



Northumberland and North Tyneside Shoreline Management Plan 2

Scottish Border to River Tyne

Final, May 2009


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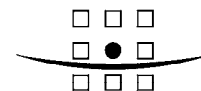

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50 YEARS
NORTHUMBERLAND COAST
AREA OF OUTSTANDING NATURAL BEAUTY

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Marlborough House
Marlborough Crescent
Newcastle upon Tyne NE1 4EE
United Kingdom
+44 (0)191 211 1300 Telephone
+44 (0)191 211 1313 Fax
info@newcastle.royalhaskoning.com E-mail
www.royalhaskoning.com Internet

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Author(s) Gregor Guthrie, Nick Cooper, Dickon Howell,
Tanja Cooper, Jamie Gardiner, Pippa Lawton,
Andy Gregory and Richard Stevens
Client Northumbrian Coastal Authority Group

Drafted by Gregor Guthrie, Nick Cooper, Dickon Howell
Checked by Dickon Howell
Date/initials check
Approved by Nick Cooper
Date/initials approval

GLOSSARY OF TERMS

Term	Definition
Advance the Line (ATL)	Building new defences seaward of the existing defence line.
Area of Outstanding Natural Beauty (AONB)	Designated by Natural England, AONBs are designated solely for their landscape qualities for the purpose of conserving and enhancing their natural beauty (which includes landform and geology, plants and animals, landscape features and the rich history of human settlement over the centuries). In this SMP area there is the Northumberland Coast AONB.
Beach nourishment	Artificial process of replenishing a beach with material from another source.
Benefits (as related to an issue)	The service that the feature provides. In other words, why people value it or use a feature. For example, a nature reserve as well as helping to preserve biodiversity and meet national legislation, may also provide a recreation outlet much like a sport centre provides a recreation function.
Berm crest	Ridge of sand or gravel deposited by wave action on the shore just above the normal high water mark.
Brackish water	Freshwater mixed with seawater.
Breaker zone	Area in the sea where the waves break.
Coastal squeeze	The reduction in habitat area which can arise if the natural landward migration of a habitat under sea level rise is prevented by the fixing of the high water mark, e.g. a sea wall.
Defra	Department for Food, Environment and Rural Affairs
Defra Procedural Guidance	Shoreline Management Plan Guidance produced by Defra to provide a nationally consistent structure for the production of future generation Shoreline Management Plans.
Downdrift	Direction of alongshore movement of beach materials.
Ebb-tide	The falling tide, part of the tidal cycle between high water and the next low water.
Ecosystem	Organization of the biological community and the physical environment in a specific geographical area.
European Marine Site (EMS)	A European Marine Site is any part of a SAC or SPA which occurs on the shore or sea. In this SMP area there is the Berwickshire and North Northumberland Coast EMS.
Environmental Impact Assessment (EIA)	Detailed studies which predict the effects of a development project on the environment. They also provide plans for mitigation of the adverse.
Environmentally Sensitive Area (ESA)	This is an area where special land management payments are available through agreement with Defra to provide farming practices which are beneficial to the environment. This is a non-statutory designation.
Feature	Something tangible that provides a service to society in one form or another or, more simply, benefits certain aspects of society by its very existence. This will be of a specific geographical location and specific to the SMP.
Fetch	Length of water over which a given wind has blown that determines the size of the waves produced.
Flood-tide	Rising tide, part of the tidal cycle between low water and the next high water.
Foreshore	Zone between the high water and low water marks, also known as the intertidal zone.

Term	Definition
Geomorphology/ Morphology	The branch of physical geography/geology which deals with the form of the Earth, the general configuration of its surface, the distribution of the land, water, etc.
Groyne	Shore protection structure built perpendicular to the shore; designed to trap sediment.
Heritage Coast	Heritage Coasts are a non-statutory landscape definition, unlike the formally designated National Parks and Areas of Outstanding Natural Beauty (AONBs) and are defined by agreement between the relevant maritime local authorities and Natural England as having notable natural beauty or scientific significance. Local authorities assist with the management of Heritage Coasts often with Heritage Coast officers.
Hold the Line (HTL)	Maintaining or upgrading the level of protection provided by defences
Local Nature Reserves (LNR)	These are established by local authorities in consultation with Natural England. These sites are generally of local significance and also provide important opportunities for public enjoyment, recreation and interpretation. This is a statutory designation.
Managed Realignment (MR)	Allowing the shoreline to realign, landwards or seawards, sometimes with management to initiate and control change.
Management Area (MA)	A collection of Policy Units that are interdependent and should therefore be managed collectively.
Mean High Water (MHW)	The average of all high waters observed over a sufficiently long period.
Mean Low Water (MLW)	The average of all low waters observed over a sufficiently long period.
Mean Sea Level (MSL)	Average height of the sea surface over a 19-year period.
Modelling and Decision Support Framework (MDSF)	Mapping-linked computer tool used in the evaluation of assets at risk from flooding or erosion.
National Nature Reserves (NNR)	Designated by Natural England. These represent some of the most important natural and semi-natural ecosystems in Great Britain, and are managed to protect the conservation value of the habitats that occur on these sites. This is a statutory designation.
No Active Intervention (NAI)	A decision not to invest in providing or maintaining defences.
Objective	An objective is set, through consultation with key parties, to encourage the resolution of the issue or range of issues. It is a desired state to be achieved in the future.
Offshore zone	Extends from the low water mark to a water depth of about 15 m and is permanently covered with water.
Policy	In this context, "policy" refers to the generic shoreline management options (No Active Intervention, Hold the Existing Line of Defence, Managed Realignment and Advance the Existing Line of Defence).

Term	Definition
Policy Development Zone (PDZ)	The coastline was divided into reasonably sized sections or PDZ's for the purpose of assessing all of the issues and the interactions in order to develop the preferred management policy. These zones are only used in the procedure of developing policy. Policy Units and Management Areas are then used for the final definition of the policies and the management of the coast.
Policy Scenario	The combinations of policies selected against the various feature/benefit objectives for the whole SMP frontage.
Policy Unit (PU)	Sections of coastline for which a certain coastal defence management policy has been defined. These are then grouped into Management Areas for management purposes.
Present Value (PV)	The value of a stream of benefits or costs when discounted back to the present day. For this SMP the discount factors used are the latest provided by Defra for assessment of schemes, i.e. 3.5% for years 0-30, 3.0% for years 31-75, and 2.5% thereafter.
Ramsar Site	Designated under the Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971. The objective of this designation is to stem progressive encroachment into, and loss of, wetlands.
Regionally Important Geological / Geomorphological Sites (RIGS)	These are identified by locally developed criteria, and are currently the most important places for geology and geomorphology outside statutorily protected land such as SSSI's. This is a non-statutory designation.
Scheduled Ancient Monuments (SAM)	The main legislation concerning archaeology in the UK is the Ancient Monuments and Archaeological Areas Act 1979. This Act, building on legislation dating back to 1882, provides for nationally important archaeological sites to be statutorily protected as Scheduled Ancient Monuments.
Sensitive Marine Area (SMA)	A generic term used to describe nationally important locations around our coast which require a cautious and detailed approach to management. They are identified by Natural England for their important benthic populations, spawning or nursery areas for fish, fragile intertidal communities, or breeding, feeding, and roosting areas for birds and sea mammals. This is a non-statutory designation.
Setback	Prescribed distance landward of a coastal feature (e.g. the line of existing defences).
Shoreline Management Plan (SMP)	A document that provides a large-scale assessment of the risks associated with coastal processes and presents a policy framework to reduce these risks to people and the developed, historic and natural environment in a sustainable manner.
Site of Nature Conservation Importance (SNCI)	These sites are defined by the Wildlife Trusts and Local Authorities as sites of local nature conservation interest. These are non-statutory but form an integral part of the formulation of planning policies relating to nature conservations issues.
Sites of Special Scientific Interest (SSSI)	These sites, notified by Natural England, represent some of the best examples of Britain's natural features including flora, fauna, and geology. This is a statutory designation.

Term	Definition
Special Area of Conservation (SAC)	This designation aims to protect habitats or species of European importance and can include Marine Areas. SACs are designated under the EC Habitats Directive (92/43EEC) and form part of the Natura 2000 site network. All SACs are also protected as SSSI, except those in the marine environment below the Mean Low Water (MLW).
Special Protection Area (SPA)	These are internationally important sites, designated under the EC Habitats Directive (92/43EEC) and form part of the Natura 2000 site network..
Special Landscape Area (SLA)	An area identified as having a strategic landscape importance.
Strategic Environmental Assessment (SEA)	Assessment under European Directive 2001/42/EC (the SEA Directive) 'on the assessment of the effects of certain plans and programmes on the environment' requires a formal environmental assessment of certain plans and programmes which are likely to have significant effects on the environment. Authorities which prepare and/or adopt such a plan or programme must prepare a report on its likely significant environmental effects, consult environmental authorities and the public, and take the report and the results of the consultation into account during the preparation process and before the plan or programme is adopted. They must also make information available on the plan or programme as adopted and how the environmental assessment was taken into account.
Storm surge	A rise in the sea surface on an open coast, resulting from a storm.
Swell	Waves that have travelled out of the area in which they were generated.
Tidal prism	The volume of water within the estuary between the level of high and low tide, typically taken for mean spring tides.
Tide	Periodic rising and falling of large bodies of water resulting from the gravitational attraction of the moon and sun acting on the rotating earth.
Topography	Configuration of a surface including its relief and the position of its natural and man-made features.
Transgression	The landward movement of the shoreline in response to a rise in relative sea level.
Updrift	Direction opposite to the predominant movement of longshore transport.
Water table	The upper surface of groundwater; below this level the soil is saturated with water.
Wave direction	Direction from which a wave approaches.
Wave refraction	Process by which the direction of approach of a wave changes as it moves into shallow water.

