeography of the North Sea which has revealed a marine transgression of the continental shelf.

In general, the focus of much RSL research is on the vertical change in sea level. However, models can improve understanding of the horizontal change. Due to the increased influence of anthropogenic activity upon the land and limitations of radiocarbon dating, it becomes difficult to establish detailed RSL history from 1000 yr BC to present when tidal records become available. Along the NE coast, two tide gauges, at North Shields and Whitby, provide information of changes in sea level from 1946 and 1980 to present respectively (NTSLF, 2007).

It is therefore possible to establish a detailed picture of Holocene coastal evolution and RSL change of NE England using a wide range of available field evidence combined with appropriate models. These palaeoenvironmental reconstructions are important to understand the relationship with, and impact of, coastal evolution on the coastal

communities of North East England since the Late Upper Palaeolithic.

3.3 Geology of the NE Coast

To provide the context for the post-LGM coastal changes of NE England we first consider the coastal solid and drift geology from Berwick-upon-Tweed to Whitby. Extensive Carboniferous, Permian, Triassic and Jurassic sequences lie upon folded basement rocks of Lower Palaeozoic age and Old Red Sandstone (Johnson, 1995). Unconsolidated Quaternary drift sediments occur along much of the coast.

3.3.1. Solid Geology

The underlying solid geology varies considerably along the coast (Figure 3.2). The Northumberland coastline is characterised by rocks of Carboniferous age. Older Carboniferous limestone dominates the coast from Berwick-upon-Tweed to Howick. Younger Carboniferous millstone grit outcrops at locations such as Cheswick, and igneous intrusive basalt deposits are found at Budle (BGS, 2007). South of Howick millstone grit defines the solid geology to High Buston. From High Buston to the Tyne the younger Carboniferous Westphalian Coal Measures, were laid down in a continuous delta (Johnson, 1995), though in places are interrupted by igneous dykes of either Jurassic or Carboniferous age, for example at Seaton.

South of the Tyne and along the County Durham coast to Hartlepool (SMP 1b and 1c), Permian marine magnesian limestone and Roker dolomite form many of the coastal cliffs, with limestone of the Late Permian Seaham Formation at Crimdon. South of Hartlepool to the Tees Estuary at Cowpen, Late Permian and Triassic Sherwood Sandstone occupies the central area of SMP 1c (BGS, 2007). The coarse material of the solid geology of the north fines out at the Tees Estuary and is replaced by Triassic Mercia Mudstone, dominated by red 'marl' (Swinnerton and Kent, 1976).

The southern extent of SMP 1c and SMP 1d from Saltburn to Whitby comprises the Jurassic rocks that form the North Yorkshire Moors. Lower Jurassic Lias deposited under marine conditions dominates the coastal geology, which south of the Tees to Saltburn consists of Lower Lias Redcar Mudstone, exposed in the intertidal zone at West Scar, off Redcar. From Saltburn to Runswick Middle Lias sandstones, Cleveland Ironstone and oolite interbed. South of Runswick to Whitby, the sandstones are replaced by Upper Lias Shales, containing Jet Rock, which lie alongside Jurassic oolitic beds (Swinnerton and Kent, 1976).

3.3.2. Drift Geology

Glacial till and diamicton deposited by the ice that occupied the NE at many times through the Quaternary, overlies much of the solid geology discussed above. Throughout SMP cells 1a and 1b (Berwick-upon-Tweed to Seaham) the deposits are generally more than 8m thick, with distinct units representing several late Pleistocene glaciations. A lower till at Warren House Gill, County Durham is dated to at least marine isotope stage (MIS) 6 (Catt, 2007), with Devensian (MIS 2) glacial material widely spread along the coast, for example at Blackhall Rocks (Bridgland, 1999). At Shippersea Bay, Easington, an interglacial raised gravel beach lies upon the magnesian limestone cliffs at ~32m above present sea level, representing a RSL high-stand during MIS 7 (Bowen *et al.*, 1991). At various locations, for example Bamburgh, Hauxley, Druridge Bay and Whitley

Figure 3.2 Solid geology of the North East coast with main locations discussed in text marked. Solid geology definitions based upon BGS data (BGS, 2007).

Bay, Holocene wind blown sand fronts the cliffs. Intertidal alluvium and river terrace deposits dissect the glacial tills on and around Holy Island and within most of the estuaries of the Northumberland coast. Numerous locations, discussed in Section 3.4, contain Holocene peat deposits.

From Horden to Saltburn the drift geology is defined by late Quaternary glacio-fluvial sands and gravels, dissected by layers of till (BGS, 2007). More recent Holocene river alluvium and peat deposits occur within the Tees Estuary. South of Saltburn to Whitby (SMP 1d) some Quaternary till occupies the embayments within the prevailing solid geology.

3.3.3. Coastal Geomorphological Processes

The NE coast is a macrotidal environment with maximum spring tides of over 4m at Amble and Blyth (NTSLF, 2007). Spring tide levels rise up estuary by around 0.2m in both the Tyne and Tees. The prevailing winds are offshore from the south west, but high speed on shore winds generate waves with long fetches over the North Sea,

particularly during winter gales. Combined with tidal currents the net movement of material along the coast in suspension and beach material by longshore drift is southwards, though there are some local variations. During the early Holocene RSL rise, unconsolidated sediments, now offshore, provided a plentiful supply for onshore and longshore movement, with additional material provided by erosion of cliffs. Holocene sea level changes and high energy waves has resulted in a series of sandy bays backed by sand dunes or cliffs of glacial till between rocky headlands fronted by wave cut platforms along the Northumberland coast. The amount of alongshore material transported is relatively small, mostly confined to individual embayments. The southward movement of longshore drift has resulted in small spits deflecting the Aln, Coquet, Lyne and Wansbeck. There is local northward drift at Blyth. Prior to industrial development the tidal section of the Tyne contained intertidal sediments during the Holocene, for example at Jarrow.

There is minimal interchange of sediment between the Tyne and Wear with the magesian limestone cliffs contributing little material to the few beaches along this stretch of coast. The tidal section of the Wear has accumulated sands, silts and clays though no saltmarsh development has occurred. The more open stretches of cliffs south of the Wear to Crimdon are fronted by beaches of gravel resulting from cliff erosion, but the net movement of material between the headlands is limited. South of Crimdon coastal dunes have formed behind a sandy beach.

The protected environment of Hartlepool Bay and Tees Bay have allowed sediment accumulation and infilling, the rate of which is particularly related to rapid sea level rise and increasing tidal range during the early Holocene (Plater *et al.*, 2000). Outside of the estuaries some southward movement of material occurs. In places such as Redcar the coast cliffs are fronted by a narrow zone of gravels due to cliff errosion. Differential erosion of the varied geology south of Saltburn results in a diverse coastline of cliffs, bays and headlands (glacial deposits at or near sea level are eroded at a rate of three times that compared to shale outcrops). Little material moves between individual bays, except in sediment suspension. Throughout the late Holocene there has been a net landward migration of the open coast, and most of the North East coast is now considered as undergoing rapid erosion.

3.4 North East England Holocene Coastal and RSL Change

The summary of the RSL change and coastal evolution of NE England from Berwick-upon-Tweed to Whitby over the last 12 kyr BC is structured around the Shoreline Management Plan (SMP) cells 1a – 1d. The main locations discussed within the text are shown by the map in Figure 3.3. All SLI points for the region are summarised in Tables 3.2 and 3.3.

3.4.1 Berwick-upon-Tweed – River Tyne (SMP Cell 1a)

Shennan and Horton (2002) report 47 SLI points and 8 limiting dates from sites between Berwick-upon-Tweed and the Tyne (Table 3.2 and fig. 3.3). The Holocene RSL history of Northumberland divides it into three geographical units: north, central and south. Data for the northern sites has been collected from Beal Cast, Bridge Mill and Broomhouse Farm (Shennan *et al.*, 2000a), central sites from Annstead Burn, Elwick and Newton Links (Plater and Shennan, 1992; Shennan *et al.*, 2000a) and in the south from Alnmouth, Amble Bay, Cresswell Ponds and Warkworth (Plater and Shennan, 1992;

Shennan *et al.*, 2000a). These are accompanied by additional palaeoenvironmental data which help to build up a full picture of coastal evolution of the Northumberland coast.

Figure 3.3 Location of SLI points from raised peat deposits within SMP Cell 1a

Shennan *et al.* (2000a) present and interpret 11 SLI points from north Northumberland constraining past sea level during ca. 6.4-1.6 kyr BC. At Broomhouse Farm a series of intercalated peat and silts overlie a Devensian till. The basal peat dates to the late Devensian interstadial at ca. 11.5 kyr BC, which underlies a Younger Dryas limnic sediment. A series of dates from Beal Cast and Bridge Mill from 6450 to 4050 yr BC, record a trend of rising sea level from ca. -0.5m to >2m above present towards the mid Holocene (fig. 3.4). Sea level tendencies derived from the lithology and biostratigraphy of the intercalated peat and silts at Broomhouse Farm record alternating positive and negative tendencies of sea level during the mid Holocene. Shennan *et al.* (2000a) are unable to exactly constrain the timing of the maximum with the available environmental data, however it is clear that between ca. 5.3-1.7 kyr BC RSL fluctuated within a 1m range at 1.5 – 2.5m above present levels. Within the sequence is a sand lens relating to a high-energy event, for example due to barrier over-wash during a storm surge, dated to 5850-6050 yr BC (Horton *et al.*, 1999c; Shennan *et al.*, 2000a). Shennan *et al.* (2000a) tentatively link this sediment deposition to the tsunami attributed to the second Storegga Slide on the Norwegian continental slope (Long *et al.*, 1989; Smith *et al.*, 1985; Smith *et al.*, 2004).

SLI points from Bridge Mill and Broomhouse Farm at 2450-2850 yr BC (RSL ca. 2.10

±0.20m above present) and 3750-4050 yr BC (RSL ca. 1.19 ±0.20m above present) record a negative sea level tendency. No SLI point exists for the late Holocene; though model results suggest a continued fall of late Holocene RSL to present levels, due to local isostatic uplift (Shennan and Horton, 2002). The best estimate of the relative land uplift over the last 4000 yrs is 0.71 mm yr^{-1} within northern Northumberland.

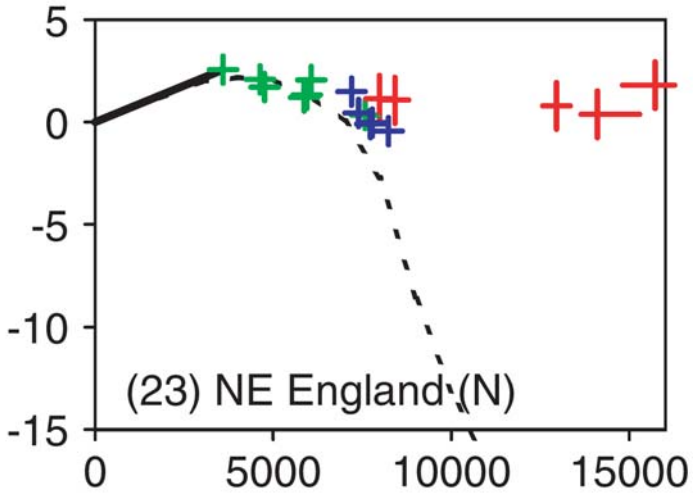


Figure 3.4 Sea level index points for Northumberland (north) sites as calibrated age (yr BP) against change in sea-level relative to present (m) as reported in Shennan and Horton (2002). The best estimate of late Holocene sea level trend plotted as a solid line with the dashed line showing predicted modelled RSL change. + Basal index points; + Intercalated index points; + Limiting dates

Within the shoreline regression of the last 1000 yrs, Wilson *et al.* (2001) identify the onset of dune development in north Northumberland from cores taken at Cheswick, Holy Island and Ross Links. Dating of aeolian sediment suggests primary dune building occurred during the climatic cooling termed the 'Little Ice Age', ca. 1300-1900 A.D. (Grove, 2004) when the falling RSL reached within 1m of present levels in the area. Wilson *et al.* (2001) suggest that the absence of dune systems prior to this period may have been a consequence of coastal configuration, the rate of shoreline regression and availability of sediment.

Less data are available from the central Northumberland sites; as summarised in the sea level curve shown in Figure 3.5. Plater and Shennan (1992) use diatoms through a complex series of silts and a peat layer at Elwick to infer a period of continual increase in marine influence. Peat accumulation on the underlying clays is dated to 5850-6150 yr BC, which, due to RSL rise, was periodically tidally inundated to a point of mudflat deposition at 5650-5950 yr BC (Shennan *et al.*, 2000a). Three additional SLI points from ca. 6350-5850 yr BC from Annstead Burn capture the early Holocene RSL rise from ca. 1.5m below present. The Annstead Burn sequence also contains a sand deposit dated to ca. 6050-6350 yr BC, generally considered a few centuries older than the timing of the Storegga Slide. Shennan *et al.* (2000a) suggests it represents a high-energy event that deposited coarse-grained material that was subsequently overlain with intertidal clays as the embayment infilled, possible due to the establishment of a dune system.

Wilson *et al.* (2001) record mid Holocene sand deposition by a series of coarse grained

layers at St. Adians dunes. These date (ca. 3850-1850 yr BC) to a period of deposition prior to the mid Holocene highstand. This is similar to the Holocene intertidal sedimentation recorded at Brockmill, Holy Island Bay (Plater and Shennan, 1992). During the late Holocene, the primary phase of dune emplacement in the central area occurred from ca. 1650-1450 yr BC with the onset of RSL regression, and increased dune development during the Little Ice Age (Wilson *et al.*, 2001). Overall, the SLI points from this small central data set plot just below those from the northern sites, with a mid-Holocene maximum (ca. 2250-1850 yr BC) represented by one point from Newton Links at 0.5m above present (Shennan *et al.*, 2000a). Modelled best fit estimates from the central area suggest 0.11 mm yr^{-1} of land uplift over the past 4000 years (Shennan and Horton, 2002).

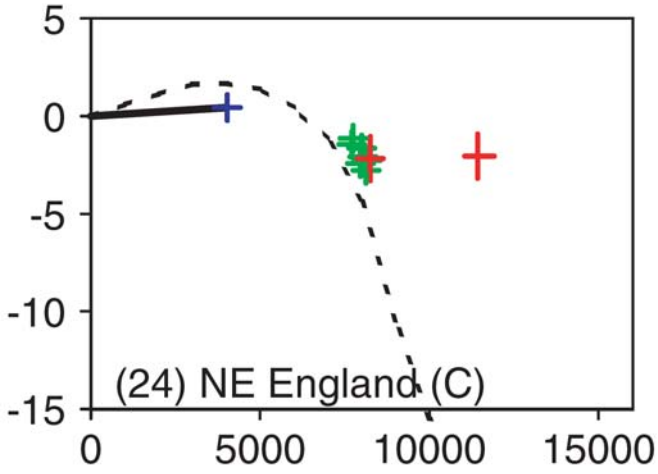


Figure 3.5 Sea level index points for Northumberland (central) sites as calibrated age (yr BP) against change in sea-level relative to present (m) as reported in Shennan and Horton (2002). The best estimate of late Holocene sea level trend plotted as a solid line with the dashed line showing predicted modelled RSL change. + Basal index points; + Intercalated index points; + Limiting dates

From Alnmouth to Cresswell 26 Holocene SLI points exist from a series of intercalated peats and inorganic deposits (Shennan *et al.*, 2000a) producing the sea level curve in Figure 3.6. The stratigraphy of the Holocene sediments at Alnmouth is highly complex with a series of peat layers whose deposition has been complicated by the underlying topography and erosion. The peats are largely dividable into an upper and lower suite dissected by silts and clays (Horton *et al.*, 1999b; Horton *et al.*, 1999c; Shennan *et al.*, 2000a). The oldest SLI point from Alnmouth (6350-7050 yr BC) records a period of rising water table levels with RSL ca. 4m below present and approaching estuarine conditions (Shennan *et al.*, 2000a). Positive sea level tendencies are also recorded at 7.8-8.0 (RSL ca. 2.01 ±0.20m below present) and 5550-5350 yr BC (RSL ca. 1.17 ±0.20m below present). Similar early Holocene SLI points from Warkworth and Cresswell capture the early Holocene RSL rise along the Northumberland coast from more than 4m below present around 6550 yr BC (Horton *et al.*, 1999b; Shennan *et al.*, 2000a).

At Howick, Boomer *et al.* (2007) record the presence of a coarse clastic unit which they dated to 6400 yr BC, similar to a comparable deposit at Annstead Burn. Boomer *et al.* (2007) do tentatively link this deposit to the tsunami associated with the Storegga Slide, unlike Shennan *et al.* (2000a) at Annstead Burn. Regardless, it is clear at ca. 6 kyr BC one

or more high-energy events occurred along the coast of Northumberland depositing coarse-grained material. At present, the cause of this/these event/s remains uncertain.

Into the mid Holocene, dates on the lower Alnmouth peat, which exists in the southern seaward part of the Alnmouth site, suggests formation between 5050-4050 yr BC. The thicker, upper peat from the central area of Plater and Shennan's (1992) north-south transect dates from 3050 yr to 1550 yr BC. Biostratigraphic analysis shows this peat-silt/clay sequence to represent fluctuations between freshwater and intertidal conditions during the mid Holocene. Amble Burn presents a similar silt-peat regressive contact dated to 5550-5850 yr BC when RSL was ca. 1.91 ±0.20m below present. Around Druridge Bay, the Creswell Pond *(*Horton *et al., 1999c;* Shennan *et al.*, 2000a) and Low Hauxley (Innes and Frank, 1988) sequences also record a period of mid-Holocene peat formation. Marine mudflats at Cresswell Ponds laid down at 5250-5550 yr BC, when RSL was ca. 2.14 ±0.20m below present, give way to transitional saltmarsh and subsequently to an organic freshwater environment. Lithological and micropalaeontological evidence from Howick also records a build up of freshwater organic material as the local sedimentation rate exceeded the rise in mid Holocene RSL (Boomer *et al.*, 2007).

A series of transgressive SLI points record increased tidal inundation with RSL up to 1m below present at 1750-1850 yr BC, due to probable dune breaching, resulting in a series of five thin peat layers intersected by sand (Horton *et al.*, 1999c; Shennan *et al.*, 2000a). Late Holocene dune instability and redistribution is also recorded at Low Hauxley (Innes and Frank, 1988). The lithological and biological data from the southern sites shows a mid Holocene highstand to little above present, which is further constrained by a limiting date from Cresswell recording RSL at or below 1.72 ±1.13m above present at 1650-1950 yr BC (Shennan *et al.*, 2000a). During the gradual late Holocene RSL regression towards present levels, coastal dune accumulation began between 750 yr BC – AD 650, with the main periods of development associated with cooler periods of the last 3000 years (Wilson *et al.*, 2001).

The spatial variation in Northumberland Holocene RSL and coastal evolution is a consequence of differential LGM glacio-isostatic loading, resulting in decreasing mid and late Holocene uplift from north to south. The rate of isostatic uplift for southern Northumberland given by Shennan and Horton (2002) is -0.09 mm yr^{-1} with a best fit estimate, taking into account sediment compaction, of 0.17 mm yr^{-1}. The Holocene RSL and coastal evolution of the south Northumberland sites is far more constrained by global eustatic sea level change than isostatic adjustment. In addition, it becomes clear that though the general trend of Holocene RSL change along the coast of Northumberland is the similar, site-specific process such as sedimentation rates, coastal geomorphology and coastal configuration have a substantial impact on local RSL change and coastal evolution.

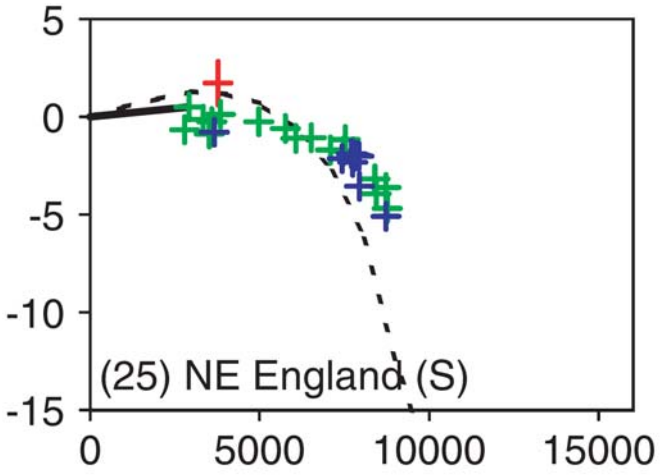


Figure 3.6 Sea level index points for Northumberland (south) sites as calibrated age (yr BP) against change in sea-level relative to present (m) as reported in Shennan and Horton (2002). The best estimate of late Holocene sea level trend plotted as a solid line with the dashed line showing predicted modelled RSL change. + Basal index points; + Intercalated index points; + Limiting dates

3.4.2 River Tyne – Seaham (SMP Cell 1b)

Very few low energy sedimentary environments suitable for the preservation of an archive of Holocene sea level change exist within the limestone and dolomite cliffs and rock platforms between the Tyne and Seaham. Therefore, very little RSL research has occurred along this stretch of coast. One offshore record, approximately 30 miles east of the mouth of the Wear, records the incursion of marine conditions, using dinoflagellate cyst's, during the early Holocene into this area of the North Sea as a consequence of global eustatic sea level rise (Harland and Long, 1996). It would seem sensible to assume that the rate and pattern of RSL change during the Holocene at this stretch of coast would be similar to that seen slightly further south, with a gradually decreasing rate of RSL rise towards present day levels. As sites in southern Northumberland experienced a mid Holocene RSL maximum only 0.5m above present levels, it is likely that RSL between the Tyne and Seaham did not exceed present day sea level. Based on model results from Shennan and Horton (2002), this part of the North East coast is experiencing very little, if any, late Holocene land/sea level changes due to its position upon the pivotal point between the isostatically rebounding north and the subsiding south.

Site	Laboratory code	^{14}C age ± 1σ	Change in RSL (m)	Calibrated age (yr BC)			Longitude W	Latitude N
				Maximum	Mean	Minimum		
North Northumberland sea-level index points								
Beal Cast, BC96-2	AA23823	6955 ± 75	-0.03 ± 0.21	5988	5832	5710	152284	5540139
Beal Cast, BC96-2	AA23896	6500 ± 75	0.45 ± 0.21	5608	5452	5323	152284	5540139
Beal Cast, BC96-3	AA23824	6885 ± 70	-0.11 ± 0.21	5892	5771	5636	152152	5540058
Beal Cast, BC96-3	AA23825	7420 ± 75	-0.45 ± 0.21	6419	6293	6091	152152	5540058
Bridge Mill, BM95-7A	AA24226	6285 ± 65	1.49 ± 0.21	5458	5254	5057	156132	5541285
Bridge Mill, BM95-7A	AA24225	5290 ± 60	2.05 ± 0.21	4310	4123	3977	156132	5541285
Bridge Mill, BM95-7A	AA24223	3360 ± 60	2.57 ± 0.21	1864	1648	1510	156132	5541285
Bridge Mill, BM95-7A	AA24224	4105 ± 55	2.1 ± 0.21	2872	2683	2494	156132	5541285
Broomhouse Farm, BR96-8	AA23894	5185 ± 55	1.34 ± 0.21	4220	3997	3802	156223	5541569
Broomhouse Farm, BR96-8	AA25596	6700 ± 60	0.35 ± 0.21	5716	5622	5516	156223	5541569
Broomhouse Farm, BR96-8	AA23893	5130 ± 55	1.19 ± 0.21	4039	3916	3789	156223	5541569
Broomhouse Farm, BR96-8	AA25595	4250 ± 70	1.7 ± 0.21	3019	2814	2623	156223	5541569
North Northumberland limiting dates								
Broomhouse Farm, BR96-8	AA25597	10900 ± 85	0.8 ± 1.13	11192	11008	10704	156223	5541569
Broomhouse Farm, BR96-8	AA25598	12040 ± 110	0.39 ± 1.13	13338	12152	11695	156223	5541569
Broomhouse Farm, BR96-8	AA25601	7165 ± 60	1.16 ± 1.13	6202	6029	5890	156223	5541569
Broomhouse Farm, BR96-8	AA27618	7620 ± 100	1.07 ± 1.13	6641	6464	6245	156223	5541569
Broomhouse Farm, BR97-3	AA34199	13120 ± 80	1.81 ± 1.13	14331	13785	12870	156292	5541569
Central Northumberland sea-level index points								
Annstead Burn, AN96-5	AA27228	7355 ± 90	-2.27 ± 0.21	6395	6212	6027	139050	5534165
Annstead Burn, AN96-5	AA27229	7145 ± 60	-2.44 ± 0.21	6162	6010	5846	139050	5534165
Annstead Burn, AN97-1	AA27226	7325 ± 60	-2.78 ± 0.21	6371	6173	6025	139027	5534191
Elwick 42	SRR3844	6875 ± 45	-1.47 ± 0.23	5838	5758	5665	148310	5537560
Elwick 42	SRR3845	7230 ± 45	-2.1 ± 0.23	6209	6085	6004	148310	5537560
Elwick Q05	SRR3842	6935 ± 45	-1.13 ± 0.22	5965	5803	5717	148320	5537550
Elwick Q05	SRR3843	7180 ± 45	-1.65 ± 0.22	6163	6042	5919	148320	5537550
Newton Links, NBD11	AA23498	3690 ± 60	0.44 ± 0.4	2277	2080	1894	138012	5531533
Central Northumberland limiting dates								
Annstead Burn, AN97-1	AA27227	9965 ± 85	-2.06 ± 1.13	9975	9482	9243	139027	5534191
Annstead Burn, AN97-1	AA27616	7420 ± 60	-2.18 ± 1.13	6411	6299	6100	139027	5534191
South Northumberland sea-level index points								
Alnmouth 31/32	SRR3848	6180 ± 50	-1.72 ± 0.22	5288	5135	4989	137120	5523380

Alnmouth 31/32	SRR3846	3560 ± 45	0.13 ± 0.21	2024	1903	1754	137120	5523380
Alnmouth 31/32	SRR3847	5285 ± 45	-1.1 ± 0.22	4226	4117	3986	137120	5523380
Alnmouth 33	SRR3850	6945 ± 45	-1.93 ± 0.8	5969	5813	5721	137160	5523350
Alnmouth 46	SRR4584	6935 ± 45	-2.34 ± 0.21	5965	5803	5717	137160	5523340
Alnmouth, AL94-21B	AA24220	7650 ± 55	-3.96 ± 0.21	6594	6486	6407	136416	5523484
Alnmouth, AL94-21B	AA27617	7885 ± 65	-3.62 ± 0.21	7035	6779	6593	136416	5523484
Alnmouth, AL95-1	AA24219	7110 ± 55	-2.01 ± 0.21	6071	5971	5840	137107	5523323
Alnmouth, AL95-1	AA24218	6635 ± 55	-1.17 ± 0.21	5632	5568	5480	137107	5523323
Amble Bay, AB96-2	AA23892	6870 ± 60	-1.91 ± 0.21	5862	5755	5637	133141	5519386
Cresswell Ponds, CP95-11	UB3906	3405 ± 43	-0.79 ± 0.22	1874	1707	1533	133050	5515060
Cresswell Ponds, CP95-6	UB3905	2656 ± 56	-0.69 ± 0.41	969	831	668	133060	5514330
Cresswell Ponds, CP95-8	AA24217	6525 ± 55	-2.14 ± 0.21	5611	5489	5367	133056	5514335
Cresswell Ponds, CP95-R1	AA22663	3280 ± 45	-0.91 ± 0.4	1680	1569	1449	133056	5514335
Cresswell Ponds, CR95/7	UB3904	3359 ± 40	-0.26 ± 0.22	1737	1647	1525	133060	5514330
Warkworth AW16	SRR3703	7030 ± 45	-1.99 ± 0.4	5993	5904	5799	136160	5520260
Warkworth AW16	SRR3700	4405 ± 45	-0.26 ± 0.4	3320	3032	2908	136160	5520260
Warkworth AW16	SRR3701	5010 ± 45	-0.62 ± 0.21	3943	3800	3700	136160	5520260
Warkworth AW16	SRR3699	2810 ± 45	0.5 ± 0.4	1105	962	832	136160	5520260
Warkworth AW16	SRR3702	6555 ± 45	-1.77 ± 0.21	5616	5518	5389	136160	5520260
Warkworth, WA94-2A	AA24228	3120 ± 55	-0.12 ± 0.21	1510	1392	1260	136112	5520239
Warkworth, WA94-2A	AA24227	5720 ± 60	-1.09 ± 0.21	4713	4570	4402	136112	5520239
Warkworth, WA94-2B	AA24230	7135 ± 70	-3.57 ± 0.21	6195	6000	5839	136112	5520239
Warkworth, WA94-2B	AA24229	7615 ± 70	-3.2 ± 0.21	6631	6458	6258	136112	5520239
Warkworth, WA95-3	AA24222	7880 ± 65	-5.1 ± 0.21	7037	6771	6590	136101	5520232
Warkworth, WA95-3	AA24221	7905 ± 60	-4.69 ± 0.21	7035	6807	6643	136101	5520232
South Northumberland limiting dates								
Cresswell, CR951	UB3907	3511 ± 38	1.72 ± 1.12	1936	1827	1738	132440	5514260
Tyne sea-level index points								
Cowen Road, CRB96-3A	AA23822	7795 ± 85	-5.68 ± 0.21	7027	6633	6452	140136	5457367

Table 3.2 Summary of SLI points and limiting data from Northumberland. RSL is calculated as altitude minus the reference water level. The RSL error range is calculated as the square root of the sum of square of altitudinal error, sample thickness, tide level error and indicative range.

3.4.3 Seaham – Saltburn (SMP Cell 1c)

Much of the reconstruction of Holocene RSL change within this area has occurred from the sedimentary basin surrounding the Tees; namely within the low energy environments of the Tees Estuary and Hartlepool Bay producing 30 SLI points (Table 3.3 and fig. 3.7) and the RSL curve shown in Figure 3.8. The limestone cliffs to the north and south of Hartlepool do not provide archives of past sea level. At present, there is no Holocene chronology for the main County Durham coastal dune system at Crimdon.

At Hartlepool Bay, peat beds exposed at several locations in the intertidal zone are the visible element of a series of intercalated Holocene clay, muds and organic material. A basal peat, thought to be laid down prior to 5050 yr BC provides the earliest evidence for sediment deposition during a period of rising sea level (Horton *et al.*, 1999a). Evidence for the earlier coastal history of the area is thought to have been buried by dunes or exist beyond the present day intertidal zone; though peat retrieved from trawlers beyond the low tide mark suggest a freshwater/wetland environment in Hartlepool Bay during the early Holocene (Waughman *et al.*, 2005).

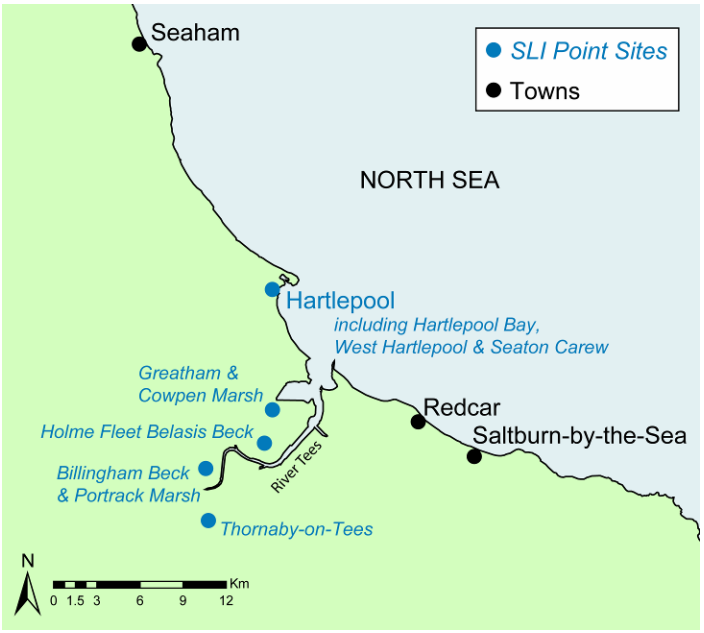


Figure 3.7: Location of SLI points from raised peat deposits within SMP Cell 1b

Transgressive overlaps record marine inundation of the peat as RSL rose towards the mid Holocene. Intertidal sedimentation is recorded by a thin silt near the base of saltmarsh deposits dated to 4050-4250 yr BC (Waughman *et al.*, 2005). Sea level rise continued until ca. 3550 yr BC when the biostratigraphy analysed from a series of intercalated silts and peats records a fluctuating RSL during the mid-Holocene highstand. Tooley (1978) records a switch from alder fen to freshwater communites of bulrushes and water lilly and later saltmarsh communities from ca. 3350 yr BC at Hartlepool Bay due to rising sea level. This complex stratigraphy is a combination of RSL change and local factors such as groundwater movements and adjacent land use changes (Horton *et al.*, 1999a). Figure 3.9 summarises the periods of mid Holocene RSL transgression and regression recorded at Hartlepool.

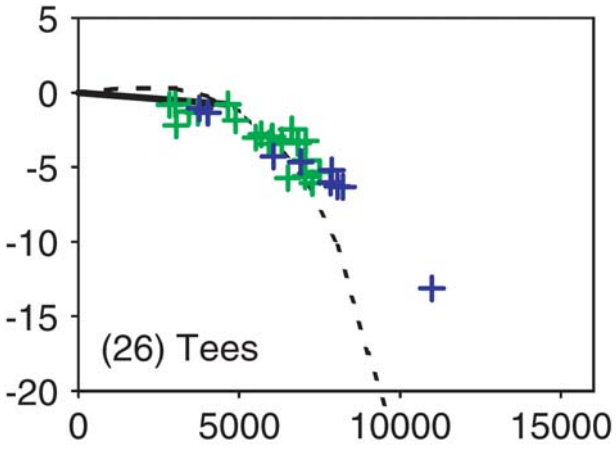


Figure 3.8 Sea level index points for Tees sites as calibrated age (yr BP) against change in sea-level relative to present (m) as reported in Shennan and Horton (2002). The best estimate of late Holocene sea level trend plotted as a solid line with the dashed line showing predicted modelled RSL change. + Basal index points; + Intercalated index points; + Limiting dates

In a similar manner to sequences along the Northumberland coast, Hartlepool Bay also records evidence of coarse-grained sediment deposited due to two high-energy events during the Holocene at ca. 4250 yr BC and ca. 2950 yr BC (Waughman *et al.*, 2005). It is possible that the later event resulted in a recorded negative tendency of sea level in the following centuries as the increased marine influence that accompanied this sediment deposition resulted in the formation of an intertidal environment. The evidence for RSL change during the last 2000 years is limited. A series of sand and organic deposits at Carr House Sidings would suggest three low amplitude fluctuations of tidal influence divided by two terrestrial phases since ca. AD 50 (Waughman *et al.*, 2005). The suggested period of reduced marine influence during the later phases of the Holocene may be a consequence of the establishment of dunes in a similar manner to those in Northumberland (Wilson *et al.*, 2001) by ca. AD 950 which formed during periods of static or regressive sea level.

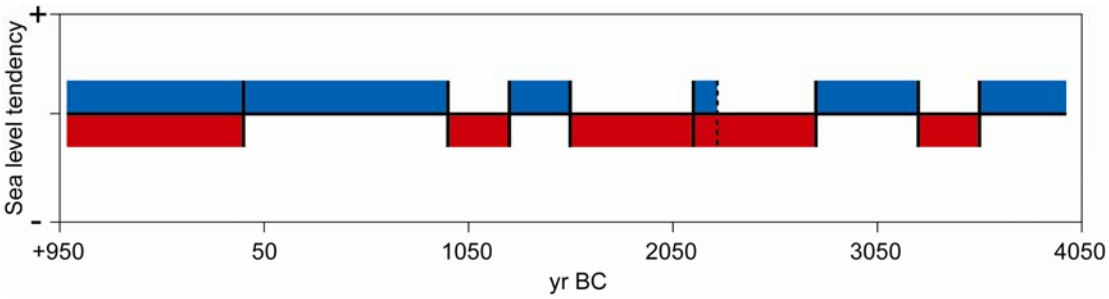


Figure 3.9 Diagrammatic representation of the fluctuations in RSL at Hartlepool Bay during the mid Holocene based on recorded tendencies of sea level moment by SLI points.

The sedimentary record in the Tees Estuary displays a very similar pattern of Holocene RSL change. Plater *et al.* (2000) describe a series of late Devensian glacio-fluvial sands and gravels and laminated silts and clays considered to be a consequence of a large ice-damned glacial lake in the Lower Tees Basin that formed during the retreat of the British

Ice Sheet. Collapse of this pro-glacial lake and establishment of the Tees channel resulted in the formation of the Tees Estuary at the end of the Pleistocene. During the late Pleistocene into the early Holocene, a resistant clay island existed in the lower Tees Estuary, which the post LGM eustatic sea level rise did not inundate until ca. 5350 yr BC (Plater *et al.*, 2000). Early Holocene (ca. 6050-8050 yr BC) sediments of sands and gravels, with some organic deposits, record a period of early Holocene sea level rise in the channels of the newly formed Tees Estuary representing both terrestrial and marine influence in the area (Plater *et al.*, 2000). Shennan (1983) records a SLI point at Thornaby-on-Tees suggesting early Holocene RSL (8450-9050 yr B) to be ~13m below present levels. From ca. 6050-550 yr BC a decelerating rate of rising sea level dominated sediment deposition in the Tees Estuary (Plater and Poolton, 1992). Shennan *et al.* (2000b) proposed a shift in tidal asymmetry in the mid Holocene that may have resulted in increased sediment accumulation between 5850-4050 yr BC. The spring tidal range increased from approximately 63% at ca. 6050 yr BC to 90% of its present magnitude by ca. 4050 yr BC. Within the outer estuary are a series of intercalated peat and tidal mud flat silts and clays from the mid to late Holocene (Horton *et al.*, 1999a). Deposited within these sediments are a series of sand layers where marine sand deposition replaced fine-grained tidal sedimentation between ca. 4350-1550 yr BC (Plater *et al.*, 2000). Terrestrial plant remains overlie tidal silts and sands as the rate of marine inundation decreased through the Holocene resulting in peat formation between 3950-4250 yr BC to 1650-1850 yr BC at Cowpen Marsh (Plater *et al.*, 2000). Brackish and fresh water lagoons existed at locations further inland, such as Billingham Beck, the location of the tidal limit from ca. 5550 yr BC (Plater *et al.*, 2000). Plater and Poolton (1992) record a major short-term change in sedimentation accompanied by a shift to marine diatoms at Cowpen Marsh thought to be a consequence of a storm surge at ca. 3150 yr BC.

From ca. 1050 yr BC the rate of sediment accumulation in the estuary increased. At Saltholme and Portrack Marsh Plater *et al.* (2000) record a transition from saltmarsh to tidal flats and more open marine influence at ca. 850 yr BC. Marine inundation also increased from ca. 1.7 kyr BC (Shennan, 1992) at Cowpen Marsh, previously terrestrially dominated, resulting in brackish to marine conditions (Plater *et al.*, 2000). Plater *et al.* (2000) also suggest that increased sedimentation in the late Holocene is a consequence of vegetation clearance and land use in the Tees Basin. The RSL curve for the Tees is constrained by 30 SLI points (Table 3.3) and at no point within the Holocene was the Tees RSL above present day levels (Shennan *et al.*, 2000c). During the mid Holocene RSL rose from ca. 5m to 1m below present (fig. 3.8). Model results suggest that during the late Holocene, the Tees has been subsiding at a rate of 0.38 mm yr^{-1} over the past 4000 years; with a best estimate of 0.17 mm yr^{-1} (Shennan and Horton, 2002).

3.4.4 Saltburn –Whitby (SMP Cell 1d)

Saltburn to Whity is dominated by Jurassic cliffs topped by Quaternary till, dissected by late Holocene sand deposits in small embayments, which, like the County Durham coast, largely do not preserve a record of Holocene RSL change. Shennan and Horton (2002) do not report any SLI points for the North Yorkshire coast. Considering the evidence from further north, as discussed above and SLI points reported in the Humber, it is likely that RSL rose rapidly in this area during the Holocene from approximately 15-20m below present at the Pleistocene-Holocene boundary and never exceeded present day levels in the late Holocene. An estimate of relative land subsidence over the last 4000 years in this coastal zone, based upon Shennan and Horton's (2002) modelled results of late Holocene relative land/sea level changes in Great Britain (fig. 3.10), is 0.2-0.5m yr^{-1}.

Site	Laboratory code	^{14}C age ± 1σ	Change in RSL (m)	Calibrated age (yr BC)			Longitude W	Latitude N
				Maximum	Mean	Minimum		
Tees sea-level index points								
Billingham Beck, BBC3	AA27200	7035 ± 75	-6.04 ± 0.21	6018	5903	5739	117559	5435341
Billingham Beck, BBC3	AA27201	7405 ± 70	-6.34 ± 0.21	6406	6277	6086	117559	5435341
Billingham Beck, BBC3	AA27199	6160 ± 70	-4.54 ± 0.21	5292	5107	4858	117559	5435341
Billingham Beck, BBC3	AA27198	6615 ± 70	-5.31 ± 0.21	5663	5557	5392	117559	5435341
Billingham Beck, BBC6	AA27202	6350 ± 95	-6.08 ± 0.22	5480	5327	5061	117506	5435179
Cowpen Marsh 01	SRR3706	7065 ± 45	-5.22 ± 0.22	6012	5933	5814	112580	5436510
Cowpen Marsh 01	SRR3705	5250 ± 45	-3.02 ± 0.21	4221	4068	3971	112580	5436510
Cowpen Marsh 01	SRR3704	3450 ± 45	-1.36 ± 0.21	1883	1767	1635	112580	5436510
Greatham Tioxide pipeline	HV18300	5830 ± 95	-2.45 ± 0.22	4905	4684	4459	112500	5437400
Greatham Tioxide pipeline	HV18299	4310 ± 70	-1.87 ± 0.22	3301	2945	2674	112500	5437400
Hartlepool Bay-4	HV18061	3685 ± 75	-1.36 ± 0.22	2290	2075	1879	111480	5440390
Hartlepool Bay-4	HV18062	3500 ± 75	-1.06 ± 0.21	2024	1825	1630	111480	5440390
Hartlepool Bay-4	HV18064	2865 ± 75	-0.78 ± 0.21	1258	1049	838	111480	5440390
Hartlepool Bay-4	HV18063	3210 ± 80	-1.28 ± 0.21	1684	1489	1306	111480	5440390
Holme Fleet Belasis Beck HFBB5	AA27203	7240 ± 90	-6.3 ± 0.21	6334	6105	5898	114010	5436196
Holme Fleet Belasis Beck HFBB11	AA27211	5165 ± 75	-3.43 ± 0.4	4220	3971	3784	114152	5436196
Holme Fleet Belasis Beck HFBB11	AA27210	2895 ± 75	-2.21 ± 0.21	1311	1091	895	114152	5436196
Portrack Marsh PMC5	AA27205	5710 ± 140	-5.74 ± 0.21	4900	4567	4254	116505	5434064
Portrack Marsh PMC5	AA27197	6160 ± 70	-5.62 ± 0.21	5292	5107	4858	116505	5434064
Portrack Marsh PMC5	AA27196	2710 ± 75	-0.84 ± 0.21	1043	881	766	116505	5434064
Seaton Carew Funfair	HV18298	4130 ± 95	-0.8 ± 0.25	2893	2705	2470	111070	5439250
Thornaby	HAR3711	9680 ± 110	-13.11 ± 0.24	9288	9035	8739	116460	5433360
West Hartlepool 11A	HAR3714	6050 ± 90	-4.68 ± 0.25	5226	4955	4722	111480	5440500
West Hartlepool 19	Q2663	4945 ± 50	-2.8 ± 0.24	3911	3730	3642	111320	5440290
West Hartlepool 19	Q2661	5975 ± 120	-3.41 ± 0.25	5208	4870	4551	111320	5440290
West Hartlepool 19	Q2660	6180 ± 100	-3.26 ± 0.25	5333	5121	4811	111320	5440290
West Hartlepool 19	Q2664	4770 ± 50	-3.02 ± 0.24	3649	3566	3377	111320	5440290
West Hartlepool 19	Q2662	5530 ± 90	-3.23 ± 0.24	4553	4379	4053	111320	5440290
West Hartlepool 2	HV3459	5240 ± 70	-2.97 ± 0.25	4304	4072	3823	111260	5440280
West Hartlepool 3	HV4712	5285 ± 120	-4.28 ± 0.24	4348	4120	3801	111490	5440500

Table 3.3 Summary of SLI points and limiting data from the Tees. RSL is calculated as altitude minus the reference water level. The RSL error range is calculated as the square root of the sum of square of altitudinal error, sample thickness, tide level error and indicative range.

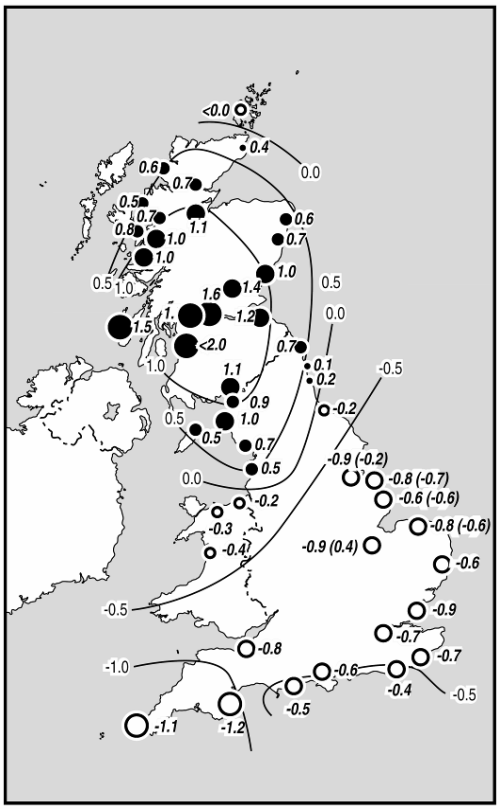


Figure 3.10 Late Holocene relative land-/ sea-level changes (mm yr^{-1}) in Great Britain from Shennan and Horton (2002). Positive values indicate relative land uplift or sea-level fall, negative values are relative land subsidence or sea-level rise. Figures in parentheses are the trends that take into account modelled changes in tidal range during the Holocene. Contours are drawn by eye as a summary sketch of the spatial pattern of change

3.5 Holocene palaeogeography of the North Sea

There is a close link between the Holocene history of the NE coast and the post-LGM transgression of the continental shelf in the North Sea. At present the only reconstruction of the Holocene palaeocoastline of the North East is from Shennan *et al.* (2000b) models of the North Sea, which we present within this section. Their models combine SLI points from the eastern coast of England and information from offshore cores with geophysical models incorporating ice-sheet reconstructions, earth rheology, eustasy and hydro- and glacio-isostasy, and estimations of previous tidal regimes to develop and test reconstructions of the palaeogeography of the North Sea. This then provides estimates of the location of the palaeocoastline through the Holocene as shown in Figure 3.11. The model ages are reported as median calibrated years BC.

3.5.1 9572 yr BC palaeogeography

At the start of the Holocene the North Sea coastline comprises the area of the Norwegian Trough and a western embayment extending south to the latitude of Flamborough Head (fig.3.11). The coastline is only a little east of the present coast of North East England. In most of Scotland there is the prediction of intertidal

sedimentation inland of the present coast.

There are few observations of this age to test this reconstruction. The sea-level index point dated 11162-11012 yr BC from core 53/+00/889 off Flamborough Head (Shennan *et al.*, 2000b) indicates that the western embayment (fig. 3.11) was inundated well before 8050 yr BC. Marine shell material from the Geordie Trough, off NE England, dated at 8748-8356 yr BC (Harland and Long, 1996), also accord with this reconstruction. Freshwater peats from the Well Bank, ENE of Norfolk, with Late Devensian pollen assemblages, dated to 11320-11179 yr BC in core 53/+02/1495 (Shennan *et al.*, 2000b), and from deep river channels in the Fenland (Waller, 1994), simply concur with the prediction of those areas being inland of any tidal influence.

3.5.2 8162 yr BC palaeogeography

By this time the western embayment had extended south, to off Spurn Point, and then east to produce a shallow estuary to the south of the Dogger Bank (fig. 3.11). This reconstruction is similar to that proposed by Jelgersma (1979). The earliest sea-level index point from the river Tees (Table 3.3) agrees with the prediction that the coastline of North East England lay very close to the present, with tidal waters extending into the estuary. The five index points from the Well Bank, off Norfolk (cores 53/+02/1398, 1399, 1400, 1496, 1947) (Shennan *et al.*, 2000b), dated between 8452 and 7974 yr BC lie at the head of the bay that extends north of the Strait of Dover. Core 53/+01/1567 records the extension of the bay to the northwest at 7963-7979 yr BC as sea level continues to rise.

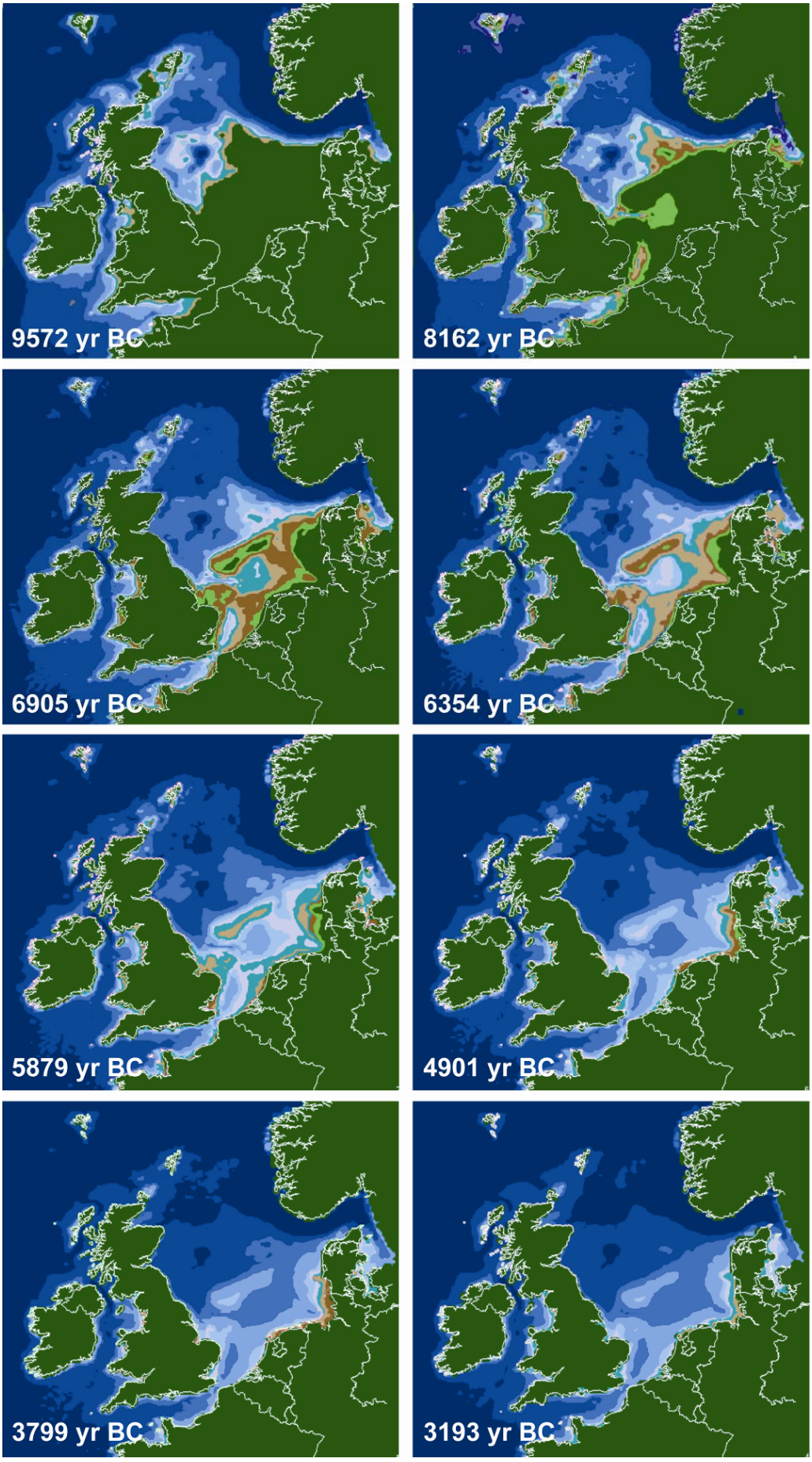
3.5.3 6905 yr BC palaeogeography

The reconstruction indicates that the North Sea was now connected to the English Channel via a narrow strait ENE of Norfolk and west of Texel (fig. 3.11). The Dogger Bank becomes cut off from the European mainland during high tides. It seems likely that the tidal regime around this time in the southern North Sea could be rapidly changing as the different tidal channels developed. The sea-level index point from the north side of the Dogger Bank, dated 7238-7057 yr BC in core 55/+02/213VE, (Shennan *et al.*, 2000b) shows good agreement with the model predictions, as do the observations from Northumberland–South and the River Tyne (Table 3.2). The model suggests that the first incursion of tidal water to the north Norfolk coast is from the east, from the deeper water eventually connecting to the English Channel. To the north there is still land above highest tides. The samples (Shennan *et al.*, 2000b) from cores 53/+01/1530 and 52/+01/2699, 7034-6824 yr BC and 6500-6379 yr BC respectively, and that from Warham Marshes in north Norfolk, 6465-6256 yr BC (Shennan et al., 2000b), record the continuing transgression over the next 500 years.

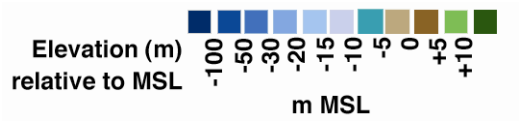
3.5.4 6354 yr BC palaeogeography

The model predicts that by 6354 yr BC all the estuaries of the east coast could have some

Figure 3.11 Palaeogeographical reconstructions of North West Europe from Shennan et al. (2002b). Elevations (meters) relative to Mean Sea Level (MSL); depths below MSL are given as negative. Ages given as median calibrated years BC.


9572 yr BC
8162 yr BC
6905 yr BC
6354 yr BC
5879 yr BC
4901 yr BC
3799 yr BC
3193 yr BC

-


Elevation (m)
relative to MSL
-100
-50
-30
-20
-15
-10
-5
0
+5
+10
m MSL

tidal influence from high tides. The ages of the first sea-level index points for the Humber estuary, Lincolnshire Marshes, Fenland and Norfolk Broads (Shennan *et al.*, 2000b) are from well-developed salt marsh peats rather than indicators of the first saline water into an estuary and their younger ages are not at odds with the model. There are extensive intertidal flats from Flamborough Head to north Norfolk. The channel separating north Norfolk from mainland Europe is only 5 to 10m deep at mid-tide and the channel between the Dogger Bank and mainland Europe was less than 5m below MSL in parts (fig. 3.11).

3.5.5 5879 yr BC palaeogeography

Wide intertidal areas are still predicted for the areas off the Humber estuary, Lincolnshire Marshes, Fenland and north Norfolk (fig. 3.11), which agree with the sea-level index points based on saltmarsh peats for these areas (Shennan *et al.*, 2000b). The Dogger Bank is only exposed at low tide.

3.5.6 4601 yr BC palaeogeography

By this time the Dogger Bank is submerged at all stages of the tide and the western margins of the North Sea are close to or inland of the present coastline (fig. 3.11), as indicated by the many index points available (Shennan *et al.*, 2000b).

3.5.7 3799, 3193 and 1228 yr BC palaeogeographies

From ~4000 yr BC to the present, relative sea level increases gradually in the western North Sea south of the River Tyne, but rises to above present to the north to a maximum after ~3500 yr BC (Shennan *et al.*, 2000c). Such changes in water depth and coastline configuration do not show clearly at the resolution of the reconstructions illustrated (fig. 3.11) and reference should be made to the local histories made in Section 3.4.

3.5.8 Tidal changes during the Holocene

The approach to tidal modelling adopted by Shennan *et al.* (2000b) is very similar to previous studies whereby models developed for the present (Flather, 1976), predict tides for past bathymetries and coastline configurations (e.g. Austin, 1991; Hinton, 1992). The major differences in comparison to previous studies is the use of bathymetries and coastlines based on modelling of differential isostatic rebound and including up to twenty-six tidal harmonics, rather than one or six (Austin, 1991; Hinton, 1992; Hinton, 1995; Hinton, 1996).

The models predict an increase in tidal range for the western North Sea during the Holocene. This coincides with the time of major changes in palaeogeography (fig. 3.11). At 6050 yr BC the coastline only lay near to the present coast of Yorkshire, north of Flamborough Head, with a tidal channel extending south towards the present Wash (fig. 3.11). Off Flamborough Head high tide level was *c.* 1.6m above mean tide level at 6050 yr BC, rising to 1.9m at 5050 yr BC, 2.1m at 4050 yr BC and only a little higher at 3050 yr BC. Holocene changes in high tide level for Northumberland-South and the Tees Estuary both record an increase in high tide level, and tidal range, through the Holocene. For example, the MHWST for Northumberland-South increases from 0.91m above RSL at 6050 yr BC to 1.88 m above RSL at AD 950. These model results allow a fuller

regional picture of the RSL and coastal changes that occurred during the Holocene in NE England.

3.6 Potential for further work

The wide range of data presented above has allowed the reconstruction of Holocene coastal evolution and RSL change along the NE coast. There are areas however, where further work would improve understanding of local and regional horizontal changes in the palaeocoastline. The contemporary geology of the NE coast is well documented by the British Geological Survey (2007). To be able to provide a more comprehensive map of local and regional palaeocoastline position beyond that produced by Shennan *et al.* (2000b), requires a series of Holocene geomorphology maps to be produced as to how the geology has altered over time in response to RSL changes.

A limitation of palaeoenvironmental data is its limited use in the late Holocene when intensive anthropogenic activity on the landscape disturbs the environmental record. Further work is required to combine historical records of coastline configuration and environmental change with evidence derived from the landscape to provide additional RSL data for the late Holocene period before instrumental monitoring comes into use. Combining both these geological and historical records will improve estimates of palaeogeography of the NE coast.

Increasing the spatial and temporal resolution of vertical and horizontal changes of the coast will also have implications for the modelling of coastal change. Shennan *et al* (2000b) acknowledge that there is little justification in increasing the sophistication of models if there are no data to test their output. Additionally, detailed palaeogeography will aid future modelling work where the next steps are to investigate sediment movement, particularly with regard to tidal changes through estuarine environments and bays such as those at Druridge and Hartlepool. Shennan *et al.* (2003) have already demonstrated such possible improvements by using an integrated approach to higher resolution coastal modelling in the Humber Estuary.

3.7 Conclusions

During the Holocene the NE coast experienced varied RSL. From the late Upper Palaeolithic to the mid Holocene all areas of the coast was subjected to marine transgression due to global eustatic sea level rise as a consequence of the melting of the ice sheets of the LGM. Shennan *et al.*'s (2000b) model results of the palaeogeographical changes of the North Sea show the degree of horizontal coastal movement since 9050 yr BC to be limited compared to elsewhere along the east coast of Great Britain, though still in the order of several kilometers. The vertical changes have been quite large with sea level rising from *c.*20m below present levels at the start of the Holocene. During the mid Holocene sites along the north Northumberland coast experienced sea level up to 2.5m above present day levels. From north to south the highstand level reduced with RSL not surpassing present day levels south of the Tees. In addition, the environmental and modelled data suggests that the mid Holocene high occurred later along the southern NE coast. In the late Holocene, RSL changes are dominated by the spatially varied response to isostatic adjustment with areas north of the Tyne uplifting and to the south subsiding. The late Holocene also offered the primary period of dune development, particularly during periods of climatic cooling and static or falling sea levels. It is clear that during the Holocene there were several high-energy coastal events depositing coarse-

grained material at several locations. The differential geology from Berwick to Whitby results in a varied response to these Holocene sea level changes with the contemporary coast consequently dominated by varied environments including cliffs, rock platforms, bays, salt marshes or dune systems. Overall, the Holocene coastal history of the NE coast is characterised by a terrestrial regression forcing coastal communities further inland over time.

CHAPTER 4

The wider context of the coastal archaeology of NE England

4.1 The Prehistoric Period [1]

4.1.1 Early Prehistory

Between *circa* 24000 and 13000 cal BC an ice sheet originating in southern Scotland and northern England spread south as far as the Midlands. If there has been any human settlement in the NE before this the ice sheets removed all evidence. This advance marked the maximum stage of the Last Glaciation, and is known as the Dimilington Stadial after a site in Holderness. The ice sheet reached its maximum extent *circa* 16000 cal BC but had mostly wasted away except from the extreme uplands by about 11000 cal BC. A return to cold conditions resumed between about 9000 and 8000 cal BC (Jones and Keen 1993, 171) but it is unlikely that much of NE England experienced glacial conditions at this time. The earliest unequivocal evidence for a human presence in the region comes with this melting of the ice.

This earliest evidence comes from a group of bone and antler tools found in Victoria Cave near Settle in North Yorkshire, several of which have been radiocarbon dated. It appears that small bands of hunters began to shelter in the cave from about 12,000 BC onwards, during the latter part of the Lateglacial Interstadial. This was not an isolated case but part of a wider movement, similar finds having been recovered from Kinsey and Kirkhead caves to the west while an antler spear point from Gransmoor to the east has also been dated to about 12,000 BC (Tolan-Smith, C. and Bonsall 1999). These hunters belonged to the Late Upper Palaeolithic and stone tools ascribed to this period have been found as far north as the valleys of the rivers Tees and Tyne. This extension of settlement towards the north was part of a movement taking place on a Continental scale, the spread of population in the British Isles being paralleled by similar movements in the Low Countries and Scandinavia. At this time the low sea levels of the Lateglacial meant that Britain remained joined to the Continent, the bed of the North Sea being a vast area of low lying ground consisting of gravel ridges, wide estuaries and salt marshes (Chapter 3 and Coles 1998). The discovery of an antler spear point similar to that from Gransmoor in the net of a trawler fishing on the Leman and Ower Bank documents the presence of humans and stresses the unity of this movement into the more northerly latitudes of western Europe.

In NE England the landscape at this time was mainly open, the pollen record being dominated by grasses and shrubs such as crowberry. In certain locations, such as on the modern coastal plains, around the margins of Lateglacial lakes and in sheltered valleys birch woodlands were becoming quite extensive.

The first arrivals moving into this landscape were pioneers in the true sense of the word moving into an unfamiliar world the opportunities and dangers of which had to be learnt about. Their impact on the landscape was slight and is likely to have been mainly in the

[1] This section is to a large extent based on Tolan-Smith 2006

temporary disturbance of game herds and the rather more long term disruption of vegetation in the vicinity of their campsites. The need for firewood to provide warmth, light and protection from predators was of paramount importance in determining where a band of hunters could halt and the exhaustion of supplies of firewood was a major incentive to move on. In the sparsely wooded landscape of the Lateglacial, human impact on the vegetation may not have been totally insignificant. We may be certain that areas with a good supply of firewood would become well known and would have quickly emerged as specific named 'places' to which groups would return at intervals. It is also likely that areas of disturbance would be recognisable to other groups and would have contributed towards the emergence of a proprietorial sense of territory.

4.1.2 The Mesolithic Period

The earliest securely dated evidence for a human presence in the NE comers from the Mesolithic site at Howick on the Northumberland coast which has been dated to *circa* 7800 cal BC. The evidence at Howick consisted of a large number of stone tools and traces of an oval hut. This site, and its relationship to the coastal landscape, is considered, in detail in Chapter 8.

The Mesolithic, or Middle Stone Age, people who settled at Howick were hunter-gatherers who had to adjust their economic strategy to the seasonal variability of resources. Whether this involved the degree of mobility once supposed, based on ethnographic parallels mostly derived from environments such as sub-Saharan Africa, Australia and the Arctic, is open to reconsideration. Conditions in temperate mid-latitude Europe may have allowed a greater degree of sedentism, particularly for those groups based on the coast, but demonstrating the year-round occupancy of a site is rarely possible. What is certain is that hunting and gathering 'task groups' roamed widely, foraging across territories that could be tens or hundreds of kilometers in extent.

An insight into the degree of mobility experienced by these hunter-gatherer task groups is provided by the distribution of raw materials. Over 70% of the raw material used for flint working on Mesolithic sites in the Wear Valley originated in the Yorkshire and Lincolnshire Wolds (Radley and Mellars 1964). Mesolithic flint scatter sites are evidence of a penetration of the uplands by groups from the coastal lowlands. Evidence of this deep penetration is provided by a number of sites at significantly higher levels such as Warcock Hill at 380m and Lominot at 426m, both in the Pennines west of Huddersfield. The finds from these high level sites are mostly of hunting equipment, or the debris produced in its manufacture. Given the hostility of the climate on such upland fells, and it would have been even more rigorous at times of low sea level, it is assumed that these sites were occupied during the summer by groups who spent other times of the year in the river valleys or by the coast.

Today, the uplands of the Pennines and North York Moors are characterized by openness where broad expanses of heather extend from horizon to horizon. They are regarded as 'areas of outstanding natural beauty' and have been formally designated as such where they lie outside the boundaries of the various National Parks. As landscapes they are certainly outstanding and in the eyes of many also beautiful but their status as 'natural' requires a closer look. At the time the Mesolithic hunter-gatherers were probing the uplands of Teesdale, Weardale and Tynedale these fells were less open than today and were being

aggressively colonized by scrub vegetation consisting mainly of hazel and birch. There is good evidence from the study of pollen cores from both the Pennines and from similar locations in the North York Moors, that steps were being taken to check this development and that hunter-gatherers were using fire to create and maintain clearings and suppress the tree line (Simmons 1996, 5). Although this may at first seem to be a rather destructive activity it is well established that vegetation quickly recovers after burning and that the fresh new growth is highly nutritious. Such areas of new growth would undoubtedly have been attractive to game and would also have facilitated both the search for and the pursuit of it. It is also the case that burning stimulates the hazelnut crop and hazelnuts are one of the few plant foods regularly recorded on Mesolithic sites.

In the uplands, as in the lowlands, the pattern of land use during the Mesolithic was one of the seasonal movement of hunter-gatherer task groups making tactical use of a range of resources as they became available. In both contexts landscape modification and manipulation was taking place but whereas in the lowlands the cycle of clearance was matched by one of regeneration, in the uplands, with their thin soils, clearance was followed by degeneration. In many of these areas once the tree cover had been removed it was unable to re-establish itself. Against a background of a generally deteriorating climate after about 8000 BC the long term trend was the development of heather-grass moorland on mor humus soils. These upland landscapes, so admired today for their openness, are partly artefacts of human endeavour.

4.1.3 The Neolithic and the Early Bronze Age

Two of the most significant developments that have affected the landscape over the past ten thousand years are the Industrial Revolution of the C18 and C19 and the adoption of farming, also regarded as a revolutionary change, during the fourth millennium BC. At 5000 BC England was a land of hunters and gatherers and had been so for at least seven thousand years. Over those millennia the landscape had evolved into a mosaic of open uplands, areas of secondary woodland regeneration and primeval wildwood, although by the end of the sixth millennium the latter may have been in rather short supply. Dotted across this landscape were clearings at various stages of regeneration, some freshly cleared others reverting to impenetrable scrub but all clearly bearing the signs of human activity. A view towards the horizon in any direction would have revealed columns of smoke, either from camp fires or from areas of woodland being cleared, perhaps for a second or third time. However, by recent standards, the population was sparse. Precise figures are unattainable but a reasonable estimate would place the population of the NE between 250 and 500 people living in groups of various sizes which probably fluctuated throughout the year (Smith 1992). By 4000 BC food production, or farming, had been adopted in many areas and the old symbiotic relationship of the hunter-gatherers and their landscape was to change for all time.

In British prehistory the introduction of farming is associated with the Neolithic period, or New Stone Age, and the transition between these two periods has for long been regarded as fundamental. Although the species of crops and domestic animals involved were not native to Britain and had to be introduced from outside, perhaps involving some limited immigration by colonists from Continental Europe, it is thought that this was a piecemeal process and that the spread of farming was mainly due to the selective adoption of novel resources and practices by indigenous Mesolithic communities. It is likely that some

population movement and displacement did occur as groups adopting Neolithic practices sought the most favourable land, but this was a gradual process spanning generations and the old rigid distinction between the hunter-gatherers of the Late Mesolithic and the farmers of the Neolithic can no longer be maintained. Hunting and gathering continued long after the end of the Mesolithic with some Late Mesolithic practices such as forest clearance, the stimulation of the hazelnut crop through burning and the selective culling of herds of herbivores, prefigured primitive farming in their impact of the landscape. As in the Mesolithic, sources of raw materials used in the Neolithic were widely scattered. For example, 45% of the stone axes found in Yorkshire are made from material quarried at Great Langdale in the Lake District while small numbers come from as far afield as North Wales and the Whin Sill in Northumberland. This period continues to be one of mobility, of communities continuing to hunt and gather but also beginning to practice some herding and possibly sowing a few crops in small clearings.

There is little direct evidence for farming practices in the NE during the Neolithic or even in the subsequent Early Bronze Age. Disturbance of the vegetation can be identified in some pollen profiles but it is not known whether this was to create primitive fields or simply a continuation of Mesolithic woodland management. It is also the case that the pollen profiles in question mainly come from upland locations which are unlikely to have been particularly attractive to early farmers. Woodland management or clearance is implied by the discovery of stone axes which, although also found in Mesolithic assemblages, are a key artefact type of the Neolithic. A study of the distribution of Neolithic stone axes from Northumberland and County Durham has revealed an interesting pattern (Burgess 1984, 133-7). Few finds have been made either on the heavy boulder clay soils of the coastal plain or in the uplands above 300m. The most favoured locations appear to have been the upland fringes around the 120m contour and the south facing slopes of the major river valleys. These axe finds may document the main areas of Neolithic agricultural activity.

An extensive programme of archaeological field survey in the Tyne Valley has documented widespread evidence for Late Mesolithic and Neolithic and Early Bronze Age activity (Tolan-Smith, C. 1996). While this evidence was widespread two interesting, albeit tentative, conclusions emerged from the analysis of these data. First, that whereas evidence for Mesolithic activity could be found almost anywhere evidence from the Neolithic and Early Bronze Age was more restricted. Typically, the *foci* of activity during these later periods tended to be in locations with a south easterly aspect situated at altitudes of between 100m and 130m above sea level and between 1.5km and 2.5km from the River Tyne. Secondly, there was found to be a less than expected degree of overlap between Mesolithic activity and that during the Neolithic. As communities began to invest an increasing amount of effort in food production they will have become more sedentary; crops take months to ripen and herds need to be closely controlled or confined for their own security. It is also the case that whereas during the Mesolithic it was possible to hunt and gather widely, some parts of the landscape, in terms of soil type, drainage and aspect, are more suited to farming than others. Areas in which the primeval wild wood had been replaced by impenetrable secondary scrub would be found to be particularly unattractive to early farmers. These factors can be held to account for the more concentrated nature of evidence for Neolithic and Early Bronze Age activity and for the lack of overlap with the Mesolithic.

Notwithstanding these distinctions, the landscape of the Neolithic differed little from that of the Late Mesolithic. With the exception of the uplands, which remained open, the landscape was still mainly wooded though most of this woodland was now secondary and some areas were probably choked with scrub. Inroads were also being made into the woods by the depredations of browsing and grazing livestock. Clearings were the main evidence for human activity and these were kept open for longer periods until soil exhaustion required an episode of abandonment. In some favoured areas clearings became more numerous and coalesced to form larger open spaces. Clearing land for cultivation involved an investment of labour that communities are unlikely to have wanted to squander, a concomitant of which will have been a growing proprietorial sense. Whereas hunter-gatherers world wide express a sense of identity with the landscape and see themselves as part of it, in the case of farmers this sense of identity manifests itself as territoriality. Farmers own land, hunter-gatherers dwell in it.

As we have seen, if it was simply a matter of reviewing landuse practices it would be difficult to draw a distinction between the landscapes of the Mesolithic and the Neolithic and Early Bronze Age. An exception might be granted in the case of the spread of cleared land, although in the NE clearance remained on a small scale until at least the later part of the Bronze Age. What does enable a clear distinction to be drawn is the construction of ritual or symbolic landscapes, a wholly new phenomenon. While we know that hunter-gatherers imbue their landscape with deep symbolic significance it is not until the Neolithic and Early Bronze Age that communities began to modify the meaning of their landscapes through the construction of ritual and symbolic monuments, sometimes on a vast scale.

Throughout the British Isles one of the defining components of the Neolithic and Early Bronze Age is the construction of burial monuments, initially to accommodate multiple burials but by the end of the third millennium often containing just a single interment, probably of a high status individual. In the NE the early stage in these developments is best represented by the earthen long barrows A recently investigated site of this type is that at Street House, Loftus in the former county of Cleveland, dated to *c.*3600 BC (Viner 1984). Further north, the stone built long cairns of Northumberland, such as the Devil's Lapfull at Kielder , are probably equivalent structures, though none of these have been studied in recent decades (Masters 1984).

Burial monuments were not the only artificial structures in the landscape of the fourth and third millennia BC. In southern and central England hill tops and promontories were enclosed by circuits of earthwork banks and discontinuous ditches known as causewayed enclosures. These sites were probably the scene of both secular and ritual activities and almost certainly functioned as central places to which communities were drawn from a wide area. No certain example of a causewayed enclosure has been identified in the NE, though two Neolithic ditch segments identified below the Roman fort at South Shields have been advanced as a possible candidate.

This is not the case with the second category of earthwork enclosure dated to the Neolithic and Early Bronze Age, henge monuments, and a major group of henge monuments has been identified in the Milfield Basin in Northumberland. Henge monuments consist of circular or oval enclosures surrounded by a bank and a ditch which is usually on the inside of the bank, indicating that a defensive function is unlikely. Henge monuments can have one or two entrances, in the latter case usually on opposite sides, and in their interior can include a

variety of structures in either stone or timber. Stonehenge is, of course, the most famous example though it is unique in the elaboration of its internal structures. Most henges incorporated simple circles of undressed stones, timbers or even pits. Their size varies enormously with diameters ranging from over 500m to a little over 10m and they are commonly associated with monuments of other kinds including burial mounds and the enigmatic cursuses, pairs of parallel ditches running for hundreds, and sometimes thousands, of metres across the landscape.

The Milfield Basin is about 35km^2 in extent and lies below the north east flank of the Cheviot hills in the north of Northumberland, 23km south of Berwick-upon-Tweed. It occupies the site of Lateglacial Lake Ewart and consists mainly of alluvial soils and gravel terraces. Research over more than a century has recorded, on the ground or from the air, traces of six henge monuments in a linear arrangement extending for 2.5km down the western side of the basin while a seventh example lies 2km to west in the valley of the River Glen at Yeavering (Harding 1981;Waddington 1999). These were all earthwork structures, now mainly ploughed flat, and incorporating arrangements of posts and pits within their interiors. They are also associated with other monuments including burial mounds, alignments of pits and a putative 'processional way' linking the henges. These henges vary in size with overall diameters ranging from 100m at Coupland to 35m at Milfield North. Numerous radiocarbon dates have been obtained and it appears that the complex was at its most developed between *circa* 2400-200 cal BC, though significantly earlier activity is reported from the Coupland henge. The extent and inter-related nature of the Milfield complex implies that these monuments were erected in an open landscape, a view supported by pollen analyses from the area. These data also testify to small scale clearance for agriculture taking place during the fourth millennium BC with a significant expansion out of basin into the surrounding uplands during the later third millennium when the monument complex was at its most fully developed.

As elsewhere in England the floruit of henge building had passed by the end of the third millennium and other, also probably ceremonial, structures had begun to take their place. The best known are the stone circles, some of which were erected within earlier henges. However, stone circles are rare in the NE with only one possible example recorded from County Durham. Northumberland is rather better served with several classic, albeit small, circles such as those at Threestone Burn and Duddo, both near Wooler with thirteen and five stones respectively. There are also several settings of just four stones such the Goatstones near Simonburn.

What the region lacks in stone circles is compensated for by the richness of its Neolithic and Bronze Age rock art. Throughout the sandstone areas of Northumberland numerous rock surfaces have been carved with groups of semi-circular hollows known as cup-marks which are often surrounded by one or more rings, giving rise to the term cup-and-ring marks. No convincing explanation has been suggested for the meaning of these carvings and in recent years research has tended to focus on their context within the landscape. It has been found that they are not randomly scattered but are usually sited at significant or prominent places such as on scarp lines, on cols or at locations where several valleys converge. They may have been territorial markers or recorded a mythological dimension to contemporary communities' experience of the landscape.

Round barrows or cairns of Early Bronze Age date are widespread in the NE, occurring singly or in cemetery groups. Size varies considerably, some being up to 20m across and incorporating numerous inhumations and cremations while others are tiny by comparison, such as the recently excavated ring cairn at Birkside Fell in the North Pennines which is only 4m in diameter and covered a single cremation in a pottery urn (Tolan-Smith, C. 2005). Evidence from buried soils and pollen analysis suggests that these barrows and cairns were erected in open country or at least in substantial clearings and they were often sited in prominent positions along the skyline. This latter observation emphasises the fact that they were intended to be seen from afar and became prominent features in the landscape.

The floruit of the great henge monuments occurred during the third millennium BC and by the middle of the second millennium most were in decline or had been abandoned to become overgrown by scrub. From this we can infer that the focus of spiritual activity had shifted, although we have little evidence as to where. There certainly seems to have been an increase in interest in natural places such as bogs and rivers as evidenced by finds of high status metalwork which are assumed to have been ritually deposited. However, the archaeological evidence for activity during this period, conventionally through the Middle and Late Bronze Age and into the Iron Age, consists of the remains of settlements and field systems marked out by permanent boundaries. Whereas during the Neolithic the landscape remained mainly open by the middle of the Bronze Age we have evidence for the beginnings of an enclosure movement.

Most of the available evidence comes from upland locations but we may safely assume that this is an accident of survival, similar evidence from low lying locations having been obliterated by later developments. Conditions for agriculture in the uplands remained good until the middle of the second millennium and the huts and fields we can see today, on the ground and in aerial photographs, mark the 'high-water' mark of prehistoric agricultural expansion. The huts survive as roughly circular banks of stone 3m to 8m in diameter, giving rise to the generic term 'hut-circles'. Numerous excavated examples have been shown to have originally been built in timber, the use of stone representing a rebuilding and perhaps implying a shortage of woodland resources once the initial phase of expansion had passed. They can occur singly or in groups of up to twenty and are found scattered on hillsides, within simple enclosures or contiguous with the enclosure walls. The enclosures within which hut-circles are situated, or onto which they open, can be regarded as farmyards within which livestock could be corralled and produce stored. Other enclosures make up the associated field systems, of which two types can be identified. In both, boundaries are made up of stones cleared from the surface of the fields, and in some cases these amount to little more than linear clearance heaps. In one type the fields are irregular in outline and the system as a whole appears to have grown in piecemeal fashion out from an original focus. In others the fields are more regular consisting of groups of oblong enclosures. It is usually assumed that the irregular fields were intended to accommodate livestock and that the shape did not matter whereas the more regular fields were given over to the cultivation of crops. As all allotment holders know, it is easier to dig over a patch of ground by working systematically in straight lines. Further evidence for crop cultivation is provided by the development of lynchets formed by soil creep around the down slope margins and by the recovery from excavated hut-circles of hand mills, or querns for grinding grain.

Few of these hut-circles and field systems have been directly dated and as a type they span a considerable period. The climate had begun to deteriorate by the middle of the second millennium and by its end temperature had fallen by 2°C, the growing season had contracted by five weeks and the altitudinal limit for crop ripening had been lowered 150m. Even in the absence of radiocarbon dates we can assume that many hut-circle settlements at higher altitudes, must date from before this deterioration for them to have been viable.

4.1.4 The Late Bronze Age and the Iron Age

The deterioration in the climate towards the end of the second millennium and early in the first has for long been considered to have had serious consequences for the prehistoric communities of the NE. At one time it was thought that there may have been a wholesale abandonment of the uplands and there is something of a hiatus in the settlement record of the uplands in the centuries on either side of 1000 BC. However, it is more likely that while there was some contraction of settlement, communities dealt with the changing conditions by modifying their patterns of economic activity and social organisation.

In the first place some of the higher level settlements were abandoned and the communities involved moved to lower and more sheltered locations. This is, after all, why the high level evidence survives, being above the limit reached by all subsequent developments. However, the high moors and fells probably continued to be used but for pasture rather than crop cultivation with flocks and herds being moved between lowlands and uplands on a seasonal basis. Such livestock management may provide a context for some of the extensive linear boundaries and cross-ridge dykes noted in the uplands.

There also seems to have been a move towards a greater nucleation of settlement with larger hut-circle settlements regularly found to be situated within substantial enclosures, some of which take on a defensive aspect and can be classified as hil lforts. The defences in question very often consisted initially of no more than one or two timber palisades. As time passed these were replaced, first by timber framed ramparts of earth and stone and later by substantial drystone walls or concentric banks of dump construction. Where ground conditions allowed ditches were included in the defensive circuits. The replacement of wooded structures by others built wholly of stone may be a further indication of dwindling supplies of suitable timber.

The NE has many classic hill forts and although these are conventionally dated to the late first millennium and attributed to the Iron Age, excavation and radiocarbon dating has shown the origins of a number to lie in the earlier part of the millennium and they can be regarded as initially Late Bronze Age sites, iron not being widely introduced until the 6th century BC. The hill fort at Easton Nab overlooking the Tees Valley began life as a small Bronze Age palisaded enclosure.

The development of these nucleated settlements during the later Bronze Age and into the Iron Age offers an insight into patterns of social development. The need for elaborate and extensive defences implies a level of social unrest not hitherto encountered and the construction of the defences themselves required a massive input of labour implying a level of social organisation only previously identified in the context of henge building two millennia earlier. The population of the hill forts is difficult to estimate and depends on

whether the hut-circles within were occupied contemporaneously. Also the sites themselves vary greatly in size. The multiple ramparts of the small hill fort at Dod Law West, near Wooler in Northumberland enclose an area about 60m across within which can be identified the traces of nine hut-circles of which six may have been occupied at any one time (Smith 1990). At the much larger, 5.2 ha site of Yeavering Bell 8km to the west a single stone wall encloses about 130 hut platforms.

We know from classical sources that society in the NE during immediately pre-Roman times was organised on tribal lines, dominated by a warrior elite and it was such high status individuals who could command the input of labour required for large scale building projects. We also know from the same sources the names of the tribes in question, the Parisi in East Yorkshire and the much larger grouping of the Brigantes to the west and north. With these names the region begins to emerge from the shadowy anonymity of prehistory.

Everybody did not live in hill forts and from the middle of the first millennium BC large numbers of smaller settlements begin to appear, usually referred to as farmsteads. These consist of groups of hut-circles within enclosures which can best be described as farmyards rather than defensive works. Many show development through time, often from initial timber phases to rebuildings in stone and usually involving an increase in the number of huts. Many of the stone built farmsteads have been found to have been occupied during to the earlier part of the Roman period though they are regarded as a late prehistoric type. Farmsteads are particularly numerous in Northumberland where two types have been identified (Burgess 1984, 164-73). In both, groups of usually from two to six hut-circles lie within stone built enclosures which are broadly rectilinear in the case of the so called 'North Tyne' type and curvilinear in the 'Cheviot' type. These differences in ground plan should not be overstressed and probably simply reflect the prevailing topographical circumstances. Farmsteads of the Cheviot Type are often built on hill sides into which the hut-circles have been terraced at the upslope end. This probably facilitated drainage. In both Cheviot and North Tyne types the dwellings were approached by a stone built causeway leading from a single simple entrance. On either side of the causeway lay sunken yards.

Farmsteads are often associated with field systems, many of which include terraces formed by substantial lynchets implying a return to crop cultivation at relatively high altitudes. A marked improvement in the climate occurred between about 200 BC and AD 500 and farming settlements appear in the Pennines up to about 300m while in the Cheviots there is evidence for crop cultivation up to 400m. This latter evidence takes the form of parcels of small parallel ridges known as 'cord-rig', usually no more than 1.4m apart and easily distinguished form later medieval 'ridge-and-furrow' (Topping 1989). These ridges probably imply hand cultivation with a spade whereas the lynchets of the larger terraced fields more likely reflect the use of the traction plough. Most dated examples of cord-rig have been found to belong to the immediately pre-Roman period but some, by association with other features, may be significantly earlier.

The field systems associated with terraces or cord-rig often extend over several hectares but are usually focused on one or more farmsteads. However, in the Tyne Valley evidence has recently come to light of much more extensive systems running to tens or even hundreds of hectares (Tolan-Smith, M. 1997). These systems are characterised by groups of parallel boundaries often extending for several kilometres oblivious of the terrain, up hill and down

dale, divided by shorter boundaries running at right-angles, giving rise to the term 'co-axial' field systems. The major boundaries are sometimes aligned on pre-existing features such as Bronze Age barrows and systems can incorporate both curvilinear and rectlinear farmsteads. The absence of evidence for crop cultivation suggests that these systems were designed with livestock management in mind. Co-axial field systems are generally dated to the latter part of the first millennium BC but many exhibit, through realignments and adjustments, a degree of chronological depth that could imply origins significantly earlier. In the Tyne Valley, in the area between Newcastle and Corbridge, parallel boundaries run upslope for about 3.5km from the edge of the valley to the upland fell while other boundaries running at right-angles sub-divide the area into a brick-like pattern. This system can be dated to the late first millennium BC by the fact that several farmsteads of Iron Age or Romano-British date have been built onto its main axes.

This evidence for the spread of field systems has major implications for our understanding of the later prehistoric landscape of the NE. Field systems and settlements imply widespread clearance and throughout the region pollen profiles document major inroads into the remaining woodland. For example, a profile from Roxby on the North York Moors has been interpreted to indicate that by the late Iron Age only 12% of the landscape remained wooded while profiles from Fellend and Steng Moss in the Pennines indicate massive clearance from the 1st century BC onwards. By the end of the first millennium BC many areas in the NE were as open as they are today.

Most of the evidence for the landscape of the later prehistoric period comes from the uplands, comparable evidence from the lowlands having been obliterated by subsequent developments although some farmstead sites and field systems have been identified as cropmarks on aerial photographs.

When the Roman legions marched into NE England in AD 60s and 70s they beheld a landscape that was mainly open. From the earliest prehistoric times human communities had made inroads into the natural woodlands that had mantled most of the region from early in the Postglacial period. These clearings were at first small and short lived. However, as woodland regeneration occurred this did not lead to a re-establishment of the primary native wildwood but to secondary woodland and scrub. As time passed areas were kept open for longer and adjacent clearings gradually coalesced to form wider open spaces. By the late Iron Age most of the lowlands were divided into small fields defined by ditches and earthwork banks which were probably surmounted by hedgerows. In the uplands the boundaries consisted of stone walls. There was still plenty of woodland, but this was on slopes that were too steep to clear and cultivate and in the damp valley bottoms. Most of it was managed as a source of raw materials, probably employing coppicing regimes, or as wood pasture for stock. Amongst the fields were farmsteads linked by drove ways along which livestock moved between pastures and areas of fallow. In most areas fields were grouped into a patchwork of enclosures focused on a farmstead or group of settlements but in some areas co-axial field systems indicate a more wide ranging degree of organisation. Whether such developments reflect the exercise of coercive authority or community effort is unknown, but in NE the Romans encountered a society rigidly structured on tribal lines and dominated by a warrior elite.

4.2 The Roman Period[2]

The Roman conquest of Britain had began a generation earlier in AD 43 when the legions of the Emperor Claudius stepped ashore on the south coast. Although most of lowland Britain was overrun within a few months no attempt was made at first to bring the uplands of the north within the realm of the empire. Instead, following a policy widely used elsewhere, military security was provided through a system of alliances with native leaders. In the case of the NE the alliance was with the Brigantes, and in particular with the matriarchal head of the royal family, Queen Cartimandua. For nearly three decades in the middle of the 1st century AD the Brigantes enjoyed both the continuation of their independence and many of the material benefits of peaceful relations with the empire.

Recent excavations at the great complex of earthworks at Stanwick in North Yorkshire have shed much light on this interesting period. This site underwent a major phase of development over several decades from *circa* AD 50. Around an early undefended Iron Age site an extensive 240 ha enclosure developed out of existing boundaries, with an inner area of about 52 ha enclosed by massive defences consisting of a rampart and ditch 12.2m wide and 4.8m deep. This inner area represented the main focus of settlement and finds from the excavations include numerous exotic trade goods from the Romanised parts of Britain and further afield in the Empire. Although only a small part of it has been examined it is clear that Stanwick should be regarded as a town, or *oppidum*, and as such is the only true example in the NE. It is also regarded as the Brigantian capital.

As the Roman authorities were well aware, alliances with fickle tribal leaders were fragile affairs and when the Roman army, led by the governor Petillius Cerialis, finally moved into the north this was provoked by the revolt of a faction of the Brigantes. The phase of conquest was relatively short lived with few implications for the landscape. As the legions advanced temporary marching camps were constructed by the digging of ditches and the throwing up of earthwork banks. These latter may have been surmounted by palisades which could have led to tree felling in the immediate vicinity though the legionaries may have carried timber stakes with them for this purpose. Except in upland areas, such marching camps leave few traces on the ground and examples continue to be discovered in the lowlands through aerial photography.

These camps were temporary features and control in the post-conquest period was maintained through a system of garrison forts. Most garrison forts were new constructions, sited according to strategic requirements rather than the tactical considerations of a military campaign. Most forts were built to a standard pattern to house units of between 500-1000 auxiliary troops. Each consisted of an oblong enclosure about two hectares in extent with gates on each side and rounded corners, giving rise to a standard 'playing-card' shape. The interiors were occupied by barrack blocks and stores, with stables in the case of cavalry units. Two important buildings lay in prominent places in the centre of each fort, a commanders house built on the lines of a civilian town house and a headquarters building from which the administration of the garrison was undertaken. Latrines were provided at suitable locations where the slope of the ground facilitated flushing. Bath blocks, which presented a fire

[2] This section is to a large extent based on Tolan-Smith 2006

hazard, were usually built outside the main area of the fort. Initially, these garrison forts were built of earth, turf and timber and the quantities required must have been considerable, while there was a continual demand for fuel for heating. By the 2nd century most of the forts which continued in use had been rebuilt in stone. This probably implies both a recognition of the need to maintain permanent garrisons in the Brigantian area and a diminution in available supplies of building timber.

Between AD 78-85, under the governorship of Julius Agricola, the Romans attempted the conquest of the rest of mainland Britain with the legions pushing into the far north of Scotland. Many of the garrison forts in the NE were first established at this time including the line of nine forts built in the Tyne-Solway gap. These formed a major strategic system extending from Corbridge in Northumberland to Kirkbride on the Solway shore and were linked by the Roman road known as the Stanegate. The conquest of Scotland was a failure and by the third decade of the 2nd century the decision had been taken to build a permanent frontier slightly to the north of the earlier Stanegate system. Construction of Hadrian's Wall began in AD 122, probably on the direct initiative of the Emperor, and although the frontier works underwent many developments over the following two-and-half centuries, the initial phase from coast to coast was completed by the time of his death in AD 138 (Johnson 1994).

The Hadrianic frontier consisted of a number of elements of which the wall itself was just one component. Immediately to the north of the wall, except where it followed the precipitous crags of the Whin Sill, there was a substantial ditch with the excavated material dumped as an irregular discontinuous mound to the north. Two techniques were used in the construction of the wall. East of the River Irthing, in Northumberland, the wall was built with a rubble core and stone facing which may have been rendered. It stood about four metres high and was probably surmounted by a wall walk and parapet. To the west, in Cumbria, the wall was initially built in turf, though it was later rebuilt in stone. Every Roman mile there were small fortlets known as milecastles which provided access through the wall and between each milecastle were two turrets. Although not part of the initial plan, from an early stage in the development of the system forts were added to the line of the wall at about 10 km intervals. To the south, the frontier zone was marked by the construction of the *vallum*, a deep flat bottomed ditch between parallel banks of upcast. The *vallum* is regarded more as a formal line of demarcation than a component in the defensive system. Nevertheless, it could only be crossed easily at a series of purpose built causeways protected by gates and giving access to each of the forts. The forts themselves were joined by a road known as the 'Military Way'. To the south, the Stanegate and its line of forts continued to provide defence in depth while a number of outpost forts were built on roads leading north such as those at Risingham and High Rochcester in Northumberland.

The construction of Hadrian's Wall was a massive undertaking comparable to the major civil engineering works of the present day and its impact on the landscape was similar. With the exception of the rocky central zone, in almost every case where excavations have been undertaken it has been established that the frontier works were built in a cleared and farmed landscape. Some of this evidence consists of actual plough marks found under the wall and associated earthwork features but the fact that for virtually half its length it could be built initially in turf implies vast extents of open pasture, a fact confirmed by pollen analysis. Many Romano-British farmers must have found their lands bisected by the frontier works

and faced difficulties over maintaining access. In the Tyne Valley, extensive co-axial field systems of late prehistoric date have been shown to have been completely disrupted by the building of the wall (Tolan-Smith, M. 1997). Even in the rocky central zone the impact must have been acute and the settlement at Milking Gap near the fort at Housesteads found itself hemmed in between the wall and the *vallum*.

While the impact of the frontier works on the pre-existing landscape was considerable, this impact must have been exacerbated by the construction works themselves and inparticular by the demand for timber, vast quantities of which was used in the forts, milecastles and turrets. Given the open nature of the landscape at the time some of this must have been imported but attrition of the local woods continued apace. A pollen profile from Fozy Moss near the Sewingshields milecastle documents rapid forest clearance and an almost totally deforested landscape at c. AD 130 (Dumayne and Barber 1994).

The landscape impact of Hadrian's Wall continued beyond the initial phase of disruption and construction. It has been estimated that when fully manned the frontier works may have housed up to 30,000 troops who would have consumed up to 10,000 tons of wheat a year. This is the yield of about 12,000 ha and when it is remembered that an army does not 'live by bread alone' it seems inconceivable that the garrison could have been kept supplied from within the immediate vicinity of the frontier zone, or even from within the region as a whole. Indeed, excavations at the fort at South Shields, which became a major supply base in the 3rd century, have recovered samples of wheat of Rhineland origin. In a short space of time most forts acquired civilian settlements outside their gates, the *vici*. While some of the residents of these *vici* were probably farmers others were merchants or worked in the service industries, such as bar and brothel keepers, adding to the non-productive part of the regional population, but part that still needed to be fed.

Hadrian's Wall continued to be occupied in one form or another until the final decades of the Roman occupation. Its impact on the landscape of the frontier zone, both at the time and in subsequent centuries, is difficult to over emphasise.

However, the Roman occupation of the NE was not an entirely military affair and a visitor from outside the Empire would probably have been as much impressed by the network of roads and the bustling civilian settlements as by the military works, although the frontier zone would always have been an exception. Two main roads traversed the region from south to north, both starting from the major Roman centre of Lincoln. The more easterly route, Ermine Street, headed almost directly north at first and crossed the Humber at Brough. It them turned northwest to run along the western flank of the Wolds and North York Moors reaching the Tyne at Newcastle. The other route, known as Dere Street beyond York, followed a northwesterly course from the outset and, skirting the eastern foothills of the Pennines for most of its route, reached the Tyne at Corbridge where it formed a junction with the Stanegate. Dere Street proceeded further north with the main line striking northwest into Scotland while a branch headed north east, the so called Devil's Causeway, towards the Northumberland coast. Small urban centres grew up at key locations such as road junctions and river crossings.

As in the frontier zone, the implications for the landscape of these developments were twofold. First, the building works involved produced a demand for raw materials. Building

stone had to be quarried and clay dug for floor and roofing tiles. Above all there must have been an almost insatiable demand for timber, both for construction works but also to fuel the hypocausts of the central heating systems and bath blocks. Fuel was also a requirement of industrial developments. Pollen profiles throughout the region document further major inroads into the remaining woodlands. Secondly, the growing urban communities and the military garrisons produced a demand for food which could only be met by an increase in production. Throughout most of the region the late prehistoric system of mixed farming remained unchanged during the Roman period, though the reorganisation of some field systems may have been in response to the increased demand. The relationship of the Romano-British subsistence farmers to the market economy of the empire is most clearly documented by discoveries of exotic trade goods such as pottery, beads and brooches, on native sites. These were presumably obtained through trade at the *vici* and small towns.

It would be a mistake to over emphasise the effect of the Roman period on the landscape beyond the environs of the small towns and within the frontier zone. Throughout much of the region the pattern of landscape development that had been taking place for millennia continued. Woodland was further reduced in extent and what remained was probably more intensively managed. Most of the population lived in farmsteads, which although sometimes grouped in loose clusters could not be described as villages in the sense in which that term is used in later periods. Some late prehistoric nucleated settlements continued to be occupied into the early decades of the Roman period such as the Dod Law West hill fort in Northumberland which was still occupied in the 2nd century AD (Smith 1990), but in most cases hill forts were abandoned and the population either moved into farmsteads or gravitated towards the proto-urban settlements outside the Roman forts.

The Roman period in Britain is conventionally regarded as having come to an end in AD 410 with the withdrawal of the garrisons to defend other parts of the Empire, but in reality the system had been in decline since the middle of the 4th century. This was due in part to the inroads of restless peoples from beyond the frontiers such as the great incursion of Picts, Saxons and Scots which overran most of northern Britain in AD 367. A phase of deteriorating climate in the C4, which made it difficult to sustain the levels of production that had been attained during the C2 and C3, must also have contributed to the decline. The affects of rising sea levels were felt far upstream in most river valleys. The landscape legacy of the three-and-a-half centuries of Roman occupation consists mainly of the towns, many of which have survived to the present day, and the road network which until the advent of motorways and by-passes provided the infrastructure of the region. In the frontier zone Hadrian's Wall and its associated features have continued to exercise an influence to the present day with the designation of the area as a World Heritage Site. In the landscape as a whole the Roman period can be seen as an interval during which the indigenous prehistoric system was brought, probably prematurely, within the realm of a 'global' market economy. When access to those markets was withdrawn production fell back to something approaching pre-Roman levels. Secondary woodland regenerated over Roman-British field systems in the Tyne Valley and seven centuries were to elapse before the relics of the these early fields emerged from the woods once more to provide the underlying structure to the medieval open field system (Tolan-Smith, M. 1997).

4.3 The Medieval Period[3]

In the first century-and-a-half of the post-Roman period the NE was divided between the kingdoms of Bernicia north of the Tees and Deira to the south. The capital of Bernicia lay at Bamburgh on the Northumberland coast while the royal palace lay at Yeavering on the northern flanks of the Cheviots. These two kingdoms became united as the Kingdom of Northumbria under Aethelfrith, King of Bernicia from AD 592-616 and this remained the *status quo* until the Viking invasions of the late C9.

Although the NE of England is famous for the Lindsifarne Gospels and Bede's *The Ecclesiastical History of the English People,* little is known of the landscape before the late C11. A principal reason for this being the omission of the region from the *Domesday Book*. What is certain is that the great majority of the population was engaged in farming and that the basic social unit was the township. What is unclear is whether settlement consisted mainly of dispersed farmsteads or nucleated villages. The former seems more likely given that the creation of planned villages was a major development of the late C11.

The excavations at Thirlings near Wooler in Northumberland provide examples of the type of buildings to be found on a C7 settlement. These were wholly timber structures, rectangular in plan and twice as long as they were broad. There were entrances in the centre of the long side and the interiors were mostly open or subdivided by light partitions. Of a later date the farmstead at Greenshield on Holy Island (Chapter 9.2.4), consisted of four buildings two of which were of long house type with humans and livestock sheltering under the same roof. However, one of the other buildings appears to have been a purpose built cow byre. These buildings had stone footings, though the upper sections of the walls may have been of turf and timber. Roofs were thatched. This site is dated by an assemblage of eleven C9 coins.

Another important development during this period was the establishment of monasteries following the spread of Christianity from the early C7. Several of the major foundations of this period - Lindisfarne, Tynemouth, Jarrow, Monwearmouth, Hartlepool and Whitby lie within the coastal zone. However, all of these establishments were subject to destruction by Viking raiders during the late C9 and surviving remains at the sites mainly date from later periods. The only complete example of an Anglos-Saxon church in the region is the tiny C7 building as Escomb in County Durham (Lomas and Muir 2006, 56 fig.4.3).

The Norman Conquest of 1066 and the devastation left by the 'Harrying of the North' in 1069-70, a response to rebellion, led to profound changes in the landscape of the NE. The most striking development was the establishment of planned villages, often at the centre of existing townships (Lomas 1996, 73). Planning usually took the form of one or more rows of farmsteads grouped in an orderly fashion around a village green. The villages were surrounded by areas of arable land farmed in strips and surviving today as patterns of ridge and furrow. Usually more than half a township's land was given over to pasture and woodland, both vital resources for the medieval economy. The layout of these planned villages can be best appreciated at sites which ultimately failed to thrive and became

[3] This section is to a large extent based on Lomas and Muir 2006

abandoned, the so called *deserted medieval villages (DMVs)* of archaeology. Successful villages underwent continual development and few traces of their original form can be observed today. This period also saw the establishment of boroughs, urban settlements with special privileges and responsibilities, examples including Hartlepool, Sunderland, Newcastle, Bamburgh, Alnwick and Berwick-upon-Tweed, although the latter was a Scottish foundation.

Most of the monasteries of the early Medieval period were re-established in the C12 and C13, often as daughter houses of the great Benedictine priory of Durham. By 1100 there were 130 parish churches to which were added about 169 'chapels of ease' without parochial status but designed to serve the growing population. The other striking feature of the Medieval landscape in the NE is the magnificent group of castles, twelve major examples being erected within in Northumberland, as opposed to two in Durham. In addition to these major fortifications the newly emergent boroughs of Hartlepool, Newcastle, Alnwick and Berwick-upon-Tweed acquired town walls.

The development of the Medieval landscape in the NE reached its high point in the late C13. The two centuries between the 'Harrying of the North' and 1286 was a period of unprecedented population growth and economic development. Farmland expanded and proto-urban settlements thrived. In terms of the history of the NE, much of this can be attributed to a period of nearly uninterrupted peace between England and Scotland. But in March 1286, Alexander III of Scotland fell off his horse and broke his neck, leaving the Scottish throne without a viable heir. Edward I of England seized the opportunity of trying to bring Scotland under his control and three centuries of warfare and border strife ensued (Fraser 1989, 20-25). To the political unrest of the C14 was added a period of deteriorating climate with reduced yields and the devastation of the population wrought by the Black Death in the late 1340s and early 1350s. By 1450 the population of the region had dropped by over 40% (Lomas and Muir 2006, 64). Settlement contracted, villages became abandoned and woodland and waste encroached on the once open arable fields.

While major military campaigns were mainly a feature of the C14 the Anglo-Scottish border remained an area of unrest until the Union of Crowns under James I and VI in 1603. The principal manifestations of this unrest are the peel towers and bastles of which hundreds survive throughout the region, dating mainly from the C15. The peel towers can be considered as small castles, usually consisting of a strongly defended tower of several floors surmounted by a battlemented parapet. Today they often stand alone but were more usually part of a complex of manorial buildings. The bastles were farmhouses in which the usual longhouse arrangement of people and livestock in adjoining bays was inverted, the stock being accommodated at ground level while the farmer and his family occupied an upper storey. The two levels were often separated by a stone, fireproof, vault and access to the domestic accommodation was at first floor level, gained by a ladder that could be withdrawn. These small castles and fortified farmhouses are an eloquent testimony to the anarchy that prevailed in the border zone.

The NE also featured in the civil wars of the C15 as the protagonists of the Lancastrian and Yorkist causes fought for supremacy. But these military campaigns had little impact on the landscape as a whole and mainly affected the strongholds of the nobility with only the occasional pitched battle, such as that at Hexham in May 1464 while Dunstanburgh Castle

changed hands several times before finally falling to the Yorkists in June of the same year, from whence it was allowed to fall into decay.

There are few archaeological traces of industry dating from the Medieval period in the NE although documentary sources indicate that coal was already being mined by the monks of Tynemouth in the C13 while there was a large scale production of salt on either side of the Tees estuary from the C12. Numerous salt mounds survive in the latter area and excavation at one site has produced C13 pottery.

4.4 The Early Post-Medieval Period

For the purposes of the NERCZA this period is defined as extending from the accession of Henry VIII in 1509 until the mid of the C18. Throughout the C16 and C17 the landscape of the NE remained very much as it had been in the Middle Ages. It was mainly a landscape of villages surrounded by open fields. The depopulation of the C14 had led to the abandonment of some settlements and the contraction of farmland but this had provided an opportunity for survivors to expand and consolidate their holdings. This consolidation led to the establishment of discrete holdings surrounded by enclosed fields and farmers preferred to move out of the villages and build farmsteads the centre of their holdings. This was a slow and diachronic process which nevertheless proceeded more rapidly in the south of the area than in the north, but even in Northumberland most of the farmland had been enclosed by 1750, leaving only the bleak moorlands as open waste. This dispersal of settlement led to the further abandonment of villages and those that survived provide the fabric of the landscape today.

This period saw the emergence of England as a nation state and against the background of gradual change in the landscape major events were taking place. Throughout the C16 the Anglo-Scottish border remained an area of conflict. This took two forms. Border raiding or reiving in which the peel towers and bastles of the C15 continued to play a part, indeed many of the latter being C16 structures, and a return to large scale military incursions similar to those experienced by the region in the C14. Of the latter, the invasion by James IV of Scotland in 1513 leading to his defeat and death at the Battle of Flodden on September 9th is the major example, while the Earl of Hertford's laying waste to much of southern Scotland in the final years of Henry's reign was more typical. The unsettled nature of relations between England and Scotland continued throughtout the C16 and it was the reign of Henry's daughter Elizabeth that saw the construction of the Spanish Battery at Tynemouth and the wholesale remodelling of the defences of Berwick-upon-Tweed to produce one of the finest renaissance fortifications in northern Europe. However, the accession of James VI of Scotland to the English throne, as James I, in 1603 marked the end of warfare between the two nations until the Jacobite uprisings of the C18. Peace between the nations did not immediately put an end to the anarchy of Border and raiding and reiving continued sometime after 1603. However, it is noteworthy that in 1612 there is a record of customs duties being paid on horse and cattle passing peacefully across the Border (Fraser 1989, 377). Times were changing, as evidenced by the replacement of the peel tower at Belsay in Northumberland by a fine Jacobean house in 1614, itself to be replaced in the early C19 by a Greek rival mansion.

Another major development in the C16 was the dissolution of the monasteries with the major religious houses of the region stripped of their assets and allowed to fall into decay to be used as quarries. Some experienced a change of use with claustral buildings being converted to domestic accommodation for the newly emerging nobility while the ruins of Lindisfarne Priory became a supply base for the Tudor navy.

As had been the case with the Wars of the Roses in the C15, the Civil War of the C17 had little overall impact on the landscape. Medieval strongholds were brought back into commission, defended, besieged, sacked and slighted as the fortunes of Parliament and the Crown waxed and waned. Newcastle was occupied by the Scottish Covenanter army in 1640 after having defeated royalist forces at Newburn. Hartlepool, while originally garrisoned for the King, was taken and held by a Scottish mercenary army on behalf of Parliament from 1645 to 1647.

While the mining for coal and the production of salt has already been noted for the Medieval period, the origins of two other major industries for which the NE became famous, lead mining and the production of alum are to be found in the Early Post-Medieval period. However, the large scale development of these industries, along with coal and iron production, is mainly a feature of the post-1750 period.

4.5 The Industrial Period

Coal mining has had a decisive impact on parts of the landscape of the NE. A mine is of itself ephemeral by nature. A shaft is sunk, the coal is extracted and the mine is abandoned while a new shaft is sunk elsewhere. The geology of the coal measures, dipping from west to east, gave a direction to this movement, the earliest mines extracting from seams near the surface lay in the west while the industry gradually migrated eastwards extracting coal from seams at ever deeper levels. The coal mines on the coast are mainly late features dating from the C19 and C20. When the Vane Tempest mine at Seaham closed in 1992 the miners were working four miles out under the North Sea. Coal mining in the NE was widespread and a mid C19 map of 'The Great Northern Coalfield' shows it extending from south of Barnard Castle in County Durham to Warkworth on the Northumberland coast (MacRaild and Purdue 2006, 91 figure 5.14) while outlying mines are recorded as far north as Scremerston near Berwick-upon-Tweed. Although lead mining had a more restricted geographical extent, being confined to the metalliferous deposits of the North Pennines, it had a symbiotic relationship with the coal industry, the production of which was needed for smelting. Lead mines and coal mines were linked to the smelters by horse drawn wagonways. Similar wagonways transported the coal to the coast where purpose built harbours and timber coal staithes facilitated the loading of colliers for transhipment elsewhere in the UK and the Empire.

The Stockton and Darlington Railway of 1825 was essentially a wagonway to which George Stephenson introduced a steam locomotive instead of a team of horses, thus giving birth to the railway age. In 1832 the Hartlepool Dock and Railway Company revived the fortunes of Hartlepool by turning it into a coal exporting port and by the mid C19 a spider's web of railways extended across the whole region, mainly developed to serve the coal industry and its ports. In the mid C20 Blyth was the largest coal shipping port in Europe (Linsley 2005,

165).

Two other major extractive industries have also left there mark on the landscape of the NERCZA project area; both to the south of the River Tees. Alum, from aluminium sulphate, is an important chemical in the tanning and dyeing industries. During the Middle Ages it was imported from the Continent but in 1607 a source was discovered at Guisborough in North Yorkshire and this gave rise to the North Yorkshire alum industry, which flourished into the late C19. This industry was mainly concentrated on the coast where the shale beds from which the alum was extracted are exposed in the cliff face. The decline of the industry came in the 1870s when it was found that alum could be extracted from colliery waste. The communities whose economic life depended on the alum industry nevertheless received something of a reprieve with the development of the ironstone industry which got underway in the 1850s with the extraction of the Main Seam of the Cleveland Ironstone. This resource was worked until the mid C20 and provided the basis for the Middlesborough and Redcar iron and steel industry.

As was the case with the coal and lead industries, the alum and ironstone industries required an infra-structure for the transport of fuel and finished products. In the C18 and early C19 this was also mainly in the form of wagonways, whereas by the late C19, as elsewhere, transport was provided by the growing railway network.

Vessels had been built on the NE coast from the Middle Ages but the proximity of the major rivers to readily available supplies of iron and coal and the demand for shipping, stimulated the development of major shipyards on the Tyne, the Wear, at Hartlepool and to a lesser extent on the Tees. These rivers also developed into major ports and the growth of mercantile traffic on the NE coast led to the construction of lighthouses, leading lights and navigation beacons to facilitate this trade, although the earliest examples date from C17.

An industry of great importance in the NE, but one that has left few archaeological traces, is the fishing industry. Throughout the length of the coastline fishing followed a similar pattern. In the winter the main quarry was white fish such as cod and haddock. Pots were set for crabs and lobsters while salmon and turbot were netted. But the main stay of the NE fisheries was the herring which arrived off the coast in the summer in vast migratory shoals. In the early C19 every beach and small haven provided a base for small vessels engaged in the herring fishery and shore facilities included net sheds, curing houses and smokeries, with the development of kippering in the 1840s. The dispersed nature of the herring fishery came to an end in the late C19 with the advent of the steam drifter and the industry became concentrated in a small number of major ports, most of which had been developed to serve other, more terrestrial, industries such as coal mining. Several NE ports including Whitby, North Shields and Berwick-upon-Tweed also supported whaling fleets. An adjunct to the NE fishery was the production of salt for the curing houses. Salterns are a feature of the NE coast from Teesmouth to Alnmouth, the former, as already noted, dating from the Middle Ages.

4.6 Military Archaeology of the C20

The NE of England has been the theatre of military operations from the earliest times. From the advance of the Roman legions through the campaigns, battles and sieges of the Middle Ages and down to the Civil War of the mid C17 the region has experienced the devastation wrought by advancing and retreating armies. But settlements burnt to the ground were rapidly rebuilt, perhaps to be burnt again the following year, and most permanent desertions can be attributed to economic rather than political factors. Apart from the construction of the Military Road along the line of Hadrian's Wall in 1749, to facilitate the east-west deployment of troops, the NE was barely affected by the Jacobite uprisings of the early C18 and from the middle of the century the military archaeology of the NE should be seen within the context of national defence.

Although coastal defences, initially constructed in the C16 and C17 to meet local needs were updated piecemeal to reflect advances in weaponry during the C18 and C19 the major developments belong to the C20. By the end of the C19 the concept of Defended Ports had emerged and the major ports of Teesmouth, Hartlepool, Sunderland and the River Tyne were protected by a series of coastal batteries, some of which had been established centuries before (Dobinson 2000a, 1-11) but mostly re-equipped with the newly developed breach loading guns. The bombardment on the 16th of December 1914 of several east coast towns, including Whitby and Hartlepool, by a squadron of German battle cruisers exposed weaknesses in the current provision and immediately a programme was put in place to establish a number of additional batteries. Examples of this development are the Coulson Battery at South Beach, Blyth which supplemented the defences of the Tyne but also provided some protection for the important coal port of Blyth itself and the Tyne Turrets. These latter consisted of 12 inch gun turrets removed from the battleship HMS *Illustrious* and mounted ashore at Marsden and Hartley, south and north of the Tyne respectively.

Aerial bombardment, although mainly a feature of WWII was also a threat in WWI. This threat was addressed by the provision of bases for squadrons of the Royal Flying Corps such as that at Marske and by a chain of early listening devices, of which the acoustic mirror at Boulby Barns is the only surviving example in the region.

In WWII the threat of invasion was added to those of coastal and aerial bombardment. The initial plan to deal with this threat was threefold. First, the enemy would be delayed on the beaches by a system of beach scaffolding, anti-tank obstacles such as concrete blocks or earthworks supported by pillboxes and by beach defence batteries mounting anti-tank guns. Second, once the enemy had broken through the beach defences they were to be 'corralled' by a series of anti-tank stop-lines improvised from existing features such as railway embankments, canals and rivers supplemented by earthworks and lines of concrete blocks. The stop-lines were to be complemented by pillboxes, weapons pits, barbed wire entanglements and mine fields (Brown *et al* 1996, 78). The third component was the creation of anti-tank islands in villages and other settlements within a stop-line. These might consist of camouflaged pillboxes or converted other buildings, weapons pits and spigot mortar emplacements positioned so as to provide intersecting fields of fire (Lowry 2004, 22-23). Once the enemy was delayed within this system and the direction of attack established, it was planned that reserve forces could be concentrated for a counter attack. The thinking

behind this essentially static approach owed much to the experience of the British generals on the Western Front during WWI and was less suited to a Panzer led *Blitzkrieg*. In the late summer of 1940 a change in tactical thinking led to more emphasis being placed on mobile reserves, although the construction of pillboxes and stop-lines continued into 1941, albeit at a slower pace (Lowry 2004, 12-13). While only isolated fragments of the major stop-lines now survive beach defences remain a conspicuous feature of the coastline throughout most of the NERCZA area. In addition to confronting sea borne landings the possibility of the enemy arriving by air, especially in gliders, had also to be addressed and suitable landing sites, especially those near the coast, were impeded with networks of anti-glider obstacles.

Most of the coastal defence batteries deployed in WWI were brought back into commission in WWII and several additional, Emergency Coastal Batteries, were established. The threat of aerial bombardment was addressed through the establishment of heavy anti-aircraft artillery batteries supported by searchlights. Such batteries were sited in an arc around each defended port and major industrial complex. Barrage balloons were used make enemy aircraft fly higher and towards the anti-aircraft batteries, and radar stations were established to detect the imminent arrival of bomber formations. Where these preparations failed it was hoped that enemy ordinance would be wasted on bombing decoy sites, designed to mimic port facilities and industrial plant.

Most of this WWII military archaeology is to be found in the coastal zone, though many other facilities such as airfields and army camps were scattered throughout the region. The build up to the D Day landings saw a great increase in the former as large numbers of British and Allied troops were assembled. Examples are the camp at Featherstone Castle in the Tyne Valley used by American troops and the concrete standings for tanks and other armoured fighting vehicles established in concealed locations such as Swarland and Long Framlington.

The NE of England has a rich archaeological heritage and the coast is no exception. However, while the uplands are famous for the upstanding remains of prehistory by far the most common features encountered on the coast relate to Medieval patterns of landuse in the form of ridge and furrow, industry and the need to defend the coastline, especially in the C20. Remains of all periods are, nevertheless, present and the following chapter provides a brief account of the kinds of archaeological features to be found on the coast and at risk from the processes of coastal erosion.

CHAPTER 5

The archaeology of the NE Coastal Zone

5.1 Introduction

The archaeology of NE England was reviewed in Chapter 4 and in this chapter attention focuses on the NERCZA study area, that narrow strip of land and foreshore between LAT and one kilometre inland of MHWS. The archaeological assets of the coastal zone may be subdivided into a number of categories. At the most general level a broad distinction may be made between assets which are part of a land based or terrestrial landscape and those in which the context is specifically coastal or maritime. In the former the position of the coastline at various times is an arbitrary limit which circumscribed or truncated the distribution of assets. In the later case it is the coastline itself that is the unifying element in the distribution. In considering the status of assets in the coastal zone they will be assessed according to whether they are part of a terrestrial or coastal/maritime landscape but working within the broad chronological periods established in chapters 1 and 4. The convention has also been adopted in that when a particularly category of asset is first mentioned in this chapter and in chapters 6 to 9, it is set in **bold** and *italics* thus: ***flint scatter sites***. The intention here is to facilitate cross-reference between chapters and avoid duplication.

5.2 Early Prehistory - The Palaeolithic and Mesolithic Periods

5.2.1 Terrestrial landscapes

The whole of NE coast was engulfed by ice during the maximum stage of the Last Glaciation. This is known as the Dimlington Stadial after a location in Yorkshire and occurred between *circa* 24000 and 11000 cal BC (Jones and Keen 1993, 171). This sheet of ice, mainly moving from north to south, swept the landscape clean of any evidence for human settlement before the Last Glaciation and the story of continuous human settlement on the NE coast is generally taken as having begun with the first groups to arrive after the melting of the ice. At present the earliest dates for such arrivals come from the Mesolithic site at Howick where the initial phase of occupation is dated to *circa* 7800 cal BC (Bayliss *et al* 2007). However, two finds from the coastal zone raise the possibility of a human presence at an earlier time. These consist of finds of putative Lower Palaeolithic hand axes at Blackhall Rocks (Trechmann 1928) and South Gare Breakwater, Redcar (Rowe *pers comm.)*. The former is said to have been found in gravel below boulder clay laid down during the Last Glaciation whereas the latter was found on the beach. If genuine, while intrinsically interesting, these isolated finds can nevertheless tell us little about the early human settlement of the NE coast.

The evidence for the early prehistoric settlement of the coastal zone in the immediate aftermath of the Last Glaciation consists mainly of stone tools, of which flint is the most common material used. The discovery of worked flint is a virtually ubiquitous occurrence throughout lowland, and much of upland, England. The coastal zone of the NE is no exception. Fieldwalking programmes in the NE, the Lincolnshire Wolds and Hampshire have demonstrated that any block of plough land can be expected to yield between 1 and 5

items of worked flint (Tolan-Smith,C. 1997, 82) per 1000m^2. This phenomenon simply reflects the fact that from about ten thousand years ago human activity occurred throughout the landscape. For this reason, isolated finds and low density distributions cannot be regarded as significant in the present context and should be regarded as evidence for incidental landscape use, or as 'background noise'. Accordingly, they have not been recorded in the present study though records can generally be found in HERs. Although human activity was distributed across the entire landscape, in some places this activity was more concentrated giving rise to what are conventionally known as ***flint scatter sites***. The density levels required for the identification of a particular location as a flint scatter site are, of necessity, arbitrary but the results of an extensive fieldwalking programme in the Tyne Valley suggested that values of nine or more items per 1000m^2 should be regarded as significant (Tolan-Smith, M. 1995, 277-8). However, in very few cases in the coastal zone have data been published in a form that is susceptible to this level of analysis and it has been necessary to proceed on the basis that records of flint scatters represent concentrations above that which could be described as 'background noise' or 'incidental landscape use'. On the rare occasions where excavations have occurred, high density flint scatter sites have been found to be associated with other traces of human activity, such as the Howick Mesolithic hut (Waddington *et al* 2007).

Mesolithic activity is well documented along the NE coast but the evidence, with the exception of that from Howick, consists almost exclusively of flint scatter sites. Such are usually taken to represent industrial activity, that is the collection of raw material and the manufacture of implements. There is rarely anything to indicate that this was a specifically coastal activity, as raw material was also available on inland sites.

5.2.2 Coastal/Maritime landscapes

The only evidence for Mesolithic activity specifically focussed on coastal/maritime resources comes from the proximity of sites such as Howick (fig. 8.8) and Low Hauxley to the Mesolithic coastline as reconstructed from RSL data (Chapter 3) and offshore bathymetry, the limited recovery of shellfish remains and the remains marine mammals during excavations at those sites, and the collection of a barbed antler harpoon on the beach at Whitburn (fig. 7.4). Such implements are normally associated with the hunting of marine mammals.

5.3 The Neolithic Period

5.3.1 Terrestrial landscapes

Apart from features associated with flint scatters, generally considered to be domestic in nature, the Neolithic period saw the erection of structures of a more monumental nature. Throughout lowland England a range of monument types are known. The most prominent are earthwork enclosures defined by concentric banks and ditches, some of which may be discontinuous, the so-called ***causewayed enclosures,*** and ***long mounds***, monuments at which one of the principal activities was funerary. The coastal zone includes examples of long mounds, the excavated site at Street Houses, Loftus, being the best known. There has

also been a putative identification of a causewayed enclosure represented by two ditch segments underlying the remains of the Roman fort at South Shields and dated to the 4th millennium cal BC.

5.3.2 Coastal/Maritime Landscapes

While the beaches might offer few opportunities other than for beachcombing, tidal estuaries may be considered to be arenas of abundance from a forager's perspective. A type of site commonly encountered in such situations is the ***midden***, an accumulation of food debris from an adjacent settlement, and often consisting mostly of shellfish remains but also including fish and animal bones. A midden of this type has been identified at Cowpen Marsh in the Tees Estuary and the presence of the bones of domesticated animals has been taken to indicate a Neolithic date.

Neolithic material recovered from the Hartlepool submerged forest deposits includes a ***fish trap*** and burial. The latter has a radiocarbon date of 4680 ± 60 BP (HV 5220) and as it was recovered from a freshwater pool, it has been suggested that this might be a ritually deposited '***bog burial'***.

5.4 The Bronze Age

5.4.1 Terrestrial landscapes

The Bronze Age in England is represented by a range of structures that are monumental in character. The best known are probably the stone circles and standing stones, although ***round barrows*** or ***cairns*** are the most numerous and are the principal type of Bronze Age monument found in the coastal zone. They consist of circular mounds of earth and stone and usually cover one of more burials which may be either inhumations or cremations or both. The mounds are usually surrounded by a ditch from which the material has been quarried. Where excavations have occurred, the mounds have been found to overlie concentric rings of post holes which would originally held timber uprights. In the coastal zone the mounds survive either as upstanding earthworks or, where denuded by ploughing, the surrounding ditches may show as cropmarks. They may occur singly or in groups and, if closely spaced, may be described as forming a cemetery. In the NERCZA study area most of the round barrows identified lie in the coastal strip of the North York Moors, several substantial cemeteries having been identified. Elsewhere they are rare. This may reflect regional variability in funerary practices, but it is also likely to be the case that a number of round barrows have been destroyed during the course of urban and industrial development.

The only other type of Bronze Age monument regularly encountered in the coastal zone, especially in the area north of the Tyne, are ***cists,*** stone-lined graves within which may lie an inhumation or cremation accompanied by grave goods (fig. 8.3). Like round barrows, cists are often found in cemetery groups, sometimes within a barrow. However, cists were also a feature of funerary practices in later periods and caution needs to be exercised in interpreting examples without diagnostic grave goods.

5.5 The Iron Age and Romano-British Periods

5.5.1 Terrestrial landscapes

With the coming of the Iron Age the nature of the archaeological record changes in that the suite of mainly ritual or funerary monuments known from earlier periods is replaced by a range of structures more secular in character. The most prominent of the features attributable to this period are ***hillforts*** or, more commonly in the coastal zone, ***promontory forts***. In the former, areas, often several hectares in extent, are encircled by a system of ditches and ramparts of a defensive aspect, whereas in the latter the circuit is incomplete, being supplemented by natural cliffs. These sites usually had within them groups of round buildings referred to as hut circles and these forts are considered to be centres of settlement, occupied either permanently or in times of unrest. Archaeological investigations of the headland at Tynemouth have suggested that the Anglo-Saxon Monastery and later Medieval Castle and Priory may have been preceded by an Iron Age promontory fort and a similar proposal has been made on the basis of field survey data at Dunstanburgh.

Multivallate forts (fig. 9.3) are also considered to be defensive sites and regarded as small scale versions of hillforts. As the name suggests they usually consist of several concentric circuits of ditches surviving as cropmarks. Originally there were probably ramparts between the ditches but these have usually been levelled. In some cases timber palisades were employed instead of ramparts and some sites might have experience more than a single phase of development, with palisades being replaced by ramparts.

The most widespread type of site of Iron Age date is the ***farmstead enclosure***, usually formed by a bank and ditch and containing one or more hut circles. In the coastal zone, especially in Northumberland, these enclosures are generally rectilinear in plan, in contrast to the more curvilinear examples found in the uplands. Although as a generic type these enclosures are regarded as an Iron Age phenomenon, many remained in use into the Romano-British period and some may have originated then, emphasising the thread of continuity in the rural landscape. Farmstead enclosures rarely survive as upstanding monuments in the coastal zone and have mostly been identified as cropmarks on aerial photographs.

Farmstead enclosures were the centres of mixed farms engaged in arable cultivation and the rearing of livestock. The HERs do not have any records of ***ancient field systems*** within the coastal zone, though several have been identified in Northumberland by the APTE. Research elsewhere in Northern England has shown that later, Medieval, field systems sometimes respected pre-existing features that can be revealed by retrogressive analysis (Tolan-Smith M. 1995 and 1997). An item specifically indicative of Iron Age and Romano-British Period is the ***bee-hive quern***. This was a form of hand mill which consisted of a pair of superimposed stones the upper of which was rotated over the lower through the use of a simple handle. The upper stone was often markedly conical in form, giving rise to the 'bee-hive' description. As mills for grinding corn, bee-hive querns are indicative of arable activity.

Little is known about funerary or ritual practices in the Iron Age, though as indicated above some stone cists may belong to this period and barrow cemeteries of Iron Age date are a feature of the archaeology of East Yorkshire outside the study area.

5.6 The Roman Period

5.6.1 Terrestrial landscapes

The three-and-a-half centuries of the Roman occupation in the NE produced a wide range of monuments and other structures, only few examples of which are to be found in the coastal zone. No Roman town lies within a kilometre of the coast and the fort at South Shields is the only structure of this type within the study area, though a Roman post of some kind is generally supposed to have existed at the terminus of the Devil's Causeway at Tweedmouth. The termination of Hadrian's Wall at Wallsend lay beside the Tyne several kilometres upstream. The absence of major urban and military centres has meant that Roman roads avoid the coast and the period is chiefly represented by the continuation of elements of the rural settlement pattern from the previous Iron Age. For this reason, when discussing rural settlement in the coastal zone, the Iron Age and Romano-British periods have generally been treated together.

5.6.2 Coastal/Maritime landscapes

The fort at South Shields is regarded as one of the main supply depots for the garrison on Hadrian's Wall, provisions and equipment beginning brought to the mouth of the Tyne from elsewhere in the province and further afield in the Empire. An inscription records the presence of river boatmen from the Tigris who presumably crewed lighters that transported commodities upstream and between the shore and seagoing ships in the offing. It follows from this that there must have been port facilities at South Shields, but no trace of these survived the development of the river in the C19. There is, however, a Tyne and Wear HER record of a possible Roman shipwreck in the River Tyne immediately below the fort.

A further aspect of the Roman military presence on the NE coast is provided by the ***signal stations*** or ***fortlets*** built along the North Yorkshire coast during the C4, and part of a system that may have extended from Flamborough Head to the Tyne. Sites of this type have been identified at Goldsborough and Huntcliff while an intervening site may have been destroyed by quarrying in the C19. These structures were substantial stone towers and it is believed that their purpose was to provide warning of attack by raiders from the sea. To function effectively they would have needed to communicate both with inland defence forces and naval flotillas strategically positioned along the coast. One such naval base may have lain at the mouth of the Tyne, under the watchful eyes of the fort at South Shields.

Two coastal industries gained an important place during the Roman period, salt production and the cultivation of oysters. Although numerous salterns are known from later periods and Roman examples are known elsewhere on the east coast, none have been identified in the study area. Most of the NE coast is unsuitable for oyster cultivation and oyster beds of this period have not been identified.

5.7 The Early Medieval Period

5.7.1 Terrestrial landscapes

The early Medieval period in the NE is most clearly represented by inhumation ***cemeteries*** and by the ecclesiastical establishments of the early church, although few of the early structures that survive lie within the coastal zone. Primitive ***cells*** are known from Coquet Island, Inner Farne and St Ebba's, Beadnell, while the ***monastic sites*** on Holy Island, Tynemouth, Monkwearmouth (fig. 7.3) and Hartlepool were destroyed by Viking raids in the C9. Elsewhere, early sites are known to have existed from the survival of ***sculptural fragments***.

Tradition, documentation and now archaeology has led to the identification of a major secular centre at Bamburgh, largely engulfed by the later medieval castle and its C19 reconstructions.

5.8 The Medieval Period

5.8.1 Terrestrial landscapes

The Medieval period may be defined as beginning with the Norman Conquest and ending with the accession of Henry VIII. The principal structures and monuments of this period are abbeys, castles, ***towers*** (fig. 8.4), fortified towns, parish churches, villages and field systems. The major ***castles*** consist of Bamburgh (fig. 9.4), Dunstanburgh and Tynemouth, while the ***monasteries*** on Holy Island (figs 8.5 and 9.5) and at Tynemouth, although established in the early Medieval period, were rebuilt and thrived during the Middle Ages. The towns of Berwick-upon-Tweed and Hartlepool were provided with ***town walls*** (fig. 9.6) during the medieval period.

Many ***churches*** can exhibit evidence of several periods of development, often mirroring the changing fortunes of the communities they served. Those originally built in the medieval period may have experienced modification and even wholesale rebuilding (fig. 8.6)

Many villages in the NE had their origins in the medieval period, either has planned developments by major lay or ecclesiastical landlords or as a result of organic growth around early centres. Those that did not survive or thrive into more recent times can be identified today as ***deserted medieval villages*** (***DMVs***).

As in all previous periods the mainstay of the medieval economy was the land and traces of medieval agriculture, in the form of parcels of ***ridge-and-furrow*** are widespread in the coastal zone and throughout the region. It is usually possible to identify two types of ridge-and-furrow. One type exhibits a reversed 'S' shape in plan. This is referred to as the aratal curve and is assumed to reflect the use of teams of oxen to pull a plough with a fixed mould board, the curve arising because of the difficulty in turning a large team of oxen at the end of each ridge. This is the classic type of ridge-and-furrow and is considered to be mostly of

Medieval or early post-Medieval date. A second type is similar in size but straighter in plan and reflects the use of horses to pull the plough, which could be used in smaller teams and were more manoeuvrable than oxen. This change was contingent on developments in the form of harness used for draught animals and was occurring in England from the C16 onwards. Accordingly, straight ridge-and-furrow is usually regarded as being post-Medieval in date. However, with the exception of areas brought into cultivation at times of crisis, such as the Napoleonic Wars of the late C18 and early C19, most areas of ridge-and-furrow identified as post-Medieval were probably Medieval in origin and simply reflect a change in ploughing practice. Most of the expansion in medieval arable land had been accomplished by the end of the C13.

Coal mining is known from documentary sources to have been underway during the Medieval period, a C13 coal mine being recorded at Tynemouth.

5.8.2 Coastal/Maritime landscapes

The ancient ports along the NE coast, Whitby, Hartlepool, Blyth and Berwick-upon-Tweed must have provided facilities for visiting shipping in the form of quays, jetties and staiths but the continued use of these facilities in later times has meant that few traces of their early form survive.

The putative remains of a medieval ***harbour*** have been identified at Dunstanburgh Castle. To the SE of the castle, the head of an inlet known as Nova Scotia has been partly cleared of stone to reveal a sandy beach, one side of which is demarcated by the remains of a stone quay, the other by the rock ledge of Cushat Stiel. The inlet offers an anchorage sheltered from the north and east and vessels could be hauled out on to the beach. An important harbour existed at Hartlepool during the Middle Ages part of which was enclosed within the circuit of the town walls.

Other coastal/maritime activities, of which fishing and ship building were prominent, are also documented during the medieval period but have left no trace.

A major medieval industrial activity on the coast was the production of salt at various ***saltworks*** and ***salterns***. As well as documentary references to this activity, physical traces survive in the form of the various salt mounds, especially on either side of the Tees Estuary.

5.9 The early Post-Medieval period

5.9.1 Terrestrial landscapes

For the purposes of this account the early Post-Medieval period is defined as having begun with the accession of Henry VIII and extended down to the middle of the C18. Many of the structures and monuments of the Middle Ages remained in use during this period although the priory church on Holy Island became a naval store and quarry following Henry VIII's dissolution of the monasteries.

A number industries that later became prominent in the NE experienced some of the early stages of their development at this time, although physical traces of these early phases only rarely survived later developments.

5.9.2 Coastal/Maritime landscapes

The construction of purpose built ***lighthouses*** began in the latter part of the C17 and was undertaken by enterprising individuals such as Sir John Clayton who built a lighthouse tower on the Farne Islands. A light had previously been shown in the ruins of the priory church at Tynemouth and when this collapsed in 1659 a purpose built lighthouse was erected on the headland in 1664.

5.10 The Industrial period

5.10.1 Terrestrial landscapes

The NE of England was one of the power houses of the Industrial Revolution and traces of industrial activity during the late C18, C19 and C20 centuries are widespread. This activity may be divided into two broad categories, extractive industries and those with a maritime focus. The latter will be considered below. Among the extractive industries coal ***mining*** and ***quarrying*** for ironstone, alum (fig. 6.4), jet and aggregates are all represented within the coastal zone along with the infra-structures associated with them. The processing lime often took place on the coast, to facilitate onward transport by ship and ***limekilns*** are prominent features at a number of localities. Kilns for lime burning can be sub-divided into 'intermittent' or 'continuous' types. In the former case the kiln was charged with limestone, which was then burned and the resulting lime drawn down in a single episode. In the case of continuous kilns, they were charged and burned for weeks at a time. The simplest type of structure was the ***clamp kiln*** where firing took place in an excavated hollow or pit. ***Flare kilns*** were permanent masonry or brick structures with a bottle-shaped or domed superstructure. They were generally fired intermittently and fuel and limestone were held in separate compartments. ***Draw kilns*** were structurally similar but the fuel and limestone charge were mixed and they were fired continuously. Draw kilns are the commonest surviving type and a number of impressive banks of draw kilns survive along the Northumberland coast (figs 9.1, 9.11 and 9.12).

5.10.2 Coastal/Maritime landscapes

It was with the great expansion of industrial activity from the mid C18 that the development of the coastal/maritime landscape of the NE gathered pace. The need to export the products of the region, coal, iron, lime and alum, led to an exponential growth in the provision of harbour facilities and a comparable growth in shipbuilding.

The term ***harbour*** covers a wide range of structures from simple quay walls, through formally built ***piers*** to ***docks*** some of which with gated access to mitigate the effects of tides (figs 7.6, 7.7, 7.8, 7.9 and 8.12). ***Coal staithes*** were specialist structures developed mainly in the NE to facilitate the loading of colliers. They were usually timber jetties of two or more levels. Coal wagons moved along the upper levels and discharged directly into the holds of

vessels moored alongside.

From the earliest times ships had simply been built at the head of the beach and launched over rollers down to the shoreline, but the increasing size of vessels and the industrialisation of the process led to the provision of purpose built ***shipyards***. A vast range of ancillary structures were also to be found in shipyards including sheds for timber storage, iron forges, ropewalks and chain lockers.

From time immemorial ***fishing*** has been a major industry on the NE coast but with the exception of detailed studies of individual ports or vessel types, such as the coble, the archaeology the NE fisheries is yet to be written. Throughout the length of the coastline fishing followed a similar pattern. In the winter the main quarry was white fish such as cod and haddock. Pots were set for crabs and lobsters while salmon and turbot were netted. But the main stay of the NE fisheries was the herring which arrived off the coast in the summer in vast migratory shoals. In the early C19 every beach and small haven provided a base for cobles engaged in the herring fishery and shore facilities included net sheds, curing houses and smokeries, with the development of kippering in the 1840s. The remains are widespread and include vessels of which there are several types in addition to the coble, such as 12m to 15m keel boats now lying inverted at Holy Island Harbour (fig. 9.14) and various shore facilities mostly now converted to other uses. The dispersed nature of the herring fishery came to an end in the late C19 with the advent of the steam drifter and the industry became concentrated in a small number of major ports, most of which had been developed to serve other, more terrestrial, industries such as coal mining. Several NE ports including Whitby, North Shields and Berwick-upon-Tweed also supported whaling fleets (fig. 9.13).

A complementary industry to that of fishing was the production of salt in ***salterns*** and ***salt works***. This activity has already been noted in a medieval context but with the growth of the fishing industry, particularly the herring fishery in the late C18 and C19, the demand for salt for curing increased exponentially. The evidence for salt making mostly consists of mounds of debris in the case of 'sleeching' which involved the extraction of salt from salt marsh deposits, and documentary references to the existence of salt pans in which the brine was evaporated.

The growth of shipping in the NE stimulated a growth in aids to navigation such as ***seamarks*** and lighthouses. The simplest form of seamarks are beacons or wood, metal, brick or stone such as the white stone pyramid at Emmanuel Head on Holy Island. These were designed to mark a hazard or provide a means by which a vessel could fix its position. Rather more sophisticated are ***leading marks*** (figs 7.15 and 9.15). These were usually erected in pairs and were designed to indicate, when aligned, the direction of a safe passage between hazards. These may be simple structures like the poles surmounted by fishing baskets marking the safe entrance to Cullercoats Harbour, or virtual lighthouses such as the High and Low Lights at North Shields (fig. 7.14) In addition, the late C18 and C19 were the great age of lighthouse building.

Features in the 'safety at sea' category include ***Lifeboat Stations*** (fig. 6.7) buildings associated with the various ***Volunteer Life Brigades*** (figs 7.16, 7.14 and 8.15) and ***Coastguard Stations*** (fig. 6.9).

There are numerous ***shipwrecks*** lying off the coast of the study area, most of which date from the industrial period. In most cases the locations are not precisely defined and are recorded with a general NGR which usually lies outside the study area below LAT. Some shipwrecks have been located above LAT and these are recorded in the assessment (figs 6.8 and 8.16).

5.11 Military Coastal Defences from the C16 to C19

With the exception of the system of Roman signal stations or fortlets, there was no systematic attempt to defend the NE coast until the C16 and the history of coastal defence in the region begins with the reign of Henry VIII when Tynemouth Castle was converted into an artillery fort and the Spanish Battery was established to command to the mouth of the River Tyne. Lindisfarne Castle (fig. 9.9) also dates from this period, built to protect the anchorage and naval base at Holy Island. These developments continued in the C17 with the establishment of a series of gun batteries on the Headland at Hartlepool during the Civil War, the erection of The Fort on the Heugh on Holy Island in 1675 (fig. 9.10) and Clifford's Fort at North Shields in 1672 while a battery had been erected at Hartley (later Seaton Sluice) by 1670. These ***batteries*** mounted muzzle loading cannons until breach loading ordinance was introduced in the late C19.