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Chris Budzynski



Phil Briggs



**Sam Talbot and
Andy Rutherford**



**Trevor Straker and
Malcolm Dixon**



**Terry Gurr and
Arthur Cranson**



**Peter Woods, David Moat
and Graham Sword**



Ian Hodge



Mike Quigley



Tom Cadwallender



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1 INTRODUCTION

1.1 The Shoreline Management Plan

A Shoreline Management Plan (SMP) provides a large-scale assessment of the risks associated with coastal evolution and presents a policy framework to address these risks to people and the developed, historic and natural environment in a sustainable manner. In doing so, an SMP is a high-level document that forms an important part of the Department for Environment, Food and Rural Affairs (Defra) strategy for flood and coastal defence (Defra, 2001). The plan provides broad scale assessment of these risks, as well as quite specific advice to operating authorities in their management of defences. Through this, and through the identification of issues covering a wide spectrum of coastal interests, the SMP supports the Government's aims, as set out in Defra's strategy "Making Space for Water" (Defra, 2005):

- To reduce the threat to people and their property; and
- To deliver the greatest environmental, social and economic benefit, consistent with the Government's sustainable development principles.

This SMP2 document, developed on behalf of the Northumbria Coastal Authorities Group (NCAG), sets out the results of the first revision to the original Shoreline Management Plan for the area of Northumberland and North Tyneside coast extending from the Scottish Border south to the River Tyne (Figure 1.1).

Similar high-level documents exist for assessing the risks from flooding in river catchments. These are referred to as Catchment Flood Management Plans. In preparing this SMP2, we have taken account of the emerging information from the following relevant CFMPs:

- North East Northumberland Catchment Flood Management Plan – Final Main Stage Report (Environment Agency, September 2008).
- Wansbeck and Blyth Catchment Flood Management Plan – Final Main Stage Report (Environment Agency, July 2008).
- Tyne Catchment Flood Management Plan – Consultation Summary Report (Environment Agency, July 2006).

These CFMPs are available from the Environment Agency through the website 'www.environment-agency.gov.uk'.

1.1.1 Principles

The SMP is a non-statutory policy document for coastal defence management planning. It takes account of other existing planning initiatives and legislative requirements, and is intended to inform wider strategic planning. It does not set policy for anything other than coastal defence management. However, from this perspective, it aims to provide the context to, and the consequences of, management decisions made in other sectors of coastal management.



Title:
NCAG SMP2 Frontage

Project:
NCAG SMP2

Client:
Northumbrian Coastal
Authority Group

Date:
Sept 2008

Scale:
1:480,000

Figure:
1.1

Drawn:
TC

Checked:
NC



The SMP2 promotes management policies for a coastline into the 22nd Century that achieve long-term objectives without committing to unsustainable defence. It is, however, recognised that due to present day objectives and acceptance, wholesale changes to existing management practices may not be appropriate in the very short-term. Consequently, the SMP2 provides a timeline for objectives, policy and management changes; i.e. a 'route map' for decision makers to move from the present situation towards the future.

The original SMP for this area (known as SMP1) was completed in 1998. Since that time, over some sections of the coastline, more detailed strategy studies have been undertaken and these, together with monitoring of the whole frontage by the coastal Local Authorities, have improved our understanding of how the coast behaves. In addition, many lessons have been learnt with respect to how the SMP process should be conducted, and indeed how we should be viewing the management of the shoreline. Defra (2001, 2003) undertook a review of the results from SMP1 documents around England and Wales, considering their strengths and weaknesses, and leading to revised SMP guidance. Some of this guidance is targeted at achieving greater consistency in the assessments and improved presentation of the information in the plans, but there are also more fundamental issues that have been identified, which this and other SMP2s must address.

One significant issue is the inappropriateness of certain policies which, when tested in more detail with a view to being implemented, may be found to be unacceptable or impossible to justify; either in terms of economics, the environment, or from a perspective of what communities need from the coast. It is, therefore, important that the SMP2 must be realistic given known legislation and constraints; neither promising what cannot be delivered nor delivering in the broader perspective that which fails against the values of the coastal zone. There will be no value in a long-term plan which has policies that are driven by short-term politics or works which prove to be to the detriment of the area when considered several years in the future.

Equally, the plan must also remain flexible enough to adapt to changes in legislation, politics and social attitudes. The plan, therefore, considers objectives, policy setting and management requirements for three main epochs; from the present day, looking ahead to the medium-term, and looking ahead to the long-term, corresponding broadly to time periods of 0 to 20 years, 20 to 50 years and 50 to 100 years respectively. There is a need to have a long-term sustainable vision, which may change with time, but should be used to demonstrate that defence decisions made today are not detrimental to achievement of that vision.

The plan covers an area both of significant environmental value, but also having a strong history of human settlement and present use. These uses and interests are not inherently opposed. In reality it is the natural attraction combined with the historical coastal use which gives this area of the coast its distinct character and considerable value to man in the present day. While individual core objectives or aims may therefore be set, and indeed are set, with respect to each specific aspect of the area, the aim of the SMP2 must be to develop policy where, as far as possible, these specific objectives are not set in conflict. The underlying principle for the development of the SMP2 has been to consider the specific circumstance of the differing sections of the coast and through this understanding, attempt to deliver greatest benefit to the totality of coastal communities in an area.

1.1.2 Objectives

The objectives of the SMP2 process (as distinct from the objectives for management of the coast) are as follows:

- To provide an understanding of the coast, its behaviour and its values.
- To define, in general terms, the risks to people and the developed, natural and historic environment within the SMP2 area over the next century.
- To appraise different policy approaches and identify the preferred policies for managing those risks or creating opportunity for sustainable management.
- To examine the consequences of implementing the preferred policies in terms of the objectives for management.
- To set out procedures for monitoring the effectiveness of the SMP policies.
- To inform others so that future land use and development of the shoreline can take due account of the risks and preferred SMP2 policies.
- To comply with international and national nature conservation legislation and biodiversity obligations.

1.1.3 Policies

The generic shoreline management policies considered in this SMP2 are those defined by Defra, and they are represented by the statements:

- **No Active Intervention (NAI):** a decision not to invest in providing or maintaining defences.
- **Hold the Line (HTL):** maintaining or upgrading the level of protection provided by defences
- **Advance the Line (ATL):** building new defences seaward of the existing defence line.
- **Managed Realignment (MR):** allowing the shoreline to realign, landwards or seawards, sometimes with management to initiate and control change.

(Note: all the above policies will need to be supported by strategic monitoring and must, when implemented, take due account of existing Health and Safety legislation.)

In developing this SMP2 we have identified the preferred policies from the above generic list, but importantly have also stated in some detail in accompanying text the intent of the policy such that it is the overall intent, not necessarily solely the definitions given above, that drive future management decisions.

1.2 Structure of the SMP2

The preferred plan and policies presented in this SMP2 are the result of collating information from numerous studies and the assessments of how the coast may perform. There is, therefore, a need to draw these threads together to provide clarity for different readerships. To this end, the documentation to communicate and support the plan is provided in a number of parts. At the broadest level these are divided into two; the Shoreline Management Plan itself, and a series of supporting appendices.

1.2.1 Shoreline Management Plan Report Structure

This document provides the plan for the future and the policies required for it to be implemented. This is intended for general readership and is the main tool for communicating intentions. Whilst the justification for decisions is presented, it does not provide all of the information behind the recommendations, this being contained in other documents. The SMP2 is presented in seven parts:

Section 1 Introduction: gives details on the principles, aims, structure and background to its development.

Section 2 Environmental Assessment and Appropriate Assessment: provides details of how the SMP2 meets the requirements for adequate environmental assessment at a strategic level.

Section 3 Basis for Development of the Plan: presents the basis for development of the Plan, providing a broad overview of the Plan area, describing the concepts of sustainable policy and providing an understanding of the constraints and limitations on adopting certain policies.

Section 4 Appraisal of Options and Rationale for Preferred Plan: It has been frequently stated that there is as much value in the thought process of developing the SMP2 as there is in the actual policies themselves. This section, therefore, aims to lead the reader through this process. The section starts with a discussion of large segments of the coast (called Policy Development Zones; PDZ). Within these zones the coast is described and the way in which the coast might behave, if present management is continued into the future or if no further defence work was undertaken, explained. This is then discussed in relation to the objectives for management and the individual policies for sections of the coast derived (Policy Units; PU). These units are finally grouped in to areas of management (Management Areas; MA), pulling together policy units which have a basic interdependency. For each Management Area statements are prepared setting out a summary of the intent, the necessary actions over different time scales, and the impacts of the preferred policies. Starting from an initial 6 Policy Development Zones, the coast is defined by 101 Policy Units which are drawn together as 27 Management Areas.

Section 5 Summary of Preferred Plan and Implications: brings together the overall plan, highlighting important issues in relation to the future management of the coast.