In the late C18 the threat of war with the French and attacks by American privateers such as John Paul Jones led to a renewed interest in coastal defence and in the provision of gun batteries to defend the major ports of the NE coast and the concept began to emerge of 'defended ports'. While Tynemouth Castle, Spanish Battery and Clifford's Fort guarded the mouth of the Tyne, Wearmouth was protected by a series of gun batteries on the south bank of the river and probably by one to the north at Roker. No defences as early as this are known from the Teesmouth but the North Battery on the Headland at Hartlepool was brought back into commission at this time while Whitby Harbour was protected by at least two batteries.

Throughout the C19, as threats waxed and waned, coastal defences were updated or mothballed. Major developments were stimulated either by improvements in weaponry, such as the move from muzzle loading cannons to breach loading guns or by the extension of the various port facilities the batteries were designed to protect. The development of the South Dock at Wearmouth made the C18 gun batteries redundant and led to the establishment of the Wave Basin Battery of Rifled Muzzle Loading (RML) guns at the river mouth. Similarly, the construction of the outer piers at Tynemouth at the end of the C19 made Clifford's Fort obsolete and led to the upgrading of the guns mounted at Tynemouth castle.

5.12 Military Coastal Defences in the Modern Period

5.12.1 World War I

Few WWI features survive and this is probably because many sites and installations were also occupied during WWII. Examples of this situation are provided by the remains of the Royal Flying Corps airfield at Marske, which lie to the NW of the more extensive but built

over remains of the WWII airfield, and the Coulson Battery at Blyth which was manned in both wars and includes the WWI control building alongside its WWII replacement (figs 7.19 and 7.20).

Several C19 gun batteries also saw service during WWI including the Heugh Battery at Hartlepool which gained distinction on 16th December 1914 when it engaged three battle cruisers of the German High Seas Fleet then in the process of bombarding the town. The weaponry deployed at this time usually consisted of 9.2 inch and 6 inch guns mounted on open concrete emplacements and 12 pdr and 6 pdr quick firing guns covering harbour entrances and narrow channels. A development, initiated during the War but remaining uncompleted at the end was the emplacement of two 12 inch battleship gun turrets to the north and south of the mouth of the Tyne, the so called 'Tyne Turrets'.

5.12.2 World War II

Features that can be dated to WWII can be divided into those that were designed for defence against bombardment or to confront an invasion, though the two categories are not mutually exclusive. The following accounts are mainly based on the details to be found in Brown *et al* (1996).

5.12.2.1 *Coastal Defence Batteries*

Coastal defence batteries were designed to fire on ships and landing craft. In many cases they were facilities recommissioned from WWI and deployed the same calibre ordinance. Structures consisted of the gun emplacements themselves, now usually roofed over to provide protection from aerial attack, a Battery Observation Post (BOP), magazines, generator buildings, searchlight emplacements and accommodation for the gun crews. The whole might lie within a barbed wire perimeter defended by pillboxes and weapons pits (fis 7.19 and 7.20). Following the evacuation of Dunkirk in June 1940 the existing batteries were supplement by a number of ***Emergency Coastal Defence Batteries*** equipped with 6 inch, 5.5 inch, 4.7 inch and 4 inch guns naval guns.

5.12.2.2 *Heavy Anti-Aircraft Batteries*

Once the likelihood of a sea borne or air borne invasion had passed, by the end of 1941 aerial bombardment posed greatest threat. To combat this threat major installations and ports were provided with batteries of heavy anti-aircraft guns.

The standard weapons deployed at these sites were 4.5 inch or the 3.7 inch guns. As initially built, batteries usually consisted of four emplacements arranged in a 'clover-leaf' arc around a battery command post with, occasionally, two additional emplacements set to one side or at either end of the arc. Other facilities included magazines, accommodation for the gun crews and a platform for a gun laying radar unit. The emplacements themselves can be of a variety of shapes and where more than one type is found on a site this might imply developments during the course of the war, the original 4.5 inch guns being replaced from 1943 onwards by improved 3.7 inch weapons (figs 7.21a and 7.21b).

5.12.2.3 *Searchlight Emplacements*

Typically, searchlight emplacements consisted of a circular earthwork 9m in diameter for a 90cm light, a predictor emplacement, a generator, accommodation for the detachment and at least one light anti-aircraft machine gun pit. Searchlight emplacements generally only survive as crop marks (fig. 9.17).

5.12.2.4 *Barrage Balloon Sites*

As well as anti-aircraft artillery major centres of population, industry and ports were protected by barrage balloons. These balloons were intended to make enemy aircraft fly higher, thus diminishing the accuracy of their bombing and divert them towards the air-aircraft batteries. From the APTE transcriptions these sites can be seen to consist of a series of concentric rings for the tethering of the balloon itself and for anchoring the lines that extended below it to deter under flying. It is unlikely that any trace will survive to the present day.

5.12.2.5 *Bombing Decoys*

As an alternative to engaging enemy aircraft or forcing them to fly higher, attempts were made to divert their attention through the use of bombing decoys. These were ground installations configured is such a way as to confuse enemy pilots and encourage them to waste their bomb load on meaningless targets. Two types were regularly deployed. 'QF' sites were established to provide mock fires to give the impression that the area had already been attacked while 'QL' sites attempted to simulate street lighting, marshalling yards and dock facilities. A detailed study of decoys has been made by Dobinson (2000) and his gazetteer of sites will be referred to in addition to the HER and APTE records (fig. 8.17).

5.12.2.6 *Radar Stations including 'Chain Home Low' sites*

Radar stations usually consisted of four elements, a transmitter (TX) block, a receiver (RX) block, a power supply and bases for the aerials. There would also be accommodation for the operators. The 'Chain Home' system was the backbone of radar provision in WWII, two types being deployed, a 'West Coast' Type and an 'East Coast' Type. It is the latter that is found in the NERCZA study area and the receiver block can be identified by finding the concrete bases for the four towers that surrounded it whereas the transmitter block should have bases for a line of towers at 55m intervals. 'Chain Home Low' (CHL) sites were developed to detect low flying aircraft and from 1942 onwards the receiver and transmitter were housed in a single structure. A particularly well preserved CHL site at Dunstanburgh is described in Chapter 8.

5.12.2.7 *Air-raid shelters*

As a last resort the civilian population and military personnel could retreat to purpose built air-raid shelters of which several types were built including trench shelters for multiple occupancy and the famous *Anderson* shelters erected semi-sunken in thousands of back gardens.

5.12.2.8 *Beach Defence Batteries*

Once an enemy was on the beach the heavy calibre weapons of the coastal defence batteries were of little use and responsibility fell to beach defence batteries to the hold the beach and prevent an incursion inland. The weapons deployed often consisted of a single 3 pdr or 6 pdr anti-tank guns in a concrete pillbox or earthwork emplacement. A good example of this kind of deployment is provided by the Druridge Bay Defence Area discussed in Chapter 8.

5.12.2.9 *Pillboxes and Section Posts*

Concrete pillboxes, and the rather less common section posts are the most familiar defensive structure encountered on the coast. They are the classic example of a protected position from which troops could engage the enemy, and a number of different types can be identified (fig. 8.18). They were either sited tactically to command a particular point of vulnerability or in groups as part of a wider system. Most notable of the latter are the pillboxes on strategically sited Stop-Lines. Hundreds of pillboxes are recorded in the NERCZA study area and many survive to the present day. A comprehensive study of these features lies beyond the scope of the present project and the existence of most pillboxes is simply noted in tabular form. However, in two cases a more detailed study has been undertaken. Chapter 6 includes an account of the section posts forming the Defence Area at Greatham Creek while the arrangements at the Defence Area at Druridge Bay are described in Chapter 8.

5.12.2.10 *Anti-tank Obstacles*

Lines of concrete blocks are the most commonly encountered anti-tank obstacles, though ditches and solid walls pierced with embrasures were also deployed (fig. 9.16). During the war these were supplement by beach scaffolding and ***minefields.*** These latter defences were cleared once the threat of invasion had passed, though they can often be identified on wartime aerial photographs.

5.12.2.11 *Anti-glider Obstacles*

Added to the threat of a sea borne invasion the possibility of an enemy arriving by air, either by parachute or the landing of troop carrying gliders, had to be considered. The latter concern was addressed by the construction of anti-glider obstacles at likely landing sites. These consisted of lines of concrete blocks similar to anti-tank obstacles but incorporated within a system of earthwork ditches and banks. The APTE has identified three types of provision. The simplest variety consisted of single or parallel lines of obstacles up to 150m long and 10m wide. When set in groups, they were about 100m apart. Variations on this arrangement include discrete segments and sections with a 'dog-leg' bend in the middle. A more complex variety consisted of an arrangement of intersecting obstacles forming a regular lattice pattern, the lattice being about 150m square. A third system consisted of a combination of simple and lattice arrangements but also incorporated enhanced natural features.

5.13 Conclusion

This completes the review of the principle types of historic asset encountered on the NE coast. The following four chapters review these remains in detail, aerial survey Block by Block, and note the extent to which individual assets and groups of assets should be considered to be under threat from coastal erosion. The approach by which these threats has been assessed was set out in Chapter 2 while Chapter 10 offers some thoughts on the scope for further work.

CHAPTER 6

Whitby West Pier to Blackhall Rocks (Block 1 NMP)

6.1 Introduction

The area covered extends from the west bank of the River Esk at Whitby to Blackhall Rocks on the Durham Heritage Coast. It falls into three major topographical units, the uplands of the North York Moors, the estuary of the River Tees and low lying coastal zones to the east and north, including Hartlepool Bay, and the most southerly section of the Magnesian Limestone cliffs of County Durham. Accordingly, this survey of the heritage assets has been undertaken with reference to the HERs maintained by North Yorkshire County Council, The North York Moors National Park Authority, Tees Archaeology and Durham County Council. This existing base of data has been enhanced by the transcription of aerial photographs (APTE) held by the NMR and carried out to the standards of the NMP.

The coastline from Whitby to Saltburn has been designated as 'Heritage Coast' while extensive sections of the County Durham coast is similarly designated. In addition, substantial sections of the coast and large areas of the Tees Estuary have been designated as SSSIs. From Crimdon Dene to Blackhall Rocks the coastline is a National Nature Reserve. The National Trust manages several properties in the area consisting of sections of coast to the north of Runswick Bay, from Beacon Hill to High Lingrow at Port Mulgrave, Cowbar Nab at Staithes, an area east of Skinningrove, and Warsett Hill, Saltburn. However, substantial sections of the coast in this area are extensively built-up, which has implications for the survival of heritage assets.

6.1.1 Soils and landuse

The solid geology of this section of the coast is described in Chapter 3. However, throughout most of the coastal zone this solid geology is mantled by varying thicknesses of glacial drift and other superficial deposits of Pleistocene and Holocene age. The Tees Estuary is dominated by the sand, silt and clay deposits of the tidal flats and similar deposits also underlie the built-up area of West Hartlepool. Along the coast west of Saltburn and as far as Crimdon Dene are ridges of blown sand forming dunes inland from the sand and gravel beach deposits. North of the Tees Estuary, and also extending as far Crimdon Dene is a zone of undifferentiated raised marine deposits of Quaternary age overlying sandstones. It is these superficial deposits that give rise to the principal soil types found along this section of the coast (Table 6.1).

The patterns of landuse that characterise these soil types are an important consideration in evaluating the survival of heritage assets and the degree of threat arising from normal farming practices. Clearly, ploughing for arable cultivation will have had a major bearing on the survival of and the extent to which, once levelled, sites can be identified on aerial photographs. Plough damage to archaeological sites is not a recent phenomenon but before the Medieval period the scale and intensity of ploughing cannot be considered significant. However, the development of ridge-and-furrow cultivation in the open fields of the Medieval and post-Medieval periods was on a sufficient scale to pose a serious threat to existing features. This is born out by the fact that most of the pre-medieval sites identified in this study lie within areas not affected by ridge-and-furrow cultivation (fig. 6.10).

Table 6.1 Soil and landuse in Block 1

Deep loam	Stock rearing and dairying with some cereals
Deep red loam	Cereals, sugar beet and potatoes with some short term grassland
Seasonally wet deep loam	Dairying and stock rearing on permanent or short term grassland with some cereals in drier areas
Seasonally wet deep red clay	Dairying on permanent grassland with some cereals in drier districts
Seasonally wet deep loam to clay	Grassland in moist lowlands with some arable in drier areas
Seasonally wet deep clay	Winter cereals, sugar beet, potatoes and field vegetables
Dune sand	Recreation and some coniferous woodland

The patterns of landuse that characterise these soil types are an important consideration in evaluating the survival of heritage assets and the degree of threat arising from normal farming practices. Clearly, ploughing for arable cultivation will have had a major bearing on the survival of and the extent to which, once levelled, sites can be identified on aerial photographs. Plough damage to archaeological sites is not a recent phenomenon but before the Medieval period the scale and intensity of ploughing cannot be considered significant. However, the development of ridge-and-furrow cultivation in the open fields of the Medieval and post-Medieval periods was on a sufficient scale to pose a serious threat to existing features. This is born out by the fact that most of the pre-medieval sites identified in this study lie within areas not affected by ridge-and-furrow cultivation (fig. 6.10)

6.1.2 Coastal erosion

There are historical records of landslips and cliff falls along this section of coast from at least the early C19 and mapping by the British Geological Survey has recorded landslips at nine locations affecting 6.2km of coastline. Coastal erosion and inundation through sea level rise represent a significant threat to heritage assets.

This section of the coast falls within Cell 1d of the Shoreline Management Plan (SMP). This is divided into 19 Management Areas each of which is subdivided into a number of Policy Units that offer an assessment of threat posed by coastal erosion over the next century. Block 1 spans Management Areas 11 to 23.

Coastal erosion poses two kinds of threat to the historic environment:

1. The erosion of the coast itself caused by the action of the sea leading to the destruction or truncation of assets.
2. Damage to assets caused by various mitigation strategies.

Five main types of mitigation are proposed:

1. 'Hold the Line' entailing construction works such as the provision of rock armour at the foot of eroding cliffs and the construction of sea defences (HTL).
2. Advance the line (A).
3. Managed Realignment (MR).

4. Hold the line on a retreated alignment (HR).
5. Retreat (R)

The alternative to these approaches is 'No Active Intervention' (NAI).

The coast extending west from Whitby to Saltburn is dominated by high cliffs backing wide foreshore platforms of Redcar Mudstone broken at intervals by narrow gorges such as that of the Skinningrove and Staithes. The two kilometres of beach at Runswick Bay and the westerly portion of Whitby Bay, extending east from Sandsend, are the only significant low lying sections of coast between Whitby and Saltburn, although the latter is punctuated by the rock outcrop at Upgang. Between Saltbrun and Crimdon Dene the coast is low lying and in the vicinity of Teesmouth much of it is barely above present sea level.

The authors of the SMP have produced estimates of baseline erosion rates at various points. These are based on existing evidence and may be expected to increase with sea level rise. Accordingly, the figures presented in the following table should be taken as a minimum.

Table 6.2 Rates of coastal erosion in Block 1 recorded in the SMP

Location	NGR (approximate)	Rate per year
Blackhall	NZ464400	0.3m
Crimdon Dene	NZ485370	0.3m
North Sands	NZ500358	0.3m
Hartlepool Headland	NZ530340	0.3m
Seaton Sands	NZ526295	0.4m
Coatham Sands	NZ575260	0.2m
Redcar	NZ610252	0.4m
Marske	NZ640228	04m
Saltburn	NZ665217	0.4m
Huntcliff	NZ690218	0.1m
Cattesty Cliff	NZ705205	0.3m
Boulby	NZ760192	0.1m
Cowbar	NZ780189	0.025m
Penny Steel - Runswick	NZ80174	0.1m
Runswick Bay	NZ814155	0.2m
Kettleness	NZ835158	0.1m
Sandsend Cliffs	NZ860130	0.1m
Sandsend	NZ863127	0.25m
Upgang Cliffs	NZ870122	0.25m
Whitby West Cliff	NZ899117	0.2m

The maps accompanying the SMP use these data to predict the position of the coastline at 20, 50 and 100 year intervals. A number of responses have been proposed on the basis of these predictions.

Table 6.3 SMP proposed responses to predicted coastal change in Block 1

Location	SMP unit	2025	2055	2105
Crimdon Dene	11.1	NAI	NAI	NAI
North Sands	11.2	HTL	HTL	MR
Hartlepool Headland	11.3	HTL	HTL	HTL
Hartlepool	12.1	HTL	HTL	HTL
Seaton Carew North	12.2	HTL	HTL	HTL
Seaton Sands	13.2	NAI	NAI	NAI
North Gare	13.3	HTL	HTL	HTL
North Gare Sands	13.4	NAI	MR	MR
Bran Sands	13.5	NAI	NAI	NAI
South Gare	13.6	HTL	HTL	HTL
Coatham Sands	13.7	NAI	NAI	NAI
Coatham East	14.1	HTL	HTL	HTL
Redcar	14.2	HTL	HTL	HTL
Redcar East	14.3	HTL	HTL	MR
Red Howes	15.1	NAI	NAI	NAI
Marske	15.2	HTL	HTL	MR
Marske Sands	15.3	NAI	NAI	NAI
Saltburn	15.4	HTL	HTL	HTL
Saltburn-Huntcliff	16.1	NAI	NAI	NAI
Cattersty Sands	17.1	R	NAI	NAI
Skinningrove	17.2	HTL	HTL	HTL
Hummersea	17.3	NAI	NAI	NAI
Boulby	18.1	NAI	NAI	NAI
Cowbar Cottages	19.1	HTL	HTL	HTL
Cowbar Nab	19.2	NAI	NAI	NAI
Staithes	19.3	HTL	HTL	HTL
Old Nab	20.1	NAI	NAI	NAI
Port Mulgrave	20.2	R	R	NAI
Lingrow	20.3	NAI	NAI	NAI
Runswick Village	21.1	HTL	HTL	HTL
Runswick Bay	21.2	NAI	NAI	NAI
Kettlesness	21.3	NAI	NAI	NAI

Sandsend Cliffs	22.1	NAI	NAI	NAI
Sandsend Village	22.2	HTL	HTL	HTL
Coastal road	22.3	HTL	R	R
Upgang Beach	22.4	NAI	NAI	NAI
Upgang Beck	23.1	HTL	R	R
Whitby West Cliff	23.2	HTL	HTL	HTL
Whitby Harbour	23.3	HTL	HTL	HTL

Whereas in the eastern section of this coastline the recommendation is that there should be 'No Active Intervention' it can be seen from the above table that 'Hold the Line' is the preferred for a significant part of the coast west of Saltburn. This no doubt reflects the fact that this part of the coast is extensively developed and that coastal change poses a significant threat to a large population and several major industries. The policy recommended for dealing with coastal erosion also has major implications for heritage assets and these will be considered on a case-by-case basis where threats are apparent.

6.2 Terrestrial Landscapes

6.2.1 Early Prehistory

Although Block 1 was entirely over run by ice during the Last, Devensian, Glaciation the possibility of an earlier human presence cannot be entirely ruled out on two counts. First, there are a number of records of pre-Devensian faunal remains from the vicinity of Hartlepool, Teesside and Redcar, such as the *Hippopotamus amphibious* from a gravel pit near Stockton-on-Tees (Sutcliffe 1959). Accordingly, these must imply the presence in the region of pre-Devensian deposits and the sand and gravel beds of the local coastline are sealed by Devensian boulder clay. Second, there are two finds from the region that have been tentatively interpreted as pre-Devensian artefacts.

At Limekiln Gill, Blackhall Rocks (NZ47623816, Durham 155) in 1927 Trechmann (1928) found what he believed to be an implement (fig. 6.2) in gravel below about 20m Devensian boulder clay. It is of yellow quartzite and measures 88mm by 76mm by 38mm. It is said to have six distinct flakes removed from each side and was stated to be 'definitely human' by Reginald Smith and Reid Moir of the British Museum. It is very rolled, but if accepted as a genuine artefact it appears to be an attempt to make a biface, and as such should be ascribed to the Lower Palaeolithic period.

This potentially interesting and unusual find has hitherto escaped the attention of writers on the Palaeolithic period in Britain and it does not feature in Wymer's gazetteer of Lower Palaeolithic Sites in Britain published in 1996. However, that volume does include details of a retouched flake from Newbiggin Farm, Whitby (NZ840077), said to have been found at a depth 1.3m in glacial till while further south in Lincolnshire authenticated bifaces have been found in deposits below glacial tills. In the light of these finds, the possibility that the Limekiln Gill find might also be authentic should be born in mind.

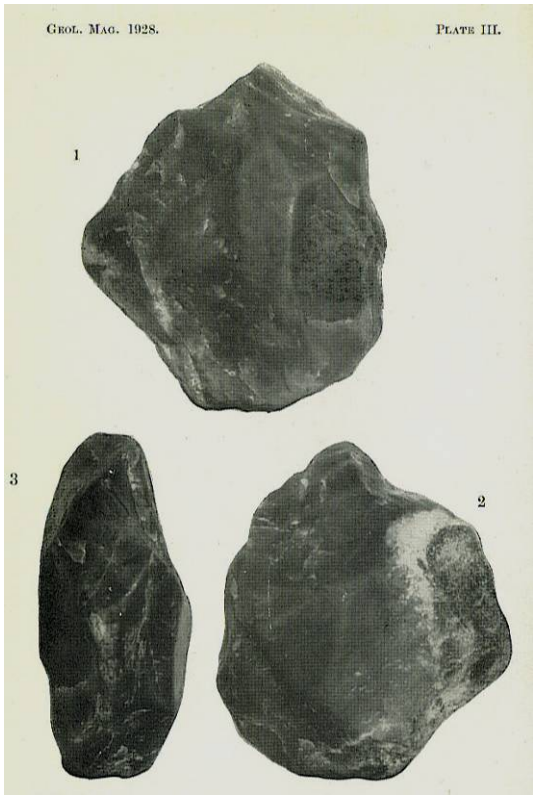


Figure 6.1 The putative Lower Palaeolithic biface from Limekiln Gill, County Durham (Trechmann 1928, Plate III)

Support for this view may be provided by the recent discovery of part of another biface (fig.6.3) on the beach at the South Gare Breakwater, Redar (Rowe *pers comm.)*. While this may have originated from sand and gravel beds which are locally sealed by Devensian boulder clay it could equally easily have originated in a load of ballast brought to Teesmouth by a collier returning from the south. However, even if genuine, these isolated finds can tell us little about the early human settlement of the NE coast beyond demonstrating the presence in the region of early humans.

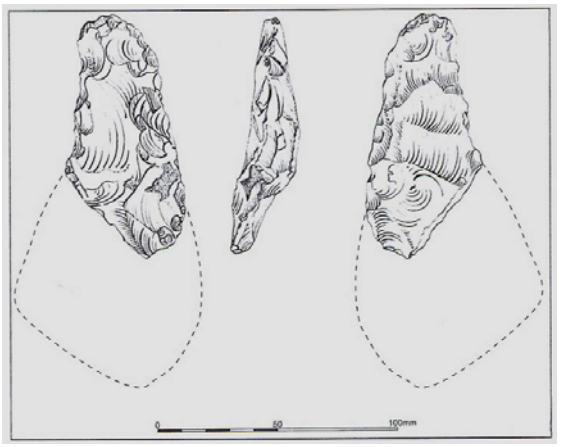


Figure 6.2 The putative Lower Palaeolithic biface from South Gare Breakwater, Teesmouth (Peter Rowe)

6.2.2 The Mesolithic period

While this section of the coast lay within the realm of continuous human settlement from at least 10000 BC the only unequivocal evidence of a human presence east of Saltburn before the construction of the Neolithic long mounds at Street Houses and Lingrow Howe is the recovery of some Mesolithic flints found during the course of the excavations at Street Houses. However, given the nature of Mesolithic hunter-gatherer activity this can be taken as indicating a Mesolithic presence throughout the coastal zone, a fact confirmed by finds to the west and north.

Further Mesolithic finds have been recorded from field walking exercises to the NW of Hartlepool. The most southerly of these ***flint scatter sites*** is that in field 206 at Hart (NZ47803644, Tees 2680). This site is situated at about 50m OD and lies about 700m to the SW of a major Mesolithic site at the mouth of Crimdon Dene (NZ48583681, Durham 118 and 154). Flints have been recovered from this location over a number of years and the NGR cited should be regarded as a general indication. More than 9000 artefacts have been collected, most of which are waste flakes and debitage which enable Crimdon Dene to be identified as a production centre. As well as cores and microliths the assemblage also includes leaf-shaped and barbed-and-tanged arrowheads indicating that activity extended from the Mesolithic period into the Neolithic period and Bronze Age, a common characteristic of flint scatter sites in the area. The Crimdon Dene site is described as occupying a low, flat topped spur of boulder clay partly covered by blown sand (Raistrick *et al* 1935).

About 1.25km NW of Crimdon Dene and at about 50m OD lie the flint scatters known collectively as Filpoke Beacon (NZ47483750-NZ47603733, Durham 109 and 120). Here, excavations during the 1930s at two locations recovered an assemblage of nearly 2000 artefacts including cores and microliths in addition to flint knapping waste. The microltihs are of distinctly narrow blade Late Mesolithic types and hazel nut shells associated with the assemblage have been dated to 8760± 140 BP ((Q-1474) (Jacobi 1976 and Young 1977).

Three further assemblages of Mesolithic flints have been recorded at Blackhall, 1.5km to the north of Filpoke Beacon (Durham 114, 115 and 112). They cannot be precisely located but lay in the general area of NZ 472389. Originally referred to as Neolithic, this material was identified by Raistrick as Mesolithic (Trechmann 1912 and Raistrick 1933a).

The last in this group of Mesolithic sites is an assemblage reported from Blue House Gill (NZ46393961, Durham 8276).

Table 6.4 Mesolithic flint scatter sites identified in Block 1

NGR	Name	HER	SMP	Importance	Risk
NZ47803644	Hart 206	Tees 2680	11.1	Low	Low
NZ48583361	Crimdon Dene	Durham 118 & 154	11.1	High	High
NZ47483750-NZ47603733	Filpoke Beacon	Durham 109 & 120	11.1	High	Low
NZ472389	Blackhall	Durham 112, 114 & 115	11.1	Low	Low
NZ46393961	Blue House Gill	Durham 8276	11.1	Low	Low

Whereas the Filpoke Beacon sites are situated well inland from the present shoreline the main Crimdon Dene site is close to the MHWS limit while the Blackhall sites are on the cliff edge. This section of the coast lies in SMP Management Areas 10.1 and 11.1 where the recommended policy is 'No Active Intervention'.

6.2.3 The Neolithic period

Neolithic axe heads are reported from Hart Lane, Hartlepool (NZ50463310, Tees 1455) and Hartlepool Headland (NZ52893345, Tees 4821) while Crimdon Dene flint scatter also includes some Neolithic items. More substantial evidence for terrestrial human activity in the coastal zone during the Neolithic period is provided by the ***long mounds*** at Street Houses and Lingrow Howe.

The mound at Street Houses, a shallow plough damaged earthwork about 6m in diameter, was excavated between 1979 and 1981(Vyner 1984) when it was found to be a complex, multi-phase structure. Initially, an east facing timber façade of closely spaced posts fronted a narrow mortuary structure set between low banks of earth and stone behind which lay a sub rectangular enclosure defined by a low stone kerb. The mortuary structure contained the burnt remains of several individuals. Radiocarbon dates suggest that the structure was initially constructed in the mid fourth millennium BC but was subsequently converted into a low trapezoidal mound. Further funerary activity took place at this site in the Bronze Age and will be considered below.

Comparatively little is known about the mound at Lingrow Howe which today survives only as a cropmark in an arable field. It is approximately 42m long and 10m wide and is oriented SW-NE. Human remains are reported to have been found in the past.

In addition to the two long mounds, a group of three enclosures, recorded as cropmarks on an aerial photograph taken in 1940 may also date from the Neolithic period. They are situated about 150m from the cliff edge above Overdale Wyke (NZ85451426). The enclosures vary in size, the largest being oval in shape and 42m by 39m with three breaks in the circuit, two of which may be the result of ploughing. Alongside this enclosure and a little to SE lies a 'U' shaped feature about 8m across while 55m to the E lies a penannular enclosure with a diameter of 24m and a 10m wide opening to the east. These features are difficult to interpret on the evidence available, but a local parallel might be provided by the Late Neolithic and Early Bronze Age palisaded enclosure at Street Houses (see below).

These sites provide a very limited basis on which to assess the terrestrial landscapes of the Neolithic period in the coastal zone. They do, however, attest the presence of stable, long term communities. Neither long mound is under threat from coastal erosion though both have been severely denuded by ploughing, while the Overdale Wyke enclosures survive only as cropmarks. The most easterly of these latter sites lies within 100m of the present cliff edge and could become vulnerable in the event of cliff collapse or landslip.

Table 6.5 Neolithic sites in Block 1

NGR	Name	HER	SMP	Importance	Risk
NZ73671933	Street House	Tees 545	18.1	Low	Low
NZ80371703	Lingrow Howe	NYMNP 7448	20.3	Medium	Low
NZ85451426	Overdale Wyke enclosures	NMR1453229	21.3	High	High

The HERs list sixteen assemblages of stone tools but none are precisely dated and could belong to Mesolithic, Neolithic or Bronze Age periods, or include material spanning all three.

Table 6.6 Flint scatter sites in Block 1

NGR	HER	SMP	Importance	Risk
NZ46713942	Durham 9632	11.1	Low	Low
NZ46783933	Durham 9632	11.1	Low	Low
NZ47273893	Durham 9632	11.1	Low	Low
NZ47213864	Durham 9632	11.1	Low	Low
NZ47413790	Durham 963	11.1	Low	Low
NZ47513759	Durham 959	11.1	Low	Low
NZ47233758	Durham 960	11.1	Low	Low
NZ47203748	Durham 961	11.1	Low	Low
NZ47903654	Tees 2861	11.1	Low	Low
NZ48253639	Tees 2862	11.1	Low	Low
NZ60272538	Tees 4869	14.2	Low	Low
NZ48603639	Tees 2866	11.2	Low	Low
NZ68002200	Tees 4348	16.1	Low	Low
NZ73481932	Tees 1741	18.1	Low	Low
NZ73921963	Tees 1742	18.1	Low	Low
NZ85231436	NYMNP 4662	21.3	Low	Low

6.2.4 The Bronze Age

This period is mainly represented by burial mounds or ***round barrows*** and ***cairns***, of which 30 either survive or are recorded. These fall into four distinct groups, each occupying areas of high ground. The most easterly group consists of five barrows that are part of an extensive group on Whinny Hill, most which lie outside the coastal zone. A number of these barrows have been excavated, beginning with work by Greenwell at several sites in the Whinny Hill group in the late C19, though it has not been possible to establish that any of the mounds he opened lie within the study area. More informative are the records of a number of excavations undertaken by W Hornsby and JD Laverick in the period between the two world wars (Hornsby and Laverick 1920).

At the Whinny Hill cemetery they excavated the Butter Howe barrow in 1918 where they uncovered a cremation and an inhumation, the latter associated with what they described as 'Anglian' pottery. They also uncovered a platform of stone slabs and the stump of an oak post, interpreted as a gallows. The mound is constructed of earth and stones and still stands about 1m high.

The Hornsby and Laverick campaign concentrated on a group of barrows extending from Rockcliff Hill across Boulby Bank, eight mounds being examined in all. The first to be described (mound no.1) was one of a group of three mounds on Beacon Hill

(NYMNP 2772.02). As well as seven cremations, the excavators recovered about 300 worked stones from within the mound, some decorated with cupmarks. This mound stands about 4m high and has a diameter of 15m, though its lateral extent has been truncated by ploughing, which has also levelled the other two barrows in this group.

Three barrows were excavated on Boulby Bank (Tees 44, 45 and 46). At Tees 44 (mound no.6) they found an empty cist together with a cremation accompanied by a cup marked stone, a slate pendant and some flint flakes They described Tees 45 (mound no.4) as composed of sandstone overlain by a layer of greenstone and capped with earth. It had a kerb of upright stones and in the centre was an inverted urn surrounded by greenstones. The urn covered a cremation and 3m SW of the centre a further cremation was found accompanied by a broken vessel. As with other barrows in the area, finds included cupmarked stones. In the centre of mound no.7 (Tees 46) was a collared urn inverted over a creation.

Excavations have also taken place at one of the Rockcliff Beacon barrows (Tees 33). This mound is approximately 20m in diameter and stands about 1.7m high. It is constructed of earth and stone. Excavations in 1923 uncovered a stone-lined cist set in the old ground surface below the mound. The remains of two cremations were identified as well as several cupmarked stones.

A number of other barrows in the group seem to have been subject to excavation or disturbance in the past, but details of finds, other than references to 'cremations' and 'collared urns' are not available.

The recent archaeological excavations at the Street Houses long mound established that the final phase of activity was the erection of a Bronze Age round barrow over the eastern half of the long mound. Secondary burials were represented by four collared urns, while a deposit of 20 jet buttons was inserted into the tail of the long mound (Vyner 1984).

This is a clear indication of at least some level of continuity between the Neolithic period and the Bronze Age, a situation confirmed by the excavations at the nearby Late Neolithic and Bronze Age palisaded structure, the so called 'Wossit'. This complex monument, which lies outside Block 1, dates from the late 3rd millennium BC. Finds here also include Grooved Ware and jet buttons (Vyner 1988).

The most westerly group lies on Warsett Hill. This features in the HER has two records (Tees 11 and 1049) at NZ69162135 and NZ69202140 but details in the NMR refer to six or seven mounds, some of which had been disturbed before the end of the C19 (Elgee 1930).The two recorded mounds lie on the edge of an area of ironstone workings and this may be responsible for the loss of some of the others.

A further barrow is recorded at NZ66922154 (Tees 15) and the NMR entry has a report of an excavation in 1913 which uncovered a cremation.

Table 6.7 Round barrows and ring ditches in Block 1

NGR	Name	HER	SMP	Importance	Risk
NZ66922154	Saltburn	Tees 15	15.4	Low	Low
NZ69162135	Warsett Hill	Tees 11	16.1	Low	Low
NZ69202140	Warsett Hill (2-6)	Tees 1049	16.1	Low	Low
NZ73671933	Street House	Tees 548	18.1	Low	Low
NZ74611917	Rockcliff Hill	NYMNP 4967	18.1	Medium	Low
NZ74641899	Rockcliff Hill	NYMNP 4966	18.1	Medium	Low
NZ74931916	Rockcliff Hill	Tees 32	18.1	Medium	Low
NZ74781918	Rockcliff Hill	Tees 3446	18.1	Medium	Low
NZ74821905	Rockcliff HIll	Tees 3447	18.1	Medium	Low
NZ74851936	Rockcliff Beacon	New record	18.1	Medium	Low
NZ74901932	Rockcliff Beacon	Tees 495	18.1	Medium	Low
NZ74961943	Rockcliff Beacon*	Tees 33	18.1	High	Low
NZ74951912	Rockcliff Hill	Tees 494	18.1	Medium	Low
NZ75151918	Boulby Bank	Tees 43	18.1	Medium	Low
NZ75341918	Boulby Bank	Tees 44	18.1	Medium	Low
NZ75561912	Boulby Bank	Tees 40	18.1	Medium	Low
NZ75641894	Boulby Bank	Tees 45	18.1	Medium	Low
NZ75801888	Boulby Bank	Tees 46	18.1	Medium	Low
NZ79321781	Beacon Hill*	NYMNP 2772.02	20.2	High	Low
NZ79351782	Beacon Hill	NYMNP 2772.01	20.2	Medium	Low
NZ79311780	Beacon Hill	NYMNP 2772.03	20.2	Medium	Low
NZ82501500	Whinny Hill	NYMNP 7458	21.2	Medium	Low
NZ82731512	Butter Howe*	NYMNP 7446	21.2	High	Low
NZ83031476	Whinny Hill	NYMNP 7400.07	21.3	Medium	Low
NZ83121489	Cow Hill*	NYMNP 7400.06	21.3	High	Low
NZ83331465	Whinny Hill	NYMNP 7400.14	21.3	Medium	Low

None of these sites appear to be threatened by coastal erosion but all have been affected by ploughing. In some cases this has modified the shape of the mound while in others the mound has been levelled and the site survives as a cropmark. Barrows indicated with an * are Scheduled Ancient Monuments.

The Durham HER has records of two crop mark sites which, from their size and shape, are more likely to date from Neolithic or Bronze Age periods than later. The Blackhall Rocks 1 cropmark (NZ46553935, Durham 8281) is oval in shape and about 10m across while the Blackhall Rocks 2 site (NZ46923921, Durham 8282) is circular and about 8m in diameter. The function of neither site has been identified though the second site may be a ring ditch marking the site of a ploughed out barrow. Neither site was identified during the APTE. A potentially Bronze Age find is a ***cist*** found at Brow Quarry (NZ75671882, Tees 496). When first discovered in 1875 this was regarded as Roman.

Table 6.8 Putative Neolithic or Bronze Age sites in Block 1

NGR	Name	HER	SMP	Importance	Risk
NZ46553935	Blackhall Rocks 1	Durham 8281	11.1	Medium	Low
NZ46923921	Blackhall Rocks 2	Durham 8282	11.1	Medium	Low
NZ75671882	Brow Quarry cist	Tees 496	18.1	n/a	n/a

6.2.5 The Iron Age and Romano-British Periods

In the later prehistoric period the evidence for human activity in the coastal zone is mainly in the form of settlement remains, in particular ***farmstead enclosures*** of various shape and size. Unlike the remains of earlier periods which are predominantly funerary or ritual in character, these enclosures appear to be mainly domestic.

A cropmark at Street Houses, Loftus, appears to record three sides of a sub- rectangular enclosure about 100m across on the surviving axis. In addition to the missing fourth side, there are two breaks in the circuit, either or both of which could be entrances. Approximately 1km to the east are the cropmarks of another rectangular enclosure near the summit of Rockcliff Beacon. Only two sides of this feature survive, 85m and 94m long respectively and joining at a right-angle. Within the angle are the cropmark traces of an oval ring ditch marking the site of a ploughed out barrow.

Four further enclosures have been identified from the records. These consist of ditched enclosures at Runswick Bank Top and East Row, an embanked enclosure also at East Row and an enclosure recorded in the Tees HER at Warsett Hill. None of these enclosures have been dated but they are of a type commonly attributable to the Iron Age or Romano-British period.

Table.6.9 Iron Age and Roman-British enclosures in Block 1

NGR	Name	HER	SMP	Importance	Risk
NZ69282137	Warsett Hill	Tees 4779	16.1	Low	Low
NZ73871951	Street House	Tees 1269/5229	18.1	Low	Low
NZ74961944	Rockcliff Beacon	Tees 6237	18.1	Low	Low
NZ80361592	Runswick Bank	NYMNP 4399	20.3	Low	Low
NZ86861223	East Row	NYCC MNY8836	22.3	Low	Low
NZ87791182	East Row	NYCC MNY4441	22.4	Low	Low

In addition to the above enclosures there are also records of six ***bee-hive querns*** from within the study area. These substantial items can be dated to the Iron Age or Romano-British periods. Two come from the immediate proximity of the Street Houses enclosure and a further two from within 500m to the SW. A fifth example is from the area of Beacon Hill, while the sixth was found during the excavation of the Roman Signal Station or fortlet at Goldsborough.

Table 6.10 Bee-hive querns from Block 1

NGR	Name	HER
NZ73501920	Street House	Tees 1015
NZ73741930	Street House	Tees 546
NZ73791950	Street House	Tees 1297
NZ73791946	Street House	Tees 1004
NZ79181769	Beacon Hill	NYMNP 3103
NZ83521514	Goldsborough	NYMNP 7444.05001

The presence of querns implies arable cultivation but the HERs do not have any records of pre-Medieval field systems within this part of the coastal zone. However, research elsewhere in Northern England has shown that later, Medieval, field systems sometimes respected pre-existing features that can be revealed by retrogressive analysis (Tolan-Smith, M.1997)

The Roman period is also represented by a number of isolated finds from the Hartlepool area. The main group of finds comes from the foreshore and will be discussed in the section dealing with coastal/maritime landscapes. Other Roman finds in the area include two coin hoards (NZ51003199, Tees 788 and NZ52773358, Tees 689) and a double inhumation (NZ50803375, Tees 1201). This burial was accompanied by coarse pottery and a necklace of jet and glass beads dated to the late C4 or C5.

6.2.6 The Early Medieval Period

The main site of Early Medieval date in Block 1 is the Hartlepool Headland where archaeological research over more than a century has revealed traces of St Hilda's C7 monastery and several Anglo-Saxon cemeteries.

The monastery site was located in Church Close (NZ52843374, Tees 335) and consisted of the postholes and wall trenches of a succession of rectangular timber buildings. Four phases of occupation were identified and a series of radiocarbon dates spans the period from the mid C7 to the mid C8. Historical accounts recall that the monastery was founded by Hieu in AD 640 who was succeeded by St Hilda in AD 649. It appears to have been destroyed in the late C8, an early victim of the Viking raids (Daniels 1988).

Two hundred metres to the north of Church Close lies the Gladstone Street Anglo-Saxon cemetery (NZ52833394, Tees 714 and 1371). Excavations here in 1964 recovered the remains of 29 inhumations. The Baptist Street Anglo-Saxon cemetery (NZ52993361,Tees 703 and 3559) lies 185m to the SE of the Church Close site while further Anglo-Saxon burials have been recorded at South Terrace (NZ53023353, Tees 4721, 4725 and 4726) 100m to the south and on the cliff edge. Anglo-Saxon remains have been found at a number of other locations on the Headland and Hartlepool was clearly an important centre during this period.

An individual Anglo-Saxon burial has been recorded from Blackhall Rocks (NZ47103881, Durham 526). This consisted of a stone cist within which was the inhumation of a child accompanied by a solitary bead.

A collection of Anglo-Scandinavian sculptural fragments from St Oswald's Church, Lythe (NZ85011316), found during restoration work in 1910, are said to date from the C10 or C11 (NYMNP 7471). These include fragments of five hogback grave covers and three cross fragments.

The church of St Hilda at Hinderwell is an C18 and C19 structure but said to be on a site with Saxon origins, while St Hilda's Well, a Scheduled Ancient Monument, (NYMNP 2774.02001) lies in the churchyard and provides the origin of the village name from the Old English *Hildewella,* meaning Hilda's Well. Another potentially early site is Three Crosses Well at Loftus (NZ75601854, Tees 4672-4) and excavations at Marske Sands are reported to have uncovered Anglo-Saxon deposits.

Table 6.11 Early Medieval sites in Block 1

NGR	Name	HER	SMP	Importance	Risk
NZ52843374	Hartlepool Monastery	Tees 335	12.1	High	Low
NZ52833394	Glastone St cemetery (Hartlepool)	Tees 714 & 3559	12.1	Low	Low
NZ52993361	Baptist St cemetery (Hartlepool)	Tees 703 & 3559	12.1	Low	Low
NZ53023353	South Terrace Burials (Hartlepool)	Tees 4721, 4725 & 4726	12.1	Low	Low
NZ47103881	Blackhall Rocks cist	Durham 526	n/a	n/a	n/a
NZ85011316	St Oswald's Church sculptural frags.	NYMNP 7471	n/a	High	Low

6.2.7 The Medieval Period

The walled town and port of Hartlepool was the most important centre in Block 1 during the Middle Ages and while the port facilities will be considered below as pertaining to the coastal/maritime landscape the town itself served a wide terrestrial hinterland and its main heritage assets will be dealt with in the context of terrestrial landscapes. The historic centre lies on the Headland and the main features that survive from the medieval period are the town walls and St Hilda's church.

The Hartlepool Headland, extending to nearly 1km SE into the North Sea and rising several metres above the low lying land to the west, offered a rare opportunity for creating a defensive stronghold along this exposed section of coast. On the NE and SE sides low but steep cliffs provided adequate defence but on the SW side and to the NW across the landward approaches, the Headland was provided, between 1326 and 1344, with a wall consisting of a curtain provided with towers or bastions and gates. The extant section of the wall (Tees 704) runs from near the southern extremity of the Headland in a north-westerly direction for about 500m (NZ52753353 to NZ52353374), including the Sandwell Gate (NZ52703359,Tees 5506) and three bastions (NZ52623363, Tees 5505; NZ52403371, Tees 5503 and NZ52363378, Tees 5501). At this latter bastion the wall turned NE and ran for 650m across the neck of the Headland to the cliff above Fairy Cove (NZ52633433). This section of the wall is no longer extant, some of it having been destroyed by the construction of the Victoria Harbour, but the HER has records of nine

bastions (Tees 5488, 5489, 5490, 5491, 5492, 5493, 5496, 5497 and 5500) and two gates, The North gate (Tees 5494) and The Water gate (Tees 5495), while excavations have revealed a ditch outside the wall (Tees 5484) (Daniels 1986). This section of the wall actually spanned the entrance to the medieval harbour (NZ52383381) which was protected by a boom chain slung between two boom towers (Tees 5498 and 5499).

The church of St Hilda (Tees1404) occupies the highest point on the Headland at 10m OD (NZ52843367). The present church, which is not the first on the site, dates from the early C13. Other medieval ecclesiastical establishments include the Franciscan Friary, dating from 1240 to 1538, which was situated to the NE of St Hilda's (NZ52963389, Tees 692) and St Helen's Chapel and Well (NZ52423422, Tees 694 and 695), which lay outside the North Gate. Excavations at various locations on the Headland have recorded medieval deposits and a cemetery has been identified at Francis Street (NZ52543411, Tees 716).

> *The coast of the Hartlepool Headland lies within SMP Management Units 11.3 and 12.1, in both of which the recommended policy is one of 'Hold the Line'. This may entail an enhancement of existing sea defences which could have a bearing on the surviving section of the town wall, which is virtually on the foreshore.*

Excavations in 1938 established that the present church of St Germain, Marske, although an early C19 structure, stands on the site of a late C12 predecessor (Tees 274). Tees 537 records a C13 wayside cross at St Mark's Church, Marske and some C14 and C15 architectural fragments are recorded in All Saints church, Hartlepool (Tees 487). The Wishing Chair Cross at Whitby (NZ88491098; NYCC MNY 8759) is a Medieval cross base comprised of a block of local sandstone with an oblong depression cut into the top to serve as a socket. The north edge of the socket has broken away to form what looks like a chair. The cross probably marked the bounds of Whitby Abbey.

Documentary sources raise the possibility of two further medieval religious establishments in the area. A deed of 1216 refers to *"Meum heremitorium de Salteburne super ripar de holdbec*" implying a small hermitage at Saltburn, the site of which has been located on the Hob Hill side of Holebeck. However, the site is reported as overgrown with no surface traces (Hornsby 1913).

Similarly, a chapel of St Thomas a'Becket is recorded at Seaton Carew as having been founded *circa* 1200 but ruinous by 1622. It has been suggested that it was located near an inlet which is named as Chapel Open on the 1st edition OS map of 1861. However, the NGR obtained for this identification lies between MHWS and LAT (Page 1928, 376).

Other medieval features in Block 1 include a rabbit warren recorded at Hart (NZ48993599, Tees 3641), and a few isolated finds from the foreshore at Seaton Carew (NZ51763197, Tees 1276, 1291 and 1474).

The deserted Medieval settlement of Old Boulby (NZ76161828; Tees 288) was excavated in 1969 in advance of development of the Boulby potash mine. Finds indicated occupation from the C13 and abandonment by the C16. Excavations also took place at the nearby site of Old Boulby Hall which was found to have been occupied from the C15 to C18.

The terrestrial landscapes of the Medieval period in Block 1 are dominated by the traces of arable cultivation in the form of parcels of ***ridge-and-furrow***. While HERs include many records of ridge-and-furrow, these are mostly as individual points and the most comprehensive record has been provided by the APTE. Traces of ridge-and-furrow, surviving as earthworks or crop marks, are virtually ubiquitous throughout most of this section of the coast, the only significant gaps in the pattern being where evidence has been removed by housing development in the hinterland of the principal urban areas at Redcar, Seaton Carew and Hartlepool, and there appears to be little distinction in respect of soil type. Unsurprisingly, traces are lacking from the dune sands and the seasonally wet deep clay, with the exception of an area of slightly higher ground to the south of Seaton Carew.

6.2.8 The Industrial period

Although a number the industries that became prominent in the area in the C18 and C19 may have begun production earlier, few early traces survived later developments. The earliest of these industries is likely to have been the mining of jet.

Jet has been a highly prized commodity from prehistoric times to the present day and the Whitby Mudstone formation of the Early Jurassic epoch is the main British source of jet. As a raw material, jet may be obtained by collecting broken slabs at the base of cliffs after a storm or landslip, by the excavation of short drifts or tunnels cut into the cliff or by the digging of pits from above. The Whitby Mudstone outcrops in the cliffs east of Saltburn facilitating the first and second of these two methods while the extensive overburden of drift deposits means that there were few opportunities of obtaining material by working directly from the surface.

The HERs have recorded extensive evidence for jet mining, mostly extracted from the 1st edition of the Ordnance Survey 25 inch sheets. These records probably refer to C19 drift mining. The main areas recorded are between Hummersea Bank and Rockhole Hill (Tees 6012, 6014, 6019 and 1164), between Staithes and Port Mulgrave (NYMNP 4748), around Runswick Bay to Kettleness (NYMNP 7315, 7316, 7450 and 7454) and from Kettleness to Deepgrove Wyke (NYMNP 7456). This latter record refers to a more than 3km long zone of artificial caves at or near the base of the cliffs.

> *Given that all these sites are located within or at the base of the cliffs they are clearly vulnerable to coastal erosion and the British Geological Survey has identified two areas in the Kettleness to Deeprove Wyke zone that are particularly susceptible to landslip.*

Alum, from aluminium sulphate, is a chemical important in the tanning and dyeing industries. In the Middle Ages it had to be imported from the Continent but in 1607 suitable deposits were discovered within the Jurassic Shales at Belman Bank, Guisborough and this led to the foundation of the Yorkshire alum industry.

The quarried shales were calcined by burning in heaps up to 15m high and 30m across covered in brushwood and gorse. The calcined shale was then steeped in water to extract sulphates of iron and alumina. The resulting liquor was sent to the alum works or 'house', boiled and had an alkali added, which might be potash from burnt seaweed or urine, the latter being collected on a commercial basis from surrounding communities. As the liquor evaporated the alum crystallized allowing the iron salts to be pumped off. From 1700 the main fuel used was coal and as supplies of suitable quality were not

available locally, it had to imported. Elements of these various processes form the archaeological record of the alum industry in North Yorkshire. The alum industry throughout the area collapsed in the late C19 when the chemistry of the industry was finally understood and it was found that alum could be extracted from colliery waste. The most successful quarries were those at Sandsend which were in production from 1733 until the 1870s. An extensive area of alum quarries is recorded to the north of Sandsend and extending to Deepgrove (NYMNP 7460). This area is a Scheduled Ancient Monument and includes features associated with the alum industry such as a steeping pit at NZ85761392 (NYMNP 7460.1) and cisterns at NZ85931328 (NYMNP 7460.2).

To the south of the quarrying area lie the remains of the Sandsend Alum House (NZ86921293 NYCC DNY478). This was located on the north side of Sandsend Beck and is now partly covered by a car park, with only the front wall surviving. This is constructed of rubble and pierced by two large entrances. A map of 1849 shows the alum works covering the whole area of the car park. The alum house operated from 1733 and processed raw alum liquor produced from the alum quarries to the north. The liquor was transported through wooden channels known as liquor troughs directly to the alum house. Alum production ceased in the late C19 when the nearby alum quarries closed. The site of the Sandsend Alum House is a Scheduled Ancient Monument.

The remains of the Kettleness alum works (NZ83301593, NYMNP 7452) occupy a promontory projecting into the North Sea, 7.5 kilometres northwest of Whitby. The works comprised quarries, an alum house plus associated processing and transport facilities. The works operated intermittently from 1727 to 1871 and was amongst the last alum works in the region to be opened and the last to close. Quarrying started at the northern end of the promontory and progressed southwards, creating by 1871 a north-facing working face up to 400 metres long and 50 metres deep, from which the grey alum shale was extracted. The first alum house lay on the foreshore in the south-east corner of Runswick Bay and was destroyed in a landslip in December 1829. A new alum house was constructed in 1830 within the quarry and the workers' housing was moved to the cliff top SW of the works (the present Kettleness hamlet). The alum house was demolished in 1875. Processing of the shale took place within the quarry, where calcining places, steeping pits, a liquor-trough tunnel, various conduits and gutters, and a number of buildings, tracks and spoil heaps all survive. The remains within the quarry area are a Scheduled Ancient Monument.

Figure 6.3 Kettleness alum works (author)

The remains of the Boulby Alum Quarries and associated features extend for about 3.5km along the coastline from NZ73292010 to NZ76221896. The workings originally extended further north, but substantial areas have been lost to coastal erosion. The Boulby alum works were started in 1672 and continued in production until 1871. There are two discrete areas of quarrying, the earliest being at the east end at Rockhole Hill where a large quarry scoop with three terraces survive. This was served by the alum house at Boulby (NZ76161903, NYMNP 4968). In the C18 the works thrived and in 1784 expanded westward with the opening of the New Works (NZ75181967, NYMNP 4968.42), situated in Loftus Parish. Surviving large mounds of shale are the remains of the calcining clamps and fragments of steeping pits protrude from the cliff face (NZ74032009, Tees 6024 and NZ73832009, Tees 6018). Extending west to east are the remains of a stone culvert which supported a wooden liquor trough. Some cisterns (NZ73452016, NYMNP 7329), reservoirs (NZ76051900 and NZ76021893, NYMNP 4968.2 and 4968.3), tunnels (NZ76151909, NYMNP 4968.11) and shafts (NZ76131905, NYMNP 4968.10) also survive as ruined structures. Excavations in the 1960s found several structures including three roomed buildings which are thought to be laboratories or a blacksmiths workshop. There has been a survey by RCHME and part of the Rockhope Hill complex is a Scheduled Ancient Monument.

The last major complex to be mentioned in the context of the alum industry is the alum house at Hummersea Bank (NZ72641997, Tees 6004). This was built c1800 and is recorded on the 1st edition Ordnance Survey sheet for 1857.This particular alum house is believed to have been the third which served the Boulby/Loftus alum quarries. The structural remains consist of a kiln-type structure, a row of 4 arches and what appears to be the housing for a large metal pan. These remains are visible in the cliff face at Hummersea, some 8m above sea level. The buildings would originally have been located on a platform, to avoid the tides. The structures have been engulfed by a landslip from the cliff above, hence the fragmentary remains in the cliff face. The HER also has records of C17 alum working sites at Saltburn (NZ66592120, Tees 4415 and NZ67452064, Tees 4416).

Table 6.12 Sites of the North Yorkshire alum industry in Block 1

NGR	Name	HER	SMP	Importance	Risk
NZ8513	Sandsend	NYMNP 7460, NYCC DNY478	22.1	Medium	High
NZ8315	Kettleness	NYMNP 7452	21.2/3	Medium	High
NZ7320-7618	Boulby	NYMNP 4968, 7329, Tees 6018, 6024	18.1	Medium	High
NZ7219	Hummersea Bank	Tees 6004	18.1	Medium	High
NZ6621	Saltburn	Tees 4415-6	15.4	Medium	High

Although the alum industry was in decline by the third quarter of the C19 something of a reprieve for the industrial communities of the area was provided by the discovery in 1850 of the Main Seam of the Cleveland Ironstone, often exposed at the same location as the beds of shale worked for alum. While nodules of ironstone had been quarried on the foreshore since the 1830s it was the mining of the Main Seam that laid the foundations of the ironstone industry. Maximum production was achieved in 1883 and the seam continued to be mined until the 1960s.This outcrops in the cliffs to the east of Staithes

and from Runswick Bay to Kettleness, and most evidence for ironstone mining and quarrying in this area is concentrated close to the cliff edge. To the west of Staithes evidence occurs rather more inland following the trend of the geology.

The evidence for the ironstone industry in Block 1 consists of mines and quarries, iron working locations and their associated infrastructure.

Table 6.13 Ironstone mines in Block 1

NGR	Name	HER	SMP	Importance	Risk
NZ65252160	Old Haven Ironstone Mine	Tees 3563	15.3	Low	Low
NZ68932181	Huntcliff Ironstone Mine	Tees 1120	16.1	High	Medium
NZ69572165	Huntcliff Ironstone Mine	Tees 5959	16.1	Low	Low
NZ71341946	Skinnigrove Ironstone Mine	Tees 1141	17.3	Low	Low
NZ70101968	Craggs Hall Mine	Tees 1170	17.1	Low	Low
NZ70851929	North Loftus Ironstone Mine	Tees 5975	17.1	Low	Low
NZ71231925	Loftus Ironstone Mine	Tees 1130	17.3	Low	Low
NZ70961917	Carlin Howe Ironstone Mine	Tees 1131	17.2	Low	Low
NZ73402000	Hummersea Bank Ironstone Mine Mine	Tees 1170	18.1	Low	Low
NZ75981941-76021808	Boulby Ironstone mine	Tees 1114-5	18.1	Low	Low
NZ78911879	Un-named mine	NYMNP 2777.01	18.1	Low	Low
NZ78441878	Un-named drift mine	NYMNP 2777.01006	18.1	Low	Low
NZ79291838	Un-named drift mine	NYMNP 2777.021	18.1	Low	Low
NZ79861775	Port Mulgrave Ironstone Mine	NYMNP 2777.03	20.1	Low	Low
NZ80481731	Un-named mine	NYMNP 2777.04	20.2	Low	Low
NZ80941667	Victoria/Albert Iron and Cement Works	NYMNP 7451.01	20.3	Medium	Medium
NZ82891559	Un-named mine	NYMNP 7453	21.2	Low	Low
NZ83261622	Foreshore quarrying	NYMNP 4576	21.2	Medium	High
NZ83491518	Kettleness Ironstone Mine	NYMNP 7332	21.3	Low	Low
NZ85791329	Sandsend Ironstone Mine	no HER record	22.1	Low	Low

The Huntcliff Ironstone Mine commenced operations in 1872 and closed in 1906. The surviving remains include an exhauster house for a Guibal ventilating machine, now a Scheduled Ancient Monument.

The Skinningrove Mine is recorded on the 1st edition of the Ordnance Survey of 1857 while the other four mines in the Skinningrove area do not appear until the 2nd edition of 1898. The North Loftus Mine is known to have been in production from 1874-1937 while the maximum period of production at the Loftus Mine was the period from 1865 to 1875. This is now the site of the Cleveland Ironstone Mining Museum.

The remains of the Victoria Iron and Cement Works lie on the cliffs above the north end of Runswick Bay. This mine first opened in 1856 but was destroyed by a landslide in 1858. It reopened in 1862, renamed as the Albert Works and continued in production until c.1865. Quarrying on the foreshore at Runswick Bay is said to dated to *circa* 1838-1842 and from 1854-1866.

The evidence for ironstone mining is confined to the eastern portion of this section of the coast, coinciding with the outcropping, near the surface or in the cliffs, of the Cleveland Ironstone. Evidence for the ironstone industry to the west consists of a number of records of C19 iron working sites in the Middlesborough and Redcar area, though most early features will have been lost in more recent developments. This group includes the Coatham Iron Works at NZ57412503 (Tees 5709) and the Lackenby Iron Works at NZ55652232 (Tees 5659).

Table 6.14 C19 iron working sites at Middlesborough, Redcar and Hartlepool

NGR	Name	HER	SMP	Importance	Risk
NZ57412503	Coatham Iron Works	Tees 5709	13.7	Low	Low
NZ55652232	Lackenby Iron Works	Tees 5659	n/a	Low	Low
NZ49992115	Middlesborough Ironworks	Tees 3861	n/a	Low	Low
NZ50702095	Victoria Works	Tees 4007	n/a	Low	Low
NZ50742050	Un-named site	Tees 3996	n/a	Low	Low
NZ50832136	Port Clarence	Tees 4183	n/a	Low	Low
NZ51042070	Tees Ironworks	Tees 3949	n/a	Low	Low
NZ51272064	Ormsby	Tees 3948	n/a	Low	Low
NZ51792070	Normanby Ironworks	Tees 3843	n/a	Low	Low
NZ52202065	Cargo Fleet Ironworks	Tees 5606	n/a	Low	Low
NZ52023374	Middleton Iron Works	Tees 4538	n/a	Low	Low
NZ51803456	Millbank Forge	Tees 4517	n/a	Low	Low

The infrastructure associated with the alum and ironstone industries consisted of tramways and rutways. The former were mainly a feature of the ironstone industry and linked the mines to the ironstone works and linked these to the harbours at Skinningrove and Port Mulgrave. The rutways are found on the foreshore and serviced both the alum and ironstone quarries. These consist of parallel grooves cut into the Redcar Mudstone at about the width of a cart axle (1.32m/4‘4“). They appear to have been designed to assist the movement of carts across the uneven surface of the mudstone and would have made it possible to continue working even when the surface was partially covered by the tide. The rutways appear to be mainly associated with the loading and unloading of vessels that used small docks (see below) or simply beached themselves at the base of the cliffs. These vessels brought in fuel and alkali for the alum works and transported ironstone ore from the foreshore quarries to the smelters.

It was noted above that the first phase of the Kettleness Alum Works was destroyed by a landslip in 1829 and this whole area has been highlighted by the SMP as being under threat of coastal erosion. The Victoria Ironworks experienced a similar fate in 1858 and the close proximity of most other sites on the section of the coast east of Saltburn to the present cliff edge implies a degree of vulnerability

to the effects of coastal erosion. It has also been pointed out that quarrying on the foreshore may have compromised the stability of the cliff line at other locations. Rising sea level also poses a threat to features on the foreshore through increased erosion and, ultimately, by restricting access.

Evidence for a number of other industrial processes is also to be found in Block 1 including quarrying for sandstone and the burning of limestone in limekilns, the kiln at NZ86111252 (NYCC DNY 11834) being a Grade II Listed Building. Immediately to the south of this limekiln lies the Roman Cement Mill (NYCC DNY 11689), which is also listed at Grade II. This cement works comprised a cement kiln and a water-powered grinding mill. It was in operation from 1811 until 1936.

Teesside is well known today for the chemical industry and the HER has records of four C19 chemical works.

Table 6.15 C19 Chemical works at Teesside

NGR	Name	HER	SMP	Importance	Risk
NZ50442026	Jones & Sadler Chemicals	Tees 3940	n/a	Low	Low
NZ50622138	Port Clarence Soda Works	Tees 4312	n/a	Low	Low
NZ50702148	Port Clarence Chlorine Works	Tees 4310	n/a	Low	Low
NZ53972181	Antonien Agro-chemical Works	Tees 5624	n/a	Low	Low

It is noticeable that the first three works in Table 6.14 lie close to the sites of C19 salt works (considered below) and a degree of continuity between these industries may be inferred.

The ironworks and chemical works of the Tees estuary all occupy very low lying locations and are vulnerable to even a modest rise in sea level. Although they lie outside the area covered by the Shoreline Management Plan they also lie within areas of high residential or industrial development and the policy adopted is likely to be one of 'Hold the Line'.

Ship building is also an industry historically located within the Teesmouth and Hartlepool areas and this will be dealt with in the section dealing with coastal/maritime landscapes.

A final feature to be mentioned in the context of the terrestrial industrial landscapes of Block 1 is the Saltburn to Whitby branch line (NYMNP 7455 and Tees 5884). Construction on this route, which was a branch of the North Eastern Railway's (NER) Darlington Section, was approved by act of parliament in 1866. Work began 1871 but was not completed until 1883 partly due to need to move the original route at Kettleness which was found to be too close to the cliff edge. The new route took the line through a tunnel. The cost on maintenance and the dwindling numbers of passengers led to the line being closed in 1958 and dismantled in in the early 1960s. Sections of the line can still be traced near the cliff top as can the entrances to the tunnel. Also, the station at Kettleness survives in use as an outdoor activities centre.

Figure 6.4 Kettleness station (author)

6.3 Coastal/maritime landscapes

6.3.1 Prehistory

The configuration of the coastline to the east of Saltburn, with its high cliffs, was not conducive in the prehistoric period to the development of economic strategies in which foraging on the foreshore played an important part. To the west the coastline is different and characterised by broad sandy beaches backed by dune systems and the wide expanse of salt marsh and mud flats of the Tees estuary.

The southern portion of Hartlepool Bay adjoining Carr House Sands is well known for the extensive submerged forest remains lying between MHWS and LAT and this site has been designated as an SSSI. Since the mid C19 archaeological finds in the form of stone tools, human remains and modified animal bones have also been recovered from these deposits (Tees 785, 786 and 1489) (Trechmann 1936 and 1947; Waughman *et al* 2005). These include cores, blades, flakes, microliths and a tranchet axe that can be dated to the Mesolithic period. The status of this material within the context of this project, whether it represents terrestrial or coastal/maritime activity needs to be considered.

The sequence of landscape development at this site can be artifacts as follows. An early Post Glacial mixed deciduous forest established itself on the boulder clay which overlay the Permian sandstones of the bedrock. With rises in the water table consequent upon rising sea level the character of this forest changed first to one of alder carr fen and freshwater peat bog and then, with continuing sea level rise, to a zone of salt marshes and creeks. Paleoenvironmental studies have established that the period down to about 6000 BP saw a more-or-less consistent rise in sea level whereas from then down until about 2000 BP the area experienced a series of low amplitude fluctuations, transgressive phases alternating with short term regressions (Waughman *et al* 2005, 123).

The Mesolithic finds are reported as having been recovered at the junction between the peat and the underlying boulder clay and, accordingly, represent activity taking place within the forest. The finds appear to be mainly 'industrial' in nature reflecting the collection of raw material and the manufacture of stone tools. The few diagnostic items all suggest a later Mesolithic date which is supported by a C14 date of 8700 ± 180 BP (BM-80)**[cal]** for a worked red deer antler (Waughman *et al* 2005, 8 and Appendix 3).

Neolithic and Bronze Age material has also been recovered from the Hartlepool Bay submerged forest deposits including flint artifacts (Tees 1454), and fish traps (Tees 3284). A burial (Tees 789) with a radiocarbon date of 4680 ± 60 BP (HV 5220) was recovered from a freshwater pool and it has been suggested that this might be a ritually deposited 'bog burial (Waughman *et al* 2005, 133).

> *While finds of prehistoric material have been recovered from the Hartlepool Bay submerged forest beds for over a century recent research has been conducted within the context of work on the sea defences which took place been 1990 and 2003. As a consequence of this work, patterns of sand movement and accumulation within the bay have changed leading to the burial of the submerged forest beds. However, this section of coast lies within SMP Unit 12.2 where the recommended policy is one of 'Hold the Line' in the face of continuing sea level rise. It is suggested that this could eventually have a negative impact on the inter-tidal peat deposits through an increase in exposure to wave action. This might have to be addressed by reducing the slope of the coastal defence barrier, in effect retreating the crest.*

While the beaches might offer few opportunities other than for beachcombing, tidal estuaries may be considered to be arenas of abundance from the forager's perspective and it is surprising that the HER has only a single record of a prehistoric site within the whole Teesmouth complex. This site is the ***midden*** within Cowpen Marsh (NZ50502460, Tees 1309). Middens are features of the archaeological record from the Mesolithic period onwards and the Cowpen Marsh site is in a classic situation for an early prehistoric midden. Finds from this site include worked flints and the bones of domesticated animals and probably imply a Neolithic of Early Bronze Age date (Stallibrass 1988 as reported by Waughman *et al* 2005, 137.

> *Cowpen Marsh benefits from multiple designations. It is an SSSI, and a Special Protection Area (SPA). It lies just outside the SMP area but adjoins SMP unit 13.4 to the east. From Table 6.003 it can be seen that the policy recommended for this unit is initially 'No Active Intervention' followed in the middle and long term by 'Managed Retreat' which may entail the construction of sea defences. From a nature conservation perspective rising water levels will have a positive effect but the effect on the archaeological deposits is likely to be negative.*

Table 6.16 Pre-Roman coastal/maritime sites in Block 1

NGR	Name	HER	SMP	Importance	Risk
NZ5232	Hartlepool Bay inter-tidal peats and submerged forest beds	Tees 785, 786 & 1489	12.2	High	High
NZ5232	Neolithic flint scatter site	Tees 14554	12.2	High	High
NZ5232	Neolithic fish trap	Tees 3284	12.2	n/a	n/a
NZ5232	Neolithic bog burial	Tees &89	12.2	n/a	n/a
NZ50502460	Cowpen Marsh midden	Tees 1309	n/a	High	High

6.3.2 The Roman Period

The Roman period is also represented by a number of isolated finds from the Hartlepool area. The main group of finds comes from close to the foreshore at the southern end of Carr House Sands (NZ52263117). These finds are described as coming from a 'midden' and testify to occupation in the vicinity. The finds include pottery (Tees 1305), brooches (Tees 660, 712, 801, 1289 and 1290) and coins (Tees 242, 725), one of the reign of Domitian (Swain 1986).

> *The Roman deposits at Carr House Sands occur in a similar situation to the submerged forest beds and are similarly vulnerable to the effects of wave action and coastal erosion.*

Other Roman finds in the area include two coin hoards (NZ51003199, Tees 788 and NZ52773358, Tees 689) and a double inhumation (NZ50803375, Tees 1201). This burial was accompanied by coarse pottery and a necklace of jet and glass beads dated to the late C4 or C5.

The Roman ***signal stations*** at Goldsborough and Huntcliff are the earliest substantial structures erected within the coastal zone with a specifically coastal/maritime focus. These structures were thought to be part of a series of signal stations along the coast from Flamborough Head to the mouth of the Tees. They date from the later C4 and were part of the Theodosian reorganization of the defences of the province and were thought to provide advanced warning of attack from the sea. However, the lack of evidence for a significant naval force in the area raises doubts about this and an alternative interpretation is that they were simply small fortlets.

The Goldsborough Roman Signal Station (NZ83521513, NYMNP 7444) is situated at 131m above sea level and 500m from the cliff edge with commanding views along the coast to NW and SE. It survives as a square mound about 40m across and up to 1.4m high with rounded corners and a roughly level top. Excavations at this site and others in the series have shown they were built to a common design with a central stone tower 30m high surrounded by a stone wall enclosing an area about of $90m^2$ beyond which was a 'V' shaped ditch. Excavations in 1918 recovered over 300 coins and it is on the basis of these that the site has been precisely dated to AD 368 to 395. Other finds included animal bones, offering an insight into the diet of the garrison, while a well in the enclosure contained three human skulls, one from a woman. Two skeletons were also found within the ruins of the tower and this has been taken to imply that the occupation of the site came to a violent end. The Goldsborough site is a Scheduled Ancient Monument.

The Huntcliff Signal Station (NZ68662198, Tees 16) lay about 16km to the west of Goldsborough. The site was first identified in *circa* 1862 and by the time it was excavated by Hornsby and Stanton in 1911-1912 only the southern half survived, the remainder having been lost to coastal erosion. It was presumably a similar structure to the one at Goldsborough. In 1953 it survived as a circular depression at the cliff edge but an aerial photograph taken in 1979 confirmed that it had been completely lost.

The excavations recovered 25 coins suggesting an occupation from AD 370 to 390. A well within the enclosure contained the remains of 14 adults and children, presumably the victims of a raid on the site, a similar experience to that noted at Goldsborough

(Hornsby and Stanton 1912).

The Huntcliff site, at about 90m OD, lay to the west of and below the summit of Warsett Hill. As there is no line of sight between Huntcliff and Goldsborough it is probable that another signal station must have lain inbetween. The most likely location for such a site, on topographical grounds, is the summit of Boulby Bank but this area has been much disturbed by alum quarrying and has been subject to landslips and no trace of a signal station has been reported.

Table 6.17 Roman coastal/maritime sites in Block 1

NGR	Name	HER	SMP	Importance	Risk
NZ52263117	Carr Sands midden	Tees 242, 660, 712, 725, 801, 1289, 1290 & 1305785, 786 & 1489	12.2	High	High
NZ51003199	West Hartlepool coin hoard	Tees 788	12.2	Low	Low
NZ52773358	Hartlepool Headland coin hoard	Tees 689	12.1		
NZ50803375	West Hartlepool double inhumation	Tees 1201	12.1	n/a	n/a
NZ83521513	Goldsborough Signal Station	NYMNP 7444	23.3	High	Low
NZ68662198	Huntcliff Signal Station	Tees 16	16.1	n/a	n/a

6.3.3 The Medieval Period

The principal port in Block 1 during the Middle Ages was at Hartlepool where the magnesian limestone promontory of the Headland provided a sheltered anchorage from the gales of the North Sea. Excavations have located the remains of a C12 quay and a dock was added during the reign of Edward II while, as noted above, these early harbour works were included within the town defences and protected by a boom chain slung between two towers.

The production of salt from sea water has been recorded from late prehistoric times and in parts of England constituted a major industry in the Roman and Medieval periods. The HER records three extensive complexes of ***salt works*** or ***salterns*** in the Teesmouth area, one at Coatham Marsh, another at Cowpen Marsh and Greatham Creek and the third at Sneaton Snook. From documentary sources it appears that most of these salterns were monastic, with Durham Priory having the major interest on the north bank of the Tees and the several Yorkshire monasteries developing sites on the south bank, though precisely which it is difficult to determine from the documents. The documents in question are mostly C12 cartularies recording grants of existing salterns to the monasteries and these sources can be treated as providing a *terminus ante quem* for the initiation of salt making on Teesside (Cranstone *pers.comm.*).

The production salt from sea water could be effected through a number of processes which varied between regions. On Teesside the preferred method was sleeching. In this method salt-encrusted surface deposits from the inter-tidal zone were leached in salt

water and the resulting salt-rich brine boiled in lead pans. Archaeologically, these activities are mainly represented by salt mounds, the debris from the production process. Occasionally, traces of the saltcote, the building in which the boiling took place, may survive.

The remains of the salterns at Coatham Marsh lie in a zone about 500m wide and extend from the outskirts of Redcar (NZ59162479) 2.7km to the SW (NZ56692339). The HER has records of 34 salt mounds in this area, 23 of which actually lie outside the study area. Most of these mounds have been plotted during the course of the APTE from which they can be seen to be of two types, compact but irregular mounds up to 100m across and elongated mounds which might be as much as 370m long and 60m wide, though the latter may have arisen from the coalescence of several irregular mounds. Although there is documentary evidence of salt working in this area during medieval times, sectioning of two mounds suggested that some might be natural features.

However, place name evidence lends strong support to the saltern interpretation, as the following list of names for mounds in this area indicates:

> Saltcoat Hill (Tees 1810), South Coat Hill (Tees 3774), White Hill (Tees 3772), Salt House Hill (Tees 3768), Great Souk Hill (Tees 3776) and Little Souk Coat Hill (Tees 3762).

The Cowpen Marsh and Greatham Creek salterns lie opposite Coatham Marsh on the far side of the estuary. Cowpen Marsh has already been referred to as the site of a prehistoric midden, and the C12 cartularies indicate that this was the main site of the Durham Priory salterns. The HER records 27 salterns in this area and although none were identified during the aerial photograph transcription exercise LIDAR coverage shows most of them to be compact irregular mounds similar to those recorded at Coatham Marsh, though rather smaller being on average about 50m across. Several can be described as 'horse-shoe' shaped, generally opening towards the NE (Tees 1718, 1719, 1724, 1725 and 1726). Mound 1713 was excavated in 1993 revealing three hearths and clay lined hollows for steeping silt scraped up from the foreshore (Nenk *et al* 1994, 198). Dating evidence was provided by a single sherd of C13 pottery. Tees 1714 is recorded as Cotehill.

> *The marsh benefits from multiple designations. It is an SSSI and a Special Protection Area (SPA). It lies just outside the SMP area but adjoins SMP unit 13.4 to the east. From Table 6.3 it can be seen that the policy recommended for this unit is initially 'No Active Intervention' followed in the middle and long term by 'Managed Retreat' which may entail the construction of sea defences. From a nature conservation perspective rising water levels will have a positive effect but the effect on the archaeological deposits is likely to be negative.*

The Seaton Snook salterns lie immediately inland from the North Gare Breakwater at Teesmouth. The HER records 20 mounds here, all but three of which were also recorded during the APTE. However, four additional small mounds were also noted on the aerial photographs and a complex of what appears to be contiguous mounds to the SW of the main group. From the aerial photographs and the LIDAR coverage these mounds seem to be mostly irregular in shape and between 50m and 100m across. Tees 1644 has similarities with the 'horse-shoe' shaped mounds at Cowpen Marsh. None of these have been excavated and no individual place names are recorded. However, their morphological similarity to the other Teesmouth salterns suggests that they also are

Medieval in date.

6.3.4 The early Post-Medieval period

The main features of this period are the series of C17 ***gun batteries*** sited on the Headland at Hartlepool during the course of the Civil War. Originally garrisoned for the King, Hartlepool was peacefully occupied by the Scots on behalf of the English Parliament from 1644 to 1658.

Table 6.18 C17 gun batteries at Hartlepool Headland

NGR	Name	HER	SMP	Importance	Risk
NZ52733436	North Battery	Tees 4753	11.3	High	Medium
NZ52803430	Low Soft Cliff Battery	Tees 4754	11.3	High	Medium
NZ53063408	High Soft Cliff/Gun Cove Battery	Tees 4755	11.3	High	Medium
NZ53103398	Cup and Saucer Battery	Tees 4756	11.3	High	Medium
NZ52873340	Crofton House/South Battery	Tees 4757	12.1	High	Medium

6.3.5 The Industrial Period

6.3.5.1 The chemical industry

Teesside is well known as the location of a number of major chemical industries, some of which were noted in the section dealing with terrestrial landscapes. The production of salt from sea water is a chemical process and the Medieval salterns can be regarded as marking an early phase in the Teesside chemical industry. A somewhat later phase is represented by the C19 saltworks, five of which are listed in the HER.

Table 6.19 C19 Saltworks on Teesside

NGR	Name	HER	SMP	Importance	Risk
NZ50002115	Cleveland Salt Works	Tees 3980	n/a	Low	High
NZ50492139	Clarence Salt Works	Tees 4308	n/a	Low	High
NZ50962166	Port Clarence Salt Works	Tees 4314	n/a	Low	High
NZ51032137	Port Clarence Salt Works	Tees 4313	n/a	Low	High
NZ52042090	Middlesborough Salt Works	Tees 3844	n/a	Low	High

A degree of continuity between salt making and the later chemical industry may be implied by the fact that Port Clarence was also the location of soda and chlorine works in the C19.

6.3.5.2 Shipbuilding

Another major industry on the NE coast was shipbuilding with the scale of operations ranging from the construction of fishing boats on any suitable strand to that of major merchant vessels and warships in the shipyards of the Tyne and Wear. Few traces of the

early stages of this industry survive in that they were either too ephemeral or have been superseded by later developments. An exception is provided by the 1998 discovery in Church Street, Whitby of a stone built dry dock dating from the mid C18.

Unlike the Rivers Tyne and Wear the River Tees below the transporter bridge is not especially noted for shipbuilding and the HER records only a single C19 shipyard at NZ50502095 (Tees 3934), The Cleveland Iron Ship Yard situated on the same site as the Victoria Ironworks. Two C19 shipyards are recorded in the HER at Hartlepool, the Punshon Denton Shipyard (NZ52083389, Tees 4530) and the Long Shipyard (NZ52123382, Tees 4531) while two C19 graving docks are recorded at NZ51173312 (Tees 4546 and 4547).

6.3.5.3 Harbour facilities

The rutways cut into the Redcar Mudstone of the foreshore have already been mentioned and it was noted that their function was to facilitate the use of carts in loading and unloading vessels at the foot of the cliffs. During the early stages of industrial development vessels would simply come in at high tide and then 'take the ground' as the tide fell, ready to sail off again on the next rising tide. In other cases natural breaks in the rock platform, or 'wykes', were used as small docks, some of which were modified.

The HERs have identified seven small docks of this type along the coast from Hummersea Bank to Brackenberry Wyke, each associated with a nearby alum or ironstone works. Several have been studied in detail.

The dock at Hole Wyke (NZ76211919, Tees 3596) lies just below the first alum house of the Boulby Alum Works. Production began here in the late C17 and continued until 1871. The dock may date from the period before 1784 when the works were extended to the north and west. The dock is a natural cleft cut into the wave cut platform of the Redcar Mudstone that appears to have been expanded by explosives. It slopes gently up from low water mark to the base of the cliffs. Sets of postholes, still retaining the stumps of posts, have been noted to either side of the dock. These may have served as seamarks to facilitate navigation into the dock or may be mooring posts pre-dating the development of the dock.

At the foot of the cliff below the Gallihowe Quarries of there are the remains of a second dock (NZ74342021, NYMNP 7327) associated with the Boulby Alum Works. The dock does not have any stonework defining its edges, but it is created by a broad cut in the bedrock of Redcar Mudstone. Four post holes were recorded in its eastern edge. The date of this dock is not known but lying below the westward extension of the Boulby Alum Works it is unlikely to be earlier than the late C18.

About 1km to the west of this site is 'The Old Gut' (NZ73402018, NYMNP 7328), a dock which also served the westward extension of the Boulby Alum Works. The eastern edge of the dock is lined with a number of substantially sized stones laid on end, forming a 'wall' some 52m long. As with the dock below Gallihowe, this dock is unlikely to have been needed before the C18 and it is believed to have functioned until c1820.

A new alum house (NZ 71 NW 29) was constructed at Hummersea c1800, and this was provided with its own dock, known as 'The New Gut' (NZ72722017, Tees 3684). This dock, which measures about 80m by 65m does not have any stone revetment and is

merely a broad cut in the Redcar Mudstone. Up to 6 post holes have been recorded at the edge of the New Gut.

The three further features of this kind lie to the east of Staithes Harbour. The first is recorded immediately east of the east pier below Hartle Loop (NZ78581896, NYMNP 2777.01004), while two others are recorded close together at Old Nab (NZ79391884, NYMNP 2777.02002 and NZ79421872, NYMNP 2777.02003).

Table 6.20 'Docks' associated with the North Yorkshire alum and ironstone industries

NGR	Name	HER	SMP	Importance	Risk
NZ76211919	Hole Wyke	Tees 3596	18.1	Medium	High
NZ74342021	Gallihowe	NYMNP 7327	18.1	Medium	High
NZ73402018	The Old Gut	NYMNP 7328	18.1	Medium	High
NZ72722017	The New Gut	Tees 3684	18.1	Medium	High
NZ78581896	Hartle Loop	NYMNP 2777.01004	20.1	Medium	High
NZ79391884	Old Nab 1	NYMNP 2777.02002	20.1	Medium	High
NZ79421872	Old Nab 2	NYMNP 2777.02003	20.1	Medium	High

Where it was not possible to modify a natural feature to create a small dock alternative arrangements had to be made for the unloading of incoming raw materials and the outward movement of the products of quarries and mines. In some cases simple timber ***staithes*** were erected.

Table 6.21 Timber staithes associated with the alum and ironstone industries in Block 1

NGR	Name	HER	SMP	Importance	Risk
NZ86931235	Sandsend	NYMNP 7462.01	22.3	Low	High
NZ86011318	Sandsend	NYMNP 4657	22.1	Low	High
NZ83131596	Kettleness	NYMNP 7318	22.1	Low	High
NZ80181723	Port Mulgrave	NYMNP 2777.04401	20.3	Low	High

Elsewhere, the needs of vessels were met by the construction of more substantial harbours protected by stone piers.

There was a West Pier at Whitby (NYCC DNY12112) in the C16 but this was rebuilt and lengthened between 1734 and 1814. It is listed at Grade II. The harbour at Port Mulgrave (NYMNP 2777.0312 and 7313) was built in the 1880s to serve the local ironstone mines. It was partly demolished in WW II as an anti-invasion measure and further damaged by storms in1953.

Staithes Harbour is provided with two C19 piers (NYMNP 2777.01007) while the single surviving west pier at Skinningrove (Tees 5982) is also a C19 structure. The 1857 OS 1st edition also records an east pier at Skinningrove (Tees 3565).

Figure 6.5 Skinningrove Harbour (author)

Table 6.22 Small harbours in Block 1

Name	HER	SMP	Importance	Risk
Whitby	NYCC DNY12112	22.3	High	High
Port Mulgrave	NYMNP 2777.0312	20.2	Low	High
Staithes	NYMNP 2777,01007	19.3	Low	High
Skinningrove	Tees 5982 & 3565	17.2	Low	High

As has already been noted Hartlepool was an important port in the Middle Ages but its main period of growth was in the C19 and it is from this period that most of the existing harbour facilities and docks date, the Victoria Dock (Tees 4522) opening in 1840.

> *All the works on the foreshore are, to varying degrees, under threat from coastal erosion and sea level rise. The more ephemeral features, such as the docks and their associated posthole arrangements and rutways are particularly vulnerable.*

6.3.5.4 Aids to Navigation and Safety at Sea

The lighthouse on the Heugh at Hartlepool (Tees 713), dating from 1847 and the lighthouse at the end of the West Pier (NYCC DNY 12113), Whitby dating from 1831, are both Grade II Listed Buildings. The 1875 Lifeboat House at Staithes (NZ78231895, NYMNP 1449) is also listed at Grade II.

Figure 6.6 The lifeboat house at Staithes (author)

6.3.5.5 Shipwrecks

The vessels that plied this section of the coast were an important, if mostly transitory, feature of the coastal/maritime landscape. There are numerous records of shipwrecks but most of these are in deep water and cannot be precisely located. However, a few lie above LAT. Shipwrecks are not always systematically recorded in the HERs so the following records are referenced with respect to the numbers in the NMR.

Figure 6.7 Wreck of an C18 colliery brig at Seaton Carew (Gary Green)

Most of these records are based on documentary sources and the physical remains of wrecks above LAT are rare, although a number have been recorded during the course of the APTE.

Table 6.23 Shipwrecks recorded above LAT in Block 1

NGR	Name of vessel	Date lost	NMR	SMP
NZ71432018	British steam trawler *Ruthin Castle*	1917	937920	17.3
NZ79331826	English ketch *Star of Bethlehem*	1890	938694	20.1
NZ81211571	Norwegian cargo vessel *Ellida*	1917	938414	22.1
NZ83131617	Un-named metal vessel	?	1385804	22.1
NZ83721591	Un-named metal vessel	?	1385806	22.1
NZ85661461	Swedish cargo vessel *Lucy*	1930	909219	22.1
NZ89291107	Swedish steamer	1915	909210	23.2
NZ89931068	English snow *Magdalene*	C18	984141	23.2
NZ63602286	*Southwick*	1860	1311295	15.1
NZ60802539	*Fleece*	1825	936611	14.2
NZ61322618	HMS *Fairplay*	1940	908828	14.3
NZ54212731	*Wallsend*	1903	908832	13.6
NZ54842783	*Stockton Packet*	?	908835	13.4
NZ52873448	*Rising Sun*	c1860	908867	11.3
NZ47513870	*Impel*	1875	94426	11.1
NZ47243901	*Newcastle*	1867	73179	11.1

It will be noted that the *Magdalene* is about 1km upstream from the mouth of the River Esk.

Table 6.24 Remains of shipwrecks recorded above LAT in Block 1

NGR	Location	Type/name	HER/NMR	SMP
NZ60222567	Coatham Pier	Unknown vessel	Tees 572	14.2
NZ60172550	Coatham Pier	Brig *Mowbray* 1834	Tees 1264	14.2
NZ52992956	Seaton Carew	C18 collier brig	NMR 1312495	13.1
NZ48213770	Crimdon Sands	Scattered timbers	Durham 8318	11.1
NZ53712721	North Gare Sands	10m by 4m hulk	NMR 1459341	13.4
NZ53782727	North Gare Sands	10m by 4m hulk	NMR 1459342	13.4
NZ53762755	North Gare Sands	10m by 4m hulk	NMR 1459343	13.4
NZ54072725	North Gare Sands	27m by 10m hulk	NMR 1459344	13.4
NZ53982756	North Gare Sands	17m by 10m hulk	NMR 1459346	13.4
NZ54192841	North Gare Breakwater	40m by 15m hulk	NMR 908179	13.3

In addition to these wrecks, remains of two vessels were found in the Church Street dry dock at Whitby during the 1998 excavation. One, a more or less complete clinker built coble was found lying on top of the dismantled timbers from a larger vessel which may have been a collier brig.

6.4. Military coastal defence

6.4.1 C18 and C19

As we have seen coastal defence has been an issue since Roman times and a large number of features identified in the coastal zone have arisen from the need to counter an attack or forestall an invasion. Although the great majority of the features of this kind date from the two World Wars, a number of sites identified in Block 1 date from the C18 and C19.

The threat of a French invasion and the activities of privateers such as John Paul Jones in the late C18 led to the re-establishment of the North Battery on Hartlepool Headland. A chart of 1782 marks the position of batteries at either end of the West Pier at Whitby, that at the landward end mounting five 18 pdr guns with five in reserve and a further five in a battery at the end of the pier (*Admirality Library Manuscripts Collection:* Vz 11/29).

The gun batteries at Hartlepool Headland were also renewed in the C19. The HER records batteries at Fairy Cove (NZ52733430, Tees 4758), The Heugh (NZ53173380, Tees 698) and the Lighthouse Battery (NZ53213379, Tees 4760). The latter two were established during the Crimean War and the Lighthouse Battery was also known as the Sebastapol Gun.

The Redcar Battery (NZ61252458, Tees 3588) is recorded as a C19 gun emplacement while a magazine is recorded 70m to SE on the 1898 6 inch OS map (Tees 4984). The area was the site of coastal defence features dating from both WWI and WWII.

Table 6.25 C18 and C19 gun batteries in Block 1

NGR	Location	HER	SMP	Importance	Risk
NZ52733436	North Battery, Hartlepool, C18	Tees 4753	11.3	High	Medium
NZ899117	West Pier, Whitby, 1782	*	23.3	High	Medium
NZ899116	West Pier, Whitby, 1782	*	23.3	Low	Medium
NZ52733430	Fairy Cove, Hartlepool, C19	Tees 4758	11.3	Medium	Medium
NZ53173380	The Heugh,, Hartlepool, C19	Tees 698	11.3	High	Medium
NZ53213379	Lighthouse, Hartlepool, C19	Tees 4760	12.1	Medium	Medium
NZ61252458	Redcar, 1898	Tees 3588	14.3	Medium	Medium
NZ45564279	South Gare, 1890	Tees 3562	13.6	High	High

* not recorded in the HER

A second C19 gun battery was sited towards the seaward of the South Gare Breakwater (Tees 3562) and this site has been identified by the APTE at NZ455642799. Aerial photographs taken between 1940 and 1952 reveal a complex group of remains of more than one period, the main features of which are three gun emplacements one of which is said to date from *circa* 1890.

6.4.2 World War I

Few WWI features survive and this is probably because many sites and installations were also occupied during WWII. An example of this situation is provided by the remains of the Royal Flying Corps airfield at Marske (NZ62102280, Tees 467) which lie to the NW of the more extensive but built over remains of the WWII airfield. A further example is provided by a group of WWI pillboxes recorded by the NMR as projecting from the retaining wall of the Redcar Promenade (NZ61302490, Monarch 611338). A WWII pillbox and a weapons pit are also recorded at this location.

Several C19 gun batteries also saw service during WWI. The South Gare Battery mounted two 4.7 inch guns, the Lighthouse Battery at Hartlepool a 6 inch gun and the Heugh Battery at Hartlepool two 6 inch guns. This latter site gained distinction on 16th December 1914 when it engaged three battle cruisers of the German High Seas Fleet then in the process of bombarding the town. An aerial photograph taken in July 1948 shows the Heugh Battery to consist of an oblong enclosure measuring 100m N-S by 46m E-W with emplacements for two guns and ranges of building along its west wall. However, this may record the WWII arrangements as the battery remained in commission until 1956. The Heugh Battery is a Scheduled Ancient Monument.

An important WWI feature on this section of coast is the sound mirror at Boulby Barns (NZ75361910, NYMNP 1445). This consists of a 'U' shaped concrete structure 4.5 metres high and forming a concave bowl in both the horizontal and vertical planes. In front of the structure are the remains of a trench, possibly where the listener would have sat. It was built in 1916 and was designed to give early warning of approaching enemy Zeppelins, other aircraft and attacks from ships threatening important industrial complexes in the NE. Whitby and Hartlepool had been a target of the German battle cruisers on the morning of 16th December 1914 and the Skinningrove Iron Works was bombed on numerous occasions. The Boulby Barns sound mirror was part of a chain of acoustic devices located on the NE coast extending from the Tyne to the Humber. The mirror is one of only four known surviving examples in the NE. It is a Scheduled Ancient Monument and a Grade II Listed Building. One other WWI feature of note in this area is the Seaton Carew Seaplane Station (NZ53252676, NMR 956723) of which a jetty and a slipway remain immediately to the east of the Hartlepool Power Station.

Two of the shipwrecks listed in Table 6.24 appear to be WWI casualties. The *Ruthin Castle* struck a mine and the *Ellida* was torpedoed, both in 1917.

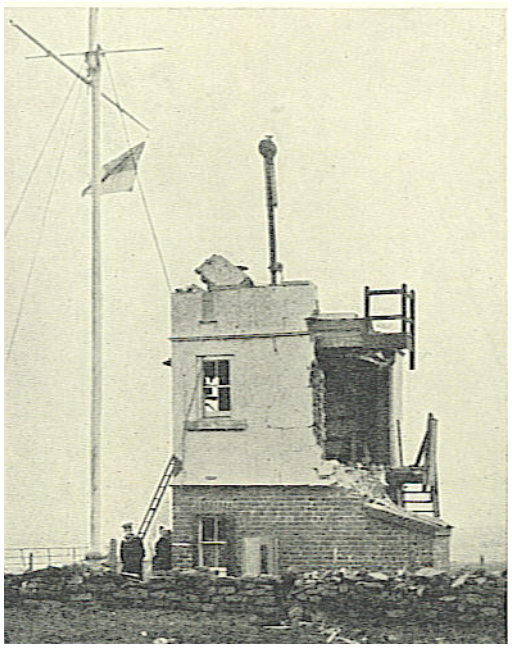


Figure 6.8 The coastguard station at Whitby after the German bombardment on 16th December 1914

6.4.3 World War II

The majority of coastal/maritime features in Block 1 date from WWII and the approach followed here is that set out in Chapter 5 of NERCZA. Major sites which survive whole or in part are described in detail with minor, ephemeral and destroyed sites being recorded in tabular form. The WWII military features in the coastal zone can be divided into two groups according to whether their role was mainly or to defend against bombardment, from the sea or from the air, or to confront a possible invasion, although the two categories are not mutually exclusive.

6.4.3.1 *Coastal defence batteries*

The coastal defence batteries were intended to respond to coastal bombardment and were the first line of defence in the event of an attempted landing. Eleven facilities of this kind have been identified in Block 1.

The only coastal defence battery recorded on the coast east of Saltburn is a brick and concrete structure (NZ71502010, NMR 1320424) to the east of Skinningrove Harbour and facing north out to sea. It has now been cleared but a photograph dating from 1993 shows that it consisted of a semi-circular gun emplacement with an oblong structure to the rear. There is no HER record for this site but photographs in 1993 show that was still extant then.

The Pasley Coastal Defence Battery is recorded at NZ57602540 (NMR 1459754, Tees 760). Details of this site have been transcribed from an aerial photograph from which it can be seen as an irregular five-sided enclosure measuring about 200m by 100m within which are a number of buildings. This battery is recorded as mounting one 9.2 inch gun. This site lies immediately NE of the Redcar Steel Works and LIDAR coverage suggests that elements of it may still be traceable on the ground, though a number features have

been removed.

The C19 century coastal defence battery on the South Gare Breakwater was brought back into commission during WWII when it is recorded as mounting two 6" guns (NMR 900075). The extensive and complex remains are difficult to interpret from the aerial photographs but in addition to the gun emplacements, include a number of military buildings, trackways and barbed wire fences

The South Gare Breakwater Battery provided cover for the mouth of the Tees. This was supported by a further battery for a 4 inch gun at Redcar Jetty (NZ55532567 NMR 1425096). The transcription of an aerial photograph enables a number of features in addition to the gun emplacement to be identified. These include three searchlight batteries, two command posts, two weapons pits and various other military buildings with track ways and barbed wire obstructions. This site now lies under the Redcar Steel Works.

A further gun battery is recorded overlooking North Gare Sands (NZ53502732, Tees 993). Details of this site are not available and it has been built over. However, its situation in relation to the mouth of the river is similar to the battery at Redcar Jetty and it may have fulfilled a similar role.

Further north, two 6 inch guns were mounted at Seaton Carew (NZ52293073, NMR 1467010) while both the Lighthouse and the Heugh Batteries at Hartlepool Headland mounted 6 inch guns. The APTE has recorded a further gun emplacement west of the Headland at NZ51293483 (NMR 1460807). This appears to consist of two 'horse-shoe' shaped earthworks each about 12m by 14m and facing towards the shore. A number of military buildings are also recorded on the site.

Table 6.26 WWII coastal defence batteries in Block 1

NGR	Name & calibre	HER	SMP	Importance	Risk
NZ71502010	Skinningrove, ?	NMR 1320424	17.2	Medium	High
NZ57602540	Pasley, 1 x 9.2 inch	Tees 760	13.7	High	High
NZ45564279	South Gare, 2 x 6 inch	Tees 3562	13.6	High	High
NZ55532567	Redcar Jetty, 1 x 4 inch	NMR 1425096	13.5	n/a	n/a
NZ53502732	North Gare Sands,?	Tees 993	13.4	n/a	n/a
NZ52293073	Seaton Carew, 2 x 6 inch	NMR 1467010	13.1	n/a	n/a
NZ53213379	The Heugh, 2 x 6 inch	Tees 698	11.3	High	Medium
NZ53173380	Lighthouse, 2 x 6 inch	Tees 4760	12.1	High	Medium
NZ51293483	?, 2 x 6 inch	NMR 1460807	11.2	n/a	n/a
NZ50603527	Palliser, 1 x 9.2 inch	NMR 1461762	11.2	n/a	n/a

The last feature of this type to be recorded in Block 1 is the Palliser Battery (NMR 1461762) situated in the western outskirts of Hartlepool (NZ50603527) and now built

over. This battery mounted a single 9.2 inch gun, the emplacement for which can be seen in an aerial photograph taken in 1940 along with an observation post and accommodation for the gun crews. The calibre of this weapon suggests that it was the northern equivalent of the Pasley Battery which covered the southern approaches to Teesmouth.

With memories of the consternation caused by the German East Coast raid of December 1914 Whitby was provided, in 1939, with a battery of two 6 inch guns at the east end of the Marine Parade (NZ89691147, NYMPN 58893), sited either side of the Captain Cook monument and surrounded by barbed wire. This appears to have been a temporary facility.

6.4.3.2 *Anti-aircraft batteries*

During WWII, once the likelihood of a sea borne invasion had passed by the end of 1941 aerial bombardment posed greatest threat. To combat this threat major installations and ports were provided with batteries of heavy anti-aircraft guns. Although no such features are recorded in the HER or NMR the APTE has identified two; an emplacement of four guns at Redcar (NZ62212372, NMR 1425107) and a further emplacement for four guns SW of Tees Dock (NZ 54532294, NMR 1459189). The photographs of the latter site show a number of associated facilities including a radar station, searchlight battery, a barrage balloon site and five weapons pits. Both batteries were serviced by small army camps. None of these features are extant.

6.4.3.3 *Searchlight emplacements*

Both anti-aircraft and coastal defence batteries were supported by search lights, either situated within the main battery complex or at separate, independent, locations. The APTE has recorded eight independently located searchlight batteries.

Table 6.27 Searchlight batteries in Block 1

NGR	Name	HER	SMP	Importance	Risk
NZ74261990	Boulby	NMR 1458656	18.1	Low	Low
NZ64072259	Marske	NMR 1459508	15.2	Low	Low
NZ54112278	Tees Dock	NMR1459189	n/a	Low	Low
NZ52953406	Hartlepool Headland	NMR 1460766	11.3	Low	Low
NZ48313664	Crimdon	NMR 1461570	11.1	Low	Low
NZ74101910	Street Houses	NYMNP 58753	18.1	Low	Low
NZ74311985	Gallihowe	NYMNP 58781	18.1	Low	Low
NZ83421455	Goldsborough	NYMNP 58826	21.3	Low	Low

6.4.3.4 *Bombing decoys*

As an alternative to shooting enemy aircraft down or forcing them to fly higher pilots could be misled by the use of decoys and a decoy for the Skinningrove Iron Works is recorded at NZ80201680 near High Lingrow (NYMNP 58102) (Dobinson 2000, 285).

Three bombing decoys are also recorded at Teesmouth at Bran Sands (NZ55902360, Tees 4365), at Seal Sands(NZ51302460, Tees 4366), both 'QL/QF' sites and the Greenabella 'QF' site (NZ51082580, Tees 4375). The latter site was identified during the APTE which noted the presence of a generator house and site shelter. These three sites appear as numbers 2(b), (c) and (d) in Dobinson's gazetteer which also lists seven other decoys in the area all of which lie outside the coastal zone.

A final bombing decoy in Block 1 listed by Dobinson as having been established at Hart (NZ494364) but this has not been recorded during the APTE.

6.4.3.5 *Beach defence batteries*

Once an enemy was on the beach the heavy calibre weapons of the coastal defence batteries were of little use and responsibility fell to the infantry to hold the beach and prevent an incursion inland. Commanders sought to accomplish this through the use of a range of strong points designed to accommodate different calibre weapons consisting of rifles, machine guns and anti-tank guns. They may have been simple earthworks, quickly thrown up, or more substantial structures of concrete.

The Hotchkiss 6 pdr MKII anti-tank gun was one of the main weapons used in beach defence, mounted either in beach defence batteries or specially designed pillboxes. The HER has records of two emplacements for 6 pdr Hotchkiss anti-tank guns covering Coatham Beach at Redcar. That nearest to the beach was sited at the junction between Majuba Road and the Promenade (NZ59202530, Tees 3589) while the second site lay 45m north of Warrenby Bridge (NZ58802509, Tees 3590). Both sites are currently undeveloped. To the east of Redcar the APTE had identified a beach defence battery at Redcar (NZ61262487, NMR 1458414) as a horse-shoe shaped earthwork 8.5m across with an opening to the east, while at Sandsend beach is the site of an emplacement for a 6 pdr Hotchkiss anti-tank gun (NZ86191280, NYMNP 58909).

There are also HER records for two beach defence batteries to the north of Teesmouth. These are at Seaton Snook (NZ53102881, Tees 3582) and to the SE of Seaton Carew (NZ52692910, Tees 3583). These were sited behind the dunes that lay at the back of Seaton Sands - a classic situation for the deployment of anti-tank weapons. The latter site has also been identified during the APTE as a rectangular pillbox, probably of Type 28, which was suitable for the Hotchkiss 6 pdr MKII.

The Durham HER records a gun battery at the head of the foreshore at Crimdon Dene (NZ48913658, Durham 8303). From its low lying situation it is likely that site was a beach defence battery. This structure was visited in September 1997 as part of the *Defence of Britain* project which has recorded the following field description.

> "Rectangular in nature the whole structure measures 3.9m x 7.1m. The height is indeterminable due to burial by sand. The entrance, despite entry not being possible, is clearly apparent that it would have been via the top of a concrete tower built onto the back of the structure. By looking through the very large gun emplacement embrasure it can be seen that there are two connected rooms inside. These

rooms correspond to a split in the roof levels. The walls of this gun emplacement are much thicker than encountered before being 1.1m. It must be stated that this thickness was measured at the gun embrasure and may not be representative of the whole structure. What can be seen of the building seems to be in a relatively good state of preservation, but there are signs of deterioration starting to show."

Table 6.28 WWII beach defence batteries in Block 1

NGR	Name	HER	SMP	Importance	Risk
NZ59702530	Majuba Rd., Redcar	Tees 3589	14.1	Medium	Medium
NZ58802509	Warreny Bdge, Redcar	Tees 3590	14.1	Medium	Medium
NZ61262487	East Redcar	NMR 1458414	14.3	Medium	Medium
NZ86191280	Sandsend	NMR 58909	22.2	Medium	High
NZ53102881	Seaton Snook	Tees 3582	13.2	Medium	High
NZ52692910	Seaton Carew	Tees 3583	13.2	Medium	High
NZ48913658	Crimdon Dene	Durham 8303	11.1	Medium	High

Beach defence batteries were a major component in the anti-invasion defences which formed an almost continuous barrier along the low lying coast from Saltburn to Seaton Carew. In addition further strong points were provided by concrete ***pillboxes*** tactically sited along lines of obstacles designed to impede the movement of tanks and other armoured fighting vehicles. The most common obstacle still encountered today are concrete ***anti-tank blocks*** although the APTE has also recorded a range of other barriers such as earthwork ditches and banks and ***minefields*** surrounded by strands of barbed wire. ***Weapons pits*** were more *ad hoc* facilities designed to meet local tactical needs such as the defence of a gun emplacement or the perimeter of an army camp. While many pillboxes and numerous anti-tank blocks survive most of the weapons pits and earthwork barriers have been levelled and the minefields cleared. For this reason no attempt is made to provide an exhaustive account of this material, although the full data are retained in files accompanying the APTE and tables are presented below of the main types recorded. However, using surviving features and APTE records, it is possible to document how parts of the system of anti-invasion defences functioned.

The best example in the Teesmouth area is provided by the Greatham Creek (NZ5025) Defence Area, recorded as number 33 in the study by William Foot (nd). This system consisted of a number of pillboxes and 'V-shaped' concrete ***section posts*** positioned so as to make maximum use of the system of drainage ditches and embankments that criss-cross the area. The hub of the defensive complex appears to have been at NZ59652532 where three section posts are located. Each of these is of the 'V-shaped' pattern, with the apex of the 'Vs' pointing in a different direction. That pointing SE has 18 loopholes, that pointing SW has 13 loopholes and that pointing NE eight loopholes. Records of this site exist in both the HER and the NMR although the details vary. The NMR has both a single record for all three (NMR 1315594) and individual records for each (SE post NMR 956728; SW post NMR 1420552 and NE post NMR 956729) while the HER has a single record (Tees 986). Moving east the next site in this group is another section post situated at NZ51232542 recorded as Tees 4648 and NMR 1418926. This site no longer survives so its precise form is unknown. Moving east again three further 'V-shaped' section posts survive along the north-south embankment overlooking Seal Sands. In each

case these features face east. The most northerly is situated at NZ51662533 and is recorded as NMR 1443947. The central site in the group is at NZ51642515 and is recorded as NMR 1443948. At both of these posts the embrasures are obscured by earth banks. The third post, recorded as NMR 1443950 lies at NZ51582486. Eighteen embrasures have been noted in the east and SE faces.

Moving clock-wise around the Greatham Creek Defence Area the next site encountered is a large rectangular pillbox at NZ50722532, situated on the top of an old railway embankment and recorded as NMR 1420554. This structure is about 12.5m square with ten embrasures in each face and with a central well of unknown function but possibly for a light anti-aircraft gun and therefore a variant of Type 27. About 50m to the north along the embankment lies a second, smaller pillbox, rectangular in shape and 5m by 3m (NZ50932501, NMR 1420553, Tees 985). This has small embrasures in the west and east faces and a large embrasure, probably for a machine gun, in the north face.

This is a very interesting group of features the significance of which can best be expressed by quoting William Foot's summary from the *Defence Areas* CD.

> "Although the reason for placing a defended locality here can be understood, the intensity of the defence indicated by the groups of section posts may appear surprising. It has to be realised, however, that what has survived here is a unique transformation into concrete of the infantry earthworks that would usually have been dug at other defended localities, which have long since been infilled. Provision was evidently made to defend the locality at company strength, with fields of fire criss-crossing the defended area. The unique nature of this defence area, and its importance, cannot be overstated." (Foot, W. *Report on Greatham Creek Defence (Defence Area 33)*, 7).

The marsh benefits from multiple designations. It is an SSSI, a Special Protection Area (SPA) and a Ramsar Site. It lies just outside the SMP area but adjoins SMP unit 13.4 to the east. From Table 6.003 it can be seen that the policy recommended for this unit is initially 'No Active Intervention' followed in the middle and long term by 'Managed Retreat' which may entail the construction of sea defences. From a nature conservation perspective rising water levels will have a positive effect but the effect on the archaeological deposits is likely to be negative.

A second, more typical, example is provided by the barrier of anti-tank blocks that ran for 1.7km along the dunes from North Gare Breakwater to Seaton Carew (NMR 1459371). This barrier was breached at intervals to allow access to-and-from the beach and punctuated by pillboxes (NZ 52872927, 52912934 and 53132893). To the south the barrier terminated at a group of three section posts and a Type 28 pillbox at the landward end of the North Gare Breakwater (NMR 1459382). Many of these anti-tank blocks survive, particularly towards the northern end of the barrier while others have been noted in the dunes to the south.

6.4.3.6 *Anti-glider obstacles*

Added to the threat of a sea borne invasion the possibility of an enemy arriving by air, either by parachute or the landing of troop carrying gliders, had to be considered. The latter concern was addressed by the construction of ***anti-glider obstacles*** at likely landing sites. The APTE has identified three types of obstacles in Block 1, none of which appear to have been recorded previously.

The simplest variety consisted of single or parallel groups of ditches and mounds upto150m long and 10m wide. When set in groups, ditches were about 100m apart.

Variations on this arrangement included ditches dug in discrete segments and ditches with a 'dog-leg' bend in the middle. Examples of this simple type of anti-glider obstacle have been recorded either side of the historic centre of Marske, (NZ64362171 NMR 1424706; NZ64092229 NMR 1458475 and NZ62922296 NMR 1424698) though some have been built over and others filled in. Two other groups of simple anti-glider obstacles have been located north of Teesmouth at North Gare Sands (NZ53582762 NMR 1459319) and Seaton Snook (NZ52332899 NMR 1459319). Both areas are undeveloped and the ditches can still be detected on the Lidar coverage.

A more complex variety of anti-glider obstruction consisted of an arrangement of intersecting ditches and mounds forming a regular lattice pattern, the lattice being about 150m square. These systems were quite extensive, the Bran Sands system (NZ56692429 NMR 1424699) being 2200m NE-SW by 600m while two lattice systems north of the Tees are 1000m E-W by 500m (Greythorpe, NZ52642745 and 1500 SW-NE by 730m (Greatham Marsh, NZ51712645).

A third system consisted of a combination of simple and lattice arrangements but also incorporated enhanced natural features. A good example being recorded at the north end of Seaton Snook (NZ52732846). All five systems north of the Tees have been recorded as NMR 1459319.

In addition to the ditches and mounds anti-glider obstacles were supplemented with other components designed to damage or ensnare incoming aircraft such as concrete blocks and poles supporting a mesh of wires as recorded in the Greatham Marsh lattice system (NMR 1421318).

The APTE recorded a large number of other features that can be classified as anti-invasion defences for which basic details are provided in the following tables.

6.4.3.7 *Radar stations*

Three radar stations have been identified. One was part of the Tees Port anti-aircraft battery noted above and another north of the Tees at Seaton Snook (NZ52232772). This latter site already has an HER record (Tees 4740) but the APTE record is more extensive (NMR 1459295). The third was at Goldsborough (NZ84091488, NYMNP 59111).

The APTE recorded a large number of other features for which basic details are provided in the following tables.

Table 6.29 Pill boxes in Block 1 identified on aerial photographs

OS Sheet	Eastings	Northings	NMR	HER	SMP Unit
NZ 43 NE	464	397	1461282	Durham	10.1
NZ 43 NE	4597	3984	1461284	Durham	10.1
NZ 43 NE	454	392	1461287	Durham	10.1
NZ 43 NE	4682	3941	1461296	Durham	10.1
NZ 43 NE	4706	3916	1461298	Durham	10.1
NZ 43 NE	471	387	1461303	Durham	10.1,11.1
NZ 43 NE	4776	3800	1461538	Durham	11.1
NZ 43 NE	4813	3723	1461555	Durham	11.1

NZ 43 NE	4828	3653	1461571	Durham	11.1
NZ 43 NE	478	369	1461592	Durham	11.1
NZ 43 NE	491	364	1461606	Tees	11.1
NZ 43 NE	496	360	1461614	Tees	11.1
NZ 43 NE	4977	3593	1461633	Tees	11.1
NZ 43 NE	4997	3569	1461724	Tees	11.2
NZ 43 NE	4795	3780	1461781	Durham	11.1
NZ 52 NE	5558	2742	900047	Tees	13.6,13.7
NZ 52 NE	5925	2537	1424479	Tees	14.1
NZ 52 NE	557	276	1424496	Tees	13.6
NZ 52 NE	558	267	1424501	Tees	13.5,13.7
NZ 52 NE	561	258	1424507	Tees	13.5
NZ 52 NE	557	282	1424516	Tees	13.6
NZ 52 NE	55861	26662	1424668	Tees	13.7
NZ 52 NE	5551	2737	1425093	Tees	13.6
NZ 52 NE	5566	2752	1459454	Tees	13.6
NZ 52 NE	557	268	1459510	Tees	13.5,13.7
NZ 52 NE	5572	2664	1459521	Tees	13.5
NZ 52 NE	5601	2633	1459543	Tees	13.7
NZ 52 NE	5640	2655	1459718	Tees	13.7
NZ 52 NE	564	256	1459746	Tees	13.7
NZ 52 NE	5677	2547	1459760	Tees	13.7
NZ 52 NE	57033	25169	1459765	Tees	13.7
NZ 52 NE	5950	2526	1459773	Tees	14.1
NZ 52 NE	5882	2516	1459774	Tees	13.7
NZ 52 NW	532	267	1421321	Tees	13.4
NZ 52 NW	51663	25331	1443947	Tees	13.4,13.5
NZ 52 NW	51637	25150	1443948	Tees	13.5
NZ 52 NW	5350	2810	1459360	Tees	13.3
NZ 52 NW	532	288	1459371	Tees	13.1,13.2,13.3
NZ 52 NW	538	283	1459382	Tees	13.2,13.3
NZ 52 SE	5831	2400	1424696	Tees	15.1
NZ 52 SE	578	247	1459784	Tees	13.7
NZ 52 SE	5900	2456	1459785	Tees	14.1
NZ 53 NW	5033	3555	1461760	Tees	11.2
NZ 53 SW	5227	3356	1460728	Tees	12.1
NZ 53 SW	5139	3487	1460810	Tees	11.2
NZ 62 SE	678	217	1424416	Tees	16.1
NZ 62 SE	663	218	1424426	Tees	15.3.15.4
NZ 62 SE	6565	2192	1424873	Tees	15.3
NZ 62 SE	6517	2224	1458455	Tees	15.3
NZ 62 SE	6533	2210	1458461	Tees	15.3
NZ 62 SE	6530	2217	1458462	Tees	15.3
NZ 62 SE	6573	2196	1458543	Tees	15.3
NZ 62 SE	659	219	1458544	Tees	15.3
NZ 62 SE	6533	2180	1458546	Tees	15.3
NZ 62 SE	672	215	1458563	Tees	16.1
NZ 62 SE	692	214	1458600	Tees	16.1

NZ 62 SE	686	219	1458605	Tees	16.1
NZ 62 SW	649	223	1424439	Tees	15.3
NZ 62 SW	639	228	1424454	Tees	15.3
NZ 62 SW	6371	2299	1425226	Tees	15.2
NZ 62 SW	6295	2283	1458474	Tees	15.1
NZ 62 SW	6483	2235	1458532	Tees	15.1
NZ 62 SW	6277	2350	1458534	Tees	15.1
NZ 72 SW	71796	20035	1424388	Tees	17.3
NZ 72 SW	704	205	1458645	Tees	16.1,17.1
NZ 81 SE	8594	1301	1453234	NYMNP	22.1
NZ 81 SE	8694	1232	1453241	NYCC	22.3
NZ 81 SE	8747	1180	1453248	NYCC	22.4
NZ 81 SE	8843	1156	1458579	NYCC	23.2
NZ 81 SE	8758	1208	1458584	NYCC	22.4

Table 6.30 Anti-tank obstacles in Block 1 identified on aerial photographs

OS Sheet	Eastings	Northings	NMR	HER	SMP Unit
NZ 43 NE	4813	3723	1461555	Durham	11.1
NZ 43 NE	486	367	1461572	Durham	11.1
NZ 43 NE	4886	3657	1461603	Durham	11.1
NZ 43 NE	494	361	1461609	Durham	11.1
NZ 43 NE	4986	3578	1461612	Durham	11.1,11.2
NZ 52 NE	5558	2742	900047	Tees	13.7
NZ 52 NE	555	271	1459509	Tees	13.5,13.6
NZ 52 NE	578	251	1459747	Tees	13.7
NZ 52 NW	532	267	1459282	Tees	13.4
NZ 52 NW	5371	2785	1459347	Tees	13.4
NZ 52 NW	5358	2817	1459350	Tees	13.3
NZ 52 NW	532	288	1459371	Tees	13.1,13.2,13.3
NZ 52 NW	538	283	1459382	Tees	13.2,13.3
NZ 53 NW	5036	3539	1461763	Tees	11.2
NZ 53 NW	5092	3508	1461765	Tees	11.2
NZ 53 SW	5211	3112	1460712	Tees	13.1
NZ 53 SW	5227	3356	1460728	Tees	12.1
NZ 53 SW	5315	3399	1460752	Tees	11.3
NZ 53 SW	5139	3487	1460810	Tees	11.2
NZ 62 NW	6072	2521	1458395	Tees	14.2
NZ 62 SE	6626	2180	1424616	Tees	15.3
NZ 62 SE	6620	2178	1424618	Tees	15.3
NZ 62 SE	6570	2200	1424620	Tees	15.3
NZ 62 SE	6687	2162	1424688	Tees	15.4
NZ 62 SE	6685	2160	1424692	Tees	15.4
NZ 62 SE	6696	2156	1424774	Tees	15.4
NZ 62 SW	6490	2225	1424623	Tees	15.3
NZ 62 SW	6461	2240	1424624	Tees	15.3
NZ 62 SW	6447	2248	1424625	Tees	15.3
NZ 62 SW	6358	2289	1424629	Tees	15.2

NZ 62 SW	6346	2298	1424631	Tees	15.1
NZ 62 SW	6283	2344	1424633	Tees	15.1
NZ 62 SW	6263	2357	1424634	Tees	15.1
NZ 62 SW	6210	2400	1424638	Tees	14.3
NZ 62 SW	6183	2412	1424639	Tees	14.3
NZ 62 SW	6153	2440	1424760	Tees	14.3
NZ 62 SW	6162	2432	1424761	Tees	14.3
NZ 62 SW	6195	2398	1424762	Tees	14.3
NZ 62 SW	6186	2408	1424763	Tees	14.3
NZ 62 SW	6208	2390	1424764	Tees	15.1
NZ 62 SW	6147	2473	1458416	Tees	14.3
NZ 62 SW	6123	2495	1458422	Tees	14.2
NZ 62 SW	630	232	1458487	Tees	15.1
NZ 62 SW	6333	2305	1458498	Tees	15.1
NZ 62 SW	6412	2267	1458509	Tees	15.2
NZ 62 SW	6473	2238	1458511	Tees	15.3
NZ 62 SW	6486	2232	1458521	Tees	15.3
NZ 71 NE	782	188	1424597	NYMNP	19.1,19.2
NZ 72 SW	7130	2010	1424598	Tees	17.2
NZ 72 SW	715	200	1424604	Tees	17.2,17.3
NZ 81 NW	814	155	1424596	NYMNP	22.1
NZ 81 SE	8710	1220	1424595	NYCC	22.3,22.4
NZ 81 SE	8850	1150	1424687	NYCC	23.1,23.2
NZ 81 SE	8607	1286	1453239	NYCC	22.1
NZ 81 SE	8754	1207	1458583	NYCC	22.4
NZ 81 SE	8817	1193	1458585	NYCC	23.1
NZ 81 SE	86231	12510	1458592	NYCC	22.2

Table 6.32 Barrage balloon moorings in Block 1 identified on aerial photographs

OS Sheet	Eastings	Northings	NMR	HER	SMP Unit
NZ 52 SW	543	228	1459189	Tees	13.5

Table 6.33 Air raid shelters in Block 1 identified on aerial photographs

OS Sheet	Eastings	Northings	NMR	HER	SMP Unit
NZ 43 NE	455	395	1461286	Durham	10.1
NZ 43 NE	454	392	1461287	Durham	10.1
NZ 43 NE	471	387	1461303	Durham	10.1,11.1
NZ 53 SW	5190	3347	1460726	Tees	12.1
NZ 53 SW	5306	3388	1460743	Tees	11.3
NZ 53 SW	5242	3428	1460796	Tees	11.3
NZ 62 SW	614	241	1458464	Tees	14.3

CHAPTER 7

Blackhall Rocks to South Beach, Blyth (Block 3 NMP)

7.1 Introduction

The area covered extends from Blackhall Rocks on the Durham Heritage Coast to South Beach, Blyth in Northumberland. It falls into two major topographical units, the magnesian limestone cliffs of County Durham and the southern part of Tyne and Wear and the coastal lowlands of Northumberland, punctuated by the lower parts of the valleys of the rivers Wear and Tyne. Accordingly, this survey of the heritage assets has been undertaken with reference to the Historic Environment Records (HERs) maintained by Durham County Council, Tyne and Wear and Northumberland County Council. This existing base of data has been enhanced by the transcription of aerial photographs held by the National Monuments Record and carried out to the standards of the National Mapping Programme (NMP). This work is referred to as the Air Photograph Transcription Exercise (APTE).

A substantial part of the coastline from Blackhall Rocks to Salterfen Rocks, south of Sunderland has been designated as 'Heritage Coast', a major interruption occurring in the vicinity of Seaham. In addition, sections of the foreshore have been designated as SSSIs. Castle Eden Dene is a National Nature Reserve while The National Trust manages sections of coast between Horden and Nose's Point. North of Sunderland most of the foreshore as far as South Shields is also a SSSI. The National Trust manages a section of coast from Souter Point to Trow Point. The whole length of the foreshore from the Tyne to the northern boundary of Block 3 is a SSSI. Substantial sections of the coastal zone in Block 3 are extensively built up, which clearly has implications for the survival of heritage assets.

7.1.1 Soils and landuse

The solid geology of this section of the coast is described in Chapter 3 though throughout most of the coastal zone this solid geology is mantled by varying thicknesses of glacial drift and other superficial deposits of Pleistocene and Holocene age. It is these superficial deposits that give rise to the principal soil types found along this section of the coast.

Table 7.1 Soil and landuse in Block 3

Deep loam	Stock rearing and dairying with some cereals
Seasonally wet deep red clay	Dairying on permanent grassland with some cereals in drier districts
Seasonally wet deep loam to clay	Grassland in moist lowlands with some arable in drier areas
Seasonally wet deep clay	Winter cereals, sugar beet, potatoes and field vegetables
Dune sand	Recreation and some coniferous woodland
Loam over limestone	Cereals, sugar beet and potatoes with some short term grassland

The patterns of landuse that characterise these soil types are an important consideration in evaluating the survival of heritage assets and the degree of threat arising from normal farming practices. Clearly, ploughing for arable cultivation will have had a major bearing on the survival of, and the extent to which, once levelled, sites can be identified on aerial photographs. Plough damage to archaeological sites is not a recent phenomenon but before the Medieval period the scale and intensity of ploughing cannot be considered significant. However, the development of ridge-and-furrow cultivation in the open fields of the Medieval and post-Medieval periods was on a sufficient scale to pose a serious threat to existing features. It is also necessary to bear in mind that extensive areas of Block 3 have been built over for housing and by industrial development and few heritage assets can be expected to have survived within these areas, irrespective of their soil type.

7.1.2 Coastal erosion

The coast extending north from Blackhall Rocks to Salterfen Rocks is characterised by magnesian limestone cliffs varying in height from 20m to 40m fronted in places by a wide wave cut platform exposing the solid geology, though this is often obscured by colliery waste. After the low lying zones of Wearmouth and Seaburn the cliffs resume from Whitburn to Trow Point on the outskirts of South Shields.

North of the Tyne the cliff line continues as far as Whitley Bay but from this point based on the solid geology of the Coal Measures. The cliffs north of the Tyne are generally lower than those to the south, rarely exceeding 23m in height. Farther north are the low lying coastal zones of Whitley and Hartley Links, fronted by broad sandy beaches but punctuated by a 1km length of low cliffs between St Mary's Island and Seaton Sluice.

The section of the coast is covered by two Shoreline Management Plans (SMPs). That south of the Tyne falls within Cells 1b to 1d of SMP2, produced by Royal Haskoning in 2007 while that to the north of the Tyne lies within Cell 1a and is covered by SMP1 produced by Posford Duvivier in 1998. South of the Tyne Block 3 spans SMP2 Management Areas 1 to 10 while to the north it spans SMP1 Management Units 42-48.

The authors of the SMP2 have produced estimates of baseline erosion rates at various points. These are based on existing evidence and may be expected to increase with sea level rise. Accordingly, the figures presented in Table 7.2 should be taken as a minimum.

The maps accompanying the SMP2 use these data to predict the position of the coastline at 20, 50 and 100 year intervals. A number of responses have been proposed on the basis of these predictions (7.3a). Such data predictions are not offered in the SMP1 document which confined itself to policy options (Table 7.3b).

Coastal erosion poses two kinds of threat to the historic environment:

1. The erosion of the coast itself caused by the action of the sea leading to the destruction or truncation of assets.
2. Damage to assets caused by various mitigation strategies.

Table 7.2 Rates of coastal erosion in Block 3 recorded in the SMP

Location	NGR (approximate)	Rate per year
Herd Sands	NZ377677	0.2m
Trow Point	NZ384666	0.2m
Frenchman's Bay	NZ388661	0.1m - 0.2m
Marsden Bay	NZ396654	0.1m - 0.2m
Lizard Point	NZ409642	0.1m
Souter Bay	NZ414627	0.2m
Whitburn	NZ411619	0.1m
Whitburn Bay	NZ406601	0.4m
Parson's Rocks	NZ407597	0.4m
Salterfen	NZ415541	0.1m
Pincushion	NZ420524	0.4m
Seaham North	NZ425502	0.3m
Seaham South	NZ435485	0.5m
Chourdon Point	NZ442464	0.3m

Five main types of mitigation are proposed:

1. 'Hold the Line' entailing construction works such as the provision of rock armour at the foot of eroding cliffs and the construction of sea defences (HTL).
2. Advance the line (A).
3. Managed Realignment (MR).
4. Hold the line on a retreated alignment (HR).
5. Retreat (R)

The alternative to these approaches is 'No Active Intervention' (NAI) or 'Do Nothing' (DN).

Figure 7.1 Rock armour at the base of cliffs north of Seaham (author)

Table 7.3a SMP2 proposed responses to predicted coastal change in Block 3 south of the Tyne

Location	SMP Unit	2025	2055	2105
South Groyne, S.Shields	1.1	HTL	HTL	HTL
Little Haven, S.Shields	1.2	MR	HR	HR
South Pier, S.Shields	1.3	HTL	HTL	HTL
Herd Sands, (north)	2.1	HTL	HTL	R
Herd Sands, (south)	2.2	HTL	MR	HR
Trow Point	2.3	R	MR	HR
Trow Point, (south)	3.1	R	MR	HR
Trow Quarry	3.2	HTL	MR	MR
Lizard Point (north)	4.1	R	R	NAI
Lizard Point	4.2	NAI	NAI	NAI
Harbour Quarry	5.1	HTL	R	R
5.1 to Souter Point	5.2	NAI	NAI	NAI
Whitburn Cliffs	6.1	NAI	NAI	NAI
The Bents	6.2	MR	MR	HR
Parson's Rocks	6.4	HTL	HTL	R
Marine Walk, Sunderland	6.5	HTL	HTL	MR
Harbour Pier, Sunderland	7.1	HTL	HTL	HTL
North Harbour, Sunderland	7.2	HTL	HTL	HTL
South Harbour, Sunderland	7.3	HTL	HTL	HTL

East Bay, Sunderland Harbour	8.1	HTL	HTL	HTL
South face, Sunderland Harbour	8.2	HTL	HTL	HTL
Hendon Seawall	8.3	HTL	HTL	HTL
Hendon to Pincushion	8.4	R	MR	MR
Pincushion to Seaham	9.1	NAI	NAI	NAI
Seaham North Promenade	9.2	HTL	HTL	HTL
Red Acre Cliffs	9.3	R	HR	HR
Seaham Harbour	9.4	HTL	HTL	HTL
Seaham South	9.5	HTL	HTL	HTL
Dawdon Beach	9.6	NAI	NAI	NAI
Blast Beach	9.7	NAI	NAI	NAI
Blackhall Rocks	10.1	NAI	NAI	NAI

Table 7.3b SMP1 proposed responses to predicted coastal change in Block 3 north of the Tyne

Location	SMP Unit	Policy
South Beach, Blyth	42	HTL
Hartley Links	43	HTL
Seaton Sluice	44	DN
Whitley Sands	45	HTL
Whitley Bay	46	HTL
Cullercoats-Long Sands	47	HTL
Tynemouth	48	HTL

It can be seen from the above table that 'Hold the Line' is the preferred recommendation for a significant part of this section of coast, 'HTL' or 'MR' being the recommended response in 26 policy units out of 39. This no doubt reflects the fact that this part of the coast is extensively developed and that coastal change poses a significant threat to a large population and several major ports. 'Holding the Line' or 'Managing Retreat' is likely to involve a range of mitigation strategies many of which may have implications for heritage assets and the situation needs to be kept under review as strategies are developed.

An additional factor on this section of the coast is erosion of colliery waste. The collieries of the Durham coast made a practice of dumping waste on the beaches adjacent to the mines. This waste was eroded by the sea but while the collieries remained in production was constantly replenished. With the closure of collieries this replenishment has ceased and the erosion of the remaining waste is exposing the original beach. The long-term implications of this will only emerge through time but two issues are immediately apparent. First, the erosion of the colliery waste is exposing pre-existing features at the head of the beaches and at the foot of the cliffs, including caves and rock fissures which

may well be of archaeological significance. Secondly, the removal of the colliery waste is likely to have a bearing on the rate of erosion at the foot of the cliffs. Coupled with rising sea level the rate of 0.3m per year may well be a significant under-estimate.

Figure 7.2 Eroding colliery waste at Hawthorn Hive, County Durham (author)

7.2 Terrestrial Landscapes

7.2.1 Early Prehistory

Although Block 3 lay within the realm of Palaeolithic settlement, at least during the Late Upper Palaeolithic Period, no finds of this date have been recorded in the coastal zone. The earliest evidence for a human presence belongs to the Mesolithic period.

7.2.2 The Mesolithic Period

The Durham HER has 26 records of ***flint scatter sites*** in Block 3 of which 18 have been ascribed to the Mesolithic period. However, with two exceptions these records refer to single or small groups of finds collected during field walking over a wide area. The exceptions are the assemblages from Blackhills Gill and from Easington Colliery. The former site lay at about 15m OD towards the foot of the limestone cliff and about 600m north of the mouth of Castle Eden Dene. This assemblage was first discovered by Trechmann and published by him in 1912 but further work was undertaken by Gibbs and Raistrick in the 1930s. It is said to consist of over 550 flakes and blades but includes two microliths (Trechmann 1912; Raistrick 1933a). The assemblage from Easington colliery consists of a single microlith, a core and 58 unreduced blades and flakes. It is the largest collection of flints from the area although material, in smaller quantities, is recorded from six other locations within the colliery.

Eight fields on the Durham coast were also examined as part of the *Turning the Tide* project

undertaken by ASUD in 1998. Field walking was undertaken systematically and density values per hectare are quoted. In each case these values fall below the nine items per 1000m^2 quoted in Chapter 5 as the critically density for the identification of a flint scatter sites. The finds recovered include Mesolithic and later items.

Moving north, the Tyne and Wear HER has records of 24 flint scatter sites within the coastal zone but only six are ascribed to a particular period. Of these four are recorded as Mesolithic but no details are provided as to the quantities of material recovered. However, some details can be gleaned Wymer (1977) who notes three sites in the Ryhope area, one with two finds, another with 20 and a third with an unrecorded total, which may suggest that they were quite numerous (Coupland 1923 and 1925; Preston 1933; Raistrick 1933a and 1933b; Wymer 1977). The NGRs quoted by Wymer are general estimates and his records cannot be directly related to those found in the HER which also has records of three collections of Mesolithic flints in the Ryhope area.

The next collection recorded is that from Monkwearmouth. Wymer (1977) records this assemblage as consisting of 379 blades and flakes, 26 cores and three scrapers. This site is situated at about 25m OD overlooking the Wear estuary to the SE.

Between the Wear and the Tyne the HER records 17 locations where prehistoric flints have been found while Wymer lists eight, all on the magnesian limestone uplands between Whitburn and Marsden. The Northumberland HER has no records of Mesolithic flint scatters within Block 3.

In addition to the above records the excavations at the South Shields Roman Fort have lead to the recovery of a significant assemblage of stone tools, some of which have been identified as Mesolithic (Hodgson *et al* 2001).

The assemblages at Blackhills Gill, Easington Colliery, Ryhope, Monkwearmouth and South Shields, and the other occasional finds, testify to the presence of Mesolithic groups on the limestone uplands of the Durham coast and should be seen as part of the same pattern of activity as that represented by the assemblages at Crimdon Dene and Filpoke Beacon in Block 1. The only dating for any of this material is the Filpoke Beacon C14 date, but on typological grounds it can all be regarded as Late Mesolithic.

Although these assemblages come from the coastal zone there is no indication, one way or the other, as to whether they represent activity with a specifically coastal focus. Indeed, the larger assemblages appear to reflect industrial activity and their locations will have been determined by the availability of raw material. Suitable material may have been available on the foreshore but was equally available inland and these assemblages have been treated as part of the terrestrial landscape. One find of Mesolithic date does reflect a specifically coastal/maritime focus. This is the barbed point from the foreshore at Whitburn, and will be discussed below in the section dealing with coastal/maritime landscapes.

Table 7.4 Mesolithic flint scatter sites in Block 3.

NGR	Name	HER	SMP	Importance	Risk
NZ45304120	Blackhills Gill	Durham 105	10.1	Low	Medium
NZ44504440	Easington Colliery	Durham 81	10.1	Low	Medium
NZ41725206	Ryhope	T&W 227	9.1	Low	Medium
NZ41755282	Ryhope	T&W 226	8.4	Low	Medium
NZ41715299	Ryhope	T&W 225	8.4	Low	Medium
NZ40045796	Monkwearmouth	T&W 49	n/a	Low	Low

The Mesolithic sites at Blackhills, Easington Colliery and Ryhope are on a section of actively eroding coast, the rate quoted for Chourdon Point being 0.3m/per year while at Pincushion this is 0.4m/per year. This is also an area where colliery waste on the foreshore is now being actively eroded. The policy recommended in the SMP is one of either R or NAI and the status of early prehistoric sites on this section of the coast needs to be kept under review.

7.2.3 The Neolithic Period

Apart from occasional finds of stone tools the only evidence for the Neolithic Period in Block 3 consists of the putative remains of a ***causewayed enclosure.*** Causewayed enclosures are rare north of the River Trent but a site at Hastings Hill in County Durham, outside the coastal zone, has been accepted as a likely northern example.

The site in Block 3 consists of two ditch segments underlying the remains of the Roman Fort at South Shields. The complete ditch segment measured 8.5m in length and 4.1m in width. It survived to a depth 0.5m and had square terminals at either end. Some 6.4m to the SW lay the terminal of a similar feature 5.4m wide and 0.53m deep. The farther terminal lay outside the area of the excavation but the exposed length of this segment was 5m. No direct dating was obtained for either segment but higher deposits were dated to the late 4th millennium cal BC, thus providing a *terminus ante quem* for the ditch segments. Whether these features are part of a causewayed enclosure in the usual sense of the term or part of some other Early Neolithic activity cannot be established on the present evidence. The overlying, dated, deposits contained stone tools indicating continuing activity on the site during the later Neolithic and in the Bronze Age (Hodgson *et al* 2001).

A cropmark site at Lookout Farm, Seaton Sluice (NZ32707680, NH 11968) was initially published as another causewayed enclosure but this has not been confirmed by the APTE and the feature is regarded as a Late Prehistoric farmstead enclosure (Newman 1976; Burgess 1984, 140).

The HER records a putative henge monument at Whitley Bay (NZ36187016, T&W 1918) based on a rather indistinct aerial photograph dating from the 1950s. This identification has not been confirmed by the APTE and the site is now built over.

7.2.4 The Bronze Age

The Bronze Age is also sparsely represented in Block 3. Apart from occasional records of Bronze Age flints the Durham HER records only a single site, the ***round barrow*** at Hawthorn (NZ43324682, Durham 61). This mound, situated at about 65m OD, is recorded as being 22.9m in diameter and 2.5m high. A depression near the top may indicate that it has been disturbed in the past but there are no records of any finds.

The Tyne and Wear HER has records of five inhumations, at least three of which are probably of Bronze Age date. Two of these were found in the northern outskirts of Sunderland (NZ39835949, T&W 2 and NZ39635955, T&W 372) each being accompanied by a pottery urn and T&W 372 was found in a stone ***cist***. At Trow Rocks (NZ3836671, T&W 832) an inhumation in a cist is recorded from within a barrow.

Table 7.5 Bronze Age sites in Block 3.

NGR	Name	HER	SMP	Importance	Risk
NZ39835949	Sunderland	T&W 2	6.5	Low	Low
NZ39635955	Sunderland	T&W 372	6.5	Low	Low
NZ38366671	Trow Rocks	T&W 832	3.1	Medium	High

> *An erosion rate of 0.2m/per year has been recorded at Trow Point and the SMP policy recommendation is to allow the cliff face to retreat. Clearly, if any of the Trow Point site survives, this should be investigated before it is totally lost.*

The two other inhumations (NZ40736262, T&W 848 and NZ39656488, T&W 884) recorded may also date from the Bronze Age. Apart from a bronze axe head found on the foreshore at Blyth (NZ32087975, NH 11983) the Northumberland HER has no Bronze Age records in Block 3.

7.2.5 The Iron Age and Romano-British Period

The terrestrial landscapes of the Iron Age and Romano-British Periods are represented in Block 3 by what appear to be the remains of settlement sites. The Northumberland HER has records of three rectilinear ***farmstead enclosures*** identified as crop marks on aerial photographs. The APTE has added four further sites to this group. At Hartley a site consisting of two, concentric rectilinear enclosures, has been identified from crop marks. The outer enclosure measures 92m by 89m and the inner enclosure 49m by 46m. Both enclosures have an entrance on the SE side. Another crop mark site lies about 500m inland from the foreshore at Hartley Links. Only three sides of this enclosure have been recorded giving a measurement of 70m by >90m with an entrance on the east side. Two further enclosures have been identified at Newsham South Farm, Blyth. The larger site is 73m by 53m with a small 25m by 15m enclosure in the NE corner. The second site lies about 35m to the north and is incomplete. It measures 30m by at least 40m. Both sites are connected to linear features that are probably part of a field system. Rectilinear farmstead enclosures are widespread outside the upland areas of Northumberland and excavated examples have been dated to the Iron Age and Romano-British Periods.

Table 7.6 Iron Age and Roman-British farmstead enclosures in Block 3

NGR	Name	HER	SMP	Importance	Risk
NZ31997760	n/a	NH 11994	43	Medium	Low
NZ33377552	n/a	NH 11969	44	Medium	Low
NZ31807770	n/a	NH 11988	43	Medium	Low
NZ33637598	Hartley	NMR 26650	43	Medium	Low
NZ32417752	Hartley Links	NMR 1464848	43	Medium	Low
NZ31487892	Newsham South Farm 1	NMR 1465425	43	Medium	Low
NZ31487892	Newsham South Farm 2	NMR 1465425	43	medium	Low

Farmstead enclosures usually included a number of round buildings that provided accommodation for the farmer, his family and their stock (Jobey 1966). Such buildings rarely show up on aerial photographs but excavations at two sites in Tyne and Wear have revealed traces of the kind of structures to be expected.