Section 6 Policy Summary: provides a very brief summary of policies. It is appreciated that many readers will focus upon the local conclusions of the SMP2. However, it is important to recognise that the SMP is produced for the coast as a whole, considering issues beyond specific locations. Therefore, this summary should be read in the context of the wider-scale issues and policy implications, as reported and developed in Section 4 and supported by information in the Appendices.

Section 7 Action Plan: This provides a programme for future activities which are required to progress the SMP2 delivery between now and its next review in around 10 years time. Individual preliminary Action Plans for each Management Area are also presented in Section 4 within the Management Area statements.

1.2.2 The Supporting Appendices

The accompanying documents provide all of the information required to support the SMP2. This is to ensure that there is clarity in the decision-making process and that the rationale behind the policies being promoted is both transparent and auditable. This information is largely of a technical nature and is provided in eleven Appendices:

Appendix A SMP Development: This reports the history of development of the SMP, describing more fully the plan and policy decision-making process.

Appendix B Stakeholder Involvement: Details of the stakeholder involvement process are provided here, together with information arising from the consultation process.

Appendix C Baseline Process Understanding: Includes baseline process report, defence assessment, No Active Intervention (NAI) and With Present Management (WPM) assessments and summarises data used in assessments.

Appendix D Natural and Built Environment Baseline (Thematic Review): This report identifies the environmental features (human, natural, historical and landscape) in terms of their significance and how these need to be accommodated by the SMP.

Appendix E Issues & Objective Evaluation: Provides information on the issues and objectives identified as part of the Plan development, including appraisal of their importance.

Appendix F: Scenario Testing: Presents the policy assessment and objective achievement for No Active Intervention scenario and the preferred SMP2 policy.

Appendix G: Economic Appraisal: Presents the economic analysis undertaken in support of the Preferred Plan

Appendix H: Estuary Assessment: Examines the need or extent to which estuaries are included in the SMP process.

Appendix I: Appropriate Assessment: Provides the information needed for the competent authority to be able to carry out an Appropriate Assessment at the strategic level under the requirements of the EU Habitats Directive (92/43/EEC) and its implementation in the UK under the Conservation (Natural Habitats *et.c.*) Regulations 1994 under Regulation 48(1).

Appendix J: Metadatabase and Bibliographic Database. This is provided to the operating authorities on CD.

Appendix K: Water Framework Directive Assessment: Provides an assessment required under the EU Water Framework Directive (2000/60/EC) to ensure that the preferred policies will not have an adverse impact on the ecological status or ecological potential of designated waterbodies within the SMP2 area.

Appendix L: Non-Technical Summary for the Strategic Environmental Assessment: Provides a stand-alone non-technical summary of the Strategic Environmental Assessment, which has been integrated into this SMP2 document, as required by Directive 2001/42/EC of the European Parliament and of the Council, and the associated Environmental Assessment of Plans and Programmes Regulations 2004.

1.2.3 GIS and Databases

The SMP2 provides a future management framework. It is accepted that our understanding of the coast can be improved, addressing the many areas of uncertainty that we are presently confronted with. There will also be changing circumstance not only as the coast evolves but as our use of the coast changes. During the development of the SMP, information on issues, on processes and our assumptions with respect to different aspects, such as the condition of defences or erosion rates, have been recorded.

This information is held within databases linked through to a Geographical Information System (GIS). This system is provided in association with the actual plan so that, as new information emerges, this may be used to update the management system. The intent is two-fold. First, that information is recorded and may be compared with our existing knowledge such that better informed management decisions can be made as management of the coast continues. Secondly, that at such a time that the SMP requires review, hard won information is readily available to this review process.

One important feature of this information is in the responses and issues which were raised during the consultation process. This data is recorded in the issues, features and objective database used for developing and appraising policy. Management of this information will help those managing the coast in the future to identify issues at a local scale, ensuring that views can be readily identified during the actual implementation of the Plan. The degree of effort all those consulted have put in to developing the Plan is fully appreciated. The storage of information on issues raised should help ensure that peoples' concerns are recognised in the future.

1.3 The Plan Development Process

1.3.1 The Need for Revision

The original SMP1 for the area was completed during 1998. It has always been recognised as part of the shoreline management planning process that plans should be reviewed on a regular basis. The review undertaken through SMP2 has been part of this process.

Whilst SMP1 covered the coastline from St. Abb's Head to the River Tyne, SMP2 now extends from the Scottish Border to the River Tyne. The section of coastline between St. Abb's Head and the Scottish Border does not display significant coastal process

interactions with the coastline further south and therefore this separation is now appropriate given the devolved powers of the Scottish Parliament since completion of SMP1.

Initiated by the findings of the SMP1, a considerable effort has been put in place over the ten years since its publication to ensure that we are now in a better position to make judgements with respect to the coast than we were during the SMP1. There have also been changes in legislation and guidance. In this first revision, therefore, the development of the Plan has been able to draw upon and has had to take account of:

- Results from an extensive programme of coastal monitoring of the beach and cliff or dune behaviour and inspections of coastal defences that commenced in April 2001 following a recommendation made in SMP1 for improved data collection.
- Latest research studies undertaken since the last SMP, such as Defra's national Futurecoast study which investigated longer term future coastal change around the whole of England and Wales.
- Issues identified by the several coastal defence strategy plans which have now been produced to cover parts of the SMP area.
- Issues identified by the several coastal defence schemes that have now been constructed in parts of the SMP area.
- Changes in legislation (e.g. the EU Directives, the emerging guidance with respect to the Water Framework Directive).
- Changes in national flood and coastal defence planning requirements (e.g. the need to consider 100 year timescales in future planning, modifications to economic evaluation criteria etc.).

The past decade has been one of quite rapid change in understanding and managing flood and coastal erosion risk. With the manner in which the SMP2 has now been organised and with the understanding that shoreline management must remain an ongoing process providing a platform for more local decision making, it is anticipated that subsequent reviews of this Plan may be undertaken in around 10 years time, although this interval would ultimately be driven by the scale of change on the coast itself.

1.3.2 Review and Development Procedure

The Northumbrian Coastal Authorities Group¹ has, since its inception, always been a broadly based body acting to co-ordinate management of, and exchange information about, the coast. This group comprises representatives from Berwick-upon-Tweed Borough Council², Alnwick District Council², Castle Morpeth Borough Council², Wansbeck District Council², Blyth Valley Borough Council², North Tyneside Council, the Environment Agency, Natural England, the Northumberland Coastal Area of Outstanding Natural Beauty, and other interested parties such as the Port of Tyne, Port of Blyth, North East Sea Fisheries, and Scottish Borders Council.

In the process of developing the SMP2, we sought involvement from numerous organisations or individuals, with principal periods of consultation being conducted in October 2007, July 2008, October 2008 and a 3-month period of public consultation on the draft plan from November 2008 to January 2009.

¹ This Group became subsumed within the wider 'North East Coastal Group' with effect from 1st October 2008.

² This authority became part of the unitary Northumberland County Council with effect from 1st April 2009.

The main activities in producing the SMP have been:

- Development and analysis of issues and objectives for various locations, assets and themes.
- Thematic reviews, reporting upon human, historic and natural environmental features and issues, evaluating these to determine relative values of the coast.
- Analysis of coastal processes and coastal evolution for baseline cases of not defending and continuing to defend as at present.
- Agreement of objectives with the Coastal Authorities Group and through public consultation, and from this determining the possible policy scenarios.
- Development of policy scenarios which consider different approaches to future shoreline management.
- Examination of the coastal evolution in response to these scenarios and assessment of the implications for the human, historic and natural environment.
- Determination of the preferred plan and policies through review with the Coastal Authorities Group and through public consultation, prior to compiling the draft SMP2 document.
- Consultation on the proposed plan and policies.

The final stage of development involved consideration of the various responses obtained from the consultation on the preferred plan and revision, where appropriate, of the document before its finalisation and formal acceptance. Key changes between draft and final status are documented in Appendix B.

2 ENVIRONMENTAL ASSESSMENT AND APPROPRIATE ASSESSMENT

2.1 Environmental Assessment

2.1.1 Background

Directive 2001/42/EC of the European Parliament and of the Council, and the associated Environmental Assessment of Plans and Programmes Regulations 2004, requires that a Strategic Environmental Assessment (SEA) be carried out by certain plans and programmes that are required by legislative, regulatory or administrative provisions. The Directive is intended to ensure that environmental considerations are taken into account alongside other economic and social considerations in the development of relevant plans and programmes. Whilst it has been determined that SMPs are not required by legislative, regulatory or administrative provisions, they do set a framework for future development and have much in common with the kind of plans and programmes for which the Directive is designed. Therefore, Defra has recommended that environmental appraisal of the SMPs be undertaken in line with the approach of the Directive.

This section identifies how the Northumberland and North Tyneside SMP2 achieves the requirements of the 2004 Regulations. The text is sub-divided into sections representing the key requirements of the Regulations, and identifies the sections of the SMP2 documentation in which the relevant information is presented. In order to ensure that the 2004 Regulations are being met the guidance document produced by the Office of the Deputy Prime Minister entitled “*A Practical Guide to the Strategic Environmental Assessment Directive*” (ODPM 2005) was consulted.