In the winter of 1963 George Jobey carried out an excavation on the headland at Tynemouth within the perimeter of the Medieval castle and priory (Jobey 1967). During the course of these excavations traces of two round buildings were exposed. The larger building was about 12m in diameter and had an external wall set into a wall trench dug into the underlying bedrock. It had internal supports for a conical roof and an outer ring of eaves supports, while the entrance faced SE. Substantial buildings of this kind are typical of the Iron Age and Roman pottery from deposits overlying the wall trench enable a pre-Roman date to be suggested. The second building was much smaller, being only 3.7m in diameter and may be of a later date as the maximum concentration of Romano-British pottery was found on this part of the site (T&W 119).

These two buildings are unlikely to have existed in isolation and Jobey speculated that they may have been part of a larger settlement on the headland. It is likely that the natural defences of the headland would have been supplemented on the landward side by a ditch, bank or palisade making the site a ***promontory fort***. However, all trace of such works has been removed by the Medieval and later developments.

Limited evidence was recovered from the Iron Age and Roman-British deposits for the economy of this community in that the bones of sheep and pig were present as were numerous shellfish remains, chiefly limpets, periwinkles and mussels. These latter probably imply the adventitious use of a handy resource rather than a specifically coastal or maritime focus for the Tynemouth site.

Across the mouth of the Tyne the excavations at the Roman Fort of *Arbeia* have revealed traces of a similar Iron Age round house. This building was represented by a continuous wall-slot defining an area 8.75m in diameter surrounded by an eaves-drip gully. Although part of the building lay outside the excavated area sufficient of the wall-slot was exposed to show that the entrance lay on the east side. To the SW of the house lay an area of arable cultivation, demarcated on the west by a ditch and bank. This episode of activity at South Shields has been dated to the middle period of the Iron Age, between 390 and 170 cal BC and came to an end when the house burnt down (Hodgson *et al* 2001).

At Sunderland, excavations on the site of the former Vaux Brewery have reportedly found traces of a late prehistoric enclosure (T&W 7111) and this site is to be investigated further.

It was noted in considering the evidence from Block 1 that ***querns***, or rotary handmills, should be taken into account in trying to identify Iron Age and Romano-British activity. The Durham HER has a record of two querns found along with Roman pottery at Seaham (NZ42464880, Durham 75) (Petch 1925, 27).

7.2.6 The Roman Period

Apart from the Roman fort at South Shields, which will be considered in the context of coastal/maritime landscapes, most of the evidence for Roman activity in Block 3 consists of occasional finds of items of metal work and Roman coins. A number of such coins have been found within the built-up area of Sunderland and the likelihood of a Roman site of some sort here seems a distinct possibility. The HER records an alleged Roman fort on the site of the Vaux Brewery but investigations at the site have yet to produce any supporting evidence (Heslop *pers.comm.)* However, a Roman pottery kiln is recorded at NZ40915765 (T&W 82).

7.2.7 The Early Medieval Period

The coast of NE England is justifiably well known for an important number of Early Medieval sites and mention has already been made of the Anglo-Saxon monastery on the Headland at Hartlepool. The coastal zone in Block 3 also boasts several major sites belonging to this period.

The most southerly is the Early Christian and Anglo-Saxon cemetery at Seaham (NZ42285063, Durham 4713 and 6731). The cemetery lies to the north of St Mary's church and is believed to be about 180m by 100m in extent. Human remains have been reported since the middle of C18 but excavations in 1997 recovered some 10 inhumations, aligned east-west. Radiocarbon dates suggest that the cemetery was in use from the middle of the C7 to the latter part of the C9. Further excavations in 1999 exposed a further 26 inhumations of which 15 were exhumed for further analysis.

> *This cemetery lies about 130m from the cliff edge on a section of the coast where erosion rates of 0.3m to 0.4m/per year have been recorded. The SMP recommended policy here is one of NAI and although the B1287 lies between the cemetery and the cliff, the long term status of the site should be kept under review.*

The church of St Mary (NZ42255050, Durham 762) is itself a partly Anglo-Saxon structure, the nave dating from the C7 or early C8 with the chancel and tower having been added in the C13, while the village of Seaham itself is first recorded in AD 933.

One of the most important and well known early medieval sites on the NE coast is the Anglo-Saxon monastery of St Peter at Monkwearmouth, twinned with that of St Paul at Jarrow. The Monkwearmouth (NZ40185778, T&W 421, 89-99, 402-415 and 417) site was established in 674. It originally consisted of two separate churches, St Peter's and St Mary's, and thrived for a little over a century before being sacked by the Vikings in 794. It was

refounded in 1075 and became a cell of Durham Priory in 1083. It is situated at 15m OD on a level terrace above the north bank of the River Wear. The only feature visible at the site is the church, though extensive remains of the monastic site have been recorded by excavation.

Of the surviving fabric, it has been suggested that the west wall of the nave and the lowest stage of the tower represent the earliest remains and date from the late C7, with further stages being added to the tower *circa* 700 and at the end of the C10. The rest of the church represents a C13 rebuilding. The pre-Conquest monastic buildings were replaced by a standard conventual layout in the late C11 but excavations have shown that the earlier arrangements were more haphazard and similar to those identified at Hartlepool (Pevsner 1983, 465-467). Monkwearmouth monastic settlement is a Scheduled Ancient Monument.

Figure 7.3 St Peter's Church, Monkwearmouth (author)

The promontory at Tynemouth, occupied in the Iron Age, was also the site of an important Anglo-Saxon monastery (NZ37276938, T&W 123) and the burial place of King Oswine. Excavations in the 1960 and 1980s revealed the footings of a number of timber buildings (Jobey 1967; Fairclough 1983). The monastery was sacked by the Vikings in 800 and the *History of the Church of Durham* records that the Viking army under Healfdene occupied the site in the 870s. The third early medieval site in this group, the monastery at Jarrow, lies outside the study area.

7.2.8 The Medieval Period

The most important Medieval site in Block 3 is the priory and castle on the headland at Tynemouth. In 1085, Robert Mowbray, Earl of Northumberland, founded a Benedictine Priory on the site of the earlier Anglo-Saxon monastery. The main upstanding element of the priory is the church which exhibits two main phases of development, in the late C11 and the early C13. The cloistral buildings, most of which do not survive above foundation level, lay

to the south while the monks cemetery was situated to the south and east of the church. Tynemouth Priory was dissolved in 1539.

The remains of the priory are situated within the walls of an enclosure castle, the origins of which also lie in the late C11. Early documents record that the castle at Tynemouth was besieged in 1095 during the rebellion of Robert Mowbray against William Rufus and it has been suggested that the remains of this early castle may survive in the large earth mound, known at the Mount, situated at the SW corner of the headland. This early castle would have been of the motte and bailey type. However, in 1296 the Prior of Tynemouth was granted a licence to crenellate and work began on the construction of walls and towers around a circuit of nearly 1000m, one of the largest castles in England at the time. The visible remains are mainly of C13 and C14 date and include the massive gatehouse and barbican, the main strong point of the castle. After the dissolution of the priory the castle remained in use as part of Henry VIII's scheme of coastal defence and this aspect will be considered below. Tynemouth Priory and Castle is a Scheduled Ancient Monument.

Although the priory and castle at Tynemouth have an evident coastal situation their *raison d'etre* was not primarily coastal, and the choice of site was governed by considerations of defence. Nevertheless, the possibility of being re-supplied by sea in the event of a siege was probably an important consideration and the small bay immediately to the south of the headland is known as Prior's Haven.

There are few other records of specifically Medieval features in Block 3. The Durham HER has just two records, the site of a putative medieval fire beacon at Beacon Hill (NZ44184544, Durham 3846) and Seaham village (NZ42255052, Durham 4935) which first appears in historical records in the late C10.

The Tyne and Wear HER has rather more entries but individual details of each site are not available and several are only known from historical sources and cannot be precisely located. These include the record of a C13 coal mine (T&W 733) worked by the monks at Tynemouth and represents the first occurrence of what was to become a major industry within Block 3.

The most widespread feature of medieval date in Block 3 is ***ridge-and-furrow***. The NERCZA assessment is on the transcriptions produced by the APTE. With the exception of the belts of dune sand backing the foreshore, traces of ridge-and-furrow are virtually ubiquitous outside the built-up areas and those disturbed by mining and quarrying. Detailed documentary analysis should make it possible to associate some of these furlongs with specific areas of common fields and with the centres of population which lay at their focus.

7.2.9 The Industrial Period

The main industry on the coastline of County Durham in Block 3 has been coal mining, four major mining sites being represented within the area. The history of the Durham Coalfield is one of migration from west to east as the mines followed the increasingly deeper strata, eventually winning coal from far under the North Sea. Accordingly, the collieries in the coastal zone mainly represent a late phase in the history of the industry, production having

began in the late C19.

The most southerly was Horden Colliery. To the north was Easington Colliery which began production in 1899 and continued for 94 years. The shafts had been sealed and, with the exception of the power house and colliery office, the above ground buildings had been cleared by 1994. North of Easington was the Dawdon Colliery, which occupied the site of the former Seaham Iron Works (Durham 8308). Shafts were sunk at Dawdon between 1894 and 1907. Dawdon ceased production in 1992 with the site being cleared by 1997. The most northerly of the group is the Vane Tempest, or Seaham, Colliery where the first shafts were sunk in the 1850s. Like the other collieries along this coast closure came in 1992 and the site had been cleared by 1994.

As indicated above, these collieries had all closed by the end of the C20 and their sites had been cleared to make way for other developments. However, the works underground have mainly been capped and are vulnerable to exposure as the cliff face erodes. The SMP policy south of Seaham is one of NAI which, if implemented, may have implications for the underground works of the Horden, Easington and Dawdon Collieries.

Table 7.7 Collieries in Block 3

NGR	Name	HER	SMP	Importance	Risk
NZ441418	Horden	Durham 8312	10.1	Low	Low
NZ437441	Easington	Durham 3843	10.1	Low	Low
NZ432475	Dawdon	Durham 3844	9.6	Low	Low
NZ423502	Vane Tempest	Durham 3841 & 4809	9.2	Low	Low
NZ364707	Cullercoats	T&W 1196	4.7	Low	Low
NZ393579	Monkwearmouth	T&W 2743	n/a	Low	Low
NZ409537	Ryhope	T&W 2947	8.4	Low	Low
NZ409633	Whitburn	T&W 2493	5.2	Low	Low
NZ373668	Westoe	T&W 5110	n/a	Low	Low
NZ355718	Whitley	T&W 1192	46	Low	Low

The Northumberland HER has seven records which all refer to the pits associated with Old Hartley Colliery.

Table 7.8 HER records of pits at Old Hartley Colliery

NGR	Name	NH HER	SMP	Importance	Risk
NZ33357571	Old Fortitude	20793	44	Low	Low
NZ33787573	Old Engine	20975	44	Low	Low
NZ33537591	June	20794	44	Low	Low
NZ32997600	Bloom	20899	44	Low	Low
NZ33207599	Swallow	20800	44	Low	Low
NZ33787624	Whin	20797	44	Low	Low
NZ33557639	Mill	12004	44	Low	Low

Other large scale industries recorded are a chemical and a bottle works, both at Seaham (Durham 8306 and 8305), Ambrose Crowley's Iron Works (T&W 4437), a bottle glass factory (T&W 4409) at Sunderland, an alkali works (T&W 4594) at South Shields and the

Hartley Bottle Works (NZ336765, NH 12006) at Seaton Sluice, while smaller scale activity is represented by numerous lime kilns. The APTE has recorded a number post-Medieval ironstone mines on Whitley Links (NZ353729, NMR 11465181).

7.3 Coastal/maritime Landscapes

7.3.1 The Mesolithic Period

The only unequivocal indication of coastal/maritime exploitation strategies during the Mesolithic period in Block 3 is provided by the barbed point picked up on the foreshore at Whitburn in 1852. This item, which appears to be made out of a segment of red deer antler, has been fully described by Mellars (1970). It measures 87mm long and varies in width from 14mm to 4mm. It has three barbs on each side, although the distal pair are very worn and almost vestigial. There is an oval hole for the attachment of a line at the broad, proximal end which suggests that this item should be classified as a harpoon. Flat, barbed points, either

Figure 7.4 The Whitburn barbed point, ventral view (Museum of Antiquities)

uniserial or biserial, are characteristic of the Late Mesolithic in northern Britain, directly dated specimens belonging to the 6th,5th and 4th millennia cal BC. All other examples come from the west coast with a concentration on sites of the so called 'Obanian' group in Argyll, though an example from Cumstoun on the coast of Dumfries and Galloway is of a similar latitude to the Whitburn harpoon.

No details are known about the provenance of the Whitburn harpoon other than the approximate location and date of the find. In his report Mellars refers to submerged forest beds being exposed in Whitburn Bay, about 1km south of the village of Whitburn. These deposits are said to be similar to those studied between Hartlepool and Seaton Carew described in Chapter 6 and a flint blade was recovered from this deposit in 1993 (T&W 1997). The Whitburn Bay deposits were also studied by Trechmann (1936, 166-167) and these deposits offer a likely source for the Whitburn harpoon.

> *An annual erosion rate of 0.4m has been recorded at Whitburn Bay. The bay lies within SMP Policy Unit 6.2 for which the recommendation is MR. Accordingly, it may be necessary to consider the long term implications of this policy for the off-shore submerged forest beds.*

Harpoons are generally interpreted as evidence for the hunting of marine mammals. Seal are endemic creatures of the NE coast and whales are frequent visitors. The Whitburn barbed point offers an interesting insight into the economic lives of the early inhabitants otherwise mainly represented by mute assemblages of stone tools.

There is an absence of evidence for coastal/maritime activity on this section of the coast during the rest of the prehistoric period. Whether this reflects a genuine lack of interest or simply a lack of evidence is unclear.

7.3.2 The Roman Period

The principal Roman site in Block 3 is the fort at South Shields (NZ36506793, T&W 914), known by its ancient name as *Arbeia*. This site is situated at 25m OD on Law Top, a flat topped hill overlooking the mouth of the Tyne on the south side. Excavations over more than a century have shown this to be a complex, multi-period site involving several phases of rebuilding between the earlier C2 and late C4 (Hodgson *et al* 2001). The first fort, dating from *circa* AD129, was part of the Hadrian's Wall system, although it is situated 6.5km east of the end of the Wall at Wallsend on the north bank of the Tyne. The South Shields fort was garrisoned by units of cavalry and it is assumed that it guarded a small port at the mouth of the Tyne.

The original earth and timber fort was replaced in stone *circa* AD160 but a more major reorganisation occurred in the first decade of the C3 when the fort was turned into a supply base both for the garrison of Hadrian's Wall and for military operations north of the frontier. This involved subdividing the fort into northern and southern portions and extending the southern portion by 45m. The barracks in the northern portion were demolished and replaced by 18 granaries. The garrison at this time consisted of units of infantry. Further reorganisation occurred *circa* AD230 when more granaries were added. The fort appears to have been abandoned at the end of the C3 but was reoccupied at the end of the C4 with activity in the post-Roman and Early Medieval periods being recorded.

Figure 7.5 The reconstructed gate at South Shields Roman Fort (author)

An inscription records the presence of river boatmen from the Tigris, and the name *Arbeia* has been interpreted as 'Place of the Arabs'. These boatmen presumably crewed lighters that

transported commodities upstream and between the shore and seagoing ships in the offing. It follows from this that there must have been port facilities (T&W 910) at South Shields, but no trace of these survived the development of the river in the C19. However, the HER records a possible Roman shipwreck at NZ36716829 (T&W 4672), immediately below the fort.

Over the centuries a substantial civilian settlement or ***vicus*** grew up outside the fort on the level ground to the west and south. *Arbeia* is included within the Hadrian's Wall World Heritage Site and is a Scheduled Ancient Monument.

7.3.3 The Early Medieval Period

Little is known of coastal activity in Block 3 during the Early Medieval Period. However, with Anglo-Saxon monasteries at Monkwearmouth and Tynemouth it can be assumed that the coast and river systems formed part of their infra-structures. It is also the case that both were sacked by Viking raiders, in AD794 and AD800 respectively.

7.3.4 The Medieval Period

The small bay to the south of the Tynemouth headland is known as Prior's Haven and it is recorded that in 1544 the Earl of Hertford made Tynemouth the base for the English fleet during the invasion of Scotland. The Tyne and Wear HER records a medieval port (T&W 1989) on the south bank of the River Wear opposite St Peter's monastery while a medieval ferry is recorded a short distance upstream (T&W 76). Other records, for which locational details are not available, include a medieval salmon yare or fish trap in the Tyne at South Shields (T&W 4485) and a medieval shipyard at Hendon (T&W 81). This latter facility is known from a document of 1346 which records that a Thomas Menvil occupied a site at Hendon "for the building of ships, paying to the Bishop an annual rent of two shillings." (Sunderland Museum and Art Gallery 1965)

A feature of the ports of the NE coast, mainly in the C19 and C20, were the ***coal staiths,*** facilities specifically designed for the loading of colliers. Coal is first recorded as having been exported from Sunderland in 1396 and there is a C15 record of a coal staith at Wearmouth (T&W 75) for which the Benedictine monks received an annual rent in 1415-1417, while a William Salter is recorded as the tenant of a coal staith in 1470.

Shipbuilding was to become a major industry on the rivers Wear and Tyne but another industry which is first recorded in the Middle Ages is the production of salt from sea water. In considering data from Block 1 it was noted that salt production in the Teesmouth area generally involved the extraction of salt from the salt-encrusted surface of the inter-tidal silts, a process known as sleeching. Farther north the direct boiling process was employed. This method involved accumulating sea water in a reservoir then pumping it up to the ***saltworks*** where the water was simply boiled off in iron pans. The fuel used was coal and direct boiling is recorded on Tyneside in the C15 (Cranstone, *pers.comm.*).

Medieval ***salt pans*** are recorded at three locations in North Shields (NZ35906826, NZ36306822 both recorded as T&W 4552 and NZ36646901, T&W 736) and at Seaton Sluice, Northumberland (NZ337768, NH 11958). Although there are no surface remains the

evaporation of brine to produce salt is recorded at Seaton Sluice from C13 (Telford 1974, 181-193).

7.3.5 The Industrial Period

7.3.5.1 Salt making

Salt making is recorded in the C16 at Wearmouth (NZ399574, T&W 80), ten salt pans being referred to in a document of 1587 (Mitchell 1919, 53-54), and in the C17 and C18 at Cullercoats where a lease of 1677 records a saltworks with two pans being situated near the pier. The Cullercoats salt pans used coal from the local mines and by 1705 there were 19 pans around the harbour. However, by 1722 the easily worked coal had been exhausted and the pits closed thus denying the salt works its source of fuel and salt making at Cullercoats ceased in 1726, six of the pans being removed to Blyth and the rest abandoned (Mitchell 1919; Linsley 2005, 196-198).

Production continued at Seaton Sluice until the C18 (NZ339768, T&W 11958). Five salt pans are recorded in production at Hartley, the village of Seaton Sluice, in 1600. Production had ceased by 1798 (Ellis 1980; Linsley 2005 172-189).

7.3.5.2 Harbours

The development of coastal trade from the middle of the C18, particularly the shipment of coal from north to south, led to a considerable increase in shipping and an increase in the facilities to service this traffic. These facilities were many and varied and ranged from simple navigation aids to the provision of major harbours such those built at Seaham, Sunderland and on the Tyne in the C19, many of which remain in use.

Seaham Harbour was founded by the Marquess of Londonderry in 1828 as an outlet for coal from his collieries. The harbour was planned by William Chapman and at first consisted of what survives today as the Inner Harbour (NZ43504947, Durham 12602) and is a Grade II Listed Building. The exploitation of coastal coal reserves from the mid C19 led to the major expansion of Seaham Harbour between 1898 and 1905.

Figure 7.6 Seaham Harbour, County Durham (author)

The harbour works at the mouth of the River Wear date from the C18 and C19. The South Pier (NZ410582,T&W 2867) was built between 1726 and 1759 and the North Pier (NZ410583,T&W 2715) added between 1788 and 1802, though both were modified and extended between 1804 and 1842 and the South Pier was demolished in 1982**.** The North Dock (NZ406584, T&W 2717) was built between 1834 and 1837 to a design by Isambard Kingdom Brunel. It had an area of 2.5ha (6 acres) and a 0.6ha (1.5 acres) tidal basin. It is regarded a significant structure by one of the greatest engineers of the C19 (Corfe 1983, 18) and its remains are a Grade II Listed Building. An illustration of 1849 by Thomas Meik shows the North Dock full of ships.

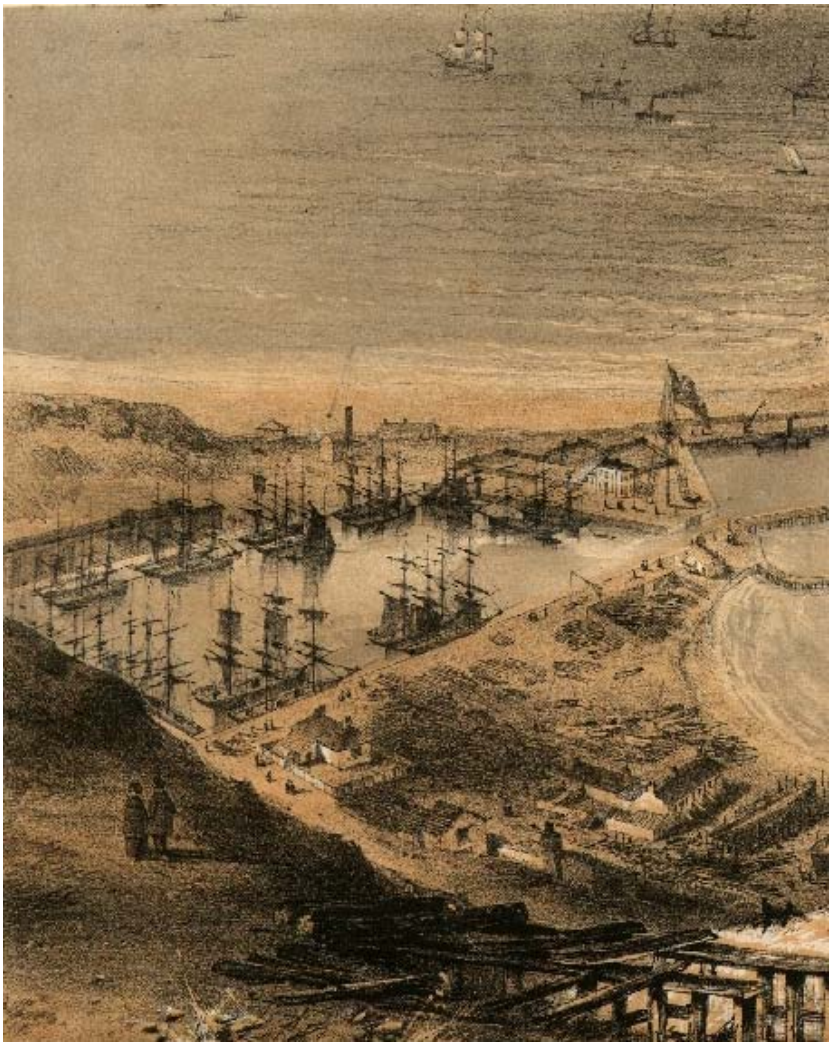


Figure 7.7 Thomas Meik's 1849 illustration of North Dock, Sunderland

The South Dock (NZ410573, T&W 2874) was added to the complex between 1846 and 1868 (Pevsner 1983, 449).

By the latter part of the C19 it was realised that the harbour mouth needed more extensive protection than that provided by the C18 North and South Piers and two new piers, or

breakwaters were added extending 600m out into the North Sea. The northern outer breakwater, Roker Pier (NZ412588, T&W 4800), was constructed between 1885 and 1903 to a design by Sir John Coode modified by Henry Hay Wake and is a Grade II Listed Building. Wake also began work on an outer south pier, The New South Pier (NZ414580, T&W 4973) but this was abandoned in 1907 and was left uncompleted.

The 1st edition of the OS Map for 1855 records small quays at Byer's Hole, Whitburn (NZ41116386, T&W 2425) and Marsden Bay (NZ39786559, T&W 859).

The extant harbour works at the mouth of the Tyne are mainly late C19 in date. The two piers, North and South, (NZ378691, T&W 2065 and NZ378682, T&W 2429) were finished by 1895. Work is recorded as having begun in 1854 but both are shown under construction on a chart of *The Entrance to the River Tyne* dated 1838-1849[i]. They replaced earlier structures, remains of which can still be identified adjacent to the North Pier and are shown on Admiralty Chart 1934. Some rebuilding to these piers was required in 1909 after storm damage. The South Groyne (NZ368682, T&W 2428) was built between 1861 and 1867.

The first phase of the tiny harbour at Cullercoats can be dated to the late C17 when in 1676 what is described as 'pier' was constructed at Cullercoats for the shipment of coal from the local mines and salt from the salt works, though it is evident that this 'pier' was actually a stone built structure. It was partly destroyed by a storm in 1710 and over a century was to pass before the harbour was restored; plans drawn up by Smeaton in the mid C18 being regarded as too costly. The present north pier (NZ364713, T&W 5056) was built in 1848, partly on the remains of the C17 pier (Linsley 2005, 195-203), while the south pier is a C20 structure.

There has been a small harbour at the mouth of the Seaton Burn from at least the mid C17 (NZ337768, T&W 11980) and by 1676 it was protected by a small pier built by Sir Ralph Delaval. In order to address the problem of silting Sir Ralph had a sluice built about 200m upstream behind which the water of the burn could be impounded. When released, this water scoured the harbour and it is from this feature that Seaton Sluice takes its name. The main commodities shipped from the harbour consisted of coal from the local mines, bottles from the Royal Hartley Bottle Works (NZ33657659, T&W 12006) situated to the south of the burn, and salt from the salt pans on the headland.

By the mid C18 the little harbour at the mouth of the burn was found to be inadequate and a supplementary, artificial harbour was constructed between 1761 and 1764. This consisted of a rock-cut channel running from the mouth of the burn eastwards to the sea, thus cutting off the headland (NZ338768, T&W 13972). It was 275m long, 9.1m wide and 15.8m deep with lock gates at either end (Pevsner 1992, 564-565).

Figure 7.8 Seaton Sluice harbour; the sluice is below the road bridge (author)

Figure 7.9 The rock-cut, artificial harbour at Seaton Sluice (author)

7.3.5.3 Shipbuilding

The NE of England is world famous for its shipbuilding heritage and those sections of the banks of both the River Wear and the River Tyne within the NERCZA study area are lined with shipyards, while those on the Tyne extended upstream virtually as far as the tidal limit at Newburn. Shipbuilding in the Sunderland area has been traced back to the C14 while the shipyards on the Tyne date back to at least the C17. In 1642 a House of Commons

Committee designated Newcastle as "the nursery of shipbuilding" (Parry 2006, 32). The HER records an C18 shipyard at North Shields (NZ36266850, T&W 11970) where John Hearn was carrying out ship repairs in 1779 and built 23 ships between 1787 and 1806 (Clarke 1997, 28).

The main shipyards recorded in the Tyne and Wear HER are listed in the following table.

Table 7.9 Shipyards in Block 3 recorded in the Tyne and Wear HER

NGR	Name	HER
NZ391576-NZ405581	Monkwearmouth Shipyard	2744,2754, 2733, 2722, 2720
NZ393575	Sir John Priestman & Co	4692
NZ398573-NZ402573	Bishopwearmouth Shipyard	2864 and 2866
NZ410578	Bartram and Sons Ltd	4694
NZ413571	Iliff & Mounsey	4695
NZ363681	South Shields Shipyard	2334

A detailed appraisal of this aspect of the region's heritage is beyond the scope of the present project. Although these shipyards had all closed by the end of the C20, their sites have been subject to redevelopment and all lie within densely built up areas. The scope of the SMP did not extend to the lower reaches of either river but it may be assumed that the policy adopted to deal with sea level rise in these areas will be one of 'Hold the Line'.

In addition to the shipyards, a number of support industries are also recorded in the HER such as the site of an C18 ropewalk at Monkwearmouth (NZ403577, T&W 4482).

7.3.5.4 Aids to Navigation and Safety at Sea

Lighthouses

The C18 North and South Piers at Sunderland were both provided with lighthouses, that on the North Pier, a masonry structure, (NZ41145842, T&W 4974) was built by Johnathan Pickernell in 1802 (Hague and Christie 1977, 222), though it was moved in 1841 to the end of the extended pier. That on the South Pier (NZ41105827, T&W 4966), an 1856 wrought iron structure with a cast iron dome (Pevsner 1983, 453) was moved to Roker (NZ 40745978) when the pier was demolished in 1982. It is a Grade II* Listed Building.

The new North, or Roker Pier, built at the end of the C19, was also provided with a lighthouse (NZ41605870, T&W 4975). This is built of Aberdeen granite and is a Grade II Listed Building. The lighthouse at Souter Point (NZ40806416, T&W 2489) was designed by Sir James Douglass in 1871 and was one of the first to employ electricity. It is a Grade II* Listed Building.

Figure 7.10 The Grade II* South Pier Lighthouse, Sunderland re-sited at Roker (author)

Figure 7.11 The Grade II* Lighthouse at Souter Point (author)

The earliest record of a lighthouse on this section of the coast is the provision by the monks at Tynemouth of a light to be shown in on one of the two turrets at the east end of the priory church, to act as a guide to mariners entering the Tyne. This monastic 'lighthouse'

collapsed in 1659 and was replaced in 1664 by a purpose built structure at the NE corner of the headland, which employed a coal fired brazier to provide a light. This lighthouse was rebuilt in 1775 and the earlier coal brazier was replaced by an oil lamp in 1802. It was finally demolished in 1898 (Saunders 1993, 39) when it was made obsolete by the construction of the lighthouses at the end of the North Pier and on St Mary's Island, to the north (Hague and Christie 1977, 76-78). The North Pier lighthouse (NZ38286904, T&W 7347) was built as part of the construction of the North Pier, which was completed in 1895. It is a Grade II Listed Building. While the South Pier was not provided with a lighthouse, one had already been erected on the South Groyne at the mouth of the river in the 1860s (NZ36926831, T&W 2431). This is an unusual structure consisting of a hexagonal iron and wood cabin raised on six struts. The cabin is approached by a flight of stairs and surmounted by a lantern chamber.

Figure 7.12 The South Groyne Lighthouse, Tynemouth with the North Pier and Lighthouse in the distance (author)

St Mary's Island is a tidal reef 6.7km north of Tynemouth and the lighthouse was built 1897-1898 (NZ35257538, T&W1037). However, earlier the island was the site of chapel dedicated to St Helen and a recorded endowment provides for the chapel to show a light (Craster 1909, 120; Hague and Christie 1977, 18), though whether this was for navigation purposes is not explicit.

Figure 7.13 St Mary's Island and Lighthouse (author)

Seamarks

The remains of four posts (NZ44504285, Durham 8290) on the cliff at Hordon, County Durham, have been interpreted as the remains of a navigation aid. In this situation they are unlikely to have been leading marks and may simply have been provided to enable coasting vessels to fix their position.

The simplicity of the arrangement at Hordon may be contrasted with the complexities necessitated by the situation at the mouth of the Tyne. Entry to the River Tyne was made hazardous both by the reef known as The Black Middens lying on the Tynemouth side and a series of sandbanks, the position and extent of which was constantly changing. In 1536 the Guild of the Holy Trinity of Newcastle obtained from Henry VIII a charter to erect two 'embattled' towers in order to provide leading marks for vessels entering the river, the alignment of the two towers indicating the main channel. These structures appear to have been of wood and were illuminated by candles. They needed to be moved from time to time owing to the movement of the sandbanks and were mounted on wheeled carriages. A chart of the course of the Tyne from Newcastle to Tynemouth dated 1639 shows two structures on the north bank down stream from North Shields. They are unlikely to be the original towers. The one nearest the mouth is shown as a rectangular structure with a pitched roof and labelled 'The Lowe Leight House'. The other, labelled 'The Heigh Leight House', is shown as a cylindrical tower surmounted by what appears to be a lantern[ii].

These structures were eventually replaced in stone by pairs of lighthouses, the High and Low Lights. The first to be erected, in 1727, was the Old Low Light (NZ36306848, T&W 4557). It was situated within the confines of Clifford's Fort, a C17 artillery fort at the mouth of the Tyne (see below), and was converted into almshouses in 1830 once it became obsolete. The other component in this arrangement was the Old High Light (NZ36116845, T&W 4556), situated on the higher ground about 200m to the west. This also dates from 1727 and is a Grade II Listed Building. By the early C19 movement of the sandbanks at the river mouth

necessitated the provision of two new towers, a New Low Light (NZ36296844) and a New High Light (NZ36056838, T&W 2129). Both the New Lights are Grade II Listed Buildings.

Figure 7.14 The 'New' High and Low Lights at North Shields (author)

A similar, though less complex arrangement was provided on the South Shields side where the West and East Lawe Beacons (NZ36546806, T&W 2347 and NZ36596808, T&W 2346) provided a leading line on the south side of the river mouth. These structures are both brick built obelisks on stone bases with stone caps. They date from 1832 and are Grade II Listed Buildings.

Figure 7.15 The East Lawe Beacon, South Shields (author)

A far more basic arrangement of leading marks is provided at Cullercoats Harbour where two vertical poles with lamps and surmounted by baskets mark the bearing of 256° True required for a safe entry.

Volunteer Life Brigades' Watch House and Rocket Sites

Rescue facilities along the coastline of Block 3 can be divided into those provided for the various volunteer life brigades and the lifeboat stations . The brigades generally operated from the shore and used rockets to carry a rescue line to stranded vessels.

The facilities usually consisted of a lookout, accommodation for members of the brigade when on duty and the mountings for, and storage of, the rocket apparatus, though these latter are rare survivals. Several of these brigades are still in existence, and their premises often incorporate small museums documenting their history.

Figure 7.16 The Seaton Sluice Brigade mustering with their rocket apparatus

The Durham HER records two rocket apparatus stations for ship-to-shore rescue (NZ44204585, Durham 3850 and NZ44094584, Durham 3851) at Hawthorn Hive.

The Sunderland Volunteer Life Brigade Watch House is situated at Pier View Roker (NZ40854868) and the South Shields Volunteer Life Brigade Watch House (NZ373678, T&W 2430) is situated at the end of the South Pier. It was built in 1867 and is a Grade II Listed Building.

The watch house (NZ37366903, T&W 1978) of the Tynemouth Volunteer Life Brigade is situated within the area occupied by the Spanish Battery. The original structure was built about 1865 and was replaced by the existing building in 1887 (T&W 2214). This consists of a hall, now a museum, and a lookout tower. It is a Grade II Listed Building.

The Rocket House (NZ36307140, T&W 5059) at Cullercoats was where the Cullercoats Life Brigade stored its rocket apparatus. This building, now the Rocket Garage, was built in 1867 and is also a Grade II Listed Building. The brigade's Lookout House (NZ36407140, T&W

5057), built 1877-79, is situated on the cliff overlooking the harbour.

The Watch House at Seaton Sluice (NZ38366862, NH 13976) is situated on the headland known as Rocky Island. It is a brick built structure dating from 1880. Like the others mentioned above, it is a Grade II Listed Building. The Watch House is supplemented by a timber lookout built on the cliff edge in 1925.

Figure 7.17 The Seaton Sluice Volunteer Life Brigade Watch House (author)

Lifeboat Stations

The history of lifeboats on the River Wear begins in 1800 with the first operational lifeboat station in Great Britain, absorbed into the RNLI in 1865. There have been 12 lifeboat stations on the lower Wear, with four in operation between 1873 and 1887.

The Tyne and Wear HER records a C19 lifeboat house at Hendon (NZ40995661, T&W 2892) and Monkwearmouth (NZ40795856, T&W 2712) both of which appear on the 1st edition OS map for *circa* 1855, while the site of the C19 lifeboat house at Whitburn (NZ40806125, T&W 2575) has been recorded from the 2nd edition OS map of 1899.

The Tyne and Wear HER records the site of a C18 lifeboat house at North Shields (NZ36406859, T&W 1972). This was located adjacent to Clifford's Fort and housed the lifeboat *Northumberland* in 1798. This was the first of six lifeboat stations, the second (NZ37306915, T&W 1982) being built in Prior's Haven in 1862. This is represented today by a roadway (NZ37416918,T&W 1983) cut into the rock and visible at low tide. A third station, Tynemouth No.2, (NZ37246898, T&W 1977) was added at Black Middens in 1865 and closed in 1905. The next was built at North Shields (NZ36406850, T&W 8000). This was destroyed by a bomb in 1941 but was in operation again by the end of the year. A new station was built in 1948 and this remained in service until the present station was opened in 1997.

There has been a lifeboat at Cullercoats since 1852 and the present lifeboat house (NZ36407140) was built in 1896 at the head of the strand inside the harbour.

7.3.5.5 Shipwrecks

As was the case with Block 1, shipwrecks are also a feature of the coastal/maritime landscape. Large numbers of shipwrecks are recorded in the HERs and in the NMR, but most of these are in deep water beyond LAT. However, a number are recorded between LAT and MHWS and these are listed in the following tables. Most of these records have been taken from historical sources such as the Lloyds Registers and the local press and therefore the existence of a record does not necessary imply that remains are still visible on the foreshore.

Table 7.10 Shipwrecks between MHWS and LAT in Block 3 recorded in County Durham

NGR	Name of vessel	Date lost	HER	SMP
NZ45014199	Barquentine *Sirius*	1901	6572	10.1
NZ444439	*Dover Excursion*	1821	10285	10.1
NZ444439	Unidentified vessel	1901	10276	10.1
NZ444439	*Dido*	1821	10284	10.1
NZ44304600	Schooner *Miss Thomas*	1864	6571	9.7
NZ44214619	Brig *Rainbow*	1835	277	9.7
NZ436486	Steamship *Lillian*	1903	285	9.5
NZ436486	Steamship *Terlings*	1889	278	9.5
NZ42995002	Steamship *Aurora*	1885	282	9.3
NZ420520	Brig *Gitana*	1974	281	9.1
NZ43005000	Steamship *Norman*	1881	280	9.3
NZ432496	Barque *Excelsior*	1876	279	9.3

Apart from the putative Roman shipwreck at South Shields the Tyne and Wear HER does not systematically record shipwrecks and data comparable to that for County Durham have been obtained from the NMR.

Table 7.11 Shipwrecks between MHWS and LAT in Block 3 recorded in Tyne and Wear

NGR	Name of vessel	Date lost	NMR	SMP
NZ41125818	Sailing vessel *Molito*	1830	1406252	7.3
NZ40975848	*Orion*	?	908710	7.2
NZ40056535	Unidentified steel vessel	?	908641	4.1
NZ37846740	Unidentified sailing vessel	1703	1366333	2.1
NZ37846740	Unidentified vessel	1854	1366333	2.1
NZ36156878	*British Officer*	1940	908748	1.2

NZ37526854	Unidentified vessel	?	908652	1.2
NZ37306854	HMS *Southsea*	1941	908746	1.2
NZ36776836	*Thomas*	1833	1434819	1.2
NZ36776836	Unidentified vessel	1750	1438910	1.2
NZ36776836	*Roseberry*	1819	971596	1.2
NZ37566948	*Hope*	1803	973326	1.1
NZ37566948	*Petrel*	1831	1387150	1.1
NZ36437133	Steamer *Sjovik*	1916	1371831	47
NZ36777173	Steamer *Butetown*	1917	1380514	47
NZ35227539	Unidentified vessel	?	908667	45

7.4 Military Coastal Defence

7.4.1 C16 to the C19

After the dissolution of Tynemouth Priory in 1539, Tynemouth Castle became part of Henry VIII's scheme of coastal defence and was converted into an artillery castle. The eminent military engineer Sir Richard Lee, designer of the defences at Berwick-upon-Tweed, was sent to Tynemouth in 1545. The medieval walls of the castle were reinforced and the main front was replaced by stone revetted earthworks providing artillery platforms.

These C16 modifications were part of a larger system designed to command the entrance to the Tyne. The view of the river mouth from the castle had always been somewhat impeded by a lower promontory to the south on the far side of Prior's Haven. To address this issue it was decided to extend the earthworks of the castle behind Prior's Haven to cut off the small promontory to the south, where further guns would be sited, with a clear field of fire across the river mouth. This became known as the Spanish Battery, after the Spanish mercenaries employed to garrison it. Lee undertook further work at Tynemouth in 1560. One of his original plans survives and the intention appears to have been to construct a battery on the lower headland and connect it with the castle by a system of walls. It is unclear to what extent this plan was carried out in full and the evidence on the promontory has been obscured by later developments.

Jobey (1967, 96) records that these defences had been largely destroyed by the late C19 but a chart of the mouth of the Tyne dated 1838-49 shows substantial remains surviving at that time[iii]. These appeared to consist of a lozenge-shaped bastion at the SW corner from which a length walling ran north towards the castle interrupted by a semi-circular bastion and fronted by a deep ditch. Jobey was able to identify some fragments of the Tudor defences. On the promontory itself, the chart shows other works but these are likely to be later in date than the C16 and it is recorded that the battery was in commission during the Civil War (Craster 1907, Plate XII; Adamson 1896).

During the English Civil War Tynemouth Castle constantly changed hands between Royalist and Parliamentarian forces. With the Restoration of Charles II, Sir Edward Villiers became governor and it is recorded that a programme of repairs was initiated in 1663.

By the late C17 the defence of the river mouth provided by Tynemouth Castle and the Spanish Battery were considered inadequate and a new artillery battery was established about 1.2km upstream at North Shields (NZ36336851, T&W 150). This became known as Clifford's Fort, probably named in honour of Thomas Clifford, Charles II Lord High Treasurer and a veteran of campaigns against the Dutch (Kear 1986). Clifford's Fort was designed by the Swedish engineer Martin Backman and built in 1672. It consists of an irregular, sub-rectilinear enclosure 150m N-S and 57m E-W. The long, eastern side faces the open river. The original armament consisted of thirty 18 pdr culverins and ten 9 pdr demi-culverins, or ten 24 pdrs. By the mid C18 this had been reduced to eighteen 18 pdrs facing the river and nine 9 pdrs facing towards the land and it was in this phase that the ashlar faced seaward curtain wall with its multiple embrasures was built. Buildings within the enclosure consisted of accommodation for the gunners and stores.

As a gun battery Clifford's Fort became obsolete at the end of the C19 when the construction of the outer piers of the harbour made the guns redundant. In 1888 it became the headquarters of the Tyne Division Royal Engineers (Volunteers) Submarine Miners. Nevertheless some armament remained at the fort and Dobinson (200a, 227) records the presence of two 6 pdr quick firing guns in 1902.

A chart of *circa* 1700 by Captain Greenvile Collins, Charles II Hydrographer, depicts a gun battery (NZ33807687, NH 11956) on the promontory commanding the entrance to the harbour at Seaton Sluice. This is the Delaval Battery established sometime before 1670 by Sir Ralph Delaval. It apparently saw action in 1667 when warning shots were fired at a Dutch privateer harassing a small vessel trying to enter the harbour (Linsley 2005, 174-175; Craster 1909, 127) There are no surface remains and the site is activity eroding.

The Roker Battery (NZ40675935, T&W 86) was situated on the cliff edge about 1km north of the mouth of the River Wear. The surviving remains and those plotted as part of the APTE date from WWII and are referred to below. However, the HER suggests that there may have been a battery here in the later C18, as the northern of two batteries reportedly built at Sunderland in 1779. An C18 plan of Sunderland marks the positions of a number of ***gun batteries*** on the south side of the river mouth and these are also recorded in the Tyne and Wear HER.

Jockey Dyke Nook and South Dock Batteries apparently mounted four guns in the 1740s while Coney Warren Battery mounted six in 1783. These gun batteries have all been destroyed, either by coastal erosion or during the development of the docks. A map of 1826 by the engineer John Rennie depicts a large rectangular enclosure in this area marked 'Barracks' (Sunderland Museum and Art Gallery 1965).

The earliest extant coastal defence at Wearmouth is the late C19 gun battery situated immediately SW of the old South Pier and known as the Wave Basin Battery. The War Office obtained this site in 1860 and the battery was established by 1873. It consists of a mole projecting into the harbour and mounted four rifle muzzle loading (RML) 80 pdr guns

Table 7.12 C18 gun batteries at Sunderland

NGR	Location/Name	Date	T&W HER
NZ40675935	Roker	1779	86
NZ40965697	Town Moor	C18	4419
NZ41015751	Jockey Dyke Nook	*c*1745-1780	4418
NZ40395764	South Dock	1742	4417
NZ41065775	Flag Staff Battery	C18-1808	4420
NZ41025777	Coney Warren Battery	*C*1783-1848	4416
NZ40925783	John Paul Jones or Black Cat Battery	1770	4415

in four emplacements. Number 1 Gun was sited at the outer, rounded end of the mole while nos. 2 and 3 fired through splayed openings in the seaward, east, side of the battery. No. 4. Gun was sited at the landward end of the mole. This is the one surviving example of an RML battery between the Humber and the Tweed. It is an important illustration of the transition from cannon to modern artillery, and also illustrates the methods used to defend mercantile ports in the years after the Crimean War and the production of iron-clad warships. It is shown on an 1875 official plan of Hudson Docks and is a Grade II Listed Building.

In 1882 a government committee proposed the establishment of a battery of two 10.4 inch breach loading guns at Frenchman's Point, on the coast at South Shields. This was revised in 1888 to two 6 inch guns but nothing was done until 1900-1903 when a battery with a single 9.2 inch and two 6 inch guns was established (NZ387663, T&W 869). This site saw service in both WWI and WWII.

A further late C19 venture was the establishment of an experimental 'floating platform' gun emplacement at Trow Rock (NZ38366667, T&W 870, NMR 1314370). This was designed by Hiram Maxim and used a system of hydraulics to raise and lower a standard naval gun from a concealed position. The site is a Grade II Listed Building (Clarke and Rudd 1989, 7-8).

In the late C18 Tynemouth Castle was provided with a battery of seven 18 pdr guns overlooking the harbour mouth and at the height of the Napoleonic Wars this was increased to thirty-two 10 pdrs, eight 12 pdrs and eleven 9 pdrs. By 1841 the batteries had been reduced to 18 guns but by 1881 this had been increased again to 20, of which six were modern rifled pieces. Most of these earthwork batteries were for muzzle-loading guns and had been replaced by 1893 by emplacements for two 6 inch guns mounted on hydro-pneumatic carriages (Saunders 1993, 36-39).

The guns at Tynemouth Castle were supplemented in 1897 by a searchlight emplacement (NZ37286930, T&W 1572) designed to help the guns fire at night. It is reported that remains of this site survive on the north side of the pier road.

7.4.2 World War I

The Roker Battery (NZ40675935, T&W 86) was situated on the cliff edge about 1km north of the mouth of the River Wear. This battery mounted two 4.7 inch guns (Dobinson 2000a, 227). The APTE has been able to plot the position of two emplacements and various ancillary buildings, but as this battery also saw service in WWII it is unclear to which period these remains belong. Although not built over, the site is now a public open space and has been landscaped.

The Kitchener Battery at Marsden (NZ40276402, NMR1403278) was one of a pair of ambitious ***coastal defence batteries*** installed towards the end of the war and known as the Tyne Turrets. This project, which was proposed in 1916, involved the mounting of two, twin 12 inch gun turrets from the guardship HMS *Illustrious* on land. The Kitchener Battery at Marsden was the more southerly of the pair while the Roberts Battery at Hartley complimented it to the north. Work began in 1917 but was not completed until 1921, when the guns were test fired and then closed down. The dismantling of the guns was underway by 1926. The Kitchener Battery has now been completely destroyed by quarrying but it is recorded on photographs taken before this. The main feature can be seen to be a circular gun emplacement about 18m in diameter with various ancillary buildings, all approached by a track way. The command post lay 600m to the SW at Lizard Lane (NZ402636, T&W 1835).

Frenchman's Battery at South Shields, established in the early C20 (see above) also saw service during WWI and WWII when it mounted the same armament as was deployed in 1905. That is, two 6 inch and one 9.2 inch guns.

> *The magnesian limestone cliffs from the Trow Point to Whitburn are actively eroding at a rate of between 0.1m and 0.2m/per year. The SMP recommended policy for this section of the coast is mainly one of NAI or R, HTL being proposed at two quarry sites. As was mentioned in the case of the Bronze Age remains at Trow Point, the adoption of this policy will have implications for the remains of C19 and C20 coastal defences at Trow Point and Frenchman's Battery.*

Following the recommendations of the Inspector General of Fortifications, by 1905 the armament at Tynemouth Castle consisted of one 9.2 inch gun, two 6 inch guns and two quick-firing 12 pdrs. With the exception of the 12 pdrs, which were removed in 1910, this constituted the armament during both World Wars and it is the remains of these facilities that can be seen on the site today (Saunders 1993, 16-19 and 38-39).

The Inspector General also recommended that one 9.2 inch gun and two smaller guns be mounted on Spanish Battery. In the event, the armament deployed in both WWI and WWII consisted of two 6 inch guns (Dobinson 2000a, 227-228) while Kear (1986, 121) records that in 1914 the Royal Marines established a three gun battery outside Clifford's Fort to cover the harbour mouth.

Roberts Battery at Hartley (NZ343762, NMR 1465610) was the northern of the Tyne Turrets, complementing Kitchener Battery to the south. This project involved the mounting of a twin 12 inch gun turret from the guardship HMS *Illustrious* on land. Work began in 1917 but was not completed until 1921, when the guns were test fired and then closed down. The dismantling of the guns was underway by 1926. The gun emplacement is recorded from

aerial photographs as a circular feature about 17m in diameter. The site has been cleared but it is reported that access to some of the underground facilities can be gained from the cliff face, 70m to the east. Some of the ancillary structures survive and include the command post and officers accommodation, now Fort House, a water tower and a combined latrine and pillbox inserted in the perimeter wall. The remains of Roberts Battery are a Grade II* Listed Building.

Figure 7.18 The water tower at Robert's Battery, a Grade II* Listed Building (author)

For range finding the battery had two transmitting and two receiving cells. Both receiver posts have been demolished as has the northern transmitter. However, the southern transmitter post does survive as a tall, seven story tower at the north end of Percy Gardens, Tynemouth (NZ37046988, NMR 1414437). A gun emplacement on the roof was probably for a light anti-aircraft gun and is likely to be of WWII date. This structure is a Grade II Listed Building.

> *Roberts Battery is situated on a section of eroding cliff line, as accounts of access to some of the under ground facilities through the cliff face indicate. The SMP recommendation for this section of the coast is 'Do Nothing'. Accordingly the situation need to be kept under review as the cliff line erodes.*

Construction of Coulson Battery at Blyth Links (NZ32087930, NH 11976) began in 1916 and was completed in 1918. Its prime purpose was to protect the port of Blyth and the submarine depot ship *Titania,* and to operate in conjunction with the defences of the Tyne. During WWI the battery mounted two quick-firing 6 inch guns controlled from a command post situated within an enclosure. The emplacements are semi-circular and seaward facing. During WWI they were unroofed. The WWI command post is a two storey, flat roofed tower with the original metal range finder housing on the roof. Other buildings in the complex include ammunition stores, workshops and accommodation for the gun crews. The whole complex had a defended perimeter of barbed wire with pillboxes at the northern and

southern limits. Further accommodation lay outside the perimeter in the area between the battery and the searchlight emplacements (see below). In 1925 the battery became incorporated within the development of the South Beach, only to be brought back into service in WWII (see below). Coulson Battery is a Scheduled Ancient Monument.

Figu**re 7.19 Coulson Battery, Blyth; the southern gun emplacement** (author)

Figure 7.20 Coulson Battery, Blyth; WWI and WWI command posts (author)

A further WWI feature on this section of the coast is the pair of searchlights, formally Defence Electric Light (D.E.L.) emplacements, and their associated engine house at Blyth Links (NZ32057968, NH 11977). The emplacements are well preserved and are constructed of concrete, steel and brick. They are semi-octagonal in plan and have a curving projection on the seaward side provided with shutters which were drawn back when the light was exposed. The searchlight emplacements are Scheduled Ancient Monuments while the engine

house lying 50m to the west is a Grade II Listed Building. This D.E.L. emplacement operated in conjunction with the Coulson Battery 300m to the south.

> *Coulson Battery and the D.E.L. Searchlight emplacements are situated in the dunes at the head of South Beach, Blyth. The SMP recommendation for this section of the coast is 'Hold the Line'. The threat posed to these assets is likely to arise from mitigation strategies rather than erosion.*

7.4.3 World War II

The majority of coastal/maritime features in Block 3 date from WWII and the approach followed here is that set out in Chapter 5 of NERCZA. Major sites which survive whole or in part are described in detail with minor, ephemeral and destroyed sites being recorded in tabular form. The WWII military features in the coastal zone can be divided into two groups according to whether their role was mainly to defend against bombardment, from the sea or from the air, or to confront a possible invasion, although the two categories are not mutually exclusive.

7.4.3.1 Coastal Defence Batteries

Dobinson (2000a, 297) and the Durham HER (5695) record an ***Emergency Coastal Defence Battery*** at Seaham Harbour, Dobinson citing an NGR of NZ430498. It mounted two 6 inch guns. Although this site was demolished after WWII the HER reports that parts of the foundations were still eroding from the cliff in August 2007.

Barrons Battery at Sunderland was unusual in that it consisted of two 12 pdr Quick Firing (QF) guns, one situated at the end of the inner North Pier and the other situated at the end of the inner South Pier (NZ41125843, T&W 85), which must have led to command and control problems. It is recorded as having been established in 1940 as an Emergency Coastal Defence Battery.

The WWI Roker Battery (NZ40675935, T&W 86) was brought back into service in WWII. It mounted two 6 inch guns and the APTE has been able to plot the position of two emplacements and various ancillary buildings, but it is unclear to which period these features belong. Although not built over, the site is now a public open space and has been landscaped.

Dobinson (2000a 114, 297) records the establishment of an Emergency Coastal Defence Battery at Whitburn in 1940. This site, which mounted two 6 inch guns, has been identified by the APTE at NZ40866138 (NMR 1462995).

Frenchman's Battery at South Shields, established in the early C20 (see above), also saw service during WWII when it mounted three 7.5 inch and two 6 inch guns. The transcription of aerial photographs during the APTE has enabled the plotting of three identical gun emplacements, presumably for the 7.5 inch guns (NMR 1314370). Various other structures on the site have been plotted but the emplacements for the 6 inch guns have not been identified. The site is now a public open space and the emplacements have been destroyed though some earthworks remain

The magnesian limestone cliffs from the Trow Point to Whitburn are actively eroding at a rate of between 0.1m and 0.2m/per year. The SMP recommended policy for this section of the coast is mainly one of NAI or R, HTL being proposed at two quarry sites. As was mentioned in the case of the Bronze Age remains at Trow Point the adoption of this policy will have implications for the remains of C19 and C20 coastal defences at Whitburn and Frenchman's Battery.

Park Battery, South Shields (NZ368678, T&W 966) was established in 1940 and mounted two 6 inch guns between 1940 and 1943 and three 5.25 inch guns from 1944 until 1956. The transcription of aerial photographs during the APTE has plotted three identical gun emplacements, presumably for the 5.25 inch guns. The site is now a public open space and the emplacements have been destroyed.

During WWII the battery within Tynemouth Castle, added a 4 inch gun to its existing compliment of two 6 inch and one 9.2 inch guns, while Spanish Battery mounted two, seaward facing 6 inch guns and two 12 pdrs were mounted at Clifford's Fort.

An Emergency Coastal Defence Battery is recorded by Dobinson (2000a 114, 297) to have been established in 1940 at Gloucester Farm (NZ32357844, NH 19956) mounting two 6 inch guns.

Coulson Battery at Blyth Links (NZ32087930, NH 11976), having been abandoned at the end of WWI was brought back into service in WWII. By March 1940 it mounted two 6 inch breach loading MK7 guns. The WWI emplacements were reused but provided with flat roofs in order to protect the guns from aerial attack. The WWI command post was superseded by a new Battery Observation Post in 1940 situated immediately north of its predecessor. It is a rectangular, flat-roofed tower of two storeys (fig. 7.17). Other buildings in the complex include ammunition stores, workshops and accommodation for the gun crews. The whole complex had a defended perimeter of barbed wire with pillboxes at the northern and southern limits. Further accommodation lay outside the perimeter in the area between the battery and the searchlight emplacements to the north, but it is not known to what extent these facilities should be dated to WWI or WWII. In 1944 it was placed on a care-and-maintenance basis and finally closed in 1956. Coulson Battery is a Scheduled Ancient Monument.

Coulson Battery, the D.E.L. Searchlight emplacements and the Gloucester Farm Emergency Coastal Battery are situated in the dunes at South Beach, Blyth. The SMP recommendation for this section of the coast is 'Hold the Line'. The threat posed to these assets is likely to arise from mitigation strategies rather than erosion.

7.4.3.2 Anti-aircraft defences

The Tyne and Wear HER and the APTE have recorded several ***heavy anti-aircraft batteries*** in Block 3.

The Ryhope heavy anti-aircraft battery (NZ40525401, T&W 5506) is of the standard, 'clover-leaf', pattern with four octagonal emplacements for 4.5 inch guns arranged in an arc to the SE of the command post. There are also ammunition stores and an adjacent army camp. This site has been built over but has been plotted by the APTE (NMR 1462351).

Immediately to the north is an octagonal 'chicken-wire' false datum enclosure which presumably surrounded a gun laying radar platform.

The Southwick heavy anti-aircraft battery at Sunderland (NZ39045879, T&W 5510, NMR 1463068)) had four rectangular gun emplacements of the type usually associated with the 3.7 inch MK11C guns. This weapon was not introduced until 1943, which may imply that this battery is later than the 4.5 inch batteries elsewhere along the coast. There is also a command post and accommodation for the gun crews. This site currently occupies an open space but the gun battery has been removed.

The Tyne and Wear HER records an ***anti-aircraft rocket, or 'Z', battery*** at Seaburn (T&W 5512). The precise location of this unit is not recorded and in any case 'Z' batteries were ephemeral features.

The Lizard Farm heavy anti-aircraft battery (NZ40066368, T&W 1795) is a complex site similar to the one at Ryhope and has also been transcribed by the APTE (NMR 1403288). It is of the standard, 'clover-leaf', pattern with four octagonal emplacements for 4.5 inch guns arranged in an arc to the east of the command post. However, unlike Ryhope, Lizard Farm also has two rectangular emplacements for 3.7 inch guns similar to those noted at Southwick and implying the modification of the battery during the course of the war. Other facilities noted include ammunition stores and accommodation for the gun crews.

Figure 7.21a Lizard Farm Heavy Anti-Aircraft Battery (NMR 1403288) (RAF 540/1381 F21 0213 07-AUG-1954 © English Heritage (NMR) RAF Photography)

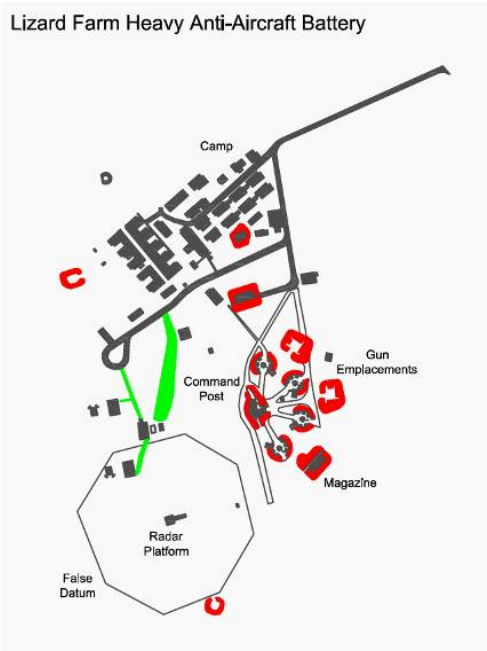


Figure 7.21b Transcription of Lizard Farm aerial photograph (©English Heritage)

A further heavy anti-aircraft battery is recorded at Horsley Hill, Sunderland (NZ381659, T&W 5493, NMR 1401052). Aerial photographs show this to be of the standard 'clover-leaf' pattern with four circular emplacements for 4.5 inch guns arranged in an arc to the east of a command building, while accommodation for the guns crews lay to the north and west. The site has now been built over.

The Broadway site at Tynemouth (NZ36117024, T&W 1919, NMR 1465240) mounted four 4.5 inch guns. Aerial photographs taken in the 1950s show four concrete, octagonal gun emplacements arranged in an east facing arc around a command post. To the SW lay a gun laying radar platform within an octagonal 'chicken-wire' false datum enclosure while accommodation for the gun crews lay to the west.

A further heavy anti-aircraft battery was established at Sharpness Point (NZ373699, T&W 5514).

> *This battery is situated on a section of eroding cliff line. The SMP recommendation for this section of the coast is 'Hold the Line'. The threat posed to these assets is likely to arise from mitigation strategies rather than erosion.*

The Tyne and Wear HER records an anti-aircraft rocket, or 'Z', battery at Tynemouth (NZ360705, T&W 5492).

Another heavy anti-aircraft battery was established at Whitley Bay (NZ344747, T&W 5508, NMR1414464). This site consists of the usual 'clover-leaf' arrangement of four octagonal gun emplacements set in an arc focused on the command post. However, this site also has two rectangular gun emplacements set at the southern end of the arc, designed to accommodate the 3.7 inch MK11C gun, installed on anti-aircraft artillery sites from 1943

onwards. As at Lizard Farm to the south, this might be taken to indicate some modification of the battery during the course of the war. The APTE has also recorded a gun laying radar platform to the NW within an octagonal 'chicken-wire' false datum enclosure and accommodation for the gun crews to the SW. The site is now occupied by a caravan park.

The Gloucester Lodge heavy anti-aircraft battery (NZ32007855, NH 11979) is one of the best preserved sites of this type in the North of England. It is of the standard 'clover-leaf' plan with four octagonal gun emplacements arranged in an arc focused on the command post. Rectangular emplacements for 3.7 inch MK11C guns, installed from 1943 onwards, survive at either end of the arc, and as at other sites where this occurred might imply some modification of the battery during the course of the war. Other structures nearby include ammunition stores, accommodation and a gun laying radar ramp within a hexagonal 'chicken-wire' false datum enclosure.

The anti-aircraft batteries were supported by the use of barrage balloons. These were mainly intended to make enemy aircraft fly higher or divert them from their targets. In order to deter under flying, in addition to the main tether, barrage balloons also supported a series of wires anchored to the ground. These leave a characteristic pattern and a number have been recorded by the APTE (Table 7.18).

7.4.3.3 Searchlight emplacements

One of the WWI Defence Electric Light (D.E.L.) emplacements at Blyth Links (NZ32057968, NH 11977) was brought back into commission in WWII. This D.E.L. emplacement operated in conjunction with the Coulson Battery 300m to the south.

Table 7.13 WWII Searchlight batteries recorded in the Tyne and Wear in Block 3

NGR	Location	HER	SMP	Importance	Risk
NZ4153	Ryhope	T&W 5568	8.3	Low	Low
NZ406602	Seaburn	T&W 5540	6.4	Low	Low
NZ409627	Whitburn	T&W 5539	6.1	Low	Low
NZ3864	Marsden Hall	T&W 5565	n/a	Low	Low
NZ389662	Frenchman's Bay	T&W 5538	4.1	Low	Low
NZ373699	Tynemouth	T&W 5526	48	Medium	Medium
NZ361710	Cullercoats	T&W 5558	47	Low	Low
NZ35687043	Marden	NMR 1465222	47	Low	Low
NZ34157601	Hartley	NMR 1465372	44	High	Medium
NZ32857716	Seaton Sluice	NMR 1465579	43	Low	Low
NZ32057968	Blyth	NH 11977	42	High	High

7.4.3.4 Bombing decoys

Although a number of ***bombing decoys*** were established in the Tyne and Wear area only one lay within Block 3 close to the cliffs between Seaham and Ryhope (NZ418517, NMR 1414288). This was a civil, C series Type QL *Starfish* site. This site is reported by Dobinson (2000b, 178, 280) to have been deployed in October 1942, but failed to draw any enemy bombs. It has been transcribed by the APTE as an irregular series of earthwork features extending over an area of about 400m by 129m, linked by trackways and surrounded by a barbed wire enclosure.

When the anti-aircraft batteries failed to hit their targets and the bombing decoys failed to deceive, the population retreated to air-raid shelters, numerous examples of which have been recorded in the APTE (Table 7.19).

7.4.3.5 Beach Defence Batteries

Broad sandy beaches likely to be attractive as potential landing sites are not a conspicuous feature of Block 3 and the APTE has identified only a single, possible example of a beach defence battery. This consists of the earthwork traces of an emplacement for two guns at Bents Farm (NZ40766104, NMR 1463000), at the north end of Whitburn Bay.

> *The rate of erosion recorded at Whitburn Bay is 0.4m/per year and the SMP policy recommendation is one of MR. This site is situated between the A183 and the beach and should be considered vulnerable to erosion.*

Beach defence batteries were a major component in the anti-invasion defences which formed an almost continuous barrier along the low lying sections of the coast. In addition further strong points were provided by concrete ***pillboxes*** tactically sited along lines of obstacles designed to impede the movement of tanks and other armoured fighting vehicles. The most common obstacle still encountered today are concrete ***anti-tank blocks*** although the APTE has also recorded a range of other barriers such as earthwork ditches and banks and ***minefields*** surrounded by strands of barbed wire. Weapons pits were more *ad hoc* facilities designed to meet local tactical needs such as the defence of a gun emplacement or the perimeter of an army camp. While many pillboxes and numerous anti-tank blocks survive most of the weapons pits and earthwork barriers have been levelled and the minefields cleared. For this reason no attempt is made to provide an exhaustive account of this material, although the full data are retained in files accompanying the APTE and tables are presented below of the main types recorded.

7.4.3.6 Anti-glider obstacles

The APTE has recorded several groups of ***anti-glider obstacles*** within Block 3. These consist of simple arrangements of earthworks and concrete blocks arranged in parallel rows or as a lattice pattern.

Table 7.14 Anti-glider obstacles in Block 3

NGR	Location	Type	NMR	SMP	Importance	Risk
NZ431478	Seaham Harbour	parallel	1456315	9.4	Low	Low
NZ415525	Ryhope	parallel	1462361	8.3	Low	Low
NZ413542	Grangetown	parallel	1462362	8.3	Low	Low
NZ410626	Whitburn	lattice	1462987	5.2	Low	Low
NZ397643	Marsden	lattice	1403238	4.2	Low	Low
NZ357708	Marden	lattice	1465219	47	Low	Low
NZ341737	Whitley Bay	parallel	1464899	45	Low	Low
NZ348742	Hartley	parallel	1464908	45	Low	Low
NZ348749	Hartley	lattice	1464911	45	Low	Low
NZ346751	Hartley	lattice	1465317	44	Low	Low
NZ320773	Seaton	lattice	1465466	43	Low	Low

7.4.3.7 Radar Stations

The Tyne and Wear HER has recorded two radar stations at Marsden. Site T&W 5523 has also been transcribed by the APTE (NZ 402643, NMR 1462950). The second station, 559m to the NW (NZ399649, T&W 5887), has been identified as the ***Chain Home Low*** *(CHL)* M-Series number M39. The CHL sites were developed from 1943 onwards to identify low flying aircraft and ships at sea. A second CHL station has been identified at Hartley (NZ43297613m, NMR 1314414) close to the site of the Robert's Battery.

> *Roberts Battery is situated on a section of eroding cliff line, as accounts of access to some of the underground facilities through the cliff face indicate. The SMP recommendation for this section of the coast is 'Do Nothing'. Accordingly, as with Roberts' Battery the situation needs to be kept under review as the cliff line erodes.*

The APTE recorded a large number of other features for which basic details are provided in the following tables.

Table 7.15 Pill boxes in Block 3 identified on aerial photographs

OS Sheet	Eastings	Northings	NMR	HER	SMP Unit
NZ 37 NE	35221	75395	1418909	T&W	44
NZ 37 NW	32014	78495	1413842	NH	43
NZ 37 NW	3221	7879	1421533	NH	43
NZ 37 NW	3235	7864	1421534	NH	43
NZ 37 NW	343	762	1427370	NH	44
NZ 37 NW	3331	7717	1427373	NH	43
NZ 37 NW	3282	7778	1427379	NH	43
NZ 37 NW	332	774	1427380	NH	43
NZ 37 NW	3355	7690	1427383	NH	43,44

NZ 37 NW	3306	7758	1427385	NH	43
NZ 37 NW	332	775	1427389	NH	43
NZ 37 NW	32035	79673	1442170	NH	42
NZ 37 NW	3497	7512	1465324	T&W	45
NZ 37 NW	3390	7671	1465595	NH	44
NZ 37 SE	3514	7348	1465171	T&W	45
NZ 37 SE	3527	7316	1465175	T&W	45
NZ 37 SE	3547	7280	1465183	T&W	46
NZ 37 SE	3644	7111	1465217	T&W	47
NZ 37 SE	360	703	1465240	T&W	47
NZ 37 SE	3681	7002	1465247	T&W	47
NZ 37 SE	3651	7078	1465250	T&W	47
NZ 44 SE	4526	4091	1461953	Durham	10.1
NZ 44 SW	4420	4431	1461910	Durham	10.1
NZ 44 SW	4440	4373	1461915	Durham	10.1
NZ 44 SW	4477	4162	1461946	Durham	10.1
NZ 45 NW	4092	5815	956440	T&W	7.1
NZ 45 NW	4108	5563	1462620	T&W	8.3
NZ 45 NW	4144	5753	1462996	T&W	8.1
NZ 45 NW	4098	5835	1463013	T&W	7.1
NZ 45 NW	4071	5979	1463040	T&W	6.4
NZ 45 SW	4058	5404	1462351	T&W	8.3,8.4
NZ 46 SW	405	606	1454847	T&W	63
NZ 46 SW	402	644	1462950	T&W	4.1
NZ 46 SW	4095	6407	1462979	T&W	5.1
NZ 46 SW	411	625	1462987	T&W	5.2,6.1
NZ 46 SW	408	613	1462995	T&W	6.1
NZ 46 SW	406	609	1463000	T&W	6.2,6.3
NZ 46 SW	411	633	1463014	T&W	5.2

Table 7.16 Anti-tank obstacles in Block 3 identified on aerial photographs

OS Sheet	Eastings	Northings	NMR	HER	SMP Unit
NZ 44 SE	4551	4083	1421118	Durham	10.1
NZ 37 NW	3331	7717	1427373	NH	43
NZ 37 NW	3267	7821	1427377	NH	43
NZ 37 NW	3282	7778	1427379	NH	43
NZ 37 NW	3306	7758	1427385	NH	43
NZ 37 NW	3234	7880	1427391	NH	42,43
NZ 37 NW	32035	79673	1442170	NH	42
NZ 44 SW	4477	4022	1461966	Durham	10.1
NZ 44 SE	4541	4051	1461969	Durham	10.1
NZ 45 NW	4140	5743	1462991	T&W	8.1
NZ 46 SW	408	613	1462995	T&W	6.1
NZ 37 SE	3502	7392	1464909	T&W	45
NZ 37 SE	3507	7485	1465044	T&W	45
NZ 37 SE	3627	7210	1465187	T&W	46
NZ 37 SE	3652	7076	1465255	T&W	47

NZ 37 NW	3242	7846	1465492	NH	43
NZ 37 NE	3510	7515	1465658	T&W	45

Table 7.17 Minefields in Block 3 identified on aerial photographs

OS Sheet	Eastings	Northings	NMR	HER	SMP Unit
NZ 37 NW	3306	7758	1427385	NH	43

Table 7.18 Barrage balloon moorings in Block 3 identified on aerial photographs

OS Sheet	Eastings	Northings	NMR	HER	SMP Unit
NZ 45 NW	4087	5524	1462609	T&W	8.3
NZ 45 NW	4081	5636	1462634	T&W	8.2
NZ 45 NW	4073	5707	1462657	T&W	8.1
NZ 45 NW	4072	5763	1462983	T&W	7.1

Table 7.19 Air raid shelters in Block 3 identified on aerial photographs

OS Sheet	Eastings	Northings	NMR	HER	SMP Unit
NZ 45 NW	406	593	1429211	T&W	6.5
NZ 46 SW	405	606	1454847	T&W	6.3
NZ 45 SW	4025	5497	1462319	T&W	8.3
NZ 45 SW	4069	5474	1462332	T&W	8.3
NZ 45 SW	4058	5404	1462351	T&W	8.3,8.4
NZ 45 SW	4111	5371	1462372	T&W	8.4
NZ 45 SW	405	530	1462405	T&W	8.4
NZ 45 SW	4128	5290	1462409	T&W	8.4
NZ 45 SW	4222	5080	1462466	T&W	9.1
NZ 45 NW	4078	5507	1462612	T&W	8.3
NZ 45 NW	4060	5573	1462615	T&W	8.2
NZ 45 NW	4078	5598	1462622	T&W	8.2
NZ 45 NW	4079	5602	1462623	T&W	8.2
NZ 45 NW	4053	5618	1462626	T&W	8.2
NZ 45 NW	4073	5630	1462628	T&W	8.2
NZ 45 NW	4017	5651	1462643	T&W	8.2
NZ 45 NW	4082	5660	1462644	T&W	8.2
NZ 45 NW	4055	5684	1462650	T&W	8.2
NZ 45 NW	4078	5699	1462656	T&W	8.1,8.2
NZ 45 NW	4031	5715	1462943	T&W	7.1,8.1
NZ 45 NW	4044	5712	1462944	T&W	8.1
NZ 45 NW	4001	5727	1462955	T&W	7.1
NZ 45 NW	4035	5732	1462956	T&W	7.1
NZ 45 NW	4051	5736	1462959	T&W	7.1,8.1
NZ 45 NW	4065	5742	1462962	T&W	7.1,8.1
NZ 45 NW	4066	5748	1462963	T&W	7.1,8.1
NZ 45 NW	4072	5750	1462980	T&W	7.1,8.1
NZ 45 NW	40741	57580	1462982	T&W	7.1
NZ 45 NW	4071	5766	1462988	T&W	7.1
NZ 45 NW	4085	5759	1462989	T&W	7.1,8.1

NZ 45 NW	4085	5739	1462990	T&W	8.1
NZ 46 SW	408	613	1462995	T&W	6.1,6.2
NZ 45 NW	4009	5775	1463003	T&W	7.1
NZ 45 NW	4031	5797	1463006	T&W	7.1
NZ 45 NW	4072	5876	1463021	T&W	7.1
NZ 45 NW	4050	5892	1463031	T&W	6.5
NZ 45 NW	4011	5983	1463032	T&W	6.4
NZ 45 NW	4055	5988	1463033	T&W	6.4
NZ 45 NW	4058	5942	1463046	T&W	6.5
NZ 37 SW	3495	7217	1464890	T&W	46
NZ 37 SW	3482	7297	1464891	T&W	45

[i] *The Entrance of the River Tyne by Edward Killwick Calver Master of HMS Porcupine, 1838-1849* (UKHO)

[ii] PRO MPF1/287

[iii] *The Entrance of the River Tyne by Edward Killwick Calver Master of HMS Porcupine, 1838-1849* (UKHO)

CHAPTER 8

South Beach, Blyth to Low Newton-by-the-Sea (Block 2 NMP)

8.1 Introduction

The area covered in this block extends from South Beach, Blyth to Low Newton-by-the-Sea. It falls within a single major topographical unit, the Northumberland coastal plain. Accordingly, this survey of the heritage assets has been undertaken with reference to the Historic Environment Records (HERs) maintained by Northumberland County Council. This existing data set has been enhanced by the transcription of aerial photographs held by the National Monuments Record and carried out to the standards of the National Mapping Programme (NMP). This work is referred to as the Air Photograph Transcription Exercise (APTE).

The coastline from Cresswell to Low Newton-by-the-Sea has been designated as a 'Heritage Coast' while the section north from Amble lies within the Northumberland Coast Area of Outstanding Natural Beauty (AONB). In addition, with the exception of 1.9km adjoining the site of Lynemouth Colliery, the whole of the foreshore zone has been designated as an SSSI. Coquet Island, lying 2km off Amble Harbour, is also an SSSI and a RSPB Reserve.

The National Trust manages sections of coastal sand dunes at Druridge Links and east of Warkworth and the whole coastline north of Craster to the northern limit of Block 2 and beyond.

8.1.1 Soils and landuse

The solid geology of this section of the coast is described in Chapter 3 though throughout most of the coastal zone this solid geology is mantled by varying thicknesses of glacial drift and other superficial deposits of Pleistocene and Holocene age. It is these superficial deposits that give rise to the principal soil types found along this section of the coast.

Table 8.1 Soil and landuse in Block 2

Deep loam	Stock rearing and dairying with some cereals
Seasonally wet deep loam to clay	Grassland in moist lowlands with some arable in drier areas
Seasonally wet deep loam	Winter cereals, stock and dairying
Seasonally wet deep clay	Winter cereals, sugar beet, potatoes and field vegetables
Stony loam over hard rock	Rough grazing
Loam over sandstone	Coquet Island
Dune sand	Recreation and some coniferous woodland

The patterns of landuse that characterise these soil types are an important consideration in evaluating the survival of heritage assets and the degree of threat arising from normal farming practices. Clearly, ploughing for arable cultivation will have had a major bearing on the survival of and the extent to which, once levelled, sites can be identified on aerial photographs. Plough damage to archaeological sites is not a recent phenomenon but before the Medieval Period the scale and intensity of ploughing cannot be considered significant. However, the development of ridge-and-furrow cultivation in the open fields of the Medieval and post-Medieval Periods was on a sufficient scale to pose a serious threat to the existing features. Although fronted by a natural zone of sand dunes, an 8km section of this coast at Druridge Bay has been restored after opencast mining and few heritage assets can be expected in this area other than those in the dunes or on the beach itself.

8.1.2 Coastal erosion

This section of the coast is predominantly low lying, consisting of broad sandy beaches backed by dune systems or low cliff lines (<10m OD) mainly formed in the boulder clay, the underlying bedrock being only exposed at beach level and on the wave cut platforms between MHWS and LAT. Somewhat higher ground reaches the coastal zone at Alnmouth where the town sits on a prominent ridge of Triassic Mudstones at about 30m OD which also gives rise to the low cliffs at Longhoughton and Howick. Between Craster and Dunstanburgh Castle the underlying Whin Sill has produced a series of intermittent ridges and cliffs rising to between 20m and 30m OD while the more familiar situation of a broad sandy beach backed by dunes continues to the north. However, in this northern sector the low lying coastal strip is narrower than farther south and the ground rises to up to 40m OD on the western margin of the study area.

Coquet Island lies about 2km to the east of Amble Harbour. It measures 0.35km N-S and 0.15km E-W but is over twice this extent at LAT. It slopes gently W-E from 10m OD to 2m OD. The geology of the island is Coal Measures sandstones capped by boulder clay on which has formed a loam soil.

Figure 8.1 The site of St Waleric's Church, Alnmouth (author)

Much of this coastline is low lying and under threat of even a modest rise in sea level while erosion is well attested historically. On Christmas Day 1806 a violent storm caused the River Aln to alter its course at Alnmouth, breaking through the southern end of the ridge on which the town sat and cutting off access to St Waleric's Church, while a similar change in the course of the River Coquet had happened at Amble in the 1760s (Linsley 2005, 122-123).

At Druridge Bay, identified as the most vulnerable part of this section of the coast, anti-invasion features of WWII originally set within the dunes now lie on the beach while monitoring posts at Hadston Carrs (NU 20 SE) have recorded an erosion rate of 11m in five years. In 1990 the sea breached the dunes at Hemscott Hill and land behind the dunes at Blakemoor Farm is being inundated at high tide, though in both these cases the situation had been exacerbated by the commercial quarrying of dune sand (SCAN 1993, 21-23).

The section of the coast north of the Tyne falls within Cell 1a of the Shoreline Management Plan (SMP). At the time of writing the SMP2 for this zone is currently being produced and the NERCZA data have to be assessed against the less detailed SMP1 criteria, produced by Posford Duvivier in 1997. This section of the coast lies within SMP1 Policy Units 20 to 41 and for each of these units the SMP1 document offers a 'Preferred Strategic Option' which is the equivalent of the 'Policy Recommendations' of SMP2. These are given as 'Do Nothing' (DN), 'Hold the line' (HTL) or 'Selectively hold the line' (SHTL), and are listed in Table 8.2.

Table 8.2 SMP1 proposed responses to predicted coastal change in Block 2

Location	SMP Unit	Policy
Newton Point - Dunstanburgh	20	DN
Dunstanburgh – Little Carr	21	DN
Craster	22	DN
Craster – Cullernose Point	23	DN
Cullernose Point – Rumbling Kern	24	DN
Rumbling Kern – Boulmer Steel	25	DN
Boulmer Steel – Fluke Hole	26	DN
Fluke Hole - Alnmouth	27	DN
Alnmouth	28	SHTL
Alnmouth – Amble N.Pier	29	DN
Amble	30	SHTL
Amble – Hauxley Haven	31	DN
Hauxley Haven - Cresswell	32	DN
Cresswell - Lynemouth	33	DN
Lyne Sands	34	SHTL
Lyne Sands – Newbiggin Point	35	DN
Newbiggin Point – Spittal Point	36	SHTL
Spittal Point – Sandy Bay	37	SHTL
Wansbeck Mouth	38	DN
Wansbeck Mouth –N.Blyth	39	SHTL
North Blyth	40	HTL
Blyth	41	HTL

Reference is also made to *A Strategy for Coastal Archaeology in Northumberland* (SCAN),

published by Northumberland County Council and English Heritage in 1993. This document focuses on two principal issues, the damage and destruction of archaeological sites through coastal erosion and the exposure of remains through dune movement, which ultimately also leads to their damage and destruction. Field work carried out by the Glasgow University Archaeology Research Division examined 112km (70 miles) of coastline and assessed the potential threat to archaeological remains in the twenty-six 1:10,000 OS Map sheets in which the coastline falls. Thirteen of these maps sheets cover the section of coast examined in this chapter. For each sheet *SCAN* provides an assessment of the archaeological potential and the level of risk from erosion. These data are summarised in the following table.

Table 8.3 Archaeological potential and risk from erosion in Block 2

1:10,000 OS Map sheet	Potential	Erosion
NU 22 NW	High	High
NU 22 SW	Low	Low
NU 22 SE	High	Medium
NU 21 NE	Medium	Low
NU 21 SE	Medium	Low
NU 21 SW	Medium	High
NU 20 NW	Low	High
NU 20 NE	Low	Low
NU 20 SE	High	High
NZ 29 NE	Medium	High
NZ 29 SE	High	High
NZ 38 NW	High	High
NZ 38 SW	Low	Low

(source:*A Strategy for Coastal Archaeology in Northumberland,* 1993)

The SCAN document draws particular attention to the threats posed at Druridge Bay (NZ 20 SE, NZ 29 NE and NZ 29 SE). The foreshore north of Cresswell is known for the exposure of intertidal peats and faunal remains. Erosion of the dunes at the head of the beach has led to the further exposure of these peat beds and ancient forest remains, while at Low Hauxley, at the north end of the bay, similar deposits are being exposed along with important Mesolithic and Bronze Age sites. Due to the importance of the situation at Low Hauxley, the SCAN report was followed up in 1995 by an Archaeological *Evaluation carried out on behalf of English Heritage by the Lancaster University Archaeological Unit (LUAU). It is noticeable that the sites exposed by the erosion of the dunes span the period of time from the Mesolithic through to the Bronze Age but do not include later material, other than remains actually sited within the dunes. In fact, the two cairns examined were separated by a thin lens of blown sand suggesting that their construction was coeval with the beginning of dune formation. Human skeletal material from the cairns has been dated to the period between 2140-1890 cal BC in the case of Cairn 1 and between 1880-1640 cal BC in*

the case of Cairn 2. The implication of this is that the dunes either began to form or reached their present position during the early 2nd millennium cal BC. The importance of this situation cannot be overstressed. For a zone of about 8km the dunes at the head of Druridge Bay seal a land surface that was the focus of human activity from the 6th to early 2nd millennium cal BC and the potential for making significant discoveries is considerable but one seriously threatened by coastal erosion.

Figure 8.2 Peat and fallen tree trunk overlying boulder clay at Low Hauxley (author)

8.2 Terrestrial Landscapes

8.2.1 Early Prehistory

Although Block 2 lay within the realm of Palaeolithic settlement, at least during the Late Upper Palaeolithic Period, no finds of this date have been recorded in the coastal zone. The earliest evidence for a human presence belongs to the Mesolithic Period.

8.2.2 The Mesolithic Period

The HER has seven records of ***flint scatter sites*** on this section of the coast, three of which have also been the scene of excavations. The most southerly records consist of the Mesolithic flint scatter sites at Newbiggin-by-the-Sea. These sites were first identified by Raistrick (1933a and 1933b) in the 1930s but the precise locations were not recorded.

However, Davis (1983) undertook fieldwork in this area in the 1970s and 1980s and his gazetteer does provide six-figure NGRs. He records the Newbiggin Point site (NH 12048) as lying at NZ321881. Wymer (1977, 221) records that these finds were collected at the interface between the boulder clay and blown sand. A second cluster of finds was recovered from the vicinity of Element Head and Sandle Holes (NH 12049) which Davis records as lying at NZ320890. According to Wymer over 300 flints were recovered from this area.

About 2km north of the cluster of flint scatter sites at Newbiggin-by-the-Sea lies the site of Lyne Hill (NZ308903, NH 12180). This important site was excavated by Raistrick (133b). In the space of two days over 3000 flints, including 320 microliths, were recovered from two concentrations each about 14m across and 90m apart. They are reported as having been found at the interface between the boulder clay and overlying blown sand. Lyne Hill is now the site of a local authority rubbish dump.

At the north end of Druridge Bay lies the Mesolithic site of Low Hauxley (NU28390181, NH 5604), discovered in 1983 during the rescue excavation of two Bronze Age cairns which were eroding out of the sand dunes (Bonsall 1984). The cairns were found to have been erected on a Mesolithic flint scatter site. Marine shells were also recovered from this deposit and it was at first interpreted as a midden, though this interpretation has not been supported by subsequent work at the site. The proximity of the shore was, nevertheless, probably the *raison d'etre* for the occupation of the site and it is dealt with below in the consideration of coastal/maritime landscapes.

The remaining two Mesolithic sites on this section of the coast both lie at Howick; the Howick Burn flint scatter site (NU255165, NH 5674) and the Howick Burn occupation site (NU25851660, NH 5690). Mesolithic artefacts were originally noted eroding out of the cliff face in the 1980s and this led in 2000 to a fieldwalking exercise in which seven fields were searched and 244 artefacts recovered. Most diagnostic pieces were of narrow blade Late Mesolithic type. As with most other flint scatter sites noted on the coast, the focus of attention appears to have been acquisition and processing of raw material, which has not been treated here as a specifically coastal/maritime activity. This work led to the identification of the Howick Burn occupation site. As at Low Hauxley, the proximity of the shore was probably the *raison d'etre* for the occupation of the site and it will also be dealt with below in the consideration of coastal/maritime landscapes.

> *The Howick Burn and Low Hauxley sites lie in SMP1 Units 25 and 32 respectively for which the 'Preferred Strategic Option' is 'Do Nothing'. This clearly has major implications for the survival of any further archaeological remains in the vicinity and the situation will need to be reviewed once the SMP2 data are available.*

Table 8.4 Flint scatter sites identified in Block 2

NGR	Name	HER	SMP	Importance	Risk
NZ321881	Newbiggin Point	NH 12048	35	Medium	High
NZ320890	Element Head & Sandle Holes	NH 12049	35	Medium	High
NZ308903	Lyne Hill	NH 12180	34	High	High
NU28390181	Low Hauxley	NH 5604	32	High	High
NU255165	Howick Burn flint scatter site	NH 5674	25	High	High
NU25851660	Howick Burn occupation site	NH 5690	25	High	High

8.2.3 The Neolithic Period and the Bronze Age

Apart from a few small, poorly recorded flint scatters the HER has no records of Neolithic activity on this section of the coast while apart from isolated finds of stone tools and items

of metalwork the Bronze Age is represented by ***round barrows*** or ***cairns*** and stone ***cists***, which may or may not have been originally covered by a mound.

Site NH 12045 is a cist with cover found at Spital Point (NZ31018687), originally wrongly identify as from Newbiggin.

An important series of Bronze Age finds were made in Amble Quarry during quarrying operations in the late C19 (NU27640429, NH 5594). The main find consisted of a cairn, situated about 65m from the beach and buried by 1m of blown sand. The cairn was about 12m in diameter and 1.5m high. It contained about 20 cists, several deposits of burnt bone and a number of pottery vessels. The primary interment was in a cist orientated SW-NE about 1.1m by 0.62m and 0.6m deep formed of four slabs and a coverstone. The body was unburnt and accompanied by a small bronze knife, a flint flake and a Food Vessel. A second cist was found about 55m away in 1893. This measured 1.4m by 0.75m. It contained bone fragments, a flint flake and two pottery vessels. The finds made at Amble were dispersed, some going to the British Museum, some to the Museum of Antiquities at Newcastle while some remained in private hands. The full total cannot now be established but the original assemblage included both Beakers and Food Vessels.

About 700m to the north of Amble Quarry is the site of another cist burial, found in 1857 (NU27300486, NH 5590). The cist is described as measuring 1m by 0.6m. It contained a crouched burial accompanied by a Beaker. The NGR given is very close to MHWS.

The sites at Amble lie about 2.5km to 3km north of the Bronze Age cairns and cists exposed by erosion of the dunes at Low Hauxley in 1983. Rescue excavations conducted at the time documented two cairns built on the crest of a low, boulder clay ridge (Bonsall 1984). Both contained flexed inhumations and one also had a cremation. Human skeletal remains from the two cairns were submitted for radiocarbon dating. The date range for Cairn 1 has been reported as 2040-1940 cal BC and for Cairn 2 as 1870-1690 (LUAU 1995, Appendix 3, 1). The cairns were separated by a thin lens of blown sand indicating that the inception of dune formation at the site can be dated to the early 2nd millennium cal BC. The cairns were exposed by erosion of the dunes and it has to be assumed that at the time of their construction the ridge on which they were built extended further to the SE. Consideration of SLI and RSL data in Chapter 3 indicates that at the time Cairn 2 was built sea level was about 0.79m lower than today. Inspection of the bathymetric data offshore at Low Hauxley suggests that the shoreline lay about 50m further to the SE and this can be taken as a rough, proxy, indicator of the further extent of the boulder clay ridge in the early 2nd millennium.

Erosion of this site continued and in 1993 two cists were excavated. One contained a cremation and a Beaker while the other held a crouched inhumation and a Beaker. A further, unaccompanied cremation lay above the first cist and another cist emerged from the dunes in 1995. This cist was empty.

The HER includes a record that in 1836 several cists and a Food Vessel were found at Low Stead Farm (NU25781615, NH 5670). One of these cists had an example of rock-art on the underside of the capstone. No further details of this site are recorded but it lies about 500m to the south of the cist cemetery excavated at Howick. During the excavation of the Mesolithic site at Howick (see below) five Bronze Age cists were also exposed. Four of the

five cists are considered to have been for infants, No. 2 containing fragments of a child's skull. Cist No.5 was adult size but no bone survived in the acidic soil. Fragments of a Food Vessel were associated with one of the other cists (Waddington *et al* 2005).

Figure 8.3 Bronze Age cist at Howick Burn (ARS)

The Howick Burn and Low Hauxley sitse lie in SMP1 Units 25 and 32 respectively for which the 'Preferred Strategic Option' is 'Do Nothing'. This clearly has major implications for the survival of any further archaeological remains in the vicinity and the situation will need to be reviewed once the SMP2 data are available.

A watching brief undertaken at the Low Newton-by-the-Sea coastguard station (NU24042488, NH 5831 and 14327) during drainage works in 1992 reportedly identified human bones and this has led to the suggestion that the site may include the remains of a small cairn. There is possibly a second, undisturbed cairn on Low Newton Point (NU24402500, NH 14767).

A hitherto unrecorded round barrow was identified during a recent field survey in the vicinity of Dunstaburgh Castle. The site lies on the summit of Scrog Hill at 25m OD (NU25352150). It stands only about 0.4m high but displays several kerb stones. It has not been further investigated and has been denuded by ploughing (Oswald *et al* 2006, 34).

Table 8.5 Bronze Age sites identified in Block 2

NGR	Name	HER	SMP	Importance	Risk
NZ31018687	Spital Point cist	NH 12045	n/a	n/a	n/a
NU27640429	Amble Quarry cairn & cists	NH 5594	31	High	High
NU27300486	Amble cist	NH 5590	n/a	n/a	n/a
NU28390181	Low Hauxley cairn 1	NH 5604	32	High	High

NU28390181	Low Hauxley cairn 2	NH 5604	32	High	High
NU28390181	Low Hauxley cist 1, 1993	NH 5604	32	High	High
NU28390181	Low Hauxley cist 2, 1993	NH 5604	32	High	High
NU28390181	Low Hauxley cist 1995	NH 5604	32	High	High
NU25781615	Low Stead Farm cists	NH 5670	n/a	n/a	n/a
NU25851660	Howick Burn cists	NH 5690	25	High	High
NU24042488	Low Newton-by-the-Sea	NH 5831 & 14327	20	Medium	High
NU24402500	Low Newton Point	NH 14767	20	Medium	High
NU25352150	Scrog Hill, Dunstanburgh	Not recorded	21	Medium	Low

The sites at Newbiggin, Low Hauxley, Amble, Low Stead Farm, Howick, Low Newton and at Howick Heugh (Jobey and Newman 1975) 2.5km from the coast, appear to be part of a pattern in which Bronze Age cemeteries occur in prominent positions close to the coast.

8.2.4 The Iron Age and Roman-British Period

The terrestrial landscapes of the Iron Age and Romano-British Periods are represented in Block 2 by what appear to be the remains of settlement sites in the form of two ***hill forts***, a ***promontory fort*** and seven ***farmstead enclosures***.

The Howick Burn hill fort (NU25571630, NH 5669) lies at 25m OD at the southern end of a wide spur overlooking the Howick Burn and about 300m inland from the foreshore. It is roughly circular in shape and 54m in diameter within a single rampart of earth and stone 8m wide and 1.2m high. There was ditch on the north side whereas the south side was mainly protected by the natural steepness of the slope. The main entrance to the enclosure is on the east side. Fragments of swords and coins are reported to have been found in the early C19, but their present whereabouts is unknown. This site is a Scheduled Ancient Monument.

The second hill fort lies at 40m OD on the top of Craster Heugh (NU25531953, NH 5667), a prominent ridge of Whin Sill. The settlement, roughly triangular in shape, measures 100m by 70m. It is enclosed by three ramparts and a ditch on the east side but only by a slight bank on the west side where the Heugh offers strong natural defence. The ramparts are built of stone and the innermost stands up to 1.8m high though the outer ramparts are lower, having been damaged by ploughing. The entrance is located on the SE side. This site is a Scheduled Ancient Monument.

The Whin Sill promontory at Dunstanburgh is rightly famous for its magnificent C14 castle (see below) but for more than a century consideration has been given to the possibility that this might not be the first activity at the site. Place-name specialists have wondered whether the *-burgh* suffix of the name might imply an Anglo-Saxon settlement while the recovery of Iron Age finds including part of a sword (NH 20741), the remains of five pottery vessels and parts of ten beehive and rotary querns led Jobey (1972) to conclude that there had been a prehistoric settlement on the promontory while some recently identified Romano-British finds (Oswald *et* al 2005, 15) imply continued occupation into the C2.

Considerable weight was given to this suggestion by the identification during the recent survey at the site of what appears to be an earthwork bank and ditch, pre-dating the castle, and blocking off access to the promontory from the south (Oswald *et al* 2005, 29-33); the

west, north and east sides being protected by steep slopes or cliffs. The situation at Dunstanburgh therefore appears to provide a parallel for that already noted at Tynemouth (Chapter 7) where Iron Age occupation was identified by excavation and a barrier across the promontory surmised.

As was also the case at Tynemouth, the presence of a promontory fort at Dunstanburgh does not necessarily imply a specifically coastal/maritime focus. Rather, use was simply being made of an easily defended site which happened to be on the coast.

Of the farmstead enclosures the most southerly was the curvilinear enclosure at Cambois (NZ29988337, NH 11782). It was situated at 5m OD and lay about 850 from MHWS. It was destroyed during the construction of Blyth Power Station. The rectilinear enclosure at Hauxley (NU28050255, NH 5628) has been destroyed by opencast mining. It is recorded as being approximately 50m square. It was situated at 7m OD and was about 500m from MHWS. The site at The Butts, Warkworth (NU25200630, NH 5550) is described as a univallate, curvilinear enclosure. It lies at 600m from MHWS and at an altitude of 19m OD. The sub-rectangular enclosure north of Low Stead (NU252160, NH 5676) lies at 28m OD and about 750m inland from the mouth of the Howick Burn. The ATPE has identified three sides of this enclosure defining an area about 58m square with a small, irregular annexe attached to the SW corner. The enclosure at Cushat Wood (NU257170, NH 5671) lies 1.2km to the north at an altitude of 20m and about 450m from the cliff edge. It was first identified from aerial photographs in 1977 and 1978 and was the subject of an evaluation in 1999. This site is roughly square in shape and consists of three enclosing ditches, which are not necessarily contemporary. They define an area about 130m square. There are traces of an entrance on the east side and indications of at least three round huts inside.

A further small enclosure which may belong to this group was identified during a recent field survey in the vicinity of Dunstanburgh Castle. The site lies at the bottom of a minor defile which gives access to Cushat Rock (NU25552155). It is oblong in plan and measures about 40m by 20m and inside is a possible hut platform (Oswald *et* al 2005, 34). A new discovery from the APTE are the crop marks of a diamond-shaped enclosure about 800m SW of Dunstanburgh Castle, enclosing an area about 50m by 50m (NU24942162, NMR 1470852).

Table 8.6 Iron Age/Romano-British sites identified in Block 2

NGR	Name	HER	SMP	Importance	Risk
NU25571630	Howick Burn hillfort	NH 5669	25	High	Low
NU25531953	Craster Heugh hillfort	NH 5667	23	High	Low
NU257218	Dunstanburgh promontory fort	NH 20741	21	High	Low
NZ29988337	Cambois farmstead	NH 11782	n/a	n/a	n/a
NU28050255	Hauxley farmstead	NH 5628	n/a	n/a	n/a
NU25200630	The Butts farmstead	NH 5550	29	Medium	Low
NU252160	Low Stead farmstead	NH 5676	25	Medium	Low
NU257170	Cushat Wood farmstead	NH 5671	24	Medium	Low
NU25552155	Cushat Rock farmstead	Not recorded	21	Medium	Low
NU24942162	Dunstanburgh farmstead	NMR 1470852	21	Medium	Low

8.2.5 The Roman Period

Other than occasional finds of coins and pot sherds, the HER does not have any records of Roman activity on this section of the coast.

8.2.6 The Early Medieval Period.

Probably the most important Early Medieval find on this section of the coast are the remains of the C10 cross shaft from Alnmouth, found in 1789 near the ruins of St Waleric's Church (NH 5705). Two, conjoined, fragments survive and measure 0.9m by 0.4m and 0.15m when joined together. The faces carry both inscriptions and figurative motifs. The inscriptions employ Anglo-Saxon capitals and runes. Face A bears a crucifixion scene while Face B has panels of interlace and a key pattern divided by an inscription transcribed as [.A]DV / LFESD with a further inscription above transcribed as [S]AV. Face C has two interlace panels and an inscription transcribed as M[Y]REDaH.MEH.wO[] ('Myredah made me'), while Face D has a key pattern (Cramp 1984, 161-162; Plate 156 & 157). A fragment of an Anglo-Saxon cross has been recovered from the river bed at Warkworth (NH 5443).

Almost as important is a group of Viking period burials found under a barrow and variously attributed to Bedlington and Cambois (possibly NU301839, NH 12074). These remains, first uncovered in 1859, consist of skeletons of a woman aged 45-60, a man in his 40s and another man in his 20s. They were accompanied by a bone comb and a circular bronze and enamel brooch with a contorted bird motif which has been dated to the C10 (Parsons 1975, 204 & Plate 24; Alexander 1987).

There is documentary evidence that in AD 684 St Cuthbert met Elfleda, sister of King Egfrith and abbess of Whitby, on Coquet Island and this can be taken as a *terminus ante quem* for the establishment of a monastic presence on the island. Other evidence consists of a C9 ring and the discovery on the beach in 1969 of a stone slab with a cross carved on it (NU293045, NH 5613). The slab measures about 2m by 1.7m by 0.4m. It could be a grave marker from an early monastic cemetery and has been dated to the late C7 or early C8.

There is also documentary evidence that St Waleric's Chapel at Alnmouth was not the first church on that site and that when William de Vescy established the new town of St Waleric, as Alnmouth was known in the C12, 'it was not necessary to build a new church for one was already standing at the mouth of the river, which it was only necessary to enlarge' (Bateson 1895, 469). Bettess and Bettess (2004, 43) take the view that this is likely to have been an Anglo-Saxon foundation, a view supported by the fact that the fragments of the C10 Alnmouth Cross were found close to the site. Nothing of this early establishment or the later medieval chapel survives above ground level.

The promontory at Dunstanburgh is recorded in the HER as the site of a possible Anglo-Saxon settlement (NU 257219, NU 5872). However, the only evidence for this is the place-name suffix –*burh*.

8.2.8 The Medieval Period

The most important Medieval site on this section of the coast is without doubt the magnificent fortress at Dunstanburgh, the construction of which began in 1313 by Thomas Earl of Lancaster. A licence to crenellate was granted in August 1316 and it is assumed that work on the castle had largely been completed by the date of Earl Thomas's execution in 1322. It may be described as a roughly quadrangular enclosure castle the fourth, northern, side of which is provided by the 20m high vertical cliffs of the Whin Sill promontory. The main feature today is the Great Gatehouse, the result of a late C14 remodelling of the original structure. This work was carried out under the orders of John of Gaunt, Duke of Lancaster. Dunstanburgh saw action and changed hands several times during the Wars of the Roses and was finally and permanently surrendered to the Yorkists in June 1464 from whence it was allowed to fall into decay. In the late C16 the Great Gatehouse was occupied by one of the Craster family who farmed the interior of the enclosure, and was probably responsible for the recently recorded ridge-and-furrow.

There is an extensive bibliography dealing with the history and development of Dunstanburgh Castle and further details need not be given here. The main source referred to has been the 2005 report by Oswald *et al*. The site is a Grade I Listed Building, a Scheduled Ancient Monument and is in the Guardianship of the Secretary of State for Culture, Media and Sport.

Lesser fortifications are represented by three ***tower houses***. The most southerly is the C15 tower at Creswell (NZ29369335, NH 11924). It is a rectangular structure measuring 12.5m by 8.5m. Its consists of two floor levels over a vaulted basement while the present parapet and turret are probably C18 additions. It is roofless but otherwise well preserved. An C18 house formerly adjoined the tower on the north but this was demolished in the mid C19. The Cresswell Tower is both a Scheduled Ancient Monument and a Grade II* Listed Building.

Figure 8.4 Cresswell Tower (author)

Like the tower at Cresswell the tower at Craster is also dated to the early C15. It measures 10.7m by 8.9m and has later buildings adjoining on the east and south faces. Internally, the tower has a vaulted basement measuring 6.9m by 4.9m entered by a lobby in the east wall which also gave access to a newel stair, now removed. Craster Tower is a Grade II* Listed Building.

The tower on Coquet Island appears in a list of 'fortalices' of 1415 as belonging to the Prior of Tynemouth. It is smaller than the towers at Cresswell and Craster and measures 5.6m by 6.8m. In 1841 this structure was converted into a lighthouse (fig. 8.X) and only the masonry up to the second floor and the vault on the ground floor is medieval. The other remains on the island are part of the C12 ***monastic cell***.. It was noted above that there had been a monastic settlement of some sort on Coquet Island from the late C7 but none of the surviving structural remains are earlier than the C15. The site was granted to Tynemouth Priory by Robert Mowbray sometime before his death in 1125 and by 1127 the Prior had granted St Henry permission to build a small cell on the island. The surviving remains of the cell comprise a domestic range with a vaulted undercroft and indications of a chapel to the east. The monastic site was dissolved in 1539 and in the C19 the remains were incorporated in the lighthouse keeper's residence. The remains on Coquet Island are a Grade II* Listed Building and a Scheduled Ancient Monument.

The ***precepetory*** of the Knights Hospitallers of St John of Jerusalem at Low Chibburn (NZ26599653, NH 11884) lie on the western margin of study area a kilometre inland from the foreshore at Druridge Bay and at an altitude of 9.4m OD. Most of the area around the site was subject to opencast mining but with the closure of the mine the land has been restored to pasture. The first mention of the site is in 1313, though the Order had been in existence for over two hundred years and their first house in England had been established in 1100. The Chibburn Precepetory was dissolved in 1540 and the site became a private residence. It consists of a quadrangular arrangement of buildings and foundations about 25m square arranged around a central courtyard. The SE side is occupied by the remains of the chapel measuring 16m by 6m of which the south, east and part of the north wall survive. Part of the NW range and the gateway survive as foundations while the SW range, consisting of a C16 house, survives virtually intact. The whole was originally surrounded by a moat but a substantial part of this was lost to opencast mining. The Low Chibburn Precepetory is a Scheduled Ancient Monument.

The site of the medieval hospital at Newbiggin-on-Sea (NH 12044) has been tentatively identified with an area currently occupied by tennis courts (NZ30938695). It is reported that when the courts were being laid in 1929 three stone coffins and the foundations of a building were exposed.

The site of the medieval hospital of St John the Baptist of Warkworth has been identified with the field name *Spittle* north of Shortridge Hall (NU24310851, NH 5401). It is recorded that a hospital for the 'poor, aged and sick' was in existence at Warkworth by the late C13. No trace of this site survives but recent cultivation has exposed stone with lime mortar and over 50 sherds of medieval pottery.

Figure 8.5 Low Chibburn C14 Preceptory (author)

As mentioned in the previous section, there is documentary evidence that St Waleric's Church at Alnmouth was not the first church on that site and that when William de Vescy established the new town at Alnmouth it was only necessary to enlarge an existing building, though in effect this appears to have been a virtual rebuilding. This is recorded as taking place between 1170 and 1190. Few details survive as the church was destroyed during the storm of 1806 which altered the course of the river and cut St Waleric's off from the rest of the town, though C18 engravings show that it was already ruinous by then. These engravings, which have been studied in detail by Bettess and Bettess (2004, 60-64), indicate a large building consisting of a nave, transcepts and chancel. Nothing now survives above ground level and some of the site has been lost to erosion.

A fragment of a medieval building has been identified at Amble as a putative monastic grange attached to Tynemouth Priory. The remains (NU26240439, NH 5595) consist of 4.6m length of walling standing 3.5m high with a window of two trefoil headed lights. Further foundations were exposed when the Catholic chapel was built on the adjoining site in 1897. The remains of the grange are a Grade II Listed Building.

The church of St Bartholomew (NH 12051) occupies a prominent site on the promontory at the north end of Newbiggin Bay (NZ31788802). Although substantially rebuilt in the C19 some parts of C13 and C14 date remain as well as some reused fragments of C12 date. There is also an important collection of C13 cross slabs, mostly in the internal walls of the north aisle (Pevsner 1992, 403-404).

Figure 8.6 Fragment of the Amble monastic grange (author)

Figure 8.7 St Bartholomew's Church, Newbiggin (author)

Although Blyth and Amble had medieval antecedents, these settlements amounted to no more than small fishing villages, the main centres of population on this section of the coast being the new towns of Newbiggin, Warkworth and Alnmouth. All that remains of medieval Newbiggin is St Bartholomew's Church and the putatative traces of a hospital (referred to above). Only part of the failed Norman borough of Warkworth lies within the NERCZA study area. HER entries include the C14 bridge (NH 5411), the medieval gateway

at the south end of the bridge (NH 5413), the C12 church of St Lawrence (NH 5415) and a possible medieval street frontage revealed by excavation (NH 12777). The bridge and gateway are both Grade II Listed Buildings and Scheduled Ancient Monuments while St Lawrence's church is listed at Grade I.

Although an Anglo-Saxon settlement may have existed at Alnmouth, the history of the present settlement began in the mid C12 with the foundation of the borough with the right to have a port being granted to Eustace de Vesci in 1207-08. This settlement consisted of a main street along the top of the ridge with elongated burgage plots down each side, the vestigial traces of which can be detected in the later town plan. At the south end lay the church of St Waleric while the estuary of the River Aln offered a broad and sheltered anchorage below the town on the western side. At this time the river entered the sea beyond the church. The Norman borough of Alnmouth was destroyed by the Scots in 1336 although later documentation, particularly a map of 1614, indicate that the town was rebuilt on much the same lines (Bettess and Bettess 2004).

During the Middle Ages the NE was a land of villages and many present day settlements have their origins in the Medieval period. However, not all settlements thrived and survived and the HER has nine records of ***deserted medieval villages***. Most are known from documentary sources only.

Table 8.7 Deserted Medieval Villages identified in Block 2

NGR	Name	HER	SMP	Importance	Risk
NZ297866	North Seaton	NH 11674	37	Low	Low
NZ291934	Cresswell	NH 11927	32	Low	Low
NZ274959	Druridge	NH 11887	32	Low	Low
NU279032	Hauxley	NH 5609	31	Low	Low
NU249065	Birling	NH 5431	29	Low	Low
NU256114	Marden	NH 5768	27	Low	Low
NU257117	Foxton Hall	NH 5769	27	Low	Low
NU264127	Saton House	NH 5770	26	Low	Low
NU250196	Craster	NH 5675	22	Low	Low

As throughout most of the rest of the NERCZA study area traces of ***ridge-and-furrow*** cultivation are virtually an ubiquitous feature of the archaeological record. In many cases these can be seen to be associated with the surviving villages and in others with the deserted settlements listed above.

8.2.8 The Industrial Period

Records to be considered during this phase of landscape development relate to the coal mining industry and mostly refer to sites at the southern end of this section of the coast, corresponding to the outcropping of the Coal Measures. As was the case with evidence for the coal mining industry in Tyne and Wear and County Durham, the history of the South Northumberland Coalfield is one of migration from west to east as the mines followed the increasingly deeper strata, eventually winning coal from far under the North Sea. Accordingly, the collieries in the coastal zone mainly represent a late phase in the history of the industry, production having begun mainly in the late C19.

The exploitation of deep coals in the Blyth area began in the late C18 and early C19 with the sinking of Cowpen Colliery Pit 'A' between 1794 and 1797 and Pit 'B' by 1804 (NZ30638150, NH 12105 and 12106), both pits being served by waggonways (NH 12176 and 12177).The Crofton Mill Colliery, Blyth (NZ31618099, NH 13259) began production in 1885 when the Cowpen and North Seaton Coal Company sunk a shaft. Crofton only had a single shaft but connected with other pits underground to provide escape routes. At its peak production reached over 350,000 tons a year. Crofton Mill Colliery ceased production in 1969 and the site has been cleared. An old mine shaft is recorded at Cambois (NZ29442392, NH 14355) and North Seaton Colliery (NZ29028575, NH 18091) is recorded on the 1866 OS Map. Lynemouth Colliery (NZ297904, NH 11941) opened in 1927 and became part of the Ellington complex. It was one of the country's biggest collieries until it closed in 1994.

An historically important waggonway that served colliers loading at Blyth was the Plessey Waggonway (NH 11491). Although this closed in 1812, it can still be traced from Plessey Hall Farm to Blyth Harbour, in places standing as an earthwork 2m high. It is reported to have had a twin track of beech wood rails laid on oak sleepers and is thought to have been constructed in the last decade of the C17.

8.3 Coastal/Maritime Landscapes

8.3.1 The Mesolithic Period

It was noted above that the excavation of two Bronze Age cairns at Low Hauxley led to identification in 1983 of a Mesolithic ***flint scatter site***. Details of these discoveries remain unpublished but the acceleration of erosion at this site led to further archaeological work being undertaken in the early 1990s, culminating in a full archaeological evaluation by the Lancaster University Archaeological Unit. This work added few details to our knowledge of Mesolithic activity at Low Hauxley, though the lithic assemblage was enlarged by the addition of 408 Items (LUAU 1995).

The lithic assemblage at Low Hauxley can be dated to the Late Mesolithic on typological grounds while a *terminus ante quem* of *circa* 3500 cal BC is provided by radiocarbon dates on the lower levels of peat deposits which overlay the Mesolithic horizon. Bonsall's summary refers to a date of *circa* 5000 RCY BC (Bonsall 1984) for the Mesolithic activity. Reference to the SLI and RSL data in Chapter 3 indicates that at this time sea level was about 2m lower than today. Inspection of the bathymetric data offshore at Low Hauxley suggests that, on this basis, the LAT lay about 120m further out. This relatively short, horizontal displacement of the shoreline means that even in the Mesolithic Period the Low Hauxley site should be considered as coastal.

The summary report on the 1983 excavations noted the recovery of marine shells along with the Mesolithic stone tools. However, subsequent work has been unable to confirm the status of this site as a ***midden*** and the nature of the activity there remains unclear. The stone tool assemblage includes few finished implements and mostly consists of knapping debris from

which it may be inferred that one of the activities at the site was the processing of raw material. According to Middleton (LUAU 1995, 29-31) by far the largest number of items are made from a type of flint usually considered to originate in the eroding cliffs of Durham and North Yorkshire. However, he draws attention to the presence within the same deposit of two unworked pebbles of the same material which may suggest a more local source with raw material being collected from the boulder clay ridge or from the adjoining foreshore.

The fieldwalking programme at Howick led to the discovery of the Howick Burn ***occupation site*** (NU25851660, NH 5690). As well as an assemblage of 18,000 stone tools the excavation of this site uncovered the remains of a circular Mesolithic hut. This was partly sunk into the ground and although some of the structure had already been lost to erosion it was established to be about 6m in diameter. On the basis of radiocarbon dates obtained from successive hearth features, the construction of the hut has been dated to *circa* 7800 cal BC, which makes it the earliest dated evidence for human settlement in Northumberland. As well as stone tools, finds included charred animal bones and hazel nut shells and occasional marine shells, though the site should not be regarded as a ***midden***.. SLI and RSL data discussed in Chapter 3 indicate that at the time the Howick hut was occupied LAT was displaced horizontally by about 200m. This is unlikely to imply a wider foreshore as the cliff face can be expected to have lain farther east by an equivalent amount.

Figure 8.8 Site of the Mesolithic hut at Howick Burn (ARS)

The Howick Burn site lies in SMP1 Unit 25 for which the 'Preferred Strategic Option' is 'Do Nothing'. This clearly has major implications for the survival of any further archaeological remains in the vicinity and the situation will need to be reviewed once the SMP2 data are available.

8.3.2 The Medieval and early Post-Medieval Periods

As noted in Chapters 6 and 7 the production of salt was an important activity in the Middle Ages, ***salterns*** or ***saltworks*** being identified in the coastal zone from Teesmouth to Cullercoats and it was noted that some of the salt pans at Cullercoats were moved to Blyth in the C18. Salt making had been an important activity on this section of the coast from at least the C11.

Linsley (2005, 141-143) has recorded a number documentary references to salt making at Blyth during the Middle Ages. Sometime between 1153 and 1165 a James de Bolam granted a salt pan to Brinkburn Priory. This was at Cowpen Shore on the south side of the river and is probably the site recorded in the HER as NH 12069 (NZ30958227). A second pan or group of pans is recorded near the mouth of the river in 1208, while Robert de Wincester granted some pans and a fishery on the north, Cambois, shore to Newminster Abbey in 1138-1140. These can be identified with the site at High Pans (NZ31018255, NH 12070). By 1533 there are records of 14 pans being in use at Blyth and with the dissolution of the monasteries in 1539 the salt pans were appropriated by the Crown, with 20 pans being recorded around the harbour in 1589. However, salt making at Blyth appears to have declined after that date and no surface remains have been identified.

A further Medieval salt making site is recorded in the HER at Gloster Hill, west of Amble (NU25660474, NH 5593). The first mention of this site is in a C12 charter which records the grant of a saltworks to Newminster Abbey. Hodgson (1899, 262) records that the site of a salt pan had been confirmed by digging while the HER notes a possible sleeching mound. Sleeching was the process employed in the Teesmouth salterns whereas direct boiling in pans was more commonly used north of the River Wear.

By the early C14 the fuel used to heat the salt pans was mainly coal and Linsley (2005, 142) notes the lease of coalmines at Cowpen Shore, Blyth in 1315. There are various other documentary references to the winning of coal for the salt industry in the C15 and C16 but no sites have been identified. This activity might have involved the digging of shallow pits, the quarrying of outcrops or the collection of seacoal.

The only formal ***harbour*** works that can be dated to the Medieval Period on this section of the coast are the remains of a small dock or quay at Dunstanburgh. Several authorities during the C20 discussed the probability that harbour facilities must have existed at Dunstanburgh but it was not until the 2003 survey that any formal remains were identified (Oswald *et* al 2006, 76-80). The site in question lies between 0.5-0.6km SSE of the Great Gatehouse at the head of the inlet known as Nova Scotia (NU259213) and protected to the east by the rocky spur of Cushat Stiel. The remains consist of a stone-built quay 72m long and increasing in width from 3.6m to 12m at the seaward end. The quay runs parallel to Cushat Stiel and a small sandy beach is confined between it and the quay. Although this is now rather boulder strewn, when cleared this has the potential to offer a secure place to beach several small boats or the occasional larger one. Several medieval documents may be taken to imply the existence of harbour facilities at Dunstanburgh. Two C14 sources refer to 'the Earl's boat' while a record of 1417 refers to three cobles belonging to the King being kept at Dunstanburgh for fishing and a reference of 1443 mentions a cargo of lead sheeting being brought to the castle from Newcastle.

The major harbours on this section of the coast mostly date from the Industrial Period and were developed as part of the infra-structure of the coal trade, though most have earlier antecedents documented in the historical record. For example, a lease of 1589 records an 'anchorage, beaconage, wharfage, [and] ballast quay' at Blyth (Linsley 2995, 142).

The only other potentially coastal/maritime feature on this part of the coast is also located in the Nova Scotia inlet at Dunstanburgh. This consists of a roughly rectangular structure 30m

across built of large blocks and exposed at low tide. It is thought that this may have been a ***fish trap***, though it would have needed to be supplemented by wicker hurdles or netting. It is undated but the nature of the construction led Oswald *et al* to suggest a medieval date.

8.3.3 The Industrial Period

8.3.3.1 Salt Making

The production of salt on this section of the coast continued into the post-Medieval Period. Salt making is recorded as taking place at Blyth in the C18, there being records of 14 pans operating in *circa* 1734, producing about 1000 tons of salt per year (Linsley 2005, 145). There are further records from the 1830s and the 1860s and production finally ceased around the year 1875. The HER records post-Medieval salt pans at NZ31668168 (NH 12124).

The salt making industry at Amble is also recorded as continuing in the C17, C18 and C19. In 1628 salt pans at Amble are recorded as worth 4s 0d per annum (NH 5626). In the C18 they were let jointly with a coal mine at a rent of £20 and production was still underway in 1887. This final phase of production took place close to the cemetery where a saltworks is marked on C19 OS maps (NU27490456). Today the foreshore here is known as Pan Point and Pan Rocks and a local street is Panhaven Road.

The most northerly salt producing site on this section of the coast is probably that at Pan Leazes, Alnmouth (NU241105, NH 5766). This name first appears on a map of 1614 where it refers to an embanked promontory lying within a bend in the River Aln while the term 'Pan Close' is used to indicate a five-side enclosure at the base of the promontory (Bettess and Bettess 2004). The HER records that a quantity of slaggy material has been noted eroding out of the sides of the promontory while mounds to the east have been identified as putative sleeching tips. The area is marked as 'Saltings' on the 1:10,000 OS Map, as are two other areas, one on the south side of the river at Waterside House, and called 'High Salt Close' on the 1791 map, and one upstream of Duchess's Bridge below the high ground of Mount Pleasant. Also, the main thoroughfare down to the ford pre-dating the construction of Duchess's Bridge was known in the C18 as 'Salters Lane.' Accordingly, the salt industry at Alnmouth may have been more extensive than recorded in the HER. None of these remains have been dated.

8.3.3.2 Oyster cultivation

In addition to salt production this section of the River Aln was also used for the cultivation of oysters, ***oyster beds*** having been identified at NU241541048 (NH 5729). These are marked on the 1865 OS Map has 'Oyster Ponds' and appear to consist of five irregular enclosures in a line across the base of the Pan Leazes promontory. Bettess and Bettess (2004, 18) were able to record two of these features which are exposed at low tide while the remaining three are covered by vegetation. Both consisted of stakes set into the foreshore as a revetment to wooden boards. The more easterly of the two measured about 6m by 9.5m while the other situated immediately to the west was also 9.5m long but only 4m wide. The smaller feature had two parallel but curving lines of stakes approaching the NW corner. These oyster beds have not been dated but they are considered to partly overlay the High Ford which had gone out of use by 1865.

Figure 8.9 Oyster beds at Alnmouth (author)

The area is being actively eroded by the river and the SMP1 data show the whole area to be at risk of flooding. It lies in SMP1 Unit 28 for which The 'Preferred Strategic Option' is 'Selectively hold the line'. It will be necessary to reconsider the situation once the SMP2 data become available.

8.3.3.3 Harbours and Ports

As stated above, the major harbours on this section of the coast mostly date from the Industrial Period and were developed in the C19 and C20 as part of the infra-structure of the coal trade. Although earlier harbour facilities are recorded at Blyth few, if any, of these features survived the development of Blyth as a major coal port in the second half of the C19. These developments have been described in detail by Linsley (2005, 141-169). After much deliberation, the development of the modern port got underway in the 1850s under the direction of James Abernethy. He proposed the construction of breakwaters, the deepening of the channel and the formation of wet docks. Work began on the east breakwater (NH 12121) in 1853 but financial constraints meant progress was slow and major works were still being undertaken three decades later. In 1872 the North Eastern Railway Company had built a deep water quay and two coal ***staiths*** on the south side of the river and by 1884 had added over 330m of staiths at Low Quay with further staiths being added in 1888 and 1896 while the railway company erected four new staiths on the north side of the river. A new west breakwater (NH 12140) was completed in 1885 and the eastern one extended in 1886 while the new 'South Harbour' was opened in 1899. Expansion of the harbour facilities continued into the early C20 with the extension of the eastern breakwater in 1907, the construction of a new lighthouse in 1908 and the West Blyth Staiths between 1912 and 1928. By the 1960s Blyth was the largest coal shipping port in Europe.

While main features of Blyth Harbour, the breakwaters, quays and South Harbour, survive, vestiges of its pre-eminence as a coal port are becoming increasingly rare. The main surviving assets of this period are the remains of the North and West Staiths, both somewhat reduced from their original form. The West Staithes (NZ30738274, NH 12075),

were the last of the traditional staithes to be built on the River Blyth. Their construction began in *circa* 1910 for the North Eastern Railway Company, but the First World War intervened and they were completed in 1923. Originally a 500m long structure comprising three decks carried on a series of trusses, they are today visible as a 373m length of the lower deck only; the two upper two decks and 130m of the whole having been demolished in 1994/5. The West Staiths at Blyth are currently a Grade II* Listed Building.

The history of Warkworth (Amble) Harbour has been fully described by Linsley (2005, 120-140) and like Blyth the development of formal port facilities at the mouth of the Coquet was dependent upon the C19 expansion of coal mining in the area. The harbour improvement plan by John Rennie was passed by an Act of Parliament in June 1837. This envisaged the construction of a North Pier to protect the harbour mouth in heavy seas and a breakwater on the south side running from Pan Rocks towards the North Pier, leaving an entrance 76m wide. New quays and coal staiths were to be provided within the harbour. The works were complete by 1849 except for the addition of a fish dock in 1878. Both the North Pier and the South Breakwater were extended in the late C19 and early C20. With the closure of the coal mines most of the traces of coal shipment at Amble have been removed.

The estuary of the River Aln at Alnmouth was an important grain exporting port in the C16, C17 and C18. It lay at the far end of the 'Alemouth Road' which ran from Hexham and through Rothbury. The grain trade at Alnmouth is evidenced by many fine stone built granneries which line Northumberland Street but the port never developed any formal harbour works, vessels simply either anchored in the river or took the ground at low tide.

Figure 8.10 A vessel 'taking the ground' in Alnmouth Harbour (author)

The only harbour structure recorded in the HER is the Old Watch Tower (NU24551051, NH 5754), the Harbour Master's office. This is an C18 brick structure and a Grade II Listed Building. The fortunes of Alnmouth changed dramatically in 1806 when the river changed its course and greatly reduced the size of the sheltered anchorage.

The harbour at Craster dates from the early years of the C20 when it was built as a memorial

to Capt. John Craster who was killed during the 1904 Younghusband expedition to Tibet.

Figure 8.11 The memorial plaque at Craster Harbour (author)

The harbour works consist of a concrete North Pier extending 64m to the SE and a concrete South Pier which runs for 60m NE and then a further 70m due north towards the North Pier, leaving an entrance about 45m wide. At low tide the harbour dries out. The harbour was constructed mainly for the shipment of whinstone from the nearby quarries, though it also served the fishermen who had used the haven for centuries.

Figure 8.12 Craster Harbour (author)

8.3.3.4 Shipbuilding

Ship building at Blyth is recorded from the middle of the C18 and there were three active yards in 1804. These included Hannay's Low Yard (NZ31888162, NH 12126) and the Clark and Taylor yard at Cowpen Square (NZ31418192, NH 12146). The first dry dock was

constructed by Linskill & Co. in 1811 and subsequently three more were added at the Cowpen Square yard. The HER also has records of three roperies (NZ31818107, NH 12131; NZ31868146, NH 12130 and NZ31818135). Three dry docks survive to the west of High Quay.

Shipbuilding at Amble is first recorded in the 1830s when a Monkwearmouth firm began to build ships on Amble Braid and between 1851 and 1861 Messrs Leighton & Sanderson built seven ships before closing down their operation (Linsley 2005, 132-133). Harrisons opened their yard in 1870 and have continued in production down to the present day.

Linsley (2005, 115) quotes records of shipbuilding at Alnmouth in the mid C18 to the mid C19, including substantial merchant vessels such as the 219 ton *Providence* launched in 1765 as well as smaller fishing cobles.

8.3.3.5 Aids to Navigation and Safety at Sea

Lighthouses

The HER records a lighthouse at Blyth commissioned by Ridley and Co and built in 1730 (NZ32038126, NH 12120). This structure is no longer extant.

The lighthouse (NH 5611, NU29300454) on Coquet Island was built in 1839-1841 incorporating the remains of a C15 tower which adjoined the medieval monastic cell. This influenced the shape of the lighthouse which is a square tower standing 21.9m high with a crenelated parapet. It is a Grade II* Listed Building.

Figure 8.13 Coquet Island Lighthouse (author)

Seamarks

The oldest extant feature at Blyth Harbour is the High Light lighthouse (NZ31988134, NH 12077). This was initially built in 1788 nd further raised in 1888 and 1900 to give a final height of 18.7m. The C18 section is stone built while that added in 1888 is in brick. It worked in conjunction with a Low Light until 1985 when the system was superseded by

modern navigational aids. The High Light is a Grade II Listed Building.

Figure 8.14 The High Light at Blyth (author)

The HER records a group of three navigation beacons at Blyth Harbour (NZ32088048, NZ32218118 and NZ32718059, NH 12169). These first appear on a map of Blyth Harbour dated 1682 but are also recorded on the 1865 OS Map.

Lifeboat Stations and Volunteer Life Brigade Facilities

The HER records a lifeboat house at Cambois (NZ31198281, NH 18303) and a lifeboat station at Huxley (NU28580281, NH 20354). The Alnmouth Lifeboat Station consists of a pair of stone-built mid C19 buildings (NU25091075, NH 14178). They are both Grade II Listed Buildings.

Figure 8.15 Boulmer Volunteer Rescue Service building (author)

However, in addition to these records there is a late C19 lifeboat house at Blyth adjoining the South Harbour (NZ321805) while at Boulmer The Volunteer Rescue Service occupies a similar building (NU26551412). Neither feature in the HER or NMR.

Coastguard Stations

The coastguard station and watch house at Low Newton-by-the-Sea (NU24052487, NH 14327) occupies a conspicuous eminence of 30m OD and 250m from MHWS. It is an early C19 structure, T-shape in plan and of a single storey. A watching brief undertaken during drainage works at the site in 1992 reported identified human bone and has led to the suggestion that the site may include the remains of a small cairn.

8.3.3.6 Shipwrecks

As was the case with Blocks 1 and 3, shipwrecks are also a feature of the coastal/maritime landscape of Block 2. Large numbers of shipwrecks are recorded in the NMR with a few additional entries in the HER. Most of these are in deep water beyond LAT. However, a number are recorded between LAT and MHWS and these are listed in the following table. Most of these records have been taken from historical sources such as Lloyds Registers and the local press and the existence of a record does not necessary imply that remains are still visible on the foreshore.

Table 8.8 Shipwrecks between MHWS and LAT in Block 2

NGR	Name of vessel	Date lost	HER	SMP
NZ32958057	?	1831	NMR 1410079	41
NZ32718078	?	?	NMR 907638	41
NU25460740	*Duke of Kent*	1831	NMR 1047754	29
NU257068	*The Hanseat*	1980	NH 5549	29
NU25991099	*Annie Walker*	1928	NH 5775	29
NU26301659	*Tadome*	1928	NH 5685	25
NU261178	Submarine *G-11*	1918	NH 5684	25
NU2618	*The Mindle*	1916	NH 5686	24
NU25802130	Polish trawler	1958 or 1969	NH 5878	21
NU24302306	?	?	NH 5870	20

In addition to the wrecks listed in the above table a number of wooden hulks lie beached on the sands on the north side of Amble Harbour (NU264049). These are recorded in the NMR (907646-907649). From satellite imagery and the APTE it has been possible to identify six substantial vessels each measuring about 20m by 10m and remains of at least two smaller vessels measuring 8m by 4m. Parry (2006, 19) has suggested that these may be abandoned herring boats while an alternative view recorded by local inquiry is that they were coal lighters. In either event, this is an important collection of timber vessels dating from at least the early C20 and requires further study.

Figure 8.16 Wooden hulks on the north shore at Amble Harbour (author)

The Amble hulks lie within SMP1 Unit 30 for which The 'Preferred Strategic Option' is 'Selectively hold the line'. It will be necessary to reconsider the situation once the SMP2 data become available but it is unlikely resources will be made available to protect these remains from the effects of rising sea level. A full survey should be considered an urgent priority.

8.4 Military Coastal Defence

8.4.1 C19

The only asset to be described in this section is the Old Battery (NZ25131108, NH 5776) overlooking Alnmouth Links. This structure was erected in 1881. It is partly sunk below ground level and consists of a rectangular chamber with a small magazine, above which was a turret. This was later modified as a WWII pillbox. An inscribed tablet reads as follows:

> "THIS BATTERY WAS ERECTED BY HIS GRACE ALGERNON DUKE OF NORTHUMBERLAND K.G. FOR THE USE OF THE PERCY ARTILLERY VOLUNTEERS COMPLETED 12TH MARCH 1881."

The Old Battery is a Grade II Listed Building.

8.4.2 World War II

The majority of coastal/maritime features in Block 2 date from WWII and the approach followed here is that set out in Chapter 5 of NERCZA. Major sites are described in detail with minor sites being given a more general treatment, or presented in tabular form. The WWII military features in the coastal zone can be divided into two groups according to whether their role was mainly to defend against bombardment, from the sea or from the air, or to confront a possible invasion, although the two categories are not mutually exclusive.

8.4.2.1 Coastal Defence Batteries

Two ***coastal defence batteries*** are recorded on this section of the coast by Dobinson (2000, 297) but only one features in the HER, while two further sites have been identified during the APTE. The two listed by Dobinson were Emergency Batteries of Northern Command. The Amble Battery (NU277042) mounted two 6 inch naval guns in 1944 and 1945 while the Hemscott Battery (NZ28079533, NH 15551) at Druridge Bay mounted a similar armament. This latter site included a Battery Observation Post, two searchlights, a generator and Nissen huts for accommodation. It is recorded as having been destroyed, although fragmentary remains can still be identified in the dunes. It was part of the Druridge Bay Defence Area to be considered further below. One of the sites recorded by the APTE (NMR 1467428) lay on Newbiggin Moor at NZ31668927. It appeared on an aerial photograph taken in August 1941 and consisted of two emplacements, probably for 6 inch or 4 inch guns. The second site recorded by the APTE (NMR 1443915) lay in the fields north of Cresswell village (NZ29039380). It is recorded on an aerial photograph taken in June 1941 but it has only been possible to transcribe the perimeter enclosure.

8.4.2.2 Anti-aircraft defences

The HER and the APTE has recorded a single ***heavy anti-aircraft battery*** in Block 2. Site NH 11685 (NZ29898504) formed part of the defences of the Port of Blyth. It was probably the northern equivalent of the Gloster Lodge HAAA Battery (NH 11929). It was noted in a list of batteries dated 1942 but was in the process of being dismantled by 1946, though the *DoB* archive describes it as being relatively intact in 1988. The APTE transcription shows it to be of the standard, 'clover-leaf', pattern with four octagonal emplacements for 4.5 inch guns arranged in an arc to the east of the command post and two rectangular emplacements for 3.7 inch guns implying a modification of the battery during the course of the war.

The anti-aircraft batteries were supported by the use of barrage balloons. These were mainly intended to make enemy aircraft fly higher or divert them from their targets. In order to deter under flying, in addition to the main tether, barrage balloons also supported a series of wires anchored to the ground. These leave a characteristic pattern and a number have been recorded by the APTE (Table 8.15).

8.4.2.3 Bombing decoys

As an alternative to shooting enemy aircraft down or forcing them to fly higher, pilots could be misled by the use of decoys. The only site of this type recorded in Block 2 is the decoy airfield at Long Houghton (NMR 1463955 and 1387328)(Dobinson 2000, 40) recorded from wartime aerial photographs. The features consist of a series of camouflaged runways, military buildings and trackways. This was a 'Q-type' and 'K-type' site intended to deflect enemy night and day bombing from RAF Acklington, which at the time the decoy was constructed contained Hurricane aircraft belonging to 13 Group. As it was also a daytime decoy it may be inferred that there were dummy buildings and dummy aircraft at the site. This location was later chosen as the site for RAF Boulmer, and is still operational.

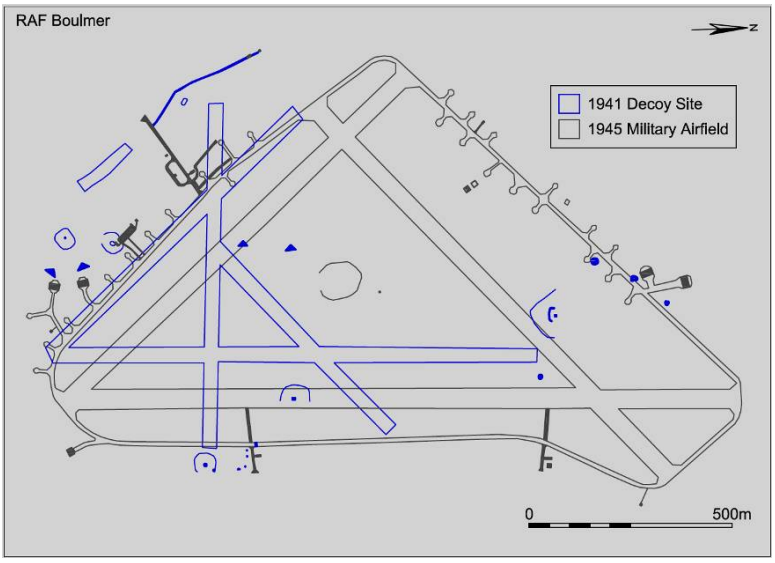


Figure 8.17 APTE record of the Long Houghton decoy airfield (English Heritage)

When the anti-aircraft batteries failed to hit their targets and the decoys failed to deceive, the population retreated to air-raid shelters, numerous examples of which have been recorded in the APTE (Table 8.16).

8.4.2.4 Anti-invasion defences

The HER and APTE have recorded a large number of other features that can be classified as anti-invasion defences. Broad sandy beaches likely to be attractive as potential landing sites are a conspicuous feature of Block 2 and the system of anti-invasion defences at Druridge Bay, the most vulnerable section of the coast, has been studied in detail by William Foot as Defence Area 60 in the English Heritage study.

This defence area consists of the section of foreshore and zone of sand dunes extending from the outskirts of Cresswell Village at Blakemoor Farm northwards for about 3.5km to beyond Druridge Farm. It consisted chiefly of a line of ***pillboxes*** situated in the sand dunes and an almost continuous length of ***anti-tank blocks***. These features were established in 1940 and from 1941 they were supplemented by ***anti-tank scaffolding***, an ***anti-tank ditch*** and ***minefields***. From 1941 onwards these defences were arranged around a series of defended localities; two at Druridge, one at Hemscott Hill and one in the rear at Chibburn Precepetory. Outside the NERCZA study area but part of the Druridge Bay Defence Area the village of Widdrington and Widdrington Station were defended by machine gun emplacements, road blocks and a further anti-tank ditch. The open fields were blocked by ***anti-glider obstacles***.

As commented on in the introduction, most of the area to the landward of the Druridge Bay dune system has been disturbed by opencast mining and the subsequent reinstatement of the land. This activity took place between 1957 and the mid 1970s and in the course of which all trace of WWII, and indeed earlier, features was removed. The surviving evidence for the Druridge Bay Defence Area consists of features within the dunes and on the foreshore. The

one exception to this is the C14 Chibburn Precepetory (NZ26599653, NH 11884) which had a pillbox (Foot S0015673) installed in the ruins of its chapel. This was removed during work on the chapel in the 1990s, but one of the gun loops has been retained in the chapel wall.

Of the features situated within the dunes or on the foreshore, some have been removed and some engulfed by sand. Foot's study is based on surviving evidence, aerial photographs and army records. It is the most comprehensive record of features at Druridge Bay and is used as the primary.

Table 8.9 Pillboxes recorded in the Druridge Bay Defence Area

NGR	Type	Foot	Condition
NZ29379479	?	S0016602	Destroyed
NZ28159492	Rectangular*	S0007011	Extant
NZ28129512	?	S0016597	Destroyed
NZ29719588	24 variant	S0007135	Part buried
NZ27829598	Hexagonal	S0016584	Destroyed
NZ27629677	Hexagonal	S0007220	Part buried

- This pillbox is disguised as a ruined cottage

Figure 8.18 Pillbox S0007011 Druridge Bay Defence Area (author)

In addition to pillboxes, Foot's study has also recorded a number of gun emplacements which fall into the category of ***beach defence batteries***.

Table 8.10 Beach defence batteries recorded in the Druridge Bay Defence Area

NGR	Location	Calibre	Foot	Condition
NZ291938	Blakemoor Links	?	S0016455	Destroyed
NZ28509415	Blakemoor Farm	2 pdr anti-tank gun	S0016473	Destroyed

NZ27739590	Druridge Farm South	6 pdr	S0016454	Destroyed
NZ27739599	Druridge Farm North	6 pdr	S0016453	Destroyed
NZ27489604	Druridge Farm	2 pdr anti-tank gun	S0016474	Destroyed

The foreshore was protected by a continuous line of anti-tank blocks set within and at the foot of the dunes while to the rear of the dunes was a continuous anti-tank ditch. The blocks can be found almost anywhere while a section of anti-tank ditch survives to the north of Druridge Farm.