2.1.2 The Appraisal Process

An SMP provides a large-scale assessment of the risks associated with coastal evolution and presents a policy framework to address these risks to people and the developed, historic and natural environment in a sustainable manner and is a non-statutory policy document for coastal defence management planning. It takes account of other existing planning initiatives and legislative requirements, and is intended to inform wider strategic planning. It does not set policy for anything other than coastal defence management.

Full details on the background to the SMP2 and the appraisal process are set out in **Sections 1** and **3**, with the exact details of the procedure followed in development of the Plan set out in Appendix A.

Rather than produce a standalone SEA, the approach within this SMP2 has been to make the environmental assessment integral to the process of setting the policies. This was done through initial consultation with relevant stakeholders. Leading on from this a biodiversity workshop was run with all relevant stakeholders as part of a wider process of extensive consultation. A comprehensive list of issues and objectives was then produced for the whole SMP area (**Appendix E**), from which SEA receptors were scoped for each policy development zone (PDZ).

In order to ensure that environment issues were integral to the policy development, environmental statements were included within the appraisal of options for each PDZ

(Section 4) along with the physical coastal processes statement. Any environmental issues were then taken forward as key issues and objectives with further extensive consultation, from which came the detailed policy development for each Management Area.

2.1.3 Stakeholder Engagement / Consultation

Stakeholders have been involved in the SMP2 appraisal process, through regular consultation with a broad range of organisations and individuals that have an interest in the coast. This involvement has:

- been undertaken throughout development of the SMP2;
- given people and organisations an opportunity to comment on the environmental appraisal of options; and
- allowed representations made by the organisations, communities and the public to be taken into account in the selection of policy options.

The Northumbrian Coastal Authority Group (NCAG) includes representatives from interests including local authorities, nature conservation, industry and heritage. This group has met periodically throughout the SMP2 development process to input information and review outputs as the study progressed.

The Project Management Group (PMG) comprises a representative from each of the local authorities, the Environment Agency, Natural England, and the Northumberland Coast Area of Outstanding Natural Beauty (AONB), attending with a remit to agree the various stages of the SMP2 as it progressed. Again, this group has met throughout the plan development.

There have been several opportunities for public involvement with the SMP process. These were:

1. At the beginning of the SMP process, a website was created to keep the public informed of developments and allow feedback (www.northumberland-smp2.org.uk). During initial consultation, the PMG identified individuals and organisations that had a stake in the coastline (a full list can be found in **Appendix B**). These stakeholders were sent a leaflet (including the website address) explaining the SMP process, and the fact that at this initial stage they were being asked their views on the issues surrounding their coastline in general, rather than on SMP policy, as these has not yet been formulated. At this stage, leaflets were publicly available in all council offices and in many public buildings.
2. A Biodiversity Workshop was run with all relevant stakeholders as part of a wider process of consultation (further details can be found in Appendix B).
3. From both the initial consultation and the Biodiversity Workshop a comprehensive issues and objectives table was drawn up (**Appendix E**) that informed the scoping process.
4. Draft policies were then drawn up that took into account the initial environmental consultation and appraisal. Once these draft policies had been drawn up the SMP went out to full public consultation. Public meetings were held in each

local authority which were fully advertised and well attended (see **Appendix B** for details).

Full details of all stages of stakeholder engagement undertaken during development of the draft SMP2 are presented in **Appendix B**. This includes the copies of briefing materials.

Appendix E details the issues and objectives that were brought up through public consultation. These issues and objectives have informed the main decision making process. The SEA directive suggests various receptors that should be included in any SEA. The themes within **Appendix D** and **Appendix E** address the various receptors as shown below (note: some SEA receptors are covered by more than one theme):

Issues and Objectives Appendix E	Thematic review Appendix D	SEA Receptor
Environment	Natural Environment	Biodiversity Fauna and flora Water
	Contaminated land	Soil
	Landscape and character	Landscape Material assets Population
Heritage	Historic environment	Cultural heritage
Commercial	Current and future land use	Population Material assets
Recreational		Population
Hard assets		Material assets Population

It can be seen from the above table that Air, Human Health and Climactic Factors are not included. Air and Human Health were scoped out of the assessment as a receptor because the SMP is a high level document regarding management of risk from coastal erosion and sea flooding and as such are not applicable to this plan (see Scoping, below). Climatic Factors (especially sea level rise) are integral to the assessment of the SMP and have been considered within each PDZ (Physical Characteristics section).

Details of individual issues and objectives can be found in **Appendix E**. There were, however, general themes relating to each of the receptors as detailed above that could apply to the whole SMP2 area. These were:

- Environment
 - Threat of invasive species
 - Loss of habitat, particularly salt marsh and rocky shore and opportunities for habitat creation
 - Recreational disturbance of protected habitats
 - Inadequate management of designated sites
 - Coastal squeeze
- Commercial
 - Erosion / flood risk threatening material assets
- Heritage
 - Erosion / flood risk threatening heritage asset
- Hard asset
 - Erosion / flood risk threatening development zones and material

- assets
 - Redevelopment plans within the coastal zone
- Recreational
 - Erosion / flood risk of recreational assets (e.g. beach, golf course)
 - Erosion / flood risk for coastal access

2.1.4 The Existing Environment

The current state of the environment is described in the “Thematic Review”, presented in **Appendix D**. The coastline covered by this plan has a rich diversity in its physical form, human usage and natural environment. This includes dramatic cliffs, river valleys, large urban areas fringing the coast and extensive areas of agricultural land. The whole stretch of coastline covered by this SMP2 is designated and protected for its heritage, landscape, geological and biological value of international importance. This combination of assets creates a coastline of great value, with a tourism economy of regional importance.

The Thematic Review in **Appendix D** identifies the key features of the natural and human environment of the coastline, including commentary on the characteristics, status, relevant designations, and commentary related to the importance of the features and the benefits they provide to the wider community. This thematic review has been used to inform the environmental statements that have been included within the appraisal of options for each PDZ (**Section 4**).

Appendix D covers all environmental designations and plans in the regions including:

- Natura 2000 sites.
- Sites of Special Scientific Interest.
- Areas of Outstanding Natural Beauty.
- European Marine Site.
- Natural Area profiles.
- Local Biodiversity Action Plans.
- Local Nature Reserves.
- Heritage Coast.
- RSPB reserves.
- National Trust property.
- Sites of Nature Conservation importance.
- Geological Conservation Review sites.
- Landscape Character Assessments.
- Scheduled Ancient Monuments.
- Registered Battlefields.
- Registered Parks and Gardens.
- Marine Heritage Features.
- Regional and local land use plans.

All of the above designations and plans have informed the policy making process. Where relevant, discussion has been made of these features or plans in the appraisal of options for each PDZ (**Section 4**).

2.1.5 Scoping

The Scoping stage of the SMP had implications for both the SMP and the SEA process as described below:

SMP Scoping

An integral part of the SMP2 development process has been the identification of issues and definition of objectives for future management of the shoreline through an extensive scoping and consultation exercise with all relevant stakeholders. This was based upon an understanding of the existing environment, the aspirations of stakeholders, and an understanding of the likely evolution of the shoreline under the hypothetical scenario of No Active Intervention (**Appendix C**), which identifies the likely physical evolution of the coast without any future defence management, and hence potential risks to shoreline features.

These objectives include all relevant plans, policies etc. associated with the existing management framework, including all identified opportunities for environmental enhancements. The definition and appraisal of objectives has formed the focus of engagement with stakeholders during development of the SMP2 (as identified in **Appendix B**). The full list of issues and objectives defined for this SMP2 is presented in **Appendix E**, which is supplemented by background information provided in the Thematic Studies (**Appendix D**).

Appendix F (Scenario Testing) includes consideration of how the objective, and hence the environment, would be affected under the No Active Intervention scenario. This Appendix also includes an assessment of how objectives have been met under the policy options considered feasible for that frontage, with consideration of international and national designations and biodiversity. **Section 5** draws together the overall potential environmental effects of the preferred policies.

SEA Scoping

Running parallel to the SMP Scoping, and using the same mechanisms such as public consultation and the collation of a full list of issues and objectives, the SEA Scoping process ensured that the SEA integral to the SMP covered the likely significant environmental effects of the plan. Annex 1 of the SEA Directive sets out various receptors which are suggested as being assessed for likely significant environmental effects. These receptors are:

- Biodiversity.
- Population and human health
- Fauna and flora.
- Soil.
- Water.
- Air.
- Climatic factors.
- Material assets.
- Cultural heritage.
- Landscape

Air, Human Health and Climactic Factors have been scoped out when assessing environmental impacts within this SMP2. Air and human health have been scoped out

of the assessment as the SMP is a high level strategic document regarding management of coastal defence and as such impacts regarding human health or air quality are not applicable to this plan. Climatic factors (especially sea level rise) are integral to the development of policy within the SMP. In this way the SMP cannot have impacts upon Climatic Factors, rather the Climatic Factors impact upon the SMP.

2.1.6 Evaluation of the Plan and Alternatives

The function of the SMP2 is to consider the coast as a whole from the perspective of defence management. As detailed in **Section 1** the generic shoreline management policies considered in this SMP2 are those defined by Defra, and they are represented by the statements:

- **No Active Intervention (NAI)**: a decision not to invest in providing or maintaining defences.
- **Hold the Line (HTL)**: maintaining or upgrading the level of protection provided by defences
- **Advance the Line (ATL)**: building new defences seaward of the existing defence line.
- **Managed Realignment (MR)**: allowing the shoreline to realign, landwards or seawards, sometimes with management to initiate and control change.