Figure 8.19 Anti-tank blocks in the Druridge Bay Defence Area (author)

A further line of defence on the seaward side was provided by continuous beach scaffolding which can be seen clearly on wartime aerial photographs while a minefield has been recorded at NZ27859570 (Foot S0016585). The anti-glider obstacles were destroyed during the opencast mining. A central feature of the defence area was the Hemscott Hill Coastal Defence Battery which has been referred to above. Foot reports that support was provided in the rear by two 60 pdr guns and a 4.75 inch tasked to fire on to the beach. These lay outside the NERCZA area. Some features within the area relate to the use of Druridge Bay as a bombing range.

Anti-invasion features are recorded, and survive, at other places along this section of coast. Details of the main features are provided in the tables below.

8.4.2.5 Anti-glider obstacles

In addition to those forming part of the Druridge Bay Defence Area described above anti-glider defences are widespread on this section of the coast and numerous examples have been recorded by the APTE.

Table 8.11 Anti-glider obstacles in Block 2

NGR	Location	Type	NMR	SMP	Importance	Risk
NZ29688394	North Blyth	Lattice	1470005	39	Low	Low
NZ29678442	North Blyth	Lattice	1470005	39	Low	Low
NZ29788510	South of Wansbeck river	Lattice	1467320	39	Low	Low
NZ29018510	South of Wansbeck river	Lattice	1467314	39	Low	Low
NZ30578651	South Newbiggin	Lattice	1467346	37	Low	Low
NZ31308885	North Newbiggin	Lattice	1467413	35	Low	Low
NZ29199255	Cresswell	Lattice	1468814	32	Low	Low
NU27710191	Hauxley	Linear	1469636	32	Low	Low
NU27900280	Hauxley	Linear	1469642	32	Low	Low
NU27640370	Hauxley	Linear	1469694	32	Low	Low
NU25331154	Boumer	Linear	1470392	26	Low	Low
NU25851434	Boumer	Linear	1470368	26	Low	Low
NU25191505	Boumer	Linear	1470217	26	Low	Low
NU25831171	Howick	Linear	1470184	24	Low	Low
NU25162033	Craster	Linear	1470656	21	Low	Low
NU23382468	Low Newton	Linear	1470739	20	Low	Low

8.4.2.6 Radar Stations

Three Radar Stations have been identified on this section of the coast. The most fully studied is that recorded on The Heughs at Craster (NU25462040, NMR 1443707 and NH 5877)). This site has been the subject of a detailed study by Hunt and Ainsworth (Hunt and Ainsworth 2006). The site has been identified as part of the ***Chain Home Low*** system. Two buildings survive; the rectangular TxRx block and the 'L-shaped' Stand-by Set House while the foundations of others were also noted in the undergrowth, including the hard standings for Nissen huts. The complex was surrounded by 11 weapons pits and a double barbed-wire enclosure. The station was apparently operational between 1941 and 1944 and housed POWs at the end of the War.

A further radar station of this type has been plotted during the course of the APTE at NU29729246 (NMR 1468808). The plot has recorded the Transmitter/Receiver (Tx/Rx) Block and the Stand-by Set House.

The APTE recorded a large number of other features for which basic details are provided in the following tables.

Table 8.12 Pillboxes identified from aerial photographs

OS Sheet	Eastings	Northings	NMR	SMP
NU 20 NE	265	051	1469571	29,30
NU 20 NE	252	072	1469634	29
NU 20 NE	257	063	1469643	29
NU 20 NW	2498	0624	1469543	29
NU 20 NW	2478	0881	1469545	29
NU 20 NW	2493	0962	1469550	29
NU 20 NW	249	087	1469596	29
NU 20 SE	2810	0142	1421546	32
NU 20 SE	2807	0194	1469646	32
NU 20 SE	2725	0147	1469657	32
NU 20 SE	278	007	1469663	32
NU 20 SE	275	003	1469665	32
NU 20 SE	279	009	1469671	32
NU 20 SE	283	017	1469675	32
NU 20 SE	261	044	1469706	29
NU 20 SE	2653	0464	1469714	30
NU 20 SE	2694	0481	1469717	30
NU 20 SE	276	042	1469730	31
NU 20 SE	281	025	1469758	32
NU 20 SE	282	017	1469761	32
NU 20 SE	2812	0150	1469763	32
NU 20 SE	2510	0456	1469810	29
NU 21 NE	25340	19751	1470138	22
NU 21 NE	257	195	1470171	22,23
NU 21 NE	2613	1588	1470233	25
NU 21 SE	26119	14484	1387343	26
NU 21 SE	2666	1330	1470418	26
NU 21 SE	2575	1167	1470420	27
NU 21 SE	2505	1064	1470422	27
NU 21 SE	2665	1451	1470967	26
NU 21 SE	2675	1297	1470974	26
NU 21 SE	2659	1264	1470983	26
NU 21 SE	261	125	1471000	26,27
NU 21 SE	2580	1207	1471016	27
NU 21 SE	2579	1367	1471046	26
NU 21 SE	2597	1302	1471049	26
NU 21 SE	2612	1279	1471055	26
NU 21 SE	2557	1259	1471061	27
NU 21 SE	2555	1247	1471062	27
NU 21 SW	2458	1005	1470340	29
NU 21 SW	2476	1031	1470350	28
NU 21 SW	2492	1046	1470351	27
NU 22 SE	2574	2192	8243	20,21
NU 22 SE	25719	21532	1417824	21

NU 22 SE	2525	2231	1421686	20
NU 22 SE	2508	2066	1470660	21
NU 22 SE	2521	2235	1470685	20
NU 22 SW	24782	21341	1421655	20
NU 22 SW	24639	22441	1421684	20
NU 22 SW	2445	2400	1470758	20
NU 22 SW	2360	2379	1470771	20
NU 22 SW	2427	2294	1470814	20
NU 22 SW	2436	2213	1470818	20
NU 22 SW	2447	2244	1470829	20
NZ 28 SE	2996	8339	1470013	39
NZ 29 NE	275	967	1418884	32
NZ 29 NE	27889	95867	1421553	32
NZ 29 NE	28311	95012	1421560	32
NZ 29 NE	27784	95973	1443628	32
NZ 29 NE	2716	9847	1468570	32
NZ 29 NE	2733	9840	1468573	32
NZ 29 NE	2717	9824	1468575	32
NZ 29 NE	2735	9789	1468622	32
NZ 29 NE	2737	9738	1468645	32
NZ 29 NE	2747	9734	1468648	32
NZ 29 NE	2747	9705	1468677	32
NZ 29 NE	2806	9530	1468847	32
NZ 29 NE	2827	9518	1468855	32
NZ 29 NE	2753	9682	1468910	32
NZ 29 SE	28148	94926	1421444	32
NZ 29 SE	28841	93767	1468774	32
NZ 29 SE	28973	93964	1468784	32
NZ 29 SE	29596	92462	1468823	33
NZ 29 SE	2814	9371	1470645	32
NZ 29 SE	2856	9427	1470674	32
NZ 29 SE	2880	9413	1470683	32
NZ 38 NW	3030	8575	1417826	37
NZ 38 NW	3160	8852	1421564	35
NZ 38 NW	3193	8806	1467374	36
NZ 38 NW	3187	8810	1467378	36
NZ 38 NW	3141	8889	1467417	35
NZ 38 NW	316	891	1467428	35
NZ 38 NW	310	895	1467433	34,35
NZ 38 SW	3061	8388	1421566	39
NZ 38 SW	3061	8382	1421567	39
NZ 38 SW	323	805	1427382	42
NZ 38 SW	3051	8425	1467026	39
NZ 38 SW	3053	8410	1470047	39
NZ 38 SW	320	812	1470146	40
NZ 39 SW	3025	9091	1468840	33

Table 8.13 Anti-tank blocks identified from aerial photographs

OS Sheet	Eastings	Northings	NMR	SMP
NU 20 NE	2520	0808	1469633	29
NU 20 NE	252	072	1469634	29
NU 20 NE	256	068	1469637	29
NU 20 NE	257	063	1469643	29
NU 20 NW	248	098	1469547	28,27
NU 20 NW	24595	09506	1469556	29
NU 20 SE	27463	00011	1469613	32
NU 20 SE	278	009	1469616	32
NU 20 SE	281	015	1469650	32
NU 20 SE	279	009	1469673	32
NU 20 SE	286	025	1469698	32
NU 20 SE	264	036	1469701	29,30,31
NU 21 NE	257	199	1470157	22
NU 21 NE	2620	1732	1470187	24
NU 21 SE	26629	14152	1427712	26
NU 21 SE	2625	1256	1470413	26
NU 21 SE	2579	1182	1470416	27
NU 21 SE	250	106	1470417	27,28
NU 21 SE	2589	1215	1471019	27
NU 22 SW	2431	2324	1421602	20
NU 22 SW	242	243	1470753	20
NU 22 SW	247	224	1470836	20
NZ 29 NE	2727	9896	1468535	32
NZ 29 NE	2702	9828	1468548	32
NZ 29 NE	2723	9685	1468697	32
NZ 29 NE	2744	9697	1468707	32
NZ 29 NE	2761	9640	1468718	32
NZ 29 NE	2787	9531	1468848	32
NZ 29 NE	2813	9500	1468850	32
NZ 29 NE	2793	9541	1468852	32
NZ 29 NE	274	975	1468920	32
NZ 29 NE	2729	9766	1468991	32
NZ 29 SE	29127	93838	1443915	32
NZ 29 SE	2879	9422	1468763	32
NZ 29 SE	282	948	1470632	32
NZ 29 SE	2982	9208	1470760	33
NZ 38 NW	315	879	1467368	36
NZ 38 NW	318	881	1467383	36
NZ 38 NW	31711	88350	1467397	35
NZ 38 NW	310	895	1467433	34,35
NZ 38 NW	3073	8999	1467434	34

Table 8.14 Minefields identified from aerial photographs

OS Sheet	Eastings	Northings	NMR	SMP
NU 20 SE	2831	0178	1469677	32
NU 20 SE	2863	0205	1469690	32
NU 20 SE	280	037	1469733	31
NU 20 SE	281	025	1469758	32
NU 20 SE	2808	0142	1469766	32
NU 21 SE	267	128	1470973	26
NU 22 SW	244	239	1470768	20
NZ 29 NE	2791	9571	1468352	32
NZ 29 NE	2723	9797	1468612	32
NZ 29 SE	2858	9439	1468716	32

Table 8.15 Barrage Balloon Sites identified from aerial photographs

OS Sheet	Eastings	Northings	NMR	SMP
NZ 38 SW	3204	8139	1466938	40
NZ 38 SW	3125	8248	1466993	39
NZ 38 SW	3059	8334	1467003	39

Table 8.16 Air-raid shelters identified from aerial photographs

OS Sheet	Eastings	Northings	NMR	SMP
NU 20 SE	26524	04351	1469712	29,30
NZ 38 NW	309	874	1467353	36
NZ 38 NW	313	881	1467358	36
NZ 38 SW	316	812	1466959	40,42
NZ 38 SW	304	838	1470059	39
NZ 38 SW	310	822	1470144	39

CHAPTER 9

Low Newton-by-the-Sea to Marshall Meadows Point, Berwick-upon-Tweed (Block 4 NMP)

9.1 Introduction

The area covered extends from Low Newton-by-the-Sea to the Scottish Border at Marshall Meadows Point. It falls within a single major topographical unit, the Northumberland coastal plain. Accordingly, this survey of the heritage assets has been undertaken with reference to the Historic Environment Records (HERs) maintained by Northumberland County Council. This existing data base has been enhanced by the transcription of aerial photographs held by the National Monuments Record and carried out to the standards of the National Mapping Programme (NMP). This work is referred to as the Air Photograph Transcription Exercise (APTE).

This entire section of coastline, with the exception of 2.5km at the mouth of the River Tweed, has been designated as a 'Heritage Coast' while the section as far north as Spittal lies within the Northumberland Coast Area of Outstanding Natural Beauty (AONB). These two designations also include the Farne Islands and Holy Island. In addition, the whole of the foreshore zone has been designated as a SSSI while the Farne Islands and the foreshore from Budle Bay to Cheswick Black Rocks are National Nature Reserves.

The National Trust manages sections of coastal sand dunes at Beadnell Bay and at St Aidan's Dunes, North Sunderland. The Farne Islands are also managed by the Trust as is Lindisfarne Castle and the adjoining foreshore on Holy Island.

9.1.1 Soils and landuse

The solid geology of this section of the coast is described in Chapter 3, though throughout most of the coastal zone this solid geology is mantled by varying thicknesses of glacial drift and other superficial deposits of Pleistocene and Holocene age. It is these superficial deposits that give rise to the principal soil types found along this section of the coast.

Table 9.1 Soil and landuse in Block 4

Deep loam	Stock rearing and dairying with some cereals
Seasonally wet deep loam to clay	Grassland in moist lowlands with some arable in drier areas
Seasonally wet deep loam	Winter cereals, stock and dairying
Seasonally wet deep red loam to clay	Dairying
Seasonally wet deep clay	Winter cereals, sugar beet, potatoes and field vegetables
Seasonally wet deep sandy	Cereal, potatoes and sugar beet
Loam over red sandstone	Dairying

Shallow peat over hard rock	Farne Islands
Dune sand	Recreation and some coniferous woodland

The patterns of landuse that characterise these soil types are an important consideration in evaluating the survival of heritage assets and the degree of threat arising from normal farming practices. Clearly, ploughing for arable cultivation will have had a major bearing on the survival of and the extent to which, once levelled sites can be identified on aerial photographs. Plough damage to archaeological sites is not a recent phenomenon but before the Medieval Period the scale and intensity of ploughing was insignificant compared with later periods. However, the development of ridge-and-furrow cultivation in the open fields of the Medieval and post-Medieval Periods was on a sufficient scale to pose a serious threat to existing features.

9.1.2 Coastal erosion

This section of the coast is predominantly low lying, consisting of broad sandy beaches backed by dune systems or low cliff lines (<10m OD) mainly formed in the boulder clay, the under lying bedrock being exposed at beach level and on the wave cut platforms between MHWS and LAT. The foreshore is punctuated by Whin Sill Dykes, usually trending SW-NE, and alternating beds of Carboniferous Limestone, Sandstone and Mudstones which occasionally give rise to low cliffs.

The Farne Islands lie between 2km and 4.5km offshore. The number of islands varies according to the state of the tide but 33 are usually exposed at MHWS, an inner group of 14 and an outer group of 19. Geologically they are part of the Whin Sill formation of the Late Carboniferous and support only shallow peaty soils. Holy Island is predominantly formed of limestone capped by boulder clay and alluvium in the central depression while Lindsifarne Castle is situated on a Whin Sill dyke. The westward extension of the island is a line of interlinked dunes.

The section of the coast from Cocklawburn Beach to the southern outskirts of Spittal is strikingly different from sections to the south, being formed of limestone cliffs rising to 30m OD. At Spittal the cliff line trends inland and gives way to the lowlying land around the mouth of the River Tweed, with Berwick-upon-Tweed occupying the northern shore. North of Berwick the limestone cliffs resume with an outcrop of the Scremerston Coal Group being exposed on the foreshore.

The section of the coast falls within Cell 1a of the Shoreline Management Plan (SMP). At the time of writing the SMP2 for this zone is currently being produced and the NERCZA data have to be assessed against the less detailed SMP1 criteria, produced by Posford Duvivier in 1997. This section of the coast lies within SMP1 Policy Units 6 to 19 and for each of these units the SMP1 document offers a 'Preferred Strategic Option' which is the equivalent of the 'Policy Recommendations' of SMP2. These are given as 'Do Nothing' (DN), 'Hold the line' (HTL) or 'Selectively hold the line' (SHTL), and are listed in Table 9.2.

Table 9.2 SMP1 proposed responses to predicted coastal change in Block 4

Location	SMP Unit	Policy
Marshall Meadows Point to Neddles Eye	6	SHTL
Neddles Eye to Berwick North Pier	7	DN
Berwick-upon-Tweed	8	HTL
Tweedmouth	9	HTL
Spittal	10	HTL
Dear's Head to Saltpan Rocks	11	SHTL
Saltpan Rocks to Cheswick Shiel	12	DN
Cheswick Shiel to Beachcomber House	13	SHTL
Beachcomber House to Budle Bay	14	SHTL
Budle Bay to Harkess Rocks	15	SHTL
Harkess Rocks to The Tumblers	16	DN
The Tumblers to Beadnell Harbour	17	SHTL
Beadnell Bay North	18	DN
Beadnell Bay and Football Hole	19	DN

Figure 9.1 The partially eroded C18 Limekilns at Beadnell Harbour; the SMP1 'Preferred Strategic Option' here (Unit 17) is *Selectively Hold the Line* (author)

Reference is made to *A Strategy for Coastal Archaeology in Northumberland* (SCAN), published by Northumberland County Council and English Heritage in 1993. This document focuses on two principal issues, the damage and destruction of archaeological sites through coastal erosion and the exposure of remains through dune movement, which ultimately also leads to their damage and destruction. Field work carried out by the Glasgow University Archaeology Research Division examined 112km (70 miles) of coastline and assessed the potential threat to archaeological remains in the twenty-six 1:10,000 OS Map sheets in which the coastline falls. Eleven of these map sheets cover the section of coast examined in this chapter. For each sheet *SCAN* provides an assessment of the archaeological potential and the level of risk from erosion. These data are summarised in the following table.

Table 9.3 Archaeological potential and risk from erosion in Block 4

1:10,000 OS Map sheet	Potential	Erosion
NT 95 NE	Low	Medium
NU 05 SW	Low	Low
NU 04 NW	Medium	High
NU 04 NE	Medium	Low
NU 04 SE	Medium	Low
NU 14 SW	High	High
NU 13 NW	High	High
NU 13 NE	High	Medium
NU 13 SE	High	Low
NU 23 SW	Medium	Medium
NU22 NW	High	High

(source:*A Strategy for Coastal Archaeology in Northumberland,* 1993)

The foregoing study is mainly based on the study of historic maps and aerial photographs backed up by some on the ground inspection. An example is provided by the study of shoreline at Bamburgh carried out as part of the *Bamburgh Research Project* (Young 2001-2002). Here, a study of mid C19 Ordnance Survey maps has shown that 150 years ago the sea reached the foot of the rock on which the castle is built whereas today a band of sand dunes 100m wide separates the castle from MHWS. In this case we are witnessing the opposite of coastal erosion, a situation which emphasises the need for the systematic collection of data in relation to sea level change, erosion and accretion.

9.2 Terrestrial Landscapes

9.2.1 Early Prehistory

Although Block 4 lay within the realm of Palaeolithic settlement, at least during the Late Upper Palaeolithic Period, no finds of this date have been recorded in the coastal zone. The earliest evidence for a human presence belongs to the Mesolithic Period and this category of evidence is dealt with in the section on Coastal/Maritime Landscapes.

9.2.2 The Neolithic Period and the Bronze Age

The only Neolithic finds from this part of the coast consist of four records of isolated stone axe head finds and the identification of some Neolithic leaf-shaped arrowheads from the mixed assemblage at Ness End on Holy Island (NU130438, NH 5360) while Neolithic Period activity has been identified in excavations at Marygate, Holy Island village. These finds do little other than illustrate that this part of the coast was occupied during the

Neolithic period.

Apart from the find of a spearhead on Holy Island (NH 5350) and a putative ***standing stone,*** the Bronze Age is mainly represented by ***round barrows*** or ***cairns*** and stone ***cists***, which may or may not have been originally covered by a mound.

The standing stone (NU21573201, NH 12269) is situated at about 20m OD in a field to the north of Seahouses. It is a sub-rectangular block of red sandstone standing about 0.85m high and is 0.4m wide and 0.2m thick. As such it is very small and may be misidentified. However, it is situated close to the spot where eight cists were found in 1905 and it could be an upended capstone.

The barrows and cists make an interesting addition to the corpus of Bronze Age funerary monuments on the Northumberland coast.

The Benthall round cairn was discovered in 1934 during the construction of a timber fisherman's hut (Askew 1938). It is situated immediately above the foreshore. The mound consisted of water worn boulders, pebbles and sand. It is about 15m in diameter and stands to 0.4m.Two cists, built of sandstone slabs, were found inserted into the edge of the mound. Cist 1 measured 0.9m by 0.5m by 0.45m. When the capstone was removed it was found to contain a disarticulated skeleton but no grave goods. Cist 2 was a little smaller. It contained a crouched inhumation and a Food Vessel. The Benthall round cairn is a Scheduled Ancient Monument.

Two cairns were discovered in 1970 during the construction of a caravan park at Beadnell Links (NU23042991 and NU 23022993, NH 5788) (Tait and Jobey 1971). Cairn 1 had been destroyed by the time the archaeologists arrived on site but it was established to have been about 4m in diameter. Cairn 2 was 5.8m in diameter and about 1m high. It was constructed of sea-rolled cobbles with a kerb of larger boulders. It contained a cist from which were recovered the remains of 19 individuals, though the find of a Romano-British brooch on the shoulder of an articulated burial implied that the cist had been reused (Whimster 1981).

The HER records the site of a round barrow at Bamburgh (NU18403451, NH 5251). This mound is irregular in shape and measures 55m by 90m and stands 3m high. Although unusually large, limited excavation in 1928 established that the mound is indeed artificial (Hodgkin 1931). There are the remains of a cist, measuring 1.38m by 0.75m, near the summit of the mound which was found to contain the fragmentary skeleton of a male while the HER records the recovery of an 'urn' in the C19. Measurements taken from the APTE transcription of this site, 38m by 50m, suggest that there has been some denudation since the site was originally recorded. The Bamburgh round barrow is a Scheduled Ancient Monument.

Another large barrow is recorded from documentary evidence about 200m from MHWS at Cheswick Beach (NU039470, NH 3968). It is recorded as having been about 15m in diameter and constructed of water-worn stones. In was opened in 1826 and found to contain a primary burial in a cist and several secondary inhumations. The cist measured 1.5m by 0.77m and, in addition to the burial, contained a bronze knife (Donaldson 1834).

A number of other HER records refer to cists, which are nevertheless attributed to the Bronze Age. There is a C19 record of two cists being found immediately adjoining the foreshore to the north of the Benthall round cairn (NU236293, NH 5784), although they appear to be no longer extant. Another C19 reference records a cist containing a burial and three 'urns' found in the yard of the Blue Bell Inn, North Sunderland (NU21113146, NH 5901). From the description as 'drinking cups', these vessels may have been Beakers (Askew 1938; Bateson 1893, 307). A further eight cists were found at Seahouses in 1905 (NU21603202, NH 5903). Most contained crouched inhumations and the assemblage included two Beakers, two Food Vessels and a cup-and-ring marked stone (Fiby 1907).

Two cists are reported from Scremerston, one found in 1922 the other in 1948 (NU01334958, NH 3964). The cists had been inserted at the south end of a low, sandy ridge. Cist 1 measured 1.2m square. It contained a female skull, fragments of a Beaker and two flints. Cist 2 was of similar size and contained two Beakers (Craw 1919-1922, 383-384).

In 1927 a cist containing two femurs was found close to the southern end of Berwick bridge (NT99345266, NH 2440). It is assumed that this is a Bronze Age burial but no further details are available (Craw 1926-1928, 131-132).

The only settlement feature that can be tentatively dated to the Bronze Age consists of a series of concentric cropmarks at North Sunderland (NU20653197, NMR 8329). The features recorded are a nearly circular ditched enclosure about 82m across, the ditch being about 10m wide. Placed concentrically within this is a second enclosure 52m across indicated by what appears to be a palisade slot, while a further concentric palisade slot has been identified outside the main ditch on the north, but probably originally continued all the way around. There is an entrance through the inner palisade and the outer ditch on the SE side and outside this two further, short lengths of palisade slot define a forecourt area. The site is undated, but morphological parallels in the region and elsewhere in England suggest a date in the early part of the 1st millennium cal BC.

Figure 9.2 Putative Late Bronze Age enclosure at North Sunderland recorded from aerial photographs (English Heritage)

Finds of Bronze Age date are also found among the mixed assemblages recovered from deflated dune areas. The most numerous group comes from Ross Links (NU145365, NH 5068), which is also the location of a Mesolithic flint scatter site (see below). Bronze Age finds include sherds from at least ten Beakers, three Food Vessels, up to 50 sherds of Late Bronze Age cinerary urns and three quartzite hammer stones. Traces of burnt bone suggest that these finds were originally associated with cremations (Buckley 1929, 92-93).

Table 9.4 Bronze Age sites identified in Block 4

NGR	Name	HER	SMP	Importance	Risk
NU21573201	Seahouses standing stone (?)	NH 12269	17	Low	Low
NU23712891	Benthall cairn	NH 5781	17	High	High
NU23042991	Beadnell cairn 1	NH 5788	n/a	n/a	n/a
NU23022993	Beadnell cairn 2	NH 5788	18	Low	Low
NU18403451	Bamburgh cairn	NH 5251	16	High	Low
NU039470	Cheswick Beach	NH 3968	12	Low	Medium
NU236293	Bethnall cists (2)	NH 5784	17	n/a	n/a
NU21113146	North Sunderland cist (1)	NH 5901	17	n/a	n/a
NU21603202	Seahouses cists (8)	NH 5903	17	n/a	n/a
NU01334958	Scremerston cists (2)	NH 3964	11	n/a	n/a
NT99345266	Berwick bridge cist (1)	NH 2440	n/a	n/a	n/a
NU20653197	North Sunderland enclosure	NMR 8329	17	High	Low
NU145365	Ross Links cremations (?)	NH 5068	14	High	High

Deflation of the dune system as Ross Links has led to the exposure of archaeological deposits spanning most of the prehistoric period. Study of historic maps by Robertson (1955quoted in Lunn 2004, 219) has shown that the whole dune system is unstable and may only have started to form in the C17 as a result of major storm activity. Any increase in storminess will add to the treat already posed to the archaeological deposits.

9.2.3 The Iron Age and Roman-British Period

The terrestrial landscapes of the Iron Age and Romano-British Periods are represented in Block 4 by what appear to be the remains of settlement sites in the form of a five ***multivallate forts***, six ***farmstead enclosures,*** three ***querns*** and several areas of ***ancient fields***.

The multivallate fort at Spindlestone Heughs (NU15253392, NH 5242) is the major site of this period on this section of the coast. It stands at 75m OD on an outcrop of Whin Sill and overlooks the head of Budle Bay to the north. The defences consist of an inner, main enclosure supplemented by annexes to the west and north. The inner enclosure measures about 100m by 60m and is defended by two ramparts on the west and north and a single rampart to the east while the south side is defined by the cliffs of the heugh. The inner rampart stands 2m high and is 5m wide. The western annexe is about 60m by 30m and is strongly defended while that to the north is weaker and measures 80m by 28m. There are two entrances into the main enclosure, one on the south close to the cliff edge and one on the west defined by upright stones. Circular areas within the main enclosure may mark the positions of round houses.(Jobey 1965, 62 no.57; Craw 1924, 197-198). The Spindlestone

Heughs hill fort is a Scheduled Ancient Monument.

The HER records a multivallate fort at NU105374 (NH 5074). This site lies partly outside the NERCZA study area but has been transcribed by the APTE exercise. As recorded the site measures 178m NW-SE and 131m SW-NE, but part of the NE section appears to have been removed by ploughing. Three ditches are recorded with what appears to be an inner palisade slot. A hut circle 10m across lies in the interior. This is a typical example of a small defended site, possibly exhibiting evidence for more than one phase.

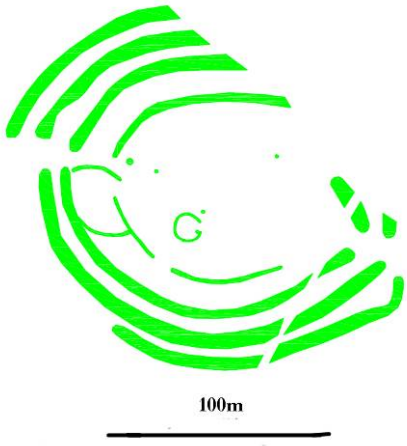


Figure 9.3 Multivallate Fort at NU105374 recorded from aerial photographs (English Heritage)

The APTE has recorded part of a multivallate fort at Fenham (NU09134013; NMR 1474811), though the cropmarks of the two outer ditches are very narrow and more likely mark the positions of palisade slots. The surviving features form concentric arcs running from the SE to the W and partially enclose an area 100m across. The remaining part of the putative circuit is very close to a low cliff about five metres high immediately above MHWS. It is likely that erosion of the cliff face has destroyed part of the site.

Another multivallate fort is recorded at NU01834968 (NMR 6483, NH 3969) which is also very close to the present cliff line. Three arcs of ditch enclose an area about 150m across. The E side is missing and it is likely that this has also been lost to erosion of the cliff.

A further multivallate fort has been recorded by the APTE at NU00115064. This consists of two arcs defining the E side of an enclosure at least 100m across, most of which lay outside the study area. This is the site originally interpreted as a Roman camp (NH 4131) (see below), due to its proximity to the Roman Road known as The Devil's Causeway.

> *The multivallate forts at Fenham and Scremerston are situated on the cliff edge and both are being actively eroded. These sites are in SMP1 Units 14 and 11 respectively and in both cases the 'Perferred Strategic Option' is 'Selectively hold the line'. In the case of the Scremerston sites this is probably due to the proximity of the main line railway while the section of the coast affecting the*

Fenham site is unlikely to be selected for mitigation.

An oval cropmark farmstead enclosure is recorded in the HER at NU21101390 (NH 5906). This site has been transcribed during the APTE and is recorded as measuring 76m by 55m. The cropmark of a second farmstead enclosure have been identified by the APTE (NMR 1471461) at NU19703350. The site is sub rectangular and measures 83m by 46m with an entrance to the SW. The APTE has recorded a sub-circular farmstead enclosure at NU02584817 (NMR 6484), and this is probably the same site as that recorded in the HER as NH 3970. The enclosure is about 54m across while the crop marks of an outer ditch have been recorded on the W and NW sides. The crop marks of a sub-circular farmstead enclosure have been identified from aerial photographs (NU02434787, NH 3974) east of Scremerston Town Farm. The APTE transcription records this site as being about 50m across. The APTE has recorded the fragmentary remains of a farmstead enclosure at NU 00705024 (NMR 1348222). This consists of traces of hut circle 7m across and two angle lengths of enclosure ditch.

The sixth farmstead enclosure lies at North Road, Berwick close to the 45m high cliffs known as Needle's Eye (NT990555, NH 2401). The enclosure has overall dimensions of 120m by 100m and part of it was excavated in advance of development over the winter of 2004/2005. Several phases of development during the Iron Age were identified, the first of which was represented by a substantial ditched enclosure dating from the period between 500 cal BC to 380 cal BC. Although no buildings were noted, only a small part of the site was examined and the presence of domestic pottery and food waste suggests occupation nearby. The second major phase of activity occurred after the enclosure had gone out of use and continued down to the C1 AD. The main feature of this phase was the recovery of quantities of briquetage from pits and the upper levels of the ditch fills. Briquetage is associated with the production and transport of salt, and this aspect of the North Road site will be considered further below (Glover 2006).

As elsewhere on the NE coast Iron Age and Romano-British activity can also be identified from the recovery of querns, usually of the rotary or 'beehive' type. The HER has three records of querns, unassociated with other archaeological features, from this section of the coast.

Table 9.5 Iron Age and Romano-British sites identified in Block 4

NGR	Name	HER	SMP	Importance	Risk
NU15253392	Spindlestone Heughs multivallate fort	NH 5242	15	High	Low
NU105374	Middleton multivallate fort	NH 5074	14	Medium	Low
NU09134013	Fenham multivallate fort	NMR 1474811	14	Medium	High
NU01834968	Scremerston multivallate fort	NH 3969	11	Medium	High
NU00115064	Spittal multivallate fort	NH4131	10	Medium	Low
NU21101390	Benthall farmstead	NH 5906	17	Medium	High
NU19703350	Fowberry farnstead	NMR 1471461	16	Medium	Low
NU02584817	Cockley Burn farmstead	NMR 6484	12	Medium	Low
NU02434787	Scremerston Town Farm farnstead	NH 3974	12	Medium	Low
NU00705024	Scremerston Red House	NMR 1348222	11	Medium	Low

	farmstead				
NT990555	North Road farmstead	NH 2401	6	n/a	n/a
NU227257	High Newton Farm quern	NH 5799	n/a	n/a	n/a
NT99975249	Berwick quern 1	NH 2448	n/.a	n/a	n/a
NT98345571	Berwick quern 2	NH 2393	n/a	n/a	n/a

Fragments of querns were also recovered during the excavations at North Road and it is worth noting that find HER 2393 is reported to have been recovered 700m to the NW of that site.

In addition to the settlement sites described above the APTE has identified a number of features which are best interpreted as the remains of ancient field systems. These generally consist of linear cropmarks forming an orthogonal pattern and indicating the former position of field boundaries. In cases where the pattern is sufficiently complete, the fields thus defined can be seen to have been about 200m by 100m.

About 150m to the west of the Scremerston multivallate fort (NH 3969) lies a linear feature running N-S for 400m while 80m further W a similar feature runs parallel for nearly 500m. The have been interpreted as the N-S axes of a field system associated with the site. A similar patter of boundaries, but with E-W elements in addition to the main N-S axes, has been recorded to the west of the North Road farmstead (NH 2401). About 800m to the north a similar pattern has been identified but in this case the main axis lies E-W.

Apart from a few isolated coin finds the only record of a Roman feature on this section of the coast is the putative Roman camp at Springhill (NU00025061, NH 4131). This site was first identified on an aerial photograph and trial excavations in 1946 found a sherd of C2 pottery leading to the site being published and scheduled as a Roman marching camp (St.Joseph 1951, 56). However, by the 1960s the original discoverer was beginning to express doubts about its status and re-published the site as a farmstead enclosure (St.Joseph 1961, 120), a view supported by the study of more recent aerial.

The Springhill site lay immediately adjoining the Roman Road known as The Devil's Causeway which has been traced to within 0.4km of the inland boundary of the study area at Spittal (NT99875059). This proximity probably originally contributed to its interpretation as a Roman camp. However, the fact remains that the Devil's Causeway has been traced as far as Tweedmouth and some form of Roman post at the crossing of the Tweed should be expected.

9.2.4 The Early Medieval Period

It has already been noted that the coast of NE England is justifiably well known for an important number of Early Medieval sites and mention has already been made of the early monasteries at Hartlepool, Monkwearmouth and Tynemouth and the C7 monastic cell on Coquet Island.

Undoubtedly, the most important site on this section of the coast is the Anglo-Saxon monastery of Lindisfarne (NU125417, NH 5346) on Holy Island. Given to St Aidan by Oswald of Northumbria in AD 635 it thrived until the late C8. In AD 793 it experienced the

first Viking attack on English shores and repeated harassment led to its abandonment in AD 875. The monastery was re-established in the C11 and very little that is visible at the site today, apart from the collection of C8 cross fragments in the museum, can be dated to the Anglo-Saxon period. However, excavations in 1977 (O'Sullivan 1985, 31 and 41-43) and 2000 (Williams 2000) have revealed a number of features which might be attributable to the early monastic site. Principal among these is the identification of the monastic boundary, a ditch partly filled with midden material but containing a bone comb of C9 or C10 date. Other finds consist of pits, areas of rough paving and a hearth, though none could be directly dated to the Anglo-Saxon period (Young and Fraser 2000-2001). In addition, it has been suggested that some of the remains on St Cuthbert's Isle may date from the Anglo-Saxon period, though it is generally agreed that most of what can be seen today dates from the C13 (Crossman 1890; Beavitt *et al* 1987).

The island of Inner Farne is associated with both St Aidan who, according to Bede, visited it in AD 651, and St Cuthbert who lived there between AD 676 and 684 and returned there to die in AD 687. Bede records that St Cuthbert built a cell, a landing place and a guest house. The cell is described as round in plan and built of stone and turf, and roofed with poles and grass. It was divided into two parts, a living area and an oratory. A religious house existed on Inner Farne until the Dissolution of the Monasteries in the C16 and the structures that can be seen on the island today date from the Medieval and later periods (NU21803592, NH 5880, 5881 and 5884). There is doubt about the precise location of St Cuthbert's cell and the other Early Medieval features recorded on the island.

A further Early Medieval religious site may have existed at Beadnell on a small rocky promontory known as Ebba's Nook (NU23962870, NH 5786). The remains on the site consist of the foundations of a C13 chapel (see below) and an associated enclosure within which are the remains of a putative earlier chapel. These consist of a stony earthwork measuring 3m by 4m and on a slightly different axis to the later chapel. The association of the site with St AEbba, the step daughter of AEthelfrith, the King of Northumbria, has led to the identification of this earlier structure as an Anglo-Saxon monastic foundation. St AEbba is known to have founded other monasteries in Northumberland. St Ebba's Chapel is a Scheduled Ancient Monument.

The site occupied by Bamburgh Castle has been identified with the Britonic fort 'Dungaray' recorded in various sources which also refer to its capture by the Anglo-Saxons. From the C6 to the C9 Bamburgh was the capital of the Anglo-Saxon kingdom of Bernicia. Most of what is known of Early Medieval Bamburgh comes from documentary sources which were chiefly concerned with the history of the royal family of Northumbria and their conflicts with their neighbours. Few details are provided of the site itself and what can be seen today dates from the Medieval period. However, limited excavations were undertaken on the site in the 1960s and 1970s and work was resumed in 1996 (Wood and Young 1997-1998; Young and Wood 2000-2001; Young 2004; Young 2005; Wood 2004; Wood 2005; Bamburgh Research Project 2006). Although some C7 and C8 surfaces have been exposed by excavation and a number of Anglo-Saxon small finds recovered, most of the evidence so far has been obtained from geophysical surveys which appear to have detected a series of structures some of which, from their alignment, are discordant with, and accordingly earlier than, the C12 castle.

In 1817 a severe storm eroded the sand dunes adjoining Bamburgh Castle and exposed an Anglo-Saxon burial ground at a location known as the Bowl Hole (NU18693483, NH 5252). This site was rediscovered in 1997 and excavations undertaken in 1998 and 1999. A total of 14 graves were excavated including both simple pits and stone-lined cists. Some burials were oriented east-west, suggesting a Christian rite, while others employed a different orientation and may imply the intrusion of pagan Anglo-Saxon burials in a pre-existing Christian C6 burial ground (Young and Wood 1999-2000). From 2006 the skeletons from the Bowl Hole became the subject of a detailed osteological analysis.

In the mid C19 the construction of a waggonway leading to the quarries on the north side of Holy Island led to the discovery of a group of buildings in the sand dunes at Green Shiel (NU12194363, NH 5337). At the time only a brief account was published and the buildings were attributed to kelp burners, although the find of two C9 coins was noted (Selby 1845). These remains were relocated in 1980 and were the subject of a detailed archaeological investigation between 1984 and 1990 (O'Sullivan and Young 1991).

Five buildings were located at Green Shiel, three aligned east-west and two north-south, forming a roughly cross-shaped layout. The eastern arm of the cross consisted of buildings 'A' and 'B', which were linked by a common cross wall. Overall, this pair of buildings was nearly 40m long and 5m wide internally. The walls were 1.5m thick and of dry-stone construction. Their thickness suggests they were the footings for turf walls. Centrally placed post holes probably supported a roof ridge. To the west were two buildings, 'E' and 'C', on a north-south alignment. The more southerly, building 'C', measured 18.5m by 4m and was subdivided internally into a series of compartments suggesting a function as a cattle byre. To the north of building 'C' and joined to it by a low wall was building 'E' which measured about 20m by 4m and appeared to be more domestic in function. West of building 'E' and on an east-west alignment was building 'D'. This was about 22m long and 5m wide internally. Buildings 'E' and 'D' both opened onto an irregular shaped yard.

Finds included a large number of cattle bones, mostly from immature animals, suggesting that the site may have had a specialist stock rearing function. Dating evidence was provided by 11 C9 coins and an iron spearhead. The lack of any ceramic evidence suggests that the Green Shiel site had been abandoned by the late C11. Few simple agricultural buildings of Early Medieval date are known in Northern England and the Green Shiel site provides important evidence for an aspect of Anglo-Saxon life glimpsed only rarely. The site is a Scheduled Ancient Monument.

9.2.5 The Medieval Period

Without doubt the most important Medieval sites on this section of the coast are the magnificent C12 castle at Bamburgh, the C12 priory on Holy Island and the Medieval castle and walled town of Berwick-upon-Tweed. These major sites are well known and only brief summaries of their major features can be offered here.

The castle at Bamburgh (NU183351, NH 5089) occupies a ridge of Whin Sill rising to 46m OD and as noted at the beginning of this chapter, although now separated from the shore by a zone of sand dunes, in the Middle Ages the high tide washed the foot of the rock. The castle consists of three baileys and the C12 keep. The latter is the main surviving relic of the

Medieval period though the east gatehouse is partly C11. Much of the rest of the castle has been rebuilt and added to many times since the Middle Ages, mainly in the late C18 and C19 (Grundy *et al* 1992, 154-157). However, excavations at the castle in the 1960s, 1970s and from 1996 have revealed a number of features of Medieval date (Wood and Young 1997-1998; Young and Wood 1999-2000; Young and Wood 2000-2001; Young and Wood 2003; Young 2004; Young 2005; Wood 2004; Wood 2005; Bamburgh Research Project 2006). Bamburgh Castle is a Grade 1 Listed Building.

Figure 9.4 Bamburgh Castle from the east (author)

Although the Anglo-Saxon monastery of Lindisfarne (NU125417, NH 5346) on Holy Island was destroyed by the Danes in AD 875 the site was refounded in AD 1083 by the Bishop of Durham as a Benedictine cell. Similarities with Durham suggest that building of the church might have been underway by the end of the C11 and is known to have been completed by the middle of the C12. In addition to the church the establishment consisted of a cloistral range to the south incorporating the main buildings including the chapter house and dormitory, the refectory, a warming house and the kitchen. Beyond this lay an outer court. Most of the surviving remains date from the C13 and C14 and some substantial rebuilding occurred in the C19 (Grundy *et al* 1992, 335-338). In its final, Medieval, form the whole complex presented a defensive aspect, the outer court being enclosed by a crenellated wall with parapet while a barbican led from it into the cloister. Lindisfarne Priory is a Grade I Listed Building and a Scheduled Ancient Monument.

Figure 9.5 Lindisfarne Priory seen from The Heugh (author)

The town of Berwick-upon-Tweed is justly famous for its C16 artillery fortifications, which rank among the best surviving examples in northern Europe. However, these bastions and massive curtain wall replaced a system of earlier Medieval fortifications which enclosed an area 50% larger (Grundy *et al* 1992, 172-178). Founded as a Royal Borough by King David l of Scotland in the mid C12 Berwick became the principal port of Scotland. Captured by the army of Edward l of England in March 1296 it never fully recovered. It changed hands several times after this but from the mid C14 it was effectively an English town (Lomas and Muir 2996, 63-64). The Medieval fortifications survive to the north of C16 defences and consist of Berwick Castle (NH 2424), a earthwork known as Spades Mire (NH 2431) and the fragmentary remains of a curtain wall dating from 1297 (NMR 28532). The castle at Berwick was first mentioned in 1180 but the surviving portions date from the late C13. It was an enclosure castle consisting of a curtain wall with towers and turrets. Spades Mire ran from the NE corner of the castle 800m eastwards to the foreshore, thus effectively cutting off the peninsula on which the town stands. It is thought to pre-date the late C13 curtain wall and consisted of a broad ditch with a rampart on the south side. A further length of C13 walling known as the White Wall runs from the SW corner of the castle down to the banks of the River Tweed. The Medieval town walls and castle at Berwick-upon-Tweed are Scheduled Ancient Monuments.

Figure 9.6 The White Wall, Berwick-upon-Tweed (author)

The HER also records that there is documentary evidence for a castle on the south bank of the Tweed at Tweedmouth (NH 2717). It is reported to have been built by King John of England between about 1208 and 1215, being destroyed shortly after this by the Scots. There is no physical evidence for a castle at Tweedmouth and there is some doubt about its precise location.

As was case with the coastline further south, this section of the coast also has a number of small defensive structures in the form of ***towers***. The most southerly is the tower at Beadnell (NU22912928, NH 5782), now incorporated into the Craster Arms public house. The tower appears to have measured 8.7m by 7.2m with walls up to 1.8m thick. It was of two storeys with a barrel vaulted cellar (Ryder 1994--1995). Beadnell Tower is a Grade II* Listed Building. The HER records the site of a second tower in North Sunderland village (NU21203145, NH 5900). This was apparently demolished in the late C18 when the present church and vicarage were built. A *Touris de Bambruigh* is referred to in a document of 1415 as belonging to the master of the cell of Austin canons at Bamburgh. This structure has been identified with a surviving fragment of Medieval masonry in the churchyard wall of St Aidan's (NU17883496, NH 5258). The remains consist of a wall 10m long standing 2.2m

high above a chamfered plinth (Ryder 1994-1995). One of the best surviving towers is Prior Castell's tower on Inner Farne (NU21783599, NH 5889). This tower is late Medieval in date being built around 1500. It is currently owned by the National Trust and a detailed study was undertaken during the course of repair work in 1998 (Ryder 1998-1999). The tower measures 12.3m by 7.3m and originally stood four storeys high. The ground floor is tunnel vaulted while the first floor served as a hall. Originally there were two floors above this. Following the Dissolution of the Monasteries the tower was used as a fort and an early lighthouse (see below). Prior Castell's tower is a Scheduled Ancient Monument.

The HER maintains records of a number of minor religious houses and related facilities. Mention has already been made of the putative Anglo-Saxon site on the small rocky promontory of Ebba's Nook (NU23962870, NH 5786), Beadnell. The remains on the site consist of the foundations of a C13 chapel. This was 17m long and 5m wide and divided into a nave and chancel. The nave had two doors facing each other in the north and south walls, the former having a semi-circular head cut out of two stones (Bateson 1893, 319-322 and 330). St Ebba's Chapel is a Scheduled Ancient Monument.

The present building known as the Monks House (NU20383354, NH 5899), on the road from Bamburgh to North Sunderland dates from the early C19 but is recorded as incorporating earlier features. The monks of Lindisfarne had a granary there in 1257 and the name Monks House is first recorded in 1495. A will of 1597 suggests that there was also a chapel there (Bateson 1893, 306). Monks House is a Grade II Listed Building.

The remains of the Dominican Friary at Bamburgh (NU17453483, NH 5253) are incorporated within the modern complex of farm buildings known as The Friary. It was established in 1265 and was dissolved in 1539 (Bateson 1893, 138-146). A survey of 1715 mentions the ruined church and by the late C19 fragments of the church and the wall of the cloister garth still survived. A watching brief in 1969 identified three skeletons. In 1992 and 1993 the farm buildings were converted into residential use and a number of features of the Medieval friary were exposed including sufficient of the church for its dimensions to be established as 37.3m by 6.5m with a north aisle of three bays, measuring 19.5m by 3m. The cloister lay to the south of the church and was about 16m square. The extent of the rest of the complex remains unknown (Nenk *et al* 1993). The remains of Bamburgh Friary are a Grade II Listed Building.

The Benedictine cell (NH 5882) on Inner Farne was founded in the mid C13 and dissolved in the mid c16. It consisted of a number of components of which the chapel of St Cuthbert (NU21803599, NH 5894) was the principal element. The surviving structure dates from the late C14 though it incorporates some earlier features and was heavily restored in the C19. It measures 15.6m by 5m and has an entrance through the south wall, which also has two windows. St Cuthbert's Chapel is a Grade II* Listed Building. The chapel occupies the NE corner of an enclosed area known as the East Court (NH 5891) in which burials were found in the early C19. In the SE corner of the East Court lie the remains of St Mary's Chapel (NH 5895). This building originally measured 16m by 5m and is thought to be of a similar date to St Cuthbert's Chapel though it has been much modified through its use by Trinity House as a store and by the National Trust as a visitor centre. The East Court and St Mary's Chapel are Grade II Listed Buildings. The original entrance to the monastic complex was through an arched gateway into the North Court (NH 5982), an irregular enclosure surrounded by a

stone wall 1.5m high but originally standing significantly higher with a crenellated parapet. Outside the monastic enclosure and close to the landing place lie the remains of a small building measuring 4.7m by 3.8m and standing 1.4m high with a door in the east end. These are interpreted as remains of the *hospitium* or guest house, referred to 1360/1 as the 'hall of St Cuthbert' (NH 5890). The monastic remains on Inner Farne are a Scheduled Ancient Monument.

The HER records the site of the Hermitage of Segden (NH 2392) as being in the vicinity of Folly Farm (NT98115600), north of Berwick. The hermitage is said to have belonged to the Hospital of St Mary Magdalen and was first mentioned in 1296.

The records of Lindisfarne Priory record the existence of a chapel at Fenham built around 1200 (NU086407, NH 4102). However, by the early C14 it was being used by the monks as a tithe barn (Raine 1852, 174-180) and by 1339 the Priory had established a ***grange*** at Fenham (NU08664070, NH 4100) which in 1385 was enclosed by a moat and ditch. The Account Rolls of the Priory contain detailed records of building work and agricultural activities, from which it is clear that the grange was involved in mixed farming. In 1560 it was described as 'a tower in good repair' and was still standing towards the end of the C18, though by the mid C19 only foundations remained. Today, the remains consist of the foundations of the ***moated manor house*** surrounded by a precinct wall with a series of adjoining enclosures containing traces of various agricultural and service buildings. The manor house was built on a platform measuring 35m by 33m, occupying the southern edge of the site. It was about 28m by 15.5m and was divided into three rooms. Two further buildings, each 14m by 8m, lay at the SW end of the platform. The footings of at least six other buildings, including steadings and a dovecot, have been recorded in the surrounding enclosures (Simms 2004) but here is no trace of the C13 chapel. The earthwork remains of Fenham Grane have been transcribed during the course of the APTE (NMR 6502). The remains of Fenham are a Scheduled Ancient Monument.

In addition to the famous Benedictine Priory a number of other features of Medieval date are recorded on Holy Island. These include a C11/C12 grave cover (NU12184231, NH 14785) (Collins 2001-2002), and the socket-stone (NU12724166, NH 5345) for one of the boundary crosses of the Lindisfarne Priory Precinct. This latter item is a Scheduled Ancient Monument. The remains of St Cuthbert's Chapel (NU12304161, NH 5338) lie on a small tidal islet 175m to the west of the Priory. The chapel was rectangular in plan and measured 9m by 5.8m with an entrance through the south wall. Attached to the west wall of the chapel is an annexe measuring 5.3m by 10.75m. The surviving remains of the chapel are dated to the C13, but it is thought possible that some other features identified on the island may date from the Anglo-Saxon phase of activity on Holy Island (Crossman 1890; Beavitt *et al* 1987). The remains of St Cuthbert's Chapel are a Scheduled Ancient Monument.

Figure 9.7 St Cuthbert's Isle (author)

Excavations within Holy Island village in 1977 (O'Sullivan 1985, 31 and 41-43) and 2000 (Williams 2000) have revealed a number of features of Medieval date including a C13 building (NH 14261), cobbled enclosures (NH 14267 and 14270) and rubbish pits (NH 14268). Of particular interest are complex of late Medieval buildings between the Priory and the harbour and known as 'the palace' (NU12754194, NH 5363). A survey in 1994 established that these remains were part of a trapezoidal enclosure measuring 55m by 45m with buildings along the west, north and east walls. These remains appear on a map of 1548 and have been identified from documentary sources as the C15 Harbottle Place. During the reign of Elizabeth I the site was converted into a naval supply base (see below). The Palace, Holy Island is a Scheduled Ancient Monument.

Before turning to Berwick-upon-Tweed, attention is given to two other categories of Medieval features found on this section of the coast, ***deserted medieval villages*** and ***ridge-and-furrow***. During the Middle Ages the NE was a land of villages and many present day settlements have their origins in the Medieval period. However, not all settlements thrived and survived and the HER has six records of deserted medieval villages (Dixon 1984) on this section of the coast. Most are known from documentary sources only, but some have been recorded on the ground or on aerial photographs.

Table 9.6 Deserted Medieval Villages in Block 4

NGR	Name	HER	SMP	Importance	Risk
NU235252	Low Newton by the Sea	NH 5801	20	Medium	High
NU2329	Beadnell	NH 5795	17	Medium	High
NU204324	Old Shoreston	NH 5905	16	Medium	Low
NU162354	Warrenmouth	NH 5087	15	Medium	Low
NU15693513	Budle	NH 5091	15	Medium	Low
NU058451	Goswick	NH 4025	13	Medium	Medium

The site at Budle has been recorded during the APTE. Most of the surviving remains lie to the north of the road, opposite the modern farmstead and consist of four building sites and

associated enclosures while further north a substantial platform might be the site of a windmill.

As throughout most of the NERCZA study area traces of ridge-and-furrow cultivation are virtually an ubiquitous feature of the archaeological record. In many cases these can be seen to be associated with the surviving villages and in others with the deserted settlements listed above (fig. 9.12). However, on this section of the coast ridge-and-furrow is a comparatively rare phenomenon in the study area north of Budle Bay, most of the recorded areas lying more than a kilometre from MHWS. An exception is provided by the 34ha block recorded to the SW of the Goswick deserted medieval village.

Industrial sites of the Medieval Period are very rare, being either small scale and transitory or engulfed in later developments. The production of lime from limestone or chalk is known from Roman and Medieval times and from the C13 lime was recognised as an agricultural fertilizer. Limekilns from the Industrial period are well known (see below) but earlier examples are rare. An exception is provided by the late C15 early C16 kiln found during the excavation of the monastic site at St Ebba's Nook, Beadnell ((NU24012874, NH 5813). This kiln was found to consist of a circular pot with a single arch drawing fuel to the north. An archaeomagnetic date indicated that the last firing occurred between 1480 and 1510 (Williams, E. 1995).

Berwick-upon-Tweed

The town of Berwick-upon-Tweed has been a major feature of the NE coast from the late C11 and the HER records a large number of Medieval features both within the town and in the adjoining settlements of Tweedmouth and Spittal. Mention has already been made of the Medieval fortifications and castle and attention is now turned to the numerous religious and secular sites recorded in the HER.

The settlement of Spittal probably derives its name from the Leper Hospital of St Bartholomew (NH 4135) recorded from documentary sources. This was founded in 1234 and provided with a tower in 1369 (Raine 1852, 246-247). Local sources locate the hospital at the site of the now demolished Spittal Hall (NU00165185).

A number of minor religious houses are recorded within the town of Berwick. The Friars of Penitence erected buildings and an oratory (NT997528, NH 2712) within the town in 1267 and these were taken over by the Dominicans in 1285 who moved from a site nearer the castle (NH 2449).The Friary is said to have been burnt down in 1436 (Clack and Gosling 1976, 162; Cambridge *et al* 2001, 35 nos 5 and 10). This site is generally associated with records of the Chapel of Ravensdale (NT99735284, NH 2453). The HER records burials being found nearby in the 1970s and an archaeological evaluation in 1998 revealed both Medieval and post-Medieval burials as well as a mortared sandstone wall. The Hospital of *Domus* or *Maison Dieu* is recorded as having been founded in 1287 (NH 2454) and its location has been identified as the site occupied by the Bank of Scotland (NT99745279). The Hospital was apparently destroyed in the siege of 1333 (Clack and Gosling 1976, 162; Cambridge *et al* 2001, 35 no. 11). St Edward's Hospital (NH 2455), or *Domus Pontis,* is said to have been founded by William the Lion of Scotland around 1200. By the mid C13 it was in the hands of the Trinitarians and had closed by the end of the C15 (Clack and Gosling

1976, 162; Cambridge *et al* 2001, 35 no. 12). An alternative name, 'the hospital of the Bridge of Berwick' suggests a location near the Medieval bridge (NT99705285). A Franciscan Friary (NH 2451) is recorded as having been founded in Berwick in 1231 by Alexander II of Scotland (Clack and Gosling 1976, 162; Cambridge *et al* 2001, 35 no. 6). The location of this friary is unknown but documentary evidence suggests that it lay between the Bell Tower and Lord's Mount. A C13 Carmelite Friary (NH 2450) is also recorded and an analysis of later documents suggests that it lay on the west side of Palace Street (NT99995264) (Clack and Gosling 1976, 162; Cambridge *et al* 2001, 35 no. 12). St Mary Magdalen's Hospital (NH2437) lay outside the town wall but just within the Spades Mire earthwork (NT99895363). The hospital was founded before 1296 and continued to appoint masters until 1395 (Clack and Gosling 1976, 162; Cambridge *et al* 2001, 35 no. 4). The HER records the discovery of coffins and architectural fragments in the C19. The Nunnery of St Leonard lay outside the study area to the NW.

Of the Medieval churches of Berwick that of St Nicholas (NH 4134) is thought to have stood near to the King's Mount (NT003527) just outside the line of the defences while St Mary's (NH 2710) has been identified in the area now occupied by the main carpark and the site of Holy Trinity (NH 4136) lies within the graveyard of the present parish church (Cambridge *et al* 2001, 35 nos 7 and 8). The church of St Lawrence lay outside the study area. In 1998 the remains of another church (NH 2714), were found during excavations on a site in Castle Terrace about 330m NW of Berwick Castle (NT99155363), and therefore well outside the circuit of the Medieval walls. Only part of the structure could be exposed but this consisted of 9.5m of the nave which was 6.5m wide. At the east end was a chancel measuring 4.5m by 4.2m and beyond this a semi-circular apse extending east for a further 3m. Attached to the SE corner of the nave was a chapel. Surrounding the church are the remains of a Medieval graveyard. Forty-six graves were identified and from this it is estimated that the graveyard as a whole might contain up to 400. Many of the graves had decorated grave slabs which indicate that the graveyard was in use in the C11 and C12 and it is believed to have gone out of use by the mid C14 (Cambridge *et al* 2001, 35 no. 13). The church and graveyard in Castle Terrace are a Scheduled Ancient Monument.

The importance, and indeed prominence, of Berwick-upon-Tweed in the Middle Ages means that wherever an excavation occurs within the walled town Medieval deposits will be encountered. Since the early 1990s a series of excavations and watching briefs have been undertaken in advance of development and summary accounts of most of this work have been published in *Archaeology in Northumberland*, the 2005 edition including a helpful index of work up to that date.

Of more specific interest in the present context is the identification in 1927 of the remains of the Medieval wooden bridge (NT99485273, NH 2436) (Jervoise 1931, 2-3). This was situated about 75m upstream of the present bridge and appears on a C16 map.

9.2.6 The early Post-Medieval Period

In the first half of the C16 a number of attempts were made to adapt the Medieval defences of Berwick-upon-Tweed to developments in siege warfare, especially the deployment of artillery in defence and attack. These adaptations include the provision of a gun turret near the SW angle of the castle wall and three casemates for cannon in the tower at the end of the

White Wall, while an artillery bastion, known as the Lord's Mount, was built at the NE angle of the town wall. During the 1550s work began on a new citadel (NH 4148) on the east side of the town consisting of a quadrangular enclosure with diamond-shaped bastions at each corner. However, this was abandoned in 1558 before completion and superseded by a much more ambitious plan that, nevertheless reduced the size of the defended area by about a third.

The Elizabethan defences of Berwick-upon-Tweed consisted of a system of five massive bastions defining the north and east sides of the town. The bastions were linked to a massive, sloping curtain wall by a narrow collar which, supplied with gun loops, provided for flanking fire. A rather weaker curtain wall was built along the south and west sides which face on to the river, mainly following the line of the earlier Medieval defences. Work began in 1558 and continued for 11 years. Extensive earthworks lay at the foot of the main defences and a feature known as the Covered Way (NH 4137) ran NE from the most northerly bastion to a redoubt (NH 4138) on the foreshore. Further additions were made to these fortifications over the next four centuries. The first set of modifications occurred between 1638 and 1652 when earthwork parapets and gun platforms were added on top of the bastions, while the walls overlooking the river were substantially rebuilt in the C18. Fisher's Fort, a gun battery overlooking the river mouth and believed to antedate the construction of the Elizabethan defences was rebuilt in the C18 while two other batteries on the riverside were added circa 1745. C19 additions mainly consisted of changes to the gates to improve access while the Windmill Bastion on the east side of the town also mounted a C19 gun battery (Grundy *et al* 1992, 174 and 177-178). The fortifications of Berwick-upon-Tweed are a Scheduled Ancient Monument (NMR 28532).

Figure 9.8 The C16 Brass Bastion and C17 earthworks, Berwick-upon-Tweed (author)

9.2.7 The Industrial Period

In terms of the terrestrial landscape the records to be considered during this phase of landscape development relate to coal mining. The production of salt and lime, and the fishing industry will be considered below. Although this section of the coast lay beyond the

main outcrop of the Coal Measures the HER records a number of small coal mines or coal workings. The most southerly consisted of a group of pits at Beadnell (NU23242905, NH 5828). Coal mining is recorded here from the mid C18 until 1899 when the C19 colliery had to close due to flooding (Craster 1956, 161-175; Bainbridge 1995, 259). A further C19 colliery is recorded at North Sunderland (NU21183196, NH 12270 and NU21113241, NY 12271) (Bainbridge 1995, 258) while other workings are recorded 0.5km to the NW (NU20603259, NH 21509 and NU20493247, NH 20363). Coal workings have also been identified from OS maps north of Fenham (NU08324117, NH 20780) while the 'Old' Berwick Hill Colliery (NU003508, NH 4155) was an outlier of the Scremerston coalfield and features on the 1828 Greenwood map and the 1899 OS 6 inch map. Most of the Scremerston pits lie outside the study area but the exit from the Scremerston Old Level is reported as being clearly visible in the cliff near Hud's Head (NU012508, NH 4152). The APTE has recorded four shafts associated with the Scremerston mines (NMR 1384230) at NU01025048, NU00965059, NU01095064 and NU00965085. Although not featuring in the HER, Linsley records documentary references to coal mining on Holy Island in the late C18 and early C19 (Linsley 2005, 55). However, reserves were found to be inadequate for the demands of the local lime burning trade and by the middle of the C19 coal was regularly being imported.

9.3 Coastal/Maritime Landscapes

9.3.1 The Mesolithic Period

The HER has five records of ***flint scatter sites*** on this section of the coast, all clustered around Budle Bay. Moving clockwise around the bay the most easterly site is at Bamburgh (NU167353, NH 5092) from which a collection of 11 microliths, five scrapers and a burin are reported (Weyman 1984, 50; Wymer 1977, 218; Davis 1983, 18-24). About 1.5km to the west lies the site at Budle Crags (NU153348, NH 5283). This site was excavated by Francis Buckley in the early C20 during the course of which an assemblage including 14 microliths was found immediately above the Whin Sill bedrock (Weyman 1984, 47 and 50; Davis 1983, 18-24; Wymer 1977, 218). The site at Spindlestone Grags, (NU 15153387, NH 5246) the most prolific in this group, lies a further 1km to the SW at 70m OD towards the west end of a ridge of Whin Sill. It was excavated by Francis Buckley in 1924 (Buckley 1925, 42-47; Wymer 1977, 218) and an assemblage of 362 items was collected from across an area of 34m^2. Three kilometres to the north on the far side of Budle Bay lies the Ross Links site (NU14483651, NH 5068). This is an area of sand dune ridges in which episodes of deflation have exposed areas of ancient ground surface revealing finds of varying date including up to 200 Mesolithic flints (Buckkley 1925, 42-47; Wymer 1977, 218; Weyman 1984, 42-43 and 51). A further, small, assemblage of Mesolithic finds has been made 1.5km to the NW at the far end of the same dune ridge at NU137377 (NH 5078) (Wymer 1977, 218).

Table 9.7 Flint scatter sites at Budle Bay

NGR	Name	HER	SMP	Importance	Risk
NU167353	Bamburgh	NH 5092	15	Low	Low
NU153348	Budle Crags	NH 5283	15	Low	Low
NU15153387	Spindlestone Crags	NH 5246	15	Medium	Low

NU14483651	Ross Links south	NH 5068	14	High	Medium
NU137377	Ross Links north	NH 5078	14	High	Medium

> *Deflation of the dune system as Ross Links has led to the exposure of archaeological deposits spanning most of the prehistoric period. Study of historic maps by Robertson (1955quoted in Lunn 2004, 219) has shown that the whole dune system is unstable and may only have started to form in the C17 as a result of major storm activity. Any increase in storminess will add to the treat already posed to the archaeological deposits.*

Today Budle Bay is a 276 hectare expanse of beach sand and mud flat inundated at high tide. It is a rich habitat and part of the Holy Island National Nature Reserve. The clustering of Mesolithic sites around the bay is unlikely to be a coincidence. However, data from the nearest SLI point at Elwick at the north end of Ross Links suggests that between the late 7th millennium and the mid 6th BC RSL stood at between -2.1m and -1.6m leading to a displacement of LAT of up to 100m. The effect of this on the bay is unclear. The Warren Burn would still have flown through the bay but the inter-tidal zone is likely to have been less extensive. An indication of this changed topography is provided by the recovery of seven microliths and three scrapers from the inter-tidal zone (NU150360, NH 5096).

Although these finds in this group consist only of stone tools, the proximity of the sites to a major coastal feature suggests that the focus of the groups responsible was coastal. The possibility of a maritime dimension is added by the reported recovery of Mesolithic flints from Inner Farne (NU21733579, NH20739) and Staple Island (NU24743749, NH 20740). The Farne Islands are major breeding grounds for Grey and Common Seals, an established quarry of Mesolithic hunter-gatherers.

Mesolithic finds are also reported from Holy Island. These consist of a flint blade from Castle Rock (NU13624173, NH 20738) and a surface collection of over 2000 items from Ness End (NU130438, NH 5360). The Ness End assemblage is notable for the fact that it includes only a very small proportion (1.7%) of finished tools as opposed to manufacturing waste. This suggests that the primary function of the site was the acquisition of raw material and the manufacture of tools. However, the presence of bevelled pebbles, usually associated with the processing of seal skins, points to other activities taking place and underlines the coastal/maritime focus of Mesolithic activity on this part of the coast (Beavitt, O'Sullivan and Young 1987, 1-23; O'Sullivan and Young 1995. 30-1).

9.3.2 The Iron Age and Romano-British Period

As noted above the excavation of the farmstead enclosure at North Road, Berwick (NT990555, NH 2401) led to the recovery of a quantity of briquetage, a category of find associated with the production and transport of salt. Today this site lies about 200m from the 45m high cliffs at Needles Eye and it is unlikely that sea water could have been transported from the foreshore to site. However, as the assemblage included two briquetage rods, items usually associated with salt production, it is likely that some stage in the production process, possibly refining, was taking place at the site. This activity at North Road began in the late C1 BC after the farmstead enclosure had been abandoned and continued down to the C1 AD as indicated by the recovery of C1 South Gaulish Samian Ware. The North Road assemblage of briquetage is the only evidence for prehistoric salt

production north of the Fens (Glover 2006).

9.3.3 The Industrial Period

9.3.3.1 Lime burning

Limekilns have been a feature throughout the NERCZA study area and the HERs have recorded many individual or small groups of kilns exploiting locally available sources of lime to meet local needs. However, at a number of locations production was undertaken on a larger scale with a view to the supply of more distant markets. The need to import fuel for the burning of the raw limestone and the need to export the finished lime in bulk led to a number of these establishments being sited on the coast and exist on the north Northumberland coast in the area of the Carboniferous Limestone outcrop.

The most southerly group on this section of the coast is the bank of three circular ***draw kilns*** at Beadnell Harbour (NU23742857, NH 5790). They consist of one, original, central kiln dating from 1798 with two later, but early C19 additions. They are approached from the north by a ramped tramway stand over 9m high and have a single pot each. Two kilns have three segmental draw arches while the third has four. Lime from the Beadnell kilns was exported to Scottish markets but by 1821 trade had sufficiently declined for the kiln eyes to be used for curing herring (Linsley 2005, 97-86). The kilns are a Grade II Listed Building and are owned by the National Trust.

Figure 9.9 Beadnell Limekilns (author)

The Beadnell Limekilns have already been partially eroded by the sea (fig.9.1). They are in SMP1 Unit 17 for which the 'Preferred Strategic Option' is Selectively Hold the Line. The seaward base of the kilns is support by rock armour.

Although there are documentary references to limestone being burned at Seahouses in the

mid C18 (Linsley 2005, 66-68) the surviving bank of four draw kilns dates from the period between 1795 and 1858 (NU21983214, NH 5907). There are seven round-headed draw arches on the seaward side and two on the NW. Fuel was provided by the local collieries (see above) and the lime produced was exported down the East Coast and north to Scotland. The Seahouses limekilns are a Grade II Listed Building.

The production of lime was a major industrial activity on Holy Island, two principal centres of production being identified. The earlier of the two is known as the Kennedy Limeworks (NU122432, NH 5353) and was situated to the NW of the village. This complex consists of two groups of draw kilns, that to the north has two kilns side-by-side while about 300m to the south lies a bank of three kilns. Tramways (NH 5368) brought limestone from the quarries to the north and coal from a jetty to the south at Tripping Chare (NU 122419, NH 5366). The same jetty was used for the export of the lime. The northern group were in use in the 1840s while those to the south replaced them in the 1850s. However, these were in use for only two years when the operation was moved to the second site on the island, Castle Point (O'Sullivan and Young 1995, 109-110).

The bank of six lime kilns at Castle Point, Holy Island (NU13834172, NH 5351) were built in 1860 by a Dundee firm, to replace the Kennedy Limeworks, which had proved to be poorly sited. These kilns were drawn from a series of barrel-vaulted tunnels with round-headed segmental arches. A high pointed arch on the south side gave access to the interior. The kilns were supplied by an embanked tramway (NH 5356) and lime was exported from the site from Cocklestone Jetty (NH 5355). The Castle Point lime kilns operated until 1896 and have been restored by the National Trust. They are a Scheduled Ancient Monument.