Having undertaken detailed analysis of its physical behaviour and, through consultation, taking into account the wide and varied interests and objectives for coastal management, a high level analysis was carried out as to the primary characteristics of different sections of the coast. Overall the coast is strongly dominated by its underlying geology. Within this imposed structure, it has become evident that not one aspect of the coast in terms of its physical behaviour, natural or built environment dominates. There is a complex interdependence between different values along this linear coast that meant that a decision taken within one policy unit would possibly affect the adjacent policy units.

It was, therefore, considered inappropriate that a simple rigid procedure of option appraisal over individual sections of the coast could be undertaken in deriving policy. If this was to be carried out there would be a multiplier effect along the coastline such that each policy unit would need to be assessed not only for the four options detailed above, but for each option in combination with one of four options for the two adjacent units. This would result in each policy unit (of which there are 101) being assessing 32 times, resulting in a total of 3232 assessments. The continuity of balancing interactions could only therefore be maintained through a scenario approach to analysis. Inevitably, the full length of coastline had to be broken down into PDZs within which such an holistic approach could be adopted. Within these PDZs, the way in which the coast would develop and the impact this would have in respect of different specific objectives was considered for the No Active Intervention and With Present Management scenarios. This highlighted areas of concern, of benefit and of potential conflict.

The objective led scenario approach was then extended, through discussion, to consider how different areas within a zone might be managed to create additional benefit or avoid damage to the overall environment. From this, policies, based on those defined in **Section 1**, have been derived for individual frontages in a logical coherent manner, to

provide an overall scenario that best delivers national and local objectives. While not necessarily discussed in detail, this approach naturally excludes specific policy options which are not technically realistic, would lead to truly unsustainable approaches to defence, or would run counter to progressing the values identified for an area.

Inherent within this process has been the examination of how different policy scenarios would dictate or be influenced by future evolution of the shoreline and how these policies could potentially impact on the environmental receptors that are relevant for a particular PDZ. Assessment of the objectives developed during the Scoping stage was done on a scenario led basis. Three scenarios were assessed, in line with policy development. These scenarios were:

- No Active Intervention
- With Present Management
- Preferred Policy

An assessment was carried out for each of the scenarios broken down by PDZ and Management Area (MA). Should any significant impacts be identified, appropriate avoidance, mitigation or enhancement strategies have been included underneath the assessment tables. The whole process of scenario appraisal and subsequent definition of proposed policies is presented in **Section 4**. The process has been openly driven by the incorporation and consideration of all detailed objectives reported in **Appendix E**. A comparison of how well policies address these objectives, compared to how they might be addressed by a general policy of no active intervention is provided in the appraisal tables of **Appendix G**.

The rationale for development of the preferred plan within each PDZ is reported in **Section 4**, including a summary policy statement for each Management Area. Within the narrative of the detailed discussion regarding policy development, potential environmental issues, impacts and objectives have been discussed.

Outside of the SEA process, the Management Area Summary Statements in **Section 4** further detail the implications of the preferred plan for all of the internationally, nationally, regionally or locally designated environmental areas for the Habitats Regulations.

2.1.7 Non-Technical Summary

In accordance with the Regulations, **Appendix L** sets out a non-technical summary of the integrated SEA that has been carried out during the production of the Northumbria Coast SMP2. In line with guidance from the Office of the Deputy Prime Minister (ODPM) this document provides a non-technical summary of the information provided under the following headings:

- **Section L2.**
- Baseline environment (**Section L3**), including:
 - current state of the environment;
 - likely evolution without the plan; and
 - any existing environmental issues.
- Environmental protection objectives (**Section L4**).

- Likely significant environmental effects (**Section L5**).
- The measures envisaged to prevent, reduce or offset any significant adverse effects (**Section L6**).
- An outline of the reasons for selecting the alternatives dealt with (**Section L7**).
- A description of measures envisaged concerning monitoring in accordance with Article 10 (**Section L8**).

2.2 Appropriate Assessment

The need for an 'Appropriate Assessment' arises under the requirements of the EC Habitats Directive (92/43/EEC) and its implementation in the UK under the Conservation (Natural Habitats &c.) Regulations 1994. Under Regulation 48(1):

"A competent authority, before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which:

- is likely to have a significant effect on a Natura 2000 Site in Great Britain (either alone or In-Combination with other plans or projects); and*
- is not directly connected with or necessary to the management of the Site,*

shall make an appropriate assessment of the implications for the Site in view of that site's conservation objectives."

A Natura 2000 Site is either a Special Area of Conservation (SAC) or a Special Protection Area (SPA). Government policy, as outlined in Planning Policy Statement 9 (PPS 9), is that wetlands of international importance designated under the Ramsar Convention (Ramsar Sites) should also be subject to the provisions of the Habitats Regulations. Ramsar Sites, SPAs and SACs, are collectively referred to hereafter as 'Natura 2000 Sites'.

Appropriate Assessment is the process to support a decision by the 'Competent Authority', as to whether the proposed plan or project would have an adverse effect on the integrity of any Natura 2000 Site. PPS9 defines a site's integrity as the:

"... coherence of the site's ecological structure and function, across its whole area, or the habitats, complex of habitats and/or population of the species for which the site is classified. An adverse effect on integrity is likely to be one that prevents the site from maintaining the same contribution to favourable status for the relevant feature(s), as it did when the site was designated."

Only where the plan or project can be determined as not having an adverse effect on any Natura 2000 Site can it be approved by the Competent Authority.

Where it is not possible to determine that a plan or project under consideration will not have an adverse effect on Natura 2000 Sites, then alternative solutions which avoid harming site integrity must be sought. If alternatives are not possible, then the plan or project can only proceed on the basis of imperative reasons of over-riding public importance (IROPI). If IROPI is agreed by the Secretary of State, then compensatory measures must be secured to offset damage done by the plan or project, such that the overall coherence of the SAC/SPA network is maintained.

The favourable conservation status of a Natura 2000 Site is defined through the Site's conservation objectives, and it is against these objectives that the effects of the plan or project must be assessed. Conservation objectives set out the physical, chemical and biological thresholds, and limits of anthropogenic activity and disturbance which are required to be met to achieve the integrity of the Site and serve both as criteria against which Site condition can be assessed and reported against, and also as a basis for assessing plans or projects which may affect the Site. Conservation objectives for European Marine Sites are set out in the relevant Regulation 33 documents (so called as their production is a requirement of Regulation 33 (2) of the Habitats Regulations) for each site, which are the responsibility of Natural England in England.

It should be noted that there are instances along this coastline where defences have been put in place that have not been consented. These defences will not have undergone assessment under the Habitats Regulations. Where these defences are in direct contradiction to the intent of this plan, this should be addressed at a local authority level.

2.3 Appropriate Assessment in the Land Use Plan Context

On the 20th October 2005, the European Court of Justice (ECJ) ruled that the UK had not transposed the Habitats Directive into law in the proper manner. Land use plans were incorrectly described under the UK Habitats Regulations, as not requiring an Appropriate Assessment to determine the impacts of the plan on Natura 2000 Sites.

At present, the Department of Communities and Local Government (DCLG) has produced draft guidance on how to determine the need for an Appropriate Assessment for a given plan and the provision of an assessment if one is considered to be required. Natural England has provided an internal draft document relating to the provision of Appropriate Assessments for Regional Spatial Strategies and Sub-Regional Strategies. More specific guidance on assessing Shoreline Management Plans (SMPs) in terms of the Habitats Regulations is available from the Environment Agency.

These three documents: "Planning for the Protection of Natura 2000 Sites: Appropriate Assessment" (DCLG, 2006); "The Assessment of Regional Spatial Strategies under the Provisions of the Habitats Regulations – Draft Guidance" (Natural England, 2006); and "Appropriate Assessment of Flood Risk Management Plans Under the Habitats Regulations" (Environment Agency, draft document) currently provide the most cohesive source of guidance relating to the provision of Appropriate Assessments for Shoreline Management Plans. Although these documents relate explicitly to land use plans, given that SMPs have the potential to influence planning decisions on the development of land, this guidance has been applied in this report to SMP policy. In this respect, there are clear parallels between Regional Spatial Strategies (RSSs) and SMPs, and the relevant elements of guidance relating to RSSs have therefore been adapted here for SMP use.

In 2006, Royal Haskoning provided the Department for Environment, Food and Rural Affairs (Defra) with a guidance note relating to Appropriate Assessment provision for SMPs. This guidance was provided following the completion of an Appropriate Assessment for the River Tyne to Flamborough Head SMP2 and has been a fundamental consideration in establishing the scope of this particular Appropriate

Assessment. However, the draft Environment Agency work instruction “Appropriate Assessment of Flood Risk Management Plans under the Habitats Regulations” provides specific advice on undertaking Appropriate Assessments of SMPs, and the approach and methodology adopted here will also take consideration of this guidance.

The Appropriate Assessment is simply a mechanism to establish the actual scale and implications of impacts and to provide a determination on whether a course of action is acceptable or unacceptable, in terms of its impacts on the integrity of Natura 2000 Sites.

The exercise, to provide an Appropriate Assessment for the SMP, provides the opportunity to determine whether the impacts of the SMP would have an effect on the integrity of International sites, by means of a specific assessment exercise. The full details of the Appropriate Assessment are provided in Appendix K.

3 BASIS FOR DEVELOPMENT OF THE PLAN

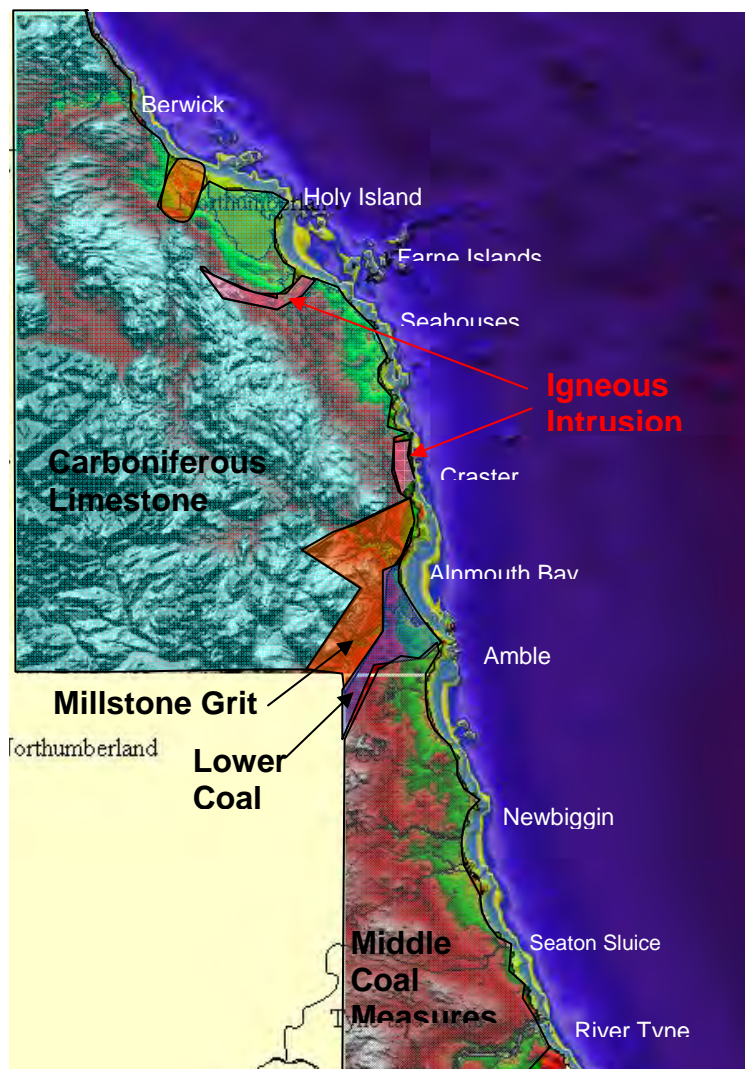
3.1 Historical and Current Perspective

3.1.1 Physical Structure

A detailed discussion of the geology and coastal processes is presented in Appendix C.

Geology

The underlying geology provides a strong influence on the behaviour of the Northumberland coastline and is formed in general by two distinct series: the harder Carboniferous Limestone and Millstone Grits, of the Lower and Upper Carboniferous periods respectively, dominating the northern section of the coast from the Scottish border down to Alnmouth, and the less resistant Middle, Upper Carboniferous, Coal Measures extending down to the River Tyne.



Cutting through the northern series are local igneous intrusions to the south of Budle Bay, forming Holy Island and the Farne Islands, and again at Low Newton and Craster.

This underlying geology has been worked by various incursions of ice sheets, with streams of ice emanating simultaneously from the centres in Scotland, the Cheviot Hills and from the west. The general pattern of movement worked over the coastal area from the north of the Cheviots in a south-easterly direction along the present coastline and from the west to the south of the Cheviots, more directly across the coast.

Figure 3.1 Indicative Areas of underlying Geology

The present form of the coastal zone has therefore been derived from these two aspects of the geology, forming the more exposed and cliffed coast of the north, to the wider glacial deposited lower land in the south. This give rise to the principle

geomorphological structure with the exposed limestone cliffs to the north of Berwick, the shoulder of hard igneous exposure at Bamburgh running north south to south of Craster and the larger bays formed by the relatively harder headlands punctuating the lower lying coast to the south and terminating in the more massive outcrop of Permian Sandstone and limestone at Cullercoats, north of the Tyne.

Glacial deposits have been reworked since the last glacial period, initially with sea level rise but over the more recent times, particularly to the north with a relatively static or decreasing sea level as the land rebounded from the removal of the ice sheets. There remains uncertainty in this northern area associated with relative sea level change such that potentially this area is now at a cusp between relative sea level fall and rise. Over the southern section of the coast sea level is identified as rising (exacerbated in local areas by mining subsidence) in relation to the shore and it is predicted that this may be the case for the more northerly section of the coast as well in the future.

The present coastline, therefore, comprises well defined and relatively stable bays, backed typically by dunes or slowly eroding glacial deposits, held by harder headlands or areas of rock exposed over the foreshore. The most major feature of sediment accumulation has occurred within the shelter of Holy Island and the supporting Bamburgh headland to the south. This accumulation of sediment extends north some 10km back towards Berwick, forming a feature of dune ridges and mudflat.

Other dune systems occur within Beadnell Bay and Embleton Bay and within Druridge Bay and Blyth South Beach, with smaller areas of dune at the mouth of the Coquet and Aln Estuaries within Alnmouth Bay.

There are seven significant rivers over the frontage: the Tweed, Aln, Coquet, Lyne, Wansbeck, Blyth and the Tyne. Of these the Tweed, Wansbeck, Coquet, Blyth and Tyne are all significantly controlled by man-made structures, reinforcing the natural control imposed by the geology. The Aln, Lyne and Wansbeck each sits to the back of a bay formed by natural control features. As such, none of the rivers has more than a local impact on coastal development.

There are several smaller rivers such as those draining the land behind the Holy Island and areas such as Beadnell Bay, Druridge Bay and Blyth South Beach. As with the more major rivers, their influence on the shoreline development is local.

Human and Other Factors

Notwithstanding the strong natural influence, other factors have also influenced the physical development of the shoreline. Man's influence in some areas is now quite strong, with construction of defences and typically at a larger scale by structures such as the main harbour piers or breakwaters. Similarly, over at least the last 200 to 300 years, man's exploitation of the economic geology, in terms of quarrying, mining or deposition of waste has had a significant influence. This impact, although locally quite substantial, tends still to be limited in extent by the natural geology determining the overall shape of the coast.

Erosion of the shoreline is influenced by many factors, most obviously, and particularly over the softer coast, by the geomorphology and exposure to wave and tidal action. Other factors include general weathering, chemical and bio-chemical deterioration and ground water. While much if not most of the coastline is subject to this long term

erosion or is under some pressure from erosion to the hard geological structure, in general terms the erosion is slow in comparison to other areas of the English coastline.

Coastal Change

Along some of the more resilient sections of coast the best estimates of erosion are less than 0.1m (less than 10m at current rates over the next of 100 year period being considered as a the basis for the SMP2). Typically this is true of many of the major lengths of hard rock exposure such as that north and immediately south of Berwick, the main headlands at Bamburgh, Seahouses, Beadnell, Dunstanburgh, Cullernose Point and Rumbling Kern in the northern section of the SMP area and Snab, Newbiggin, Spital Points, Seaton Sluice, Crag, Brown and Tynemouth North Point over the southern section. In addition, there are many major rock outcrops to the foreshore, which although more vulnerable to the affect of sea level rise reduce current erosion rates to the softer cliffs behind to similar low rates of erosion.

The effect of this quite resilient solid structure to the coast is in having allowed many of the bays between to reach a good degree of stability. Erosion rates, even to many of the soft embayed frontages is therefore similarly low, ranging from at present an assessed rate of erosion of 0.1m per year to maximum average rates of 0.5m. With present natural and man-made controls in place there are areas where erosion is recorded historically as being negligible.

The most significant changes could arise from sea level rise, in effect swamping key rock outcrops, such as at Boulmer, Marden Rocks at Alnmouth, the Bondi and Hadston Carrs to the north of Druridge Bay, and the rocks fronting Cresswell. It is estimated as a result of sea level rise erosion rates on more directly exposed sections of coast, such as the headlands, may increase by a factor of between 1.4 and 1.7 times historical rates. It is also estimated that in areas of relatively stable backshore erosion purely due to a rolling back of the shore could be a much as 50m, though more typically 10m to 20m depending on shoreline slope.

The most major areas of set back under a hypothetical scenario of No Active Intervention (NAI) would be predicted for some of the larger bays to the south with potential erosion of 50m to 100m in areas such as the northern section of Druridge Bay, Lynemouth, Wansbeck, Blyth South Beach and Whitley Bay. To the north, the more vulnerable sections of the coast would be Spittal (dependent on the Berwick North Breakwater), to the north of Holy Island (where the slope of the foreshore coupled to sea level rise could give rise to substantial set back), Beadnell (dependent on the harbour) and locally at locations such as Boulmer, Alnmouth and Low Hauxley. Although relatively low, erosion along the coast could affect significant elements of the substantially local coastal communities. Equally the main towns on the frontage all have substantial economic or socially important assets at risk from a small re-adjustment of the shoreline.