Figure 9.10 Castle Lime Works, Holy Island (author)

9.3.3.2 Salt Making

Apart from the archaeological evidence for salt making during the Iron Age at North Road, Berwick (referred to above) there are no records of salt making on this section of the coast earlier than the C18 and these all relate to a group of salt pans at Beadnell. It is recorded that in 1735 a Thomas Wood of Preston begun the production of salt from sea water at Beadnell using coal from the local mines as fuel. By the mid 1760s production had passed to an Alexander Long who was operating five pans by 1770. Long modified the standard method of production by first allowing natural evaporation to take place in reservoirs before pumping the brine to the pans (Linsley 2005, 80-82). The precise location of these salt pans has not been identified and they are not recorded in the HER or NMR. However, the documentary references imply that they were situated in the area of the Nacker Hole (NU238289).

9.3.3.3 Fishing and whaling

Very few sites associated with the fishing industry feature in the HER. One of the most important is the shiel at Sandstell Road, Spittal (NU00415188, NH 14258). This C18 building was used to store tackle associated with the Tweed salmon fishery. It is the only surviving unmodernised example of this type of structure on the Tweed and is a Grade II Listed Building.

In addition to salmon, Berwick was also engaged in the herring fishery, catches being shipped to London in fast 40-ton smacks. Ancillary facilities consisted of ice houses recorded from the late C18 and a herring curing station at Spittal in the 1840s (Linsley 2005, 27, 30 and 37).

Another important building associated with this industry at Berwick is the Pier Maltings on Pier Road (NU00275267, NH 22025). Although dating from the mid C19 in its present form, the eastern eight bays of this building were built *circa* 1807 as an oil house, associated with the whaling trade. The presence of an oil yard processing whale oil at Berwick is documented in the years between 1807 and 1838, although the main focus of this activity lay on the south side of the river at Tweedmouth. It is record that Berwick was the base in the early C19 for two vessels engaged in the Greenland whaling trade, the *Norfolk* and the *Lively* Barrow 2001, 60-62). The Pier Maltings is a Grade II Listed Building. A large number of whale bones have been recovered from the area at the rear of the maltings.

Figure 9.11 Pier Maltings, Berwick-upon-Tweed (author)

The advent of the steam drifter in the mid C19 had a profound effect on the fisheries of this part of the coast. Small harbours and havens could not accommodate the larger more powerful vessels and fell into decline. This is well exemplified at Holy Island Harbour where 12 or more keelboats lie inverted at the head of the beach. The corollary of this was the increasing prosperity of ports such as Seahouses which was able to support of fleet of steam drifters.

Figure 9.12 Keel boat sections at Holy Island Harbour (author)

The HER records the putative remains of two fish weirs at Budle Bay (NU15183580, NH 5086) and The Cages at Fenham (NU083426, NH 4117). The former consisting of lines of stones visible at low water and the latter is based on an interpretation of the place name.

9.3.3.4 Harbours

Harbour facilities along this section of the coast range from sheltered havens where vessels may safely lie at anchor or take the ground at low tide, to formerly constructed harbour works of piers and docks, with at least one example where coastal topography has been modified. Beadnell Bay, a 3.2km stretch of sheltered sandy foreshore, was considered in the early C19 to be capable of offering shelter to 'half the navy of England (Linsley 2005, 79). To the north of Beadnell Point the foreshore is rocky and inhospitable, except that differential erosion has left a number of natural inlets, notably Lady's Hole, Nacker Hole, Beadnell Haven and Collith Hole. These were probably the earliest fishing havens. The Nacker Hole was partly obstructed by a whinstone dyke and an opening was quarried through this in the mid C18 to create a small key from which lime from the nearby kilns and salt from the salt pans could be exported (Linsley 2005, 81). In the later C18 steps were taken to improve the harbour facilities at Beadnell and the decision was taken to construct a small harbour at Ebba's Nook (NU23702855, NH 5798) where there was already a small pier. The harbour was constructed by Robert Cramond who was also responsible for the harbour works at North Sunderland (Seahouses). Several schemes were produced and that finally built in 1798 consists of two piers, one straight the other dog-legged, providing about 212m of moorings. The harbour at Beadnell mainly served the adjoining limekilns and the herring fishery, the latter becoming increasingly important with the decline of lime burning in the early C19 (Linsley 2005, 82-87). Beadnell Harbour is a Grade II Listed Building.

Before the final quarter of the C18 the haven at North Sunderland (Seahouses) consisted of no more than a narrow channel between the rocks but by 1786 Robert Cramond was employed to build a 'pier' which was in fact a small harbour similar to that Cramond later built at Beadnell (Linsley 2005, 66-67). This consists of the existing, straight south pier and the inner part of the dog-legged north pier. By 1886 this first harbour was found to be insufficient and plans were made to construct an extension to the north pier with a terminal lighthouse. The new north pier was 267m long and the new lighthouse was a hexagonal concrete tower 8.2m high. A breakwater was also constructed across the rocks to the east of the harbour. Work began in 1886 and was completed in 1889 (Linsley 2005, 69-70). The Powder House (NU22493217, NH 5914) was built in 1886 for the storage of explosives used in the construction of the North Pier. It is situated on the rocks adjoining the North breakwater and is a Grade II Listed Building. The construction of the breakwater provided shelter for vessels taking the ground in the Fluke Hole, a sandy embayment east of the harbour entrance. The entry to the Fluke Hole is partly blocked by a reef, The Brigses. Although this can be passed over at high tide, a channel, similar to that at the Nacker Hole at Beadnell, has been cut through the reef to facilitate access.

In most respects the harbour at Holy Island is no more than a sheltered anchorage and an expanse of sand and shingle on which vessels can 'take the ground' at low tide. However, to facilitate the export of lime and the import of coal two jetties were constructed at the ends of the tramways serving the lime kilns. The remains of the Tipping Chare Jetty (NU122419, NH 5366) lie below MHWS. This jetty was constructed for the import of coal and the export of lime from the Kennedy Limeworks. A similar *raison d'etre* applies to the Cocklestone Jetty (NU13474168, NH 5355), associated with the Castle Point Lime Kilns (Linsley 2005, 56-60).

According to the 1st Edition Ordnance Survey in the mid C19 there was a pier at the mainly natural harbour of Budle Bay, probably for the export of grain from Waren Mill (Linsley 2005, 47-48).

The earliest record of formal harbour facilities at Berwick is the construction of a pier or breakwater, known as the Holdman Wall, in the late C13 (Linsley 2005, 24-25). This was replaced in 1557 by a new pier about 300m long and about 10m wide but by the late C18 this was in decay and Berwick had reverted to being a natural harbour. The general increase in trade and the size of vessels employed led to proposals being drawn up in 1808 for improved harbour works. These were to involve the construction of a new pier on the Berwick side (NH 4133), the extension of the existing quay and the construction of a stone jetty on the Spittal side. Work began in 1810 and was completed in 1825 (Linsley 2005, 31-33). The pier is a Grade II Listed Building. Trade continued to develop and in 1873 work began on the construction of a wet dock at Tweedmouth (NT996523, NH 2722), the 1.4ha dock being opened in 1876 (Linsley 2005, 38-45).

9.3.3.5 Shipbuilding

Shipyards do not feature in the Northumberland HER but Linsley's 2005 book on *Ports and Harbours in Northumberland* provides details of a number of yards on this section of the coast. Small fishing boats could have been built anywhere where access to the tide line was suitable.

The main larger scale ship building facilities were at Seahouses and Berwick. Dawson's Shipyard at Seahouses at the NW corner of the inner harbour used C18 methods down to 1980, but closed in the 1990s. Shipbuilding at Berwick can also be traced back to the mid C18 with the establishment of Byram's yard in 1751, which remained in production until the 1970s. By the end of the C18 Byram's was joined by Bruce's yard at Tweedmouth and Linsley records that between 1786 and 1813 an aggregate tonnage of 12,828 tons was launched on the Tweed (Linsley 2005, 27, 29-30). Byrams appear to have mainly built larger vessels in the schooner and smack category while the yard at Tweedmouth concentrated on fishing boats and cobbles.

Records exist of shipbuilding on Holy Island from the late C14 while the best two documented vessels built on the island are the 500 ton *Sally* launched in 1763 and the 360 ton *Kent* launched in 1766, both probably built for the lime burning and limestone trade (Linsley 2005, 50 and 55).

9.3.3.6 Aids to Navigation and Safety at Sea

Lighthouses

In 1673 Charles II gave Sir John Clayton and George Blake a license to erect lighthouses on the Northumberland coast and it was decided to adapt the partly ruinous Prior Castell's tower on Inner Farne to this purpose. It appears that only the southern portion of the uppermost floor was still serviceable and this was provided with a fire grate supported on a wooden platform. However, the refusal of Newcastle merchants to pay tolls in support of the light meant that it was never lit (Woodman and Wilson 2002, 98-99). By the end of the

C18 the tower was ruinous. In 1778 two lighthouses were established on the Farnes, one on Inner Farne the other on Staple Island. The latter was damaged in 1784, rebuilt and damaged again in 1800. In 1796 a new lighthouse was built on Brownsman's Island, the keeper being Robert Darling, the grandfather of Grace Darling immortalised through the rescue of survivors from the wreck of the *Forfarshire* in 1838. In 1810 Trinity House appointed Daniel Alexander to organise the building of two new lighthouses on the Farnes, one on Inner Farne the other on Longstone (NU24603895, NH 5888), Robert Darling being transferred to the latter. The work was finally completed in 1826 by Joseph Nelson, Alexander's successor (Woodman and Wilson 2002, 98-99). The Longstone Lighthouse is a Grade II Listed Building.

Bamburgh, or Blackrocks, Lighthouse (NU173358) is a C20 structure while a building known as the Chapel of the Lamp (NU12604166, NH 5340), situated towards the west end of The Heugh to the south of Holy Island Harbour has been interpreted as an early lighthouse or coastguard lookout. It measures 10m by 8m and the walls stand up to 3m high (Beavitt *et al* 1987). The ecclesiastical attribution is thought to derive from the inclusion in the structure of two stones from a plastered doorway, but these were probably robbed from the priory ruins. The HER reports a local tradition that this building dates from the C14 and was operated by the monks as a primitive lighthouse.

Seamarks

The difficulties faced by mariners trying to enter Holy Island Harbour have led to the provision of a number of beacons whereby vessels may fix their position and establish the correct bearing to follow. The most prominent of these are the two brick-and-stone-clad obelisks at Guile Point (NU13114054 and NU12994052, NH 5375). These were designed by the famous Newcastle architect John Dobson and built between 1820 and 1840. The Guile Point Beacons are Grade II Listed Buildings. Further beacons were provided in 1830s on the Heugh between Holy Island village and the harbour and on Emmanuel Head, designed to assist vessels approaching from the north (Linsley 2005, 57-58). The latter, now a prominent white pyramid, is a major Holy Island landmark.

Figure 9.13 The Guile Point obelisks, Holy Island Harbour (author)

Lifeboat Stations

The Seahouses lifeboat station was established in 1827 by the Lord Crewe Trustees, the first RNLI lifeboat being provided in 1865. The lifeboat house was replaced in 1935 to accommodate a new motor lifeboat and was rebuilt again in 1991 to cater for a further upgrade of vessel (Linsley 2005, 77-78).

Two lifeboat stations are recorded on Ordnance Survey maps at the Old Law Dunes, south of Guile Point. That shown on the 1866 1st Edition is at NU13563964 (NH 20725) while that on the 1899 2nd Edition is shown at NU13463961 (NH 20726).

The first lifeboat station on Holy Island lay at the Snook, the extreme NW point of the island, in 1839. This was replaced on the same site in 1869 (Linsley 2005, 53).A second lifeboat house stands beside to shore opposite St Cuthbert' Isle (NU12484172, NH 14045). This is marked on the 2nd Edition Ordnance Survey map of 1898.

The Tweed's first lifeboat was stationed at Spittal in 1835 although it was not provided with a purpose built house at Carr Rock until 1859 (Linsley 2005, 37).

9.3.3.7 Shipwrecks

As is the case with the rest of the NERCZA study area, shipwrecks are also a feature of the coastal/maritime landscape of Block 4. Large numbers of shipwrecks are recorded in the NMR with a few additional entries in the HER. Most of these are in deep water beyond LAT. However, a number are recorded between LAT and MHWS and these are listed in the following table. Most of these records have been taken from historical sources such as Lloyds Registers and the local press and the existence of a record does not necessary imply that remains are still visible on the foreshore.

Table 9.8 Shipwrecks between MHWS and LAT in Block 4

NGR	Name of vessel	Date lost	HER	SMP
NU239286	*The Misterley*	?	NH 5806	18
NU241288	*The Yewglen*	1960	NH 5807	17
NU07154576	?	?	NMR 907661	14
NU08104536	?	?	NMR 907660	14
NU09864493	?	?	NMR 907659	14
NU13723982	?	?	NMR 907657	14
NU149372	?	?	NH 5083	14
NU080433	?	?	NH 4114	14
NU083430	?	?	NH 4116	14
NU05254639	?	?	NH 4027	13
NU24182545	?	?	NH 20730	19
NU23773844	*Forfarshire*	1838	NH 5885	Farnes

NU01045262	HMS *Ben Heilem*	1917	NMR 943573	9
NU00005444	*Oscar den Forste*	1848	NMR 1434785	8

9.4 Military Coastal Defence

9.4.1 C16 to C19

With Dissolution of the Monasteries in the early C16 the buildings of Lindsifarne Priory were to turned into a supply base for the ships of the Tudor navy, the Priory church becoming the 'great storehouse' (Linsley 2005, 50), although a survey of 1550 reported that this was in a state of collapse. However, some time before this an additional storage facility was established at a complex of C15 buildings lying to the east of the Priory and known as 'The Palace' (NU12754194, NH 5363). The earlier history of this site as a private residence has already been referred to and its conversion into a Tudor supply base that was the main feature of the investigation carried out by Channel 4's *Time Team* in June 2002 (CH/NAA 2001, 20-21). A plan of 1548 complied by the Crown Agents shows that the site consisted of a group of buildings arranged around a courtyard, with the northern building containing two circular features thought to be brewing vats and a survey carried for Queen Elizabeth in 1559/1560 refers to the 'Pallace' as a 'storehouse' with a 'brew house' and a 'bakehouse'. The excavations in 2000 identified the brewing vats and evidence for a granary. This seems to have been a short lived facility as by 1596 the brewing vats are described as useless and the site was ruinous by the late C18.

In 1539 it was ordered that 'all havens should be fenced with bulwarks and blockhouses against the Scots' and an earth and timber defence work was erected within ten years on Benblow, the whinstone crag on the north side of Holy Island Harbour. However, these flimsy defences were considered inadequate and were replaced by a stone castle between 1565 and 1571 (Linsley 2005, 50). Lindisfarne Castle (NU13634175, NH 5347) was built as an artillery fort to protect the anchorage and harbour. The present building dates mainly from 1902 when the castle was substantially rebuilt by Sir Edwin Lutyens as a country residence. It is one of the outstanding houses of the Arts and Crafts Movement and it is a Grade I Listed Building . Only a few original features survived the rebuilding. The castle has an irregular polygonal plan. It mounted gun batteries on two levels while an entrance on the south side is approached by a cobbled ramp leading to a portcullis gate. Lindisfarne Castle remained garrisoned until 1819 (Grundy *et al* 1992, 339-340). It is owned by the National Trust.

Figure 9.14 Lindisfarne Castle (author)

Lying about 600m to the west and on a rocky Whin Sill promontory on the opposite side of Holy Island Harbour lie the remains of The Fort on the Heugh, also known as Osborne's Fort (NU12954165, NH 5339). Built between 1671 and 1675 its layout can be established from a plan of 1742 and a survey carried out on site in 1986. The fort consisted of a polygonal enclosure, measuring 64m east-west by 32m north-south, surrounding a rectangular blockhouse or redoubt. The north, east and south sides follow the edge of the promontory while that to the west, including the main entrance runs across level ground. The south and east, seaward facing, sides were originally protected by a double wall, but much of the outer wall has collapsed down slope. The space between these walls was occupied by the gun platforms. According to the 1742 plan small turrets stood at the west, north and east corners of the enclosure. The redoubt was 6.6m square and probably of two storeys with a pitched roof (Beavitt, O'Sullivan and Young 1987, 20-21; O'Sullivan and Young 1995, 91-92, 98-99). The north and east walls still stand to 4m. The Fort on the Heugh is a Scheduled Ancient Monument.

Figure 9.15 The Fort on the Heugh, Holy Island with Lindisfarne Castle in the background (author)

With the Dissolution of Monasteries, Prior Castell's tower on Inner Farne was converted into a fort, garrisoned jointly with Lindisfarne Castle. In 1637 the two forts were reduced to a single garrison which probably implies that Prior Castell's tower was abandoned (Ryder 19989-1999).

9.4.2 World War II

The majority of coastal/maritime features in Block 4 date from WWII and the approach followed here is that set out in Chapter 5 of NERCZA. Major sites are described in detail with minor sites being given a more general treatment, or presented in tabular form. The WWII military features in the coastal zone can be divided into two groups according to whether their role was mainly to defend against bombardment, from the sea or from the air, or to confront a possible invasion, although the two categories are not mutually exclusive.

Figure 9.16 WWII anti-tank obstacles at the Beal end of the Holy Island causeway
(author)

There are few sites other than ***pillboxes*** and ***anti-tank obstacles,*** as this section of the coast does not incorporate any major ports or industrial complexes. The only major site to be considered is the ***emergency coastal battery*** at Spittal (NU006517). This site is recorded in the NMR (NMR 1421589) and features in Dobinson's gazetteer (2000, 297-298) and Civic Trust leaflet on coastal defences in the NE. This battery covered the mouth of the River Tweed, apparently mounting two 6 inch naval guns and was in commission between 1940 and 1944. It had been manned by the Home Guard and had been put on a care and maintenance footing by September 1944. It had been dismantled by February 1945 though according to the NMR some features can still be traced (NMR 1421589).

The Civic Trust leaflet also records the emplacement of three emplacements for 4 inch guns on the mainland foreshore facing Holy Island, identified as Beal Battery. These emplacements do not feature in Dobinson's gazetteer but the most northerly site does have an HER entry (NU03174809, NH 19976) and has been recorded by the APTE (NMR 1421615). The other emplacements appear to have been towards the end of the Holy Island causeway and overlooking Budle Bay. The latter has been identified by the APTE at NU16083576 (NMR 1421614). This appears to have consisted of two gun emplacements with an associated magazine and ***searchlight battery***. This site is recorded in the HER as NH 5101 and 5102.

A ***searchlight battery***, not directly associated with a gun emplacement, has been recorded by the APTE at NU20323272 (NMR 1471609). This consists of three emplacements with associated military buildings.

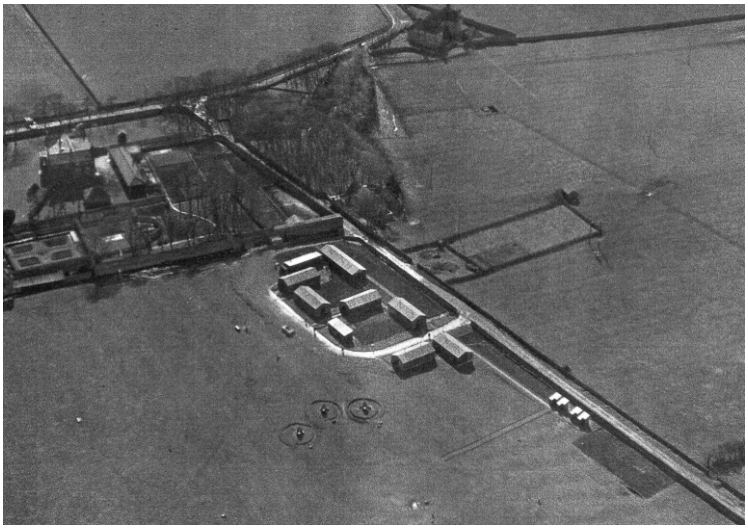


Figure 9.17 Searchlight Battery at Shoreston Hall, Seahouses (NMR NU 2032/26 (31056/PO-04855) 31-MAR-1941 © English Heritage. NMR)

The site of a 6pdr Hotchliss gun at Bamburgh is also recorded in the Civic Trust leaflet. This site has been recorded by the APTE at NU17823548 (NMR 1421604). This emplacement does not feature in Dobinson's gazetteer and the calibre of the weapon suggests that it should be regarded as a ***beach defence battery.***

The APTE recorded a large number of other features for which basic details are provided in the following tables.

Table 9.9 Pillboxes recorded from aerial photographs

OS Sheet	Eastings	Northings	NMR	SMP
NU 04 NE	05129	46292	1421689	13
NU 04 NE	055	457	1472613	13
NU 04 NW	0412	4705	1472872	13
NU 04 SE	0652	4280	1421569	14
NU 04 SE	0798	4318	1474720	14
NU 04 SE	0761	4315	1474728	14
NU 13 NE	178	355	1421604	16
NU 13 NE	161	358	1472105	15
NU 13 NE	1724	3590	1472251	15
NU 13 NE	1732	3573	1472261	15
NU 13 NE	176	355	1472288	16
NU 13 NE	1763	3525	1472346	16
NU 13 NE	1822	3529	1472372	16
NU 13 NW	148	369	1472273	14
NU 13 SE	198	342	1421644	16
NU 22 NW	23171	28990	1421651	17
NU 22 NW	22061	27060	1421652	19
NU 22 NW	2249	2971	1471523	18
NU 22 NW	223	289	1471543	18

NU 22 NW	2417	2500	1471688	20
NU 22 NW	2305	2533	1471741	19
NU 22 NW	2351	2528	1471750	19
NU 22 NW	2352	2514	1471755	19
NU 22 NW	2378	2521	1471761	19
NU 22 NW	2366	2606	1471790	19
NU 23 SW	2281	3164	1471530	17
NU 23 SW	2026	3382	1471623	16

Table 9.10 Anti-tank blocks recorded from aerial photographs

OS Sheet	Eastings	Northings	NMR	SMP
NU 04 NE	05991	45551	1421608	13,14
NU 04 NE	055	457	1472613	13
NU 04 NW	0482	4656	1472868	13
NU 04 SE	080	427	1417828	14
NU 04 SE	074	443	1472668	14
NU 13 NE	159	356	1472082	15
NU 13 NE	1775	3558	1472290	16
NU 13 NE	1802	3537	1472331	16
NU 13 NW	134	370	1472199	14
NU 22 NW	2371	2864	1471579	17
NU 22 NW	235	288	1471624	17
NU 22 NW	231	282	1471657	18
NU 22 NW	228	272	1471727	19
NU 23 SW	2223	3105	1417827	17
NU 23 SW	2252	3145	1471507	17
NU 23 SW	2112	3263	1471618	16

CHAPTER 10

Recommendations for further work and proposed research agenda

10.1 Introduction

Chapters 6 to 9 have offered an initial, baseline, assessment of the heritage assets of the NE coast and the threat to which they are exposed by coastal erosion. If that threat is to be addressed this initial assessment must be used as the basis for the formulation of policies for mitigation and record. In this chapter a few broad principles are advocated by which this work may be taken further. The following paragraphs begin with noting two issues that need to be addressed as a preliminary to further work and then proceed to a consideration of a number of broad topics where more research is needed on categories of asset which seem to be particularly under threat. The identification of these topics is seen as contributing to the development of a research agenda for implementation within the context of the Phase 2 of the NERCZA. Where appropriate, these themes are cross referenced to the priorities and recommendations itemised in *Shared Visions*: *The North-East Regional Research Framework for the Historic Environment* (NERRF) (Petts and Gerrard nd). Chapter 21 of that volume deals specifically with 'Maritime and coastal archaeology' and makes a number of recommendations for further research. The present chapter concludes with comments on specific sites under immediate or imminent threat.

10.2 SMP2

The NERCZA study north of the mouth of the Tyne has had to be undertaken with reference to the SMP1 produced in 1997. This is significantly more limited than the SMP2 document produced for the coast south of the Tyne and, in particular, does not offer details of rates of erosion and predicted coastlines. Work on SMP2 for the coast north of the Tyne is underway at the time of writing and is due for completion in the near future. In order to make the NERCZA north of the Tyne comparable to that to the south it is important that the assessment is reviewed in the light of the SMP2 criteria when they become available. The SMP2, being currently undertaken by Royal Haskoning, is expected to be available sometime during 2009.

10.3 Designation

Of the historic assets described in the previous chapters forty-two, by their status as Scheduled Ancient Monuments, are deemed to be of national importance. This is less than 2% of the sites identified in the HERs, not counting the 968 new sites that have been added by the APTE (Chapter 2). The national average for scheduled sites in relation to the record as a whole is 3.14% and there is clearly a considerable discrepancy in the coastal zone. The situation with Listed Buildings is less clear-cut in that the NERCZA brief stipulated that only those buildings specifically associated with coastal and maritime activities should be taken into account. Indeed, while most, but not all, lighthouses are listed, the statutory designation of lifeboat stations and facilities associated with the volunteer life brigades is more patchy.

Only major seamarks, deemed to be of architectural interested, have been afforded listed status.

The significance of an historic asset will clearly have a bearing on the lengths to which it is appropriate to go to mitigate the effects of sea level rise and coastal erosion. Scheduled Ancient Monuments and Listed Historic Buildings have vested in them a level of interest above that enjoyed by the majority of HER entries. Indeed, as noted above, Scheduled Ancient Monuments are deemed to be of national importance. Given the discrepancy in the proportion of coastal sites on the Schedule and the patchy nature of the List of Historic Buildings in respect of specifically coastal and maritime structures, a review of the NERCZA data base for this purpose is regarded as a matter of priority. It is envisaged that such a review will identify those assets that could be put forward for consideration for statutory designation. The documentation required for the submission of proposals to English Heritage's Heritage Protection Department is considerable and in most cases requires a field visit. This is beyond the scope of the NERCZA desk-based study.

10.4 Research Agenda Themes for informing NERCZA Phase 2

Both the nature of the coastline and the extent of development have a bearing on the survival of assets and the degree to which they are under threat. The cliffs of County Durham, Tyne and Wear and North Yorkshire, while subject to landslips are relatively resistant to sea level rise whereas the lowlying areas around Teesmouth and Hartlepool Bay are particularly vulnerable to even small rises, which is also the case along most of the Northumberland coast. The coast between Saltburn and Tynemouth is heavily developed and the threat to assets in this zone is likely to come as much from mitigation strategies as from sea level rise.

During the course of the assessment a number of broad themes have emerged which relate to categories of asset that are either particularly vulnerable or are topics that have received too little attention to make a valid assessment possible.

10.4.1 Inter-tidal peats

Inter-tidal peats, reflecting formerly lower sea levels, have been identified at a number of locations along the NE coast, notably at Hartlepool Bay (Chapter 6), Whitburn Bay (Chapter 7), Cresswell (Chapter 8), Low Hauxley (Chapter 9) (see also Raistrick and Blackburn 1932). At Hartlepool these are associated with archaeological deposits dating from the Mesolithic, Neolithic and Romano-British periods while artefacts and palaeofuanal remains have been recovered at the other localities. Access to these deposits is generally difficult and only possible at low tide, while some are never exposed, although the Low Hauxley land surface extends into the cliffs below a later dune system from where Bronze Age burials continue to emerge. It was noted in Chapter 6 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 needs to be established, together with their date and their archaeological and palaeoenvironmental potential. This has already been largely achieved for the Hartlepool Bay peat (Waughman 2005). These deposits are also a major component of the research

undertaken into sea level change outlined in Chapter 3. They are the focus of NERRF Research Theme **M1**, Research Priority **Mi** and Recommendations **MT18** to **MT23**.

10.4.2 Deflation and blow-out of sand dunes

While sand dunes are a major feature of the NE coast, particularly north of the Tyne, the history of these systems is little understood. At some locations they appear to have formed during recent centuries whereas elsewhere their presence can be documented from the Bronze Age. Even where some management has been undertaken, dune systems are dynamic and constantly on the move. Part of this movement is the process of deflation and blow-out in which the sand of the dune is re-deposited through wind action and underlying deposits are exposed. At a number of locations where this has occurred, archaeological deposits have been exposed; examples being the Mesolithic and Bronze Ages sites at Low Hauxley and Ross Links and those at Bamburgh where Bronze Age and Anglo-Saxon burials have been found in and around a blow-out known locally as the 'Bole Hole'. Low Hauxley lies at the north end of Druridge Bay and the dune system there extends for over 8km while that at Ross Links is 3km in extent. These systems seal land surfaces that were the focus of human activity from the 6th to early 2nd millennium cal BC and the potential for making significant discoveries is considerable, but one that is seriously threatened by erosion of the dunes. Comparable dune systems are widespread along the Northumberland coast and offer the prospect of important discoveries similar to those at Low Hauxley and Ross Links. However, while these sites are known to be important and are, to some extent, monitored, the potential elsewhere is unknown and priority should be given to recording dune deflation and blow-out along the entire Northumberland coast north of the Coquet and as far as Scremerston. They are the focus of NERRF Research Priorities **Mi, Mvii**, **liv** and **EMiv** and Recommendations **M26** to **M27**.

10.4.3 Land reclamation

The history of land reclamation in the major tidal estuaries, especially that of the Tees, is yet to be addressed. The association of sea banks and walls with traces of the salt making industry, some of which can be dated to the Medieval Period, provides an indication of a way in which this topic may be approached while desk based studies of cartographic and documentary sources should be carried out in parallel. The salt making industry is itself an important field of inquiry and currently the subject of a programme of documentary research and field work being undertaken by David Cranstone (*pers. Comm.*).

10.4.4 Pre-Industrial shipbuilding

Shipbuilding has been a major industry on the NE coast and in the estuaries of the major rivers. The C19 and C20 rise, decline and fall of the major shipyards of the Tyne, the Wear and Hartlepool has been well documented but few systematic data are available on the earlier phases of the industry or on the smaller scale shipyards to be found at every suitable location along the coast. Some sites are recorded in the HERs, but mainly from documentary rather than field evidence. Stafford Linsley's 2005 book on *Ports and Harbours of Northumberland* provides a starting point for consideration of that part of the coast but this is also mainly based on documentary rather than field evidence. Shipbuilding is identified as NERRF Research Theme **MO2** and Recommendations **MT1** and **MT2**.

10.4.5 The fishing and whaling industries

From time immemorial fishing has been a major industry on the NE coast but with the exception of detailed studies of individual ports or vessel types, such as the coble, the archaeology the NE fisheries is yet to be written. The remains of the fishing industry are widespread and include vessels of which there are several types in addition to the coble, such as 12m to 15m keel boats now lying inverted at Holy Island Harbour and various shore facilities mostly now converted to other uses. Several NE ports including Whitby, North Shields and Berwick-upon-Tweed also supported fleets engaged in the Greenland whaling trade. This industry required a range of special facilities for the processing and storage of the catch. At present the early C19 oil house at Berwick-upon-Tweed, later converted into maltings, is the only structure on the NE coast associated with the whaling industry to receive statutory projection through designation. The fishing industry is highlighted as NERRF Research Priorities **EMiv**, and **MDx**..

10.4.6 The evolution of small harbours, docks and related facilities

The consideration of the North Yorkshire coast in Chapter 6 drew attention to a number of small docks and harbours associated with the alum and ironstone industries. These have already been the subject of some study but lying between MHWS and LAT they are particularly vulnerable to the effects of sea level rise, either exposing them to accelerated erosion or further limiting access. Associated with this work is the study of the rutways, rock-cut channels designed to facilitate the movement of carts across the foreshore. Some recording of these features has already taken place, undertaken by Tees Archaeology, but this work needs to be supplemented and extended to cover the whole coastline from Huntcliff to Sandsend.

Small harbours and docks are not phenomena limited to the North Yorkshire coast in that similar, simple dock-like facilities have been noted at Beadnell and Seahouses while an example at Dunstanburgh has been dated to the Middle Ages. These represent the earliest stages in the development of harbour facilities on the NE coast and ante-date the construction of formal piers and harbour works in the C18. A programme of recording these features and prospecting for similar sites should be considered a priority.

10.4.7 Foreshore survey of all surviving shipwrecks

All shipwrecks documented between LAT and MHWS have been listed but in the majority of cases the evidence is documentary rather than physical. It will be necessary to undertake a survey of the foreshore in order to establish where actual vessels survive and when identified these should be fully documented. Lying between LAT and MHWS such assets, like other features on the foreshore, are particularly vulnerable to the effects of sea level rise, either exposing them to accelerated erosion or further limiting access. Only when this fieldwork has been undertaken can an assessment be made of the extent to which individual wrecks are under threat. The study of shipwrecks is identified as a component of NERRF Research Theme **MO2** and Recommendations **MT3** and **MT5** to **MT12**.

10.4.8 WWII anti-invasion features

It has already been noted that 74% of the assets recorded during the APTE relate to the Second World War. Most of these features have been identified on aerial photographs taken during the course of the war or in its immediate aftermath. Many were ephemeral and were cleared at the end of hostilities while others have been removed during subsequent development projects, such as the building of housing and industrial estates. Some features such as pillboxes and anti-tank blocks do survive and are frequently encountered on visits to the coast. However, the establishment of which sites recorded by the APTE are still extant requires field visits and is beyond the scope of the current desk-based study. Priority should be given to fully recording the two Defence Areas within the NERCZA study zone, Greatham Creek and Druridge Bay, while in the longer term this should be extended to the whole coastline. Some work of this kind was undertaken by the CBA's *Defence of Britain* project, but the coverage is incomplete, very often sites are only recorded with a six-figure NGR and some parts of the survey have been found to be unreliable. This topic falls within NERRF Recommendation **F10** and Research Priority **MOvi**.

10.4.9 Recreation

The recreational use of the coastline and foreshore – the 'seaside' – is only now beginning to emerge as a topic of interest and associated facilities do not generally feature in the HERs, though some beach huts at Saltburn are Grade II Listed Buildings. This topic is partly covered by NERRF Research Priority **MOvii.**

10.5 Site specific issues

In the following paragraphs details are provided of nine localities within the NERCZA study area where coastal erosion is currently degrading heritage assets. In each case the situation needs to be monitored and proposals for mitigation drawn up. Such proposals are likely to entail surveys of the surviving remains and in some cases, excavation leading to preservation by record. Specific proposals for the most threatened sites are contained in the project design for a Phase 2 NERCZA.

10.5.1 The main flint scatter site at Crimdon Dene is close to the MHWS limit while the sites at Blackhall are on the cliff edge (Chapter 6.2.2). This section of the coast lies in SMP2 Management Areas 10.1 and 11.1 where the recommended policy is one of 'No Active Intervention'. The former is vulnerable to the effects of sea level rise and the latter to erosion of the cliff.

10.5.2 Although the Overdale Wyke enclosures (Chapter 6.2.3) survive only as cropmarks, the most easterly sites lie within 100m of the present cliff edge and could become vulnerable in the event of cliff collapse or landslip.

10.5.3 In Chapter 6 it was noted that the SMP2 recommendation for the areas adjoining Greatham Creek is 'No Active Intervention' to be followed in the middle term by 'Managed Retreat' which may entail the construction of sea defences. Three categories of asset in this area can be considered vulnerable to the effects of flooding due to rising sea levels and/or the construction works involved in the erection of sea defences. These consist of a prehistoric midden, a group of Medieval and later salterns and the features of the Greatham Creek Defence Area, the latter being one of the most complete surviving complexes in the NE. The full recording of these features and the assessment of the extent to which they are at risk is a matter of priority.

10.5.4 The remains of an alum works are visible in the cliff face at Hummersea (Chapter 6.2.8), currently some 8m above sea level. The buildings would originally have been located on a platform, to avoid the tides. The structures have been engulfed by a landslip from the cliff above, hence the fragmentary remains exposed in the cliff face. All the North Yorkshire alum works were situated close to the cliff and several have been reduced by cliff collapse and landslip. The Kettleness site has been the subject of a detailed survey but similar surveys are also required at Boulby and Sandsend.

10.5.5 An erosion rate of 0.2m/per year has been recorded at Trow Point and the SMP2 policy recommendation is to allow the cliff face to retreat. Clearly, if any of the Trow Point barrow survives (Chapter 7.2.4), this rate of erosion is likely to lead to its total loss in the near future. A field visit visit and survey is required in order to assess the condition of preservation of this feature and the opportunities for any recording depending on what currently survives.

10.5.6 The HER records that a quantity of slaggy material has been noted eroding out of the sides of an embanked promontory known as 'Pan Close' beside the River Aln at Alnmouth. A number of mounds to the east have been identified as sleeching tips and the area is marked as 'Saltings' on the 1:10,000 OS Map (Chapter 8.3.3.1). This site is being actively eroded by the river and the SMP1 data show the whole area to be at risk of flooding. The 'Preferred Strategic Option' here is to 'Selectively hold the line' and it is unclear what the implication of this is for the site.

10.5.7 The oyster beds which lie adjacent to the Alnmouth salt working site are subject to the same threat. This is the only example of oyster cultivation recorded on the NE coast but represents an activity that was formerly widespread in England from Roman times.

10.5.8 The Amble hulks (Chapter 8.3.3.6) lie in the zone between LAT and MHWS and are vulnerable to every tide. They lie within SMP1 Unit 30 for which The 'Preferred Strategic Option' is 'Selectively hold the line' and it is unclear what the implication of this is for the site. A full survey should be considered an urgent priority.

10.5.9 The multivallate fort identified from cropmarks at Fenham (Chapter 9.2.3) has already been partly destroyed by ploughing and erosion. The remaining part is very close to a low cliff about five metres high immediately above MHWS. This site is likely to be further reduced as the cliff continues to erode. Lowland Iron Age forts are poorly understood having have been only recently been recognised. Iron Age forts in coastal settings are also relatively rare, particularly on the NE coast. Therefore this site, and that mentioned below at

Scremerston, are of high regional significance and should be investigated and recorded without delay. Assessment of the condition of surviving deposits, their exposure to on-going erosion and production of a concise management plan are key priorities.

10.5.10 The situation at Fenham is being repeated in the case of the multivallate lowland fort at Scremerston (Chapter 9.2.3) where the eastern side of the site has been lost to erosion of the cliff. The same priorities for the Fenham fort also apply to this site.

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Appendix – Concordance of HER/NMR numbers and SMP units

Details are provided for each HER, sorted by HER and NMR numbers, the latter being mostly new additions to the record, many generated by the APTE. The policy column refers to the recommendations in the SMPs. These are as follows:

NAI	No Active Intervention
HTL	Hold the Line
SHTL	Selectively Hold the Line
R	Retreat the Line
MR	Managed Retreat
DN	Do Nothing

The data in the 'Importance' and 'Risk' columns are derived from the tables in Chapters 6 to 9. Where these cells are left blank, mainly in the case of shipwrecks and WWII anti-invasion features, it is felt a field visit is necessary before either the importance or risk can be determined. 'n/a' entries apply in cases not within a SMP unit, casual find spots or sites known to have been destroyed.

North Yorkshire County Council

HER entries

HER	SMP2	Policy	Importance	Risk
478	22.1	NAI	Medium	High
4441	22.4	NAI	Low	Low
8836	22.3	HTL	Low	Low
12112	22.3	HTL	High	High

NMR entries

NMR	SMP2	Policy	Importance	Risk
58909	22.2	HTL	Medium	High
909210	23.2	HTL	-	-
984141	23.2	HTL	-	-
1424595	22.3	HTL	-	-
1424687	23.1	HTL	-	-
1453239	22.1	NAI	-	-
1453241	22.3	HTL	-	-
1453248	22.4	NAI	-	-
1458579	23.2	HTL	-	-
1458583	22.4	NAI	-	-
1458584	22.4	NAI	-	-
1458585	23.1	HTL	-	-
1458592	22.2	HTL	-	-

North York Moors National Park

HER entries

HER	SMP2	Policy	Importance	Risk
2772.01	20.2	R	Medium	Low
2772.02	20.2	R /NAI	High	Low
2772.03	20.2	R	Medium	Low
2777.01	18.1	NAI	Low	Low
2777.01004	20.1	NAI	Medium	High
2777.01006	18.1	NAI	Low	Low
2777.01007	19.3	HTL	Low	High
2777.02002	20.1	NAI	Medium	High
2777.02003	20.1	NAI	Medium	High
2777.021	18.1	NAI	Low	Low
2777.03	20.1	NAI	Low	Low
2777.0312	20.2	R	Low	High
2777.04	20.2	R	Low	Low
2777.04401	20.3	NAI	Low	High
4399	20.3	NAI	Low	Low
4576	21.2	NAI	Medium	High
4657	22.1	NAI	Low	High
4662	21.3	HTL	Low	Low
4966	18.1	NAI	Medium	Low
4967	18.1	NAI	Medium	Low
4968	18.1	NAI	Medium	High
7318	22.1	NAI	Low	High
7327	18.1	NAI	Medium	High
7328	18.1	NAI	Medium	High
7329	18.1	NAI	Medium	High
7332	21.3	HTL	Low	Low
7400.06	21.3	HTL	High	Low
7400.07	21.3	NAI	Medium	Low
7400.14	21.3	NAI	Medium	Low
7444	23.3	HTL	High	High
7446	21.2	NAI	High	Low
7448	20.3	NAI	Medium	Low
7451.01	20.3	NAI	Medium	Medium
7452	21.2	NAI	Medium	High
7458	21.2	NAI	Medium	Low
7460	22.1	NAI	Medium	High
7462.01	22.3	HTL	Low	High
7471	n/a	n/a	High	Low
58753	18.1	NAI	Low	Low
58781	18.1	NAI	Low	Low
58826	21.3	HTL	Low	Low

NMR entries

NMR	SMP2	Policy	Importance	Risk
909219	22.1	NAI	-	-
938414	22.1	NAI	-	-
1385804	22.1	NAI	-	-
1385806	22.1	NAI	-	-
1424596	22.1	NAI	-	-

1424597	19.1	HTL	-	-
1453229	21.3	NAI	High	High
1453234	22.1	NAI	-	-

Tees Archaeology

HER entries

HER	SMP2	Policy	Importance	Risk
11	16.1	NAI	Low	Low
15	15.4	HTL	Low	Low
16	16.1	NAI	n/a	n/a
32	18.1	NAI	Medium	Low
33	18.1	NAI	High	Low
40	18.1	NAI	Medium	Low
43	18.1	NAI	Medium	Low
44	18.1	NAI	Medium	Low
45	18.1	NAI	Medium	Low
46	18.1	NAI	Medium	Low
242	12.2	HTL	High	High
335	12.1	HTL	High	Low
494	18.1	NAI	Medium	Low
495	18.1	NAI	Medium	Low
496	18.1	NAI	n/a	n/a
545	18.1	NAI	Low	Low
548	18.1	NAI	Low	Low
572	14.2	HTL	-	-
660	12.1	HTL	High	High
689	12.1	HTL	n/a	n/a
698	11.3	HTL	High	Medium
703	12.1	HTL	Low	Low
712	12.1	HTL	High	High
714	12.1	HTL	Low	Low
725	12.1	HTL	High	High
760	13.7	NAI	High	High
785	12.2	HTL	High	High
786	12.1	HTL	High	High
786	12.2	HTL	High	High
788	12.2	HTL	Low	Low
801	12.1	HTL	High	High
993	13.4	NAI	n/a	n/a
1049	16.1	NAI	Low	Low
1114	18.1	NAI	Low	Low
1120	16.1	NAI	High	Medium
1130	17.3	NAI	Low	Low
1131	17.2	HTL	Low	Low
1141	17.3	NAI	Low	Low-
1170	17.1	R	Low	Low
1170	18.1	NAI	Low	Low
1201	12.1	HTL	n/a	n/a
1264	14.2	HTL	-	-
1269	18.1	NAI	Low	Low
1289	12.1	HTL	High	High
1290	12.1	HTL	High	High
1305	12.1	HTL	High	High
1309	n/a	n/a	High	High
1489	12.1	HTL	High	High

1489	12.2	HTL	High	High
1741	18.1	NAI	Low	Low
1742	18.1	NAI	Low	Low
2680	11.1	NAI	Low	Low
2861	11.1	NAI	Low	Low
2862	11.1	NAI	Low	Low
2866	11.2	HTL	Low	Low
3284	12.2	HTL	n/a	n/a
3446	18.1	NAI	Medium	Low
3447	18.1	NAI	Medium	Low
3562	13.6	HTL	High	High
3563	15.3	NAI	Low	Low
3565	17.2	HTL	Low	High
3582	13.2	NAI	Medium	High
3583	13.2	NAI	Medium	High
3588	14.3	HTL	Medium	Medium
3589	14.1	HTL	Medium	Medium
3590	14.1	HTL	Medium	Medium
3596	18.1	NAI	Medium	High
3684	18.1	NAI	Medium	High
3843	n/a		Low	Low
3844	n/a		Low	High
3861	n/a		Low	Low
3940	n/a		Low	Low
3948	n/a		Low	Low
3949	n/a		Low	Low
3980	n/a		Low	High
3996	n/a		Low	Low
4007	n/a		Low	Low
4183	n/a		Low	Low
4308	n/a		Low	High
4310	n/a		Low	Low
4312	n/a		Low	Low
4313	n/a		Low	High
4314	n/a		Low	High
4348	16.1	NAI	Low	Low
4415	15.4	HTL	Medium	High
4517	n/a		Low	Low
4538	n/a		Low	Low
4721	12.1	HTL	Low	Low
4725	12.1	HTL	Low	Low
4726	12.1	HTL	Low	Low
4753	11.3	HTL	High	Medium
4753	11.3	HTL	High	Medium
4754	11.3	HTL	High	Medium
4755	11.3	HTL	High	Medium
4756	11.3	HTL	High	Medium
4757	12.1	HTL	High	Medium
4758	11.3	HTL	Medium	Medium
4760	12.1	HTL	Medium	Medium
4779	16.1	NAI	Low	Low
4869	14.2	HTL	Low	Low
5229	18.1	NAI	Low	Low
5606	n/a		Low	Low
5624	n/a		Low	Low
5659	n/a		Low	Low
5709	13.7	NAI	Low	Low
5959	16.1	NAI	Low	Low
5975	17.1	R	Low	Low

5982	17.2	HTL	Low	High
6004	18.1	NAI	Medium	High
6018	18.1	NAI	Medium	High
6024	18.1	NAI	Medium	High
6237	18.1	NAI	Low	Low
14554	12.2	HTL	n/a	n/a

NMR entries

NMR	SMP2	Policy	Importance	Risk
900047	13.7	NAI	-	-
900047	13.6	NAI	-	-
908179	13.3	HTL	-	-
908828	14.3	HTL	-	-
908832	13.6	HTL	-	-
908835	13.4	NAI	-	-
908867	11.3	HTL	-	-
936611	14.2	HTL	-	-
937920	17.3	NAI	-	-
938694	20.1	NAI	-	-
1311295	15.1	NAI	-	-
1312495	13.2	NAI	-	-
1320424	17.2	HTL	Medium	High
1421321	13.4	NAI	-	-
1424388	17.3	NAI	-	-
1424416	16.1	NAI	-	-
1424426	15.3.15.4	NAI/HTL	-	-
1424439	15.3	NAI	-	-
1424454	15.3	NAI	-	-
1424479	14.1	HTL	-	-
1424496	13.6	HTL	-	-
1424501	13.5	NAI	-	-
1424507	13.5	NAI	-	-
1424516	13.6	HTL	-	-
1424598	17.2	HTL	-	-
1424604	17.2	HTL	-	-
1424616	15.3	NAI	-	-
1424618	15.3	NAI	-	-
1424620	15.3	NAI	-	-
1424623	15.3	NAI	-	-
1424624	15.3	NAI	-	-
1424625	15.3	NAI	-	-
1424629	15.2	HTL	-	-
1424631	15.1	NAI	-	-
1424633	15.1	NAI	-	-
1424634	15.1	NAI	-	-
1424638	14.3	HTL	-	-
1424639	14.3	HTL	-	-
1424668	13.7	NAI	-	-

1424688	15.4	HTL	-	-
1424692	15.4	HTL	-	-
1424696	15.1	NAI	-	-
1424760	14.3	HTL	-	-
1424761	14.3	HTL	-	-
1424762	14.3	HTL	-	-
1424763	14.3	HTL	-	-
1424764	15.1	NAI	-	-
1424774	15.4	HTL	-	-
1424873	15.3	NAI	-	-
1425093	13.6	HTL	-	-
1425096	13.5	NAI	n/a	n/a
1425226	15.2	HTL	-	-
1443947	13.4	NAI	-	-
1443948	13.5	NAI	-	-
1458395	14.2	HTL	-	-
1458414	14.3	HTL	Medium	Medium
1458416	14.3	HTL	-	-
1458422	14.2	HTL	-	-
1458455	15.3	NAI	-	-
1458461	15.3	NAI	-	-
1458462	15.3	NAI	-	-
1458464	14.3	HTL	-	-
1458474	15.1	NAI	-	-
1458487	15.1	NAI	-	-
1458498	15.1	NAI	-	-
1458509	15.2	HTL	-	-
1458511	15.3	NAI	-	-
1458521	15.3	NAI	-	-
1458532	15.1	NAI	-	-
1458534	15.1	NAI	-	-
1458543	15.3	NAI	-	-
1458544	15.3	NAI	-	-
1458546	15.3	NAI	-	-
1458563	16.1	NAI	-	-
1458600	16.1	NAI	-	-
1458605	16.1	NAI	-	-
1458645	16.1	NAI	-	-
1458656	18.1	NAI	Low	Low
1459189	13.5	NAI	Low	Low
1459282	13.4	NAI	-	-
1459341	13.4	NAI	-	-
1459342	13.4	NAI	-	-
1459343	13.4	NAI	-	-
1459344	13.4	NAI	-	-
1459346	13.4	NAI	-	-
1459347	13.4	NAI	-	-
1459350	13.3	HTL	-	-

1459360	13.3	HTL	-	-
1459371	13.2	NAI	-	-
1459371	13.2	NAI	-	-
1459382	13.2	NAI	-	-
1459382	13.2	NAI	-	-
1459454	13.6	HTL	-	-
1459508	15.2	HTL	Low	Low
1459509	13.5	NAI	-	-
1459510	13.5	NAI	-	-
1459521	13.5	NAI	-	-
1459543	13.7	NAI	-	-
1459718	13.7	NAI	-	-
1459746	13.7	NAI	-	-
1459747	13.7	NAI	-	-
1459760	13.7	NAI	-	-
1459765	13.7	NAI	-	-
1459773	14.1	HTL	-	-
1459774	13.7	NAI	-	-
1459784	13.7	NAI	-	-
1459785	14.1	HTL	-	-
1460712	13.2	NAI	-	-
1460726	12.1	HTL	-	-
1460728	12.1	HTL	-	-
1460728	12.1	HTL	-	-
1460743	11.3	HTL	-	-
1460752	11.3	HTL	-	-
1460766	11.3	HTL	Low	Low
1460796	11.3	HTL	-	-
1460810	11.2	HTL	-	-
1460810	11.2	HTL	-	-
1461606	11.1	NAI	-	-
1461614	11.1	NAI	-	-
1461633	11.1	NAI	-	-
1461724	11.2	HTL	-	-
1461760	11.2	HTL	-	-
1461762	11.2	HTL	n/a	n/a
1461763	11.2	HTL	-	-
1461765	11.2	HTL	-	-
1467010	13.2	NAI	n/a	n/a

Durham County Council

HER entries

HER	SMP2	Policy	Importance	Risk
81	10.1	NAI	Low	Medium
105	10.1	NAI	Low	Medium
109	11.1	NAI	High	Low
112	11.1	NAI	Low	Low

114	11.1	NAI	Low	Low
115	11.1	NAI	Low	Low
118	11.1	NAI	High	High
120	11.1	NAI	High	Low
154	11.1	NAI	High	High
277	9.7	NAI	-	-
278	9.5	HTL	-	-
279	9.3	R	-	-
280	9.3	R	-	-
281	9.1	NAI	-	-
282	9.3	R	-	-
285	9.5	HTL	-	-
526	n/a	n/a	n/a	n/a
959	11.1	NAI	Low	Low
960	11.1	NAI	Low	Low
961	11.1	NAI	Low	Low
963	11.1	NAI	Low	Low
3841	9.2	HTL	Low	Low
3843	10.1	NAI	Low	Low
3844	9.6	NAI	Low	Low
4809	9.2	HTL	low	Low
6571	9.7	NAI	-	-
6572	10.1	NAI	-	-
8276	11.1	NAI	Low	Low
8281	11.1	NAI	Medium	Low
8282	11.1	NAI	Medium	Low
8303	11.1	NAI	Medium	High
8312	10.1	NAI	Low	Low
8318	11.1	NAI	-	-
9632	11.1	NAI	Low	Low
10276	10.1	NAI	-	-
10284	10.1	NAI	-	-
10285	10.1	NAI	-	-

NMR entries

NMR	SMP2	Policy	Importance	Risk
73179	11.1	NAI	-	-
94426	11.1	NAI	-	-
1421118	10.1	NAI	-	-
1456315	9.4	HTL	Low	Low
1460807	11.2	HTL	-	-
1461282	10.1	NAI	-	-
1461284	10.1	NAI	-	-
1461286	10.1	NAI	-	-
1461287	10.1	NAI	-	-
1461287	10.1	NAI	-	-
1461296	10.1	NAI	-	-
1461298	10.1	NAI	-	-
1461303	10.1	NAI	-	-
1461303	10.1	NAI	-	-
1461538	11.1	NAI	-	-
1461555	11.1	NAI	-	-

1461555	11.1	NAI	-	-
1461570	11.1	NAI	-	-
1461571	11.1	NAI	-	-
1461572	11.1	NAI	-	-
1461592	11.1	NAI	-	-
1461603	11.1	NAI	-	-
1461609	11.1	NAI	-	-
1461612	11.1	NAI	-	-
1461781	11.1	NAI	-	-
1461910	10.1	NAI	-	-
1461915	10.1	NAI	-	-
1461946	10.1	NAI	-	-
1461953	10.1	NAI	-	-
1461966	10.1	NAI	-	-
1461969	10.1	NAI	-	-

Tyne and Wear

HER entries

HER	SMP1/2	Policy	Importance	Risk
2	6.5	HTL	Low	Low
49	n/a		Low	Low
225	8.4	R	Low	Medium
226	8.4	R	Low	Medium
227	9.1	NAI	Low	Medium
372	6.5	HTL	Low	Low
832	3.1	R	Medium	High
1192	46	HTL	Low	Low
1196	47	HTL	Low	Low
2493	5.2	NAI	Low	Low
2743	n/a		Low	Low
2947	8.4	R	Low	Low
5110	n/a		Low	Low
5526	48	HTL	Medium	Medium
5538	4.1	R	Low	Low
5539	6.1	NAI	Low	Low
5540	6.4	HTL	Low	Low
5558	47	HTL	Low	Low
5565	n/a		Low	Low
5568	8.3	HTL	Low	Low

NMR entries

NMR	SMP1/2	Policy	Importance	Risk
908641	4.1	R	-	-
908652	1.2	MR	-	-
908667	45	HTL	-	-
908710	7.2	HTL	-	-
908746	1.2	MR	-	-
908748	1.2	MR	-	-
956440	7.1	HTL		

971596	1.2	MR	-	-
973326	1.1	HTL	-	-
1366333	2.1	HTL	-	-
1371831	47	HTL	-	-
1380514	47	HTL	-	-
1387150	1.1	HTL	-	-
1403238	4.2	NAI	Low	Low
1406252	7.3	HTL	-	-
1418909	44	DN	-	-
1429211	6.5	HTL	-	-
1434819	1.2	MR	-	-
1438910	1.2	MR	-	-
1454847	6.3	HTL	-	-
1454847	6.3	HTL	-	-
1462319	8.3	HTL	-	-
1462332	8.3	HTL	-	-
1462351	8.3	HTL	-	-
1462361	8.3	HTL	Low	Low
1462362	8.3	HTL	Low	Low
1462372	8.4	R	-	-
1462405	8.4	R	-	-
1462409	8.4	R	-	-
1462466	9.1	NAI	-	-
1462609	8.3	HTL	-	-
1462612	8.3	HTL	-	-
1462615	8.2	HTL	-	-
1462620	8.3	HTL	-	-
1462622	8.2	HTL	-	-
1462623	8.2	HTL	-	-
1462626	8.2	HTL	-	-
1462628	8.2	HTL	-	-
1462634	8.2	HTL	-	-
1462643	8.2	HTL	-	-
1462644	8.2	HTL	-	-
1462650	8.2	HTL	-	-
1462656	8.1	HTL	-	-
1462657	8.1	HTL	-	-
1462943	7.1	HTL	-	-
1462944	8.1	HTL	-	-
1462950	4.1	R	-	-
1462955	7.1	HTL	-	-
1462956	7.1	HTL	-	-
1462959	7.1	HTL	-	-
1462962	7.1	HTL	-	-
1462963	7.1	HTL	-	-
1462979	5.1	HTL	-	-
1462980	7.1	HTL	-	-
1462982	7.1	HTL	-	-
1462983	7.1	HTL	-	-
1462987	5.2	NAI	-	-
1462987	5.2	NAI	Low	Low
1462988	7.1	HTL	-	-
1462989	7.1	HTL	-	-
1462990	8.1	HTL	-	-
1462991	8.1	HTL	-	-
1462995	6.1	NAI	-	-

1462995	6.1	NAI	-	-
1462995	6.1	NAI	-	-
1462996	8.1	HTL	-	-
1463000	6.2	NAI	-	-
1463003	7.1	HTL	-	-
1463006	7.1	HTL	-	-
1463013	7.1	HTL	-	-
1463014	5.2	NAI	-	-
1463021	7.1	HTL	-	-
1463031	6.5	HTL	-	-
1463032	6.4	HTL	-	-
1463033	6.4	HTL	-	-
1463040	6.4	HTL	-	-
1463046	6.5	HTL	-	-
1464890	46	HTL	-	-
1464891	45	HTL	-	-
1464899	45	HTL	Low	Low
1464908	45	HTL	Low	Low
1464909	45	HTL	-	-
1464911	45	HTL	Low	Low
1465044	45	HTL	-	-
1465171	45	HTL	-	-
1465175	45	HTL	-	-
1465183	46	HTL	-	-
1465187	46	HTL	-	-
1465217	47	HTL	-	-
1465219	47	HTL	Low	Low
1465222	47	HTL	Low	Low
1465240	47	HTL	-	-
1465247	47	HTL	-	-
1465250	47	HTL	-	-
1465255	47	HTL	-	-
1465317	44	DN	Low	Low
1465324	45	HTL	-	-
1465372	44	DN	High	Medium
1465466	43	HTL	Low	Low
1465579	43	HTL	Low	Low
1465658	45	HTL	-	-

Northumberland County Council

HER entries

HER	SMP1	Policy	Importance	Risk
2393	n/a	n/a	n/a	n/a
2401	6	SHTL	n/a	n/a
2440	n/a	n/a	n/a	n/a
2448	n/a	n/a	n/a	n/a
3964	11	SHTL	n/a	n/a
3968	12	DN	Low	Medium
3969	11	SHTL	Medium	High
3974	12	DN	Medium	Low
4025	13	SHTL	Medium	Medium
4027	13	SHTL	-	-
4114	14	SHTL	-	-

4116	14	SHTL	-	-
4131	10	HTL	Medium	Low
5068	14	SHTL	High	High
5068	14	SHTL	High	Medium
5074	14	SHTL	Medium	Low
5078	14	SHTL	High	Medium
5083	14	SHTL	-	-
5087	15	SHTL	Medium	Low
5091	15	SHTL	Medium	Low
5092	15	SHTL	Low	Low
5242	15	SHTL	High	Low
5246	15	SHTL	Medium	Low
5251	16	DN	High	Low
5283	15	SHTL	Low	Low
5431	29	DN	Low	Low
5549	29	DN	-	-
5550	29	DN	Medium	Low
5590	n/a	n/a	n/a	n/a
5594	31	DN	High	High
5604	32	DN	High	High
5604	32	DN	High	High
5604	32	DN	High	High
5604	32	DN	High	High
5604	32	DN	High	High
5604	32	DN	High	High
5609	31	DN	Low	Low
5628	n/a	n/a	n/a	n/a
5667	23	DN	High	Low
5669	25	DN	High	Low
5670	n/a	n/a	n/a	n/a
5671	24	DN	Medium	Low
5674	25	DN	High	High
5675	22	DN	Low	Low
5676	25	DN	Medium	Low
5684	25	DN	-	-
5685	25	DN	-	-
5686	24	DN	-	-
5690	25	DN	High	High
5690	25	DN	High	High
5768	27	DN	Low	Low
5769	27	DN	Low	Low
5770	26	DN	Low	Low
5775	29	DN	-	-
5781	17	SHTL	High	High
5784	17	SHTL	n/a	n/a
5788	n/a	n/a	n/a	n/a
5788	18	DN	Low	Low
5795	17	SHTL	Medium	High
5799	n/a	n/a	n/a	n/a
5801	20	DN	Medium	High
5806	18	DN	-	-
5807	17	SHTL	-	-
5831	20	DN	Medium	High
5870	20	DN	-	-
5878	21	DN	-	-
5885	Farnes	n/a	-	-
5901	17	SHTL	n/a	n/a
5903	17	SHTL	n/a	n/a
5905	16	DN	Medium	Low

5906	17	SHTL	Medium	High
11674	37	SHTL	Low	Low
11782	n/a	n/a	n/a	n/a
11887	32	DN	Low	Low
11927	32	DN	Low	Low
11969	44	DN	Medium	Low
11977	42	HTL	High	High
11988	43	HTL	Medium	Low
11994	43	HTL	Medium	Low
12004	44	DN	Low	Low
12045	n/a	n/a	n/a	n/a
12048	35	DN	Medium	High
12049	35	DN	Medium	High
12180	34	SHTL	High	High
12269	17	SHTL	Low	Low
20730	19	DN	-	-
20741	21	DN	High	Low
20793	44	DN	Low	Low
20794	44	DN	Low	Low
20797	44	DN	Low	Low
20800	44	DN	Low	Low
20899	44	DN	Low	Low
20975	44	DN	Low	Low

NMR entries

NMR	SMP1	Policy	Importance	Risk
6484	12	DN	Medium	Low
8243	20	DN	-	-
8329	17	SHTL	High	Low
14767	20	DN	Medium	High
26650	43	HTL	Medium	Low
907638	41	HTL	-	-
907657	14	SHTL	-	-
907659	14	SHTL	-	-
907660	14	SHTL	-	-
907661	14	SHTL	-	-
943573	9	HTL	-	-
1047754	29	DN	-	-
1348222	11	SHTL	Medium	Low
1387343	26	DN	-	-
1410079	41	HTL	-	-
1413842	43	HTL	-	-
1417824	21	DN	-	-
1417826	37	SHTL	-	-
1417827	17	SHTL	-	-
1417828	14	SHTL	-	-
1418884	32	DN	-	-
1421444	32	DN	-	-
1421533	43	HTL	-	-
1421534	43	HTL	-	-
1421546	32	DN	-	-
1421553	32	DN	-	-
1421560	32	DN	-	-
1421564	35	DN	-	-
1421566	39	SHTL	-	-
1421567	39	SHTL	-	-

1421569	14	SHTL	-	-
1421602	20	DN	-	-
1421604	16	DN	-	-
1421608	13	SHTL	-	-
1421644	16	DN	-	-
1421651	17	SHTL	-	-
1421652	19	DN	-	-
1421655	20	DN	-	-
1421684	20	DN	-	-
1421686	20	DN	-	-
1421689	13	SHTL	-	-
1427370	44	DN	-	-
1427373	43	HTL	-	-
1427373	43	HTL	-	-
1427377	43	HTL	-	-
1427379	43	HTL	-	-
1427379	43	HTL	-	-
1427380	43	HTL	-	-
1427382	42	HTL	-	-
1427383	43	HTL	-	-
1427385	43	HTL	-	-
1427385	43	HTL	-	-
1427385	43	HTL	-	-
1427389	43	HTL	-	-
1427391	42	HTL	-	-
1427712	26	DN	-	-
1434785	8	HTL	-	-
1442170	42	HTL	-	-
1442170	42	HTL	-	-
1443628	32	DN	-	-
1443915	32	DN	-	-
1464848	43	HTL	Medium	Low
1465425	43	HTL	Medium	Low
1465425	43	HTL	-	-
1465492	43	HTL	-	-
1465595	44	DN	-	-
1466938	40	HTL	-	-
1466959	40	HTL	-	-
1466993	39	SHTL	-	-
1467003	39	SHTL	-	-
1467026	39	SHTL	-	-
1467314	39	SHTL	Low	Low
1467320	39	SHTL	Low	Low
1467346	37	SHTL	Low	Low
1467353	36	SHTL	-	-
1467358	36	SHTL	-	-
1467368	36	SHTL	-	-
1467374	36	SHTL	-	-
1467378	36	SHTL	-	-
1467383	36	SHTL	-	-
1467397	35	DN	-	-
1467413	35	DN	Low	Low
1467417	35	DN	-	-
1467428	35	DN	-	-
1467433	34	SHTL	-	-
1467433	34	SHTL	-	-
1467434	34	SHTL	-	-
1468352	32	DN	-	-
1468535	32	DN	-	-

1468548	32	DN	-	-
1468570	32	DN	-	-
1468573	32	DN	-	-
1468575	32	DN	-	-
1468612	32	DN	-	-
1468622	32	DN	-	-
1468645	32	DN		-
1468648	32	DN	-	-
1468677	32	DN	-	-
1468697	32	DN	-	-
1468707	32	DN	-	-
1468716	32	DN	-	-
1468718	32	DN	-	-
1468763	32	DN	-	-
1468774	32	DN	-	-
1468784	32	DN	-	-
1468814	32	DN	Low	Low
1468823	33	DN	-	-
1468840	33	DN	-	-
1468847	32	DN	-	-
1468848	32	DN	-	-
1468850	32	DN	-	-
1468852	32	DN	-	-
1468855	32	DN	-	-
1468910	32	DN	-	-
1468920	32	DN	-	-
1468991	32	DN	-	-
1469543	29	DN	-	-
1469545	29	DN	-	-
1469547	28	SHTL	-	-
1469550	29	DN	-	-
1469556	29	DN	-	-
1469571	29	DN	-	-
1469596	29	DN	-	-
1469613	32	DN	-	-
1469616	32	DN	-	-
1469633	29	DN	-	-
1469634	29	DN	-	-
1469634	29	DN	-	-
1469636	32	DN	Low	Low
1469637	29	DN	-	-
1469642	32	DN	Low	Low
1469643	29	DN	-	-
1469643	29	DN	-	-
1469646	32	DN	-	-
1469650	32	DN	-	-
1469657	32	DN	-	-
1469663	32	DN	-	-
1469665	32	DN	-	-
1469671	32	DN	-	-
1469673	32	DN	-	-
1469675	32	DN	-	-
1469677	32	DN	-	-
1469690	32	DN	-	
1469694	32	DN	Low	Low
1469698	32	DN	-	-
1469701	29	SHTL	-	-
1469706	29	DN	-	-
1469712	29	DN	-	-

1469714	30	SHTL	-	-
1469717	30	SHTL	-	-
1469730	31	DN	-	-
1469733	31	DN	-	-
1469758	32	DN	-	-
1469758	32	DN	-	-
1469761	32	DN	-	-
1469763	32	DN	-	-
1469766	32	DN	-	-
1469810	29	DN	-	-
1470005	39	SHTL	Low	Low
1470005	39	SHTL	Low	Low
1470013	39	SHTL	-	-
1470047	39	SHTL	-	-
1470059	39	SHTL	-	-
1470138	22	DN	-	-
1470144	39	SHTL	-	-
1470146	40	HTL	-	-
1470157	22	DN	-	-
1470171	22	DN	-	-
1470184	24	DN	Low	Low
1470187	24	DN	-	-
1470217	26	DN	Low	Low
1470233	25	DN	-	-
1470340	29	DN	-	-
1470350	28	SHTL	-	-
1470351	27	DN	-	-
1470368	26	DN	Low	Low
1470392	26	DN	Low	Low
1470413	26	DN	-	-
1470416	27	DN	-	-
1470417	27	DN	-	-
1470418	26	DN	-	-
1470420	27	DN	-	-
1470422	27	DN	-	-
1470632	32	DN	-	-
1470645	32	DN	-	-
1470656	21	DN	Low	Low
1470660	21	DN	-	-
1470674	32	DN	-	-
1470683	32	DN	-	-
1470685	20	DN	-	-
1470739	20	DN	Low	Low
1470753	20	DN	-	-
1470758	20	DN	-	-
1470760	33	DN	-	-
1470768	20	DN	-	-
1470771	20	DN	-	-
1470814	20	DN	-	-
1470818	20	DN	-	-
1470829	20	DN	-	-
1470836	20	DN	-	-
1470852	21	DN	Medium	Low
1470967	26	DN	-	-
1470973	26	DN	-	-
1470974	26	DN	-	-
1470983	26	DN	-	-
1471000	26	DN	-	-
1471016	27	DN	-	-

1471019	27	DN	-	-
1471046	26	DN	-	-
1471049	26	DN	-	-
1471055	26	DN	-	-
1471061	27	DN	-	-
1471062	27	DN	-	-
1471461	16	DN	Medium	Low
1471507	17	SHTL	-	-
1471523	18	DN	-	-
1471530	17	SHTL	-	-
1471543	18	DN	-	-
1471579	17	SHTL	-	-
1471618	16	DN	-	-
1471623	16	DN	-	-
1471624	17	SHTL	-	-
1471657	18	DN	-	-
1471688	20	DN	-	-
1471727	19	DN	-	-
1471741	19	DN	-	-
1471750	19	DN	-	-
1471755	19	DN	-	-
1471761	19	DN	-	-
1471790	19	DN	-	-
1472082	15	SHTL	-	-
1472105	15	SHTL	-	-
1472199	14	SHTL	-	-
1472251	15	SHTL	-	-
1472261	15	SHTL	-	-
1472273	14	SHTL	-	-
1472288	16	DN	-	-
1472290	16	DN	-	-
1472331	16	DN	-	-
1472346	16	DN	-	-
1472372	16	DN	-	-
1472613	13	SHTL	-	-
1472613	13	SHTL	-	-
1472668	14	SHTL	-	-
1472868	13	SHTL	-	-
1472872	13	SHTL	-	-
1474720	14	SHTL	-	-
1474728	14	SHTL	-	-
1474811	14	SHTL	Medium	High