Confidence and Uncertainty

At the broader scale there is, from the data collated as part of the SMP process, a good level of confidence in overall physical evolution of the SMP frontage. However, given the relatively slow rate of natural evolution, further obscured in several areas by the large scale of change brought about by past activities (such as the deposition of colliery waste on the shore at Lynemouth or sub sea coal mining leading to subsidence, such as at Newbiggin Bay) obscuring the slower natural changes, there is still uncertainty in extrapolating accurately specific rates of erosion at a local level.

In terms of a general perspective of the SMP area, therefore, frontages under distinct pressure tend to be of a local nature; but over the broader area there is the requirement for the longer term perspective of 100 years given by the SMP from which to consider significant larger, longer scale change. Further uncertainty exists, both in terms of definition of and in terms of physical response to climate change.

Conclusions

Even over time and with the potential of sea level rise the basic physical structure of the coastline would remain intact. The principal structural (man-made) or geomorphological (natural) division of the coast is:

- the hard geology north of Berwick, defining the limit of the SMP2 area;
- the combined influence of Holy Island and the shoulder of solid geology between Harkess Rocks and Seaton Point;
- the general headland in the area of Amble;
- a similar general headland at Newbiggin;
- the reinforced headland at the mouth of the Blyth;
- Seaton Sluice through to St Mary's Lighthouse; and
- The headland to the north of the Tyne; with the mouth of the Tyne being influenced by the North Breakwater.

While some of these are influenced to some degree by man made structures, it is only at Blyth and at the Tyne where significant larger scale influence is maintained of the overall structure of the shore.

At the broader scale of the SMP coastline and notwithstanding areas of uncertainty (which relate more to the timescale of evolution than the underlying process of erosion), the conclusions which may be drawn are that there is little overall change anticipated to the basic geomorphology of the coastline (i.e. the underlying shape of the coast will be dictated by the hard geology and slowly eroding control features), but that within this, there will be a continued process of erosion over much of the coast, placing pressure on more local areas. The fundamental aim of the SMP is to consider how management of the coast, specifically its defence policy, may be best taken forward to reduce risk from flooding and coastal erosion against this background.

3.1.2 Coastal Processes and Process Linkage

Over much of the coast, specific studies (strategy studies), considering aspects of coastal processes have been undertaken; largely since the development of the initial SMP1. This improved definition of wave climate, tidal flows and water levels, and sediment movement.

Despite some variation from north to south, the typical pattern of wave climate offshore records a dominant wave approach from the north and north east, with significant but reduced frequency of exposure from directions south of east. The general pattern of drift anticipated based on this overall wave climate acting over the nearshore area is from north to south. The relatively steep nearshore zone would suggest that this north to south drift may act over much of the coast within this zone. The only significant influence on this nearshore drift system being in the area of Holy Island and the Farne Islands, where the whole coastal and nearshore platform has developed in line with the prevailing wave direction.

Findings from the SMP1 concluded that, at the shoreline, the expected southerly trend of drift is strongly interrupted by the headlands and rock outcrops on the foreshore. This again is most evident in the area of Holy Island, but also at Amble, Cresswell, the Newbiggin Headland and Seaton Sluice, and in the smaller well indented bays Embleton and further south at Whitley Bay and Long Sands.

Subsequent scheme and strategy studies have demonstrated that while there is an anticipated onshore-offshore movement of material, interacting with the nearshore sediment reserve and supplying sediment to individual bays from this nearshore zone, there is little direct interaction between bays. This process is evident from the experience at Lynemouth, where the tipping of material to the foreshore brought forward the shoreline into a more active drift zone supplying sediment generally to the south. As the bay has settled back to a more natural shape material has tended to be retained along the shoreline and drift supply has decreased.

The SMP1 also concluded that in certain bays the prominence of the nominal up drift headland resulted in local sediment movement to the north or a greater stability of the northern section of such bays. This effect is seen at Snab Point in association with the outcropping rock immediately to the south and even more obviously at Beadnell, where the strategy study has demonstrated the strong influence on sediment drift in the lee of the headland and harbour structures. Similar affects are confirmed at Berwick, principally due to the Breakwater, to a degree at Alnmouth, where the up drift control is provided by Marden Rocks, at Blyth South Beach and within some of the smaller bays such as Newbiggin and Cullercoats. It may be appreciated that in many of these cases it is where man-made structures have further reinforced the natural control of drift.

The SMP1 also suggested overall many of the bays, although having reached a relatively stable condition, are still subject to movement longshore depending on wave conditions. It also suggested that there is significant onshore-offshore sediment movement, as motioned earlier; this being supported from the evidence of the monitoring over the last 6 years.

Two bays in particular have not demonstrated such stability however, these being Druridge and Newbiggin. In the former case the monitoring has shown a continued loss of the backshore and associated with this erosion along a significant length to the north of the bay. In the case of Newbiggin, a lack of sediment supply, associated with defences forward of the natural shoreline and exacerbated by mining subsidence has resulted in considerable pressure for erosion. The new scheme, now in place, aims to address these issues by artificially drawing forward the shoreline creating conditions for a sustainable recharge of the foreshore.

3.1.3 Sediment Supply

As much of the coastline remains geologically controlled, there is relatively little fresh contemporary input of sediment from coastal erosion, other than through local scale events along the dunes and cliffs. More sediment comes from the nearshore zone, transported along the North Sea corridor, although this remains modest. Little sediment is supplied from the rivers. This means that contemporary processes are mostly re-working existing sediment stocks with only relatively modest fresh inputs of sediment occurring. The implication of this is that with sea level rise there would be increased

sediment losses to the nearshore zone unless the vulnerable sections are allowed to retreat landwards to retain a natural elevation in the rising tidal frame.

3.1.4 The Purpose of the SMP in Relation to the Physical Structure and Processes

The aim of the SMP is to ensure that proper account is taken of the impact or interaction between areas, such that management in one area does not have a detrimental impact elsewhere. Typically this implies the need to consider the reliance of defences or erosion rate and cliff stability on secure beach levels. From this; and from the broader picture of the sediment supply (potentially from the nearshore and offshore areas and from erosion of the land), there is the need to consider the potential sediment pathways, the possible interruption of those pathways and the potential for erosion or retention of sediment. At the same time the SMP has to provide flood and erosion risk policy guidance to a level of information that may feed practically into local planning and management of specific defence lengths. In developing this, therefore, the SMP has to maintain a perspective at a broad level while still addressing local interactions. In terms of the physical processes, the Northumberland SMP coastline exhibits a relatively limited interaction within the nearshore area. At the shoreline this general linkage is far more constrained. Therefore, at the same time as taking the high level picture of interaction over the whole coast, many of the more immediately practical issues relate, to quite small discrete frontages and bays.

3.1.5 Natural and Cultural Heritage

Appendix D (Thematic Review) provides a detailed definition of the natural and historic environments, landscape and land use. The SMP shoreline is highly diverse in terms of its natural and cultural heritage; those aspects of the coastline that give an essential and important quality and backdrop to the current use and appreciation of the area. The following paragraphs draw this together in a general appreciation of the values of the area.

Geology

Geology, in terms of its physical structure, has been described previously in Section 3.1.1; however, in addition, the NCAG frontage exhibits an range of both hard and soft geological exposures; significant for research, in understanding the very long term perspective of change, for education, in awakening and developing an appreciation of this change, and for the enjoyment of the varied landscape, habitats, flora and fauna.

The value of the SMP frontage is verified by containing 11 Geological Conservation Review (GCR) Sites, 10 of which are part of, or are, designated as Sites of Special Scientific Interest (SSSIs). The GCR is concerned with maintaining representative and unique examples of geological features for study, research and educational purposes, i.e. ensuring that the resource and access to that feature is preserved for future generations.

Three geological features have been identified as being of significant interest along the Northumberland coastline:

- **Whin Sill** - Originally intruded as fluid magma, Whin Sill is a bed of quartz dolerite underlying parts of Northern England and outcropping locally in striking land-form features, particularly within the Bamburgh Coast and Hills SSSI. Exposures on the Bamburgh Hills support a characteristic flora found only in Northumberland. These exposures show the extremely complicated

relationships that may develop between the Sill and country rocks to best advantage, including the enclosure of a variety of large sedimentary blocks and rafts that suggest the Sill may be intruding at a pre-existing fault. Rock exposures between Castle Point and Cullernose Point demonstrate clearly the development of a number of rock types within the Whin Sill as well as other features characteristic of sill intrusion such as incorporated blocks of sediment and columnar jointing. As the first described 'sill' this is the world type, or 'reference', area for all sills.

- **Flandrian** - The Flandrian stage is the name given by geologists and archaeologists in the British Isles to the first, and so far only, stage of the Holocene epoch (the present geological period), covering the period from around 12,000 years ago when the last ice age ended to the present day. The only raised beach of Flandrian age known on the English east coast can be found within the Lindisfarne SSSI on Holy Island and provides geomorphological and stratigraphic evidence for sea-level changes. Underlying deposits, including organic remains, provide a dateable stratigraphic record which, with morphological evidence, provides a key link in comparing relative sea-level changes on the east coast of Britain during the Flandrian.
- **Northumberland Coal Measures** - The Tynemouth to Seaton Sluice SSSI provides one of the best exposures of Coal Measures strata in Great Britain, showing a continuous lower Westphalian B sequence from the Plessey to the High Main seams. It includes outcrops of numerous coal seams and several mudstone horizons yielding non-marine bivalve faunas, which together provide a tight stratigraphical control on the sequence. Of particular importance are outcrops of sandstone bodies, which have been interpreted as braided river deposits in marked contrast to the meandering river deposits which dominate the Pennines Coalfields to the south. The site is of considerable importance for interpreting the palaeogeographical structure of Britain during the Middle Carboniferous.

Heritage

The heritage features along the Northumberland coast portray a long, and often bloody, legacy. This is especially true for the north as a result of the ongoing border disputes between England and Scotland which has resulted in the construction of numerous castles. The significance of this military heritage has been recognised by the battlefield for the Battle of Halidon Hill being registered by English Heritage, one of only 43 in England.

The history of the area dates back to the Neolithic times, whilst many of the 35 scheduled monuments have a religious theme due to the areas close association with early Christianity in England. The history to the south of the study illustrates its industrial heritage, which is mainly linked to fishing and coal mining.

This area of coastline also includes the Northumberland Heritage Coast, and Northumberland Coast AONB. Both designations aim to conserve, protect and enhance the natural beauty of the area, including the terrestrial, littoral and marine flora and fauna, and also the heritage features of archaeological, architectural and historical interest. The Heritage coast extends for 40 miles from the Scottish border to Amble.

Natural Environment

The importance of the Northumberland coast is recognised through both international and national designations for nature conservation. The entire northern half of the area is designated as the Berwickshire and Northumberland Coast Special Area of Conservation (SAC), from the Scottish border to Alnmouth. This area also includes the Tweed Estuary and North Northumberland Dunes SACs (the latter of which extends intermittently to Amble), the Lindisfarne Special Protection Area (SPA) and Ramsar Site, and the Farne Islands SPA; whilst further down the coast is the Coquet Island SPA. The Northumbria Coast SPA and Ramsar Site extend intermittently along the entire SMP frontage. A European Marine Site (EMS) is any part of a SAC or SPA which occurs on the shore or sea. In this SMP area there is the Berwickshire and North Northumberland Coast EMS which is made up of the Berwickshire and North Northumberland SAC and the Lindisfarne SPA (Fast Castle Head in Berwickshire to Alnmouth in Northumberland). The Northumberland Coast AONB is recognised as an internationally important landscape under the European Landscape Convention. National designations protect the coastline to various degrees and include 17 SSSIs, two National Nature Reserves (NNRs).

In addition to this there are a plethora of regional and local levels of protection (including: Natural Areas, Local Biodiversity Action Plans (LBAPs), Local Nature Reserves (LNRs), Wildlife Trust sites, Sites of Nature Conservation Importance (SNCIs) and the aforementioned Heritage Coast) and conservation areas managed by the RSPB and the National Trust.

Conclusion

For all aspects of heritage, and with respect to a specific designation, it may be possible to rank the significance of different elements. In considering SMP policy at a local and strategic level, there has to be recognition of the need to conserve very specific aspects of heritage in the context of how it contributes to the overall value of a local area. This is with respect to both specific heritage themes as well as to the cross-cutting benefit(s) to the region. In developing policy and policy scenarios there needs to be an awareness of the overall potential interrelationship between these different elements.

3.1.6 Human (Socio-Economic) Environment and Activity

The majority of urban form in the SMP study area is within 30 km of the coastline. In the south lies the major conurbation of Newcastle, with the coastline running north being characterised by rural areas and smaller towns and villages. The main settlements on the SMP frontage are:

- **Berwick-upon-Tweed, Tweedmouth, Spittal** - Berwick is main settlement in the northern half of the SMP area and the only commercial port between Edinburgh and Blyth and consequently of strategic importance. Supported by the industrial area at Tweedmouth, these settlements are of vital importance to the area's employment. The coastal frontage of Spittal, just to the south, is a valuable tourism asset and important to the local community.
- **Seahouses** - an important traditional sea-side town as well as having a working fishing port and being the embarkation point for the Farne Islands is an important nature based destination hub. Seahouses is an important holiday destination supporting a thriving tourism industry.
- **Amble** - lies at the mouth of the River Coquet, and the nearby Coquet Island is clearly visible from its beaches and harbour. The harbour is now the second

largest on the north-east coast in terms of vessel numbers and fishing is an integral part of the local community and vital to the continued prosperity of the town. Tourism forms an important sector of the town's economy; part of the harbour has been redeveloped into a marina, and a caravan park, guest houses and B&Bs exist to serve visitors to the Northumberland coast.

- **Newbiggin-by-the-Sea** - the town's frontage curves around a sandy bay, which is a major asset to the whole town, both as an amenity zone and an area for tourism. A recent project to stop on-going beach erosion involved significant sand importation, the construction of an offshore breakwater and improvements to the promenade.
- **Blyth** - the largest town in Northumberland, Blyth is situated on the Blyth estuary. The town is a major employer for the area, through the Port of Blyth, and important to the region's economy. Blyth is to be promoted as a location for tourism, building on the town's historical, architectural and natural assets. Work has already begun on a number of projects, including the improvement and promotion of the Blyth Links coastal area for informal recreation and tourism. The Blyth Estuary Initiative, through the south east Northumberland and North Tyneside Regeneration initiative (SENNTri), aims to unlock the potential of this sub-region and transform the area by opening up the Blyth waterfront to both investment and the wider community. The Blyth Development Plan document will allocate the Blyth Estuary as a brownfield mixed use development (incorporating housing, employment and leisure uses). There are nine wind turbines erected on the East Pier at Blyth Harbour. These are to be replaced by seven new turbines, six situated on the East Pier and adjacent foreshore, and one 'landmark' turbine on Battleship Wharf. The new wind farm is to be called the Wansbeck Blyth Harbour Wind Farm.
- **North Tyneside** - forming a continuously built-up area contiguous with Newcastle, the major settlements include Whitley Bay and North Shields. North Tyneside has extensive areas of coast and river estuary with considerable existing and potential resources for land and water-based recreation. Whitley Bay is seen as a dormitory town to Newcastle however is an important settlement in its own right with an extensive sandy beach, which has important tourism and amenity value. The Spanish City Dome, which is a Grade II Listed building, is to become the centrepiece of a multimillion pound regeneration of the seafront complex, which will include hotel and leisure developments. Although the fishing industry at North Shields has diminished significantly over the years, it has been identified as worthy of protection and support due to its importance to local heritage and tourism. Additionally, under planned resurrection of the fishing industry, North Shields is likely to attract the largest concentration of regional activity in the future. Therefore, the areas required for fish landing, marketing, processing and transport are to be protected, with the development of training and other facilities required for the successful continuation of the industry encouraged, under the management of the North Shields Fish Quay Development Company.

Between these main centres are the smaller villages such as Beadnell, Alnmouth, Craster, Cambois and North Blyth, all adding to an essential vitality of the coastal environment. These villages and the larger towns both provide the important commercial and economic justification for management of the coast but also contribute to the overall value and appreciation of the area.

Conclusion

An important role of the SMP is to reflect what it is about each centre that is important, so that in maintaining defence to an area, or in considering the need for change in defence policy, the values of the coastal frontages are equally maintained.

3.2 Sustainable Policy

3.2.1 Natural Processes

The geological exposures of the coast, certainly over the northern section of the frontage, are clear evidence of how sea levels in the area have changed. Over the last 2,000 years, this change has been quite minimal (averaging less than a millimetre per year). However, we are now entering a period of accelerating sea level rise that will impose greater pressure on the coast to erode and could in some areas; particularly where the shoreline is dependent on natural protection provided by beach material, result in significant change. There is also the potential for changes in sediment supply. This problem has been exacerbated at some locations in the last century due to human intervention reducing the contemporary sediment supply from cliff erosion by the construction of coastal defences and harbour arms. Although attention is focussed upon the shoreline position, this process also has the potential to produce a deepening of the seabed at any particular point. This is a feature that has been potentially identified within a number of areas on the coast where there is evidence of the low water contour moving closer to the shoreline. We have to plan for this change. In general terms we have to expect greater energy against the coast and against defences coupled with a potential reduction of sediment along sections of the shoreline. If we choose to continue to defend our shorelines in the same locations that we do at present, then the size of the defences may need to increase. We need, therefore, to be looking to create width where this is possible, either through setting back defences or through modifying the approach we take. Equally we need to be recognising the importance of the geological control that exists to the coast, working with this to sustain the shape of the coast and thus to retain and maximise the use we make of the sediments which are available.

As discussed earlier, over much of the coast, there is quite limited overall movement of sediment at the shoreline. This is not primarily seen as a coast where action in one area has major impact elsewhere. More locally the transfer of sediment along the shore can be significant. In considering the sustainability of managing areas of the coast we have to understand the significance of these impacts such that we are able to maximise the use of material without creating problems elsewhere. A sustainable shoreline sediment system is one that is allowed to behave as naturally as possible, without significant further intervention.

3.2.2 Economic Sustainability

One of the difficulties facing us, as a nation, is the cost of continuing to protect shorelines to the extent that we do at present. Many of the defences that exist today have been the result of reactive management with often limited understanding (or perhaps knowledge) of the long-term consequences, including financial commitment. Studies over the past few years have established that the cost of maintaining all existing defences is already likely to be significantly more than present expenditure levels. In simple terms this means that either more money needs to be invested in coastal defence, defence expenditure has to be prioritised or funding has to come from other sources based on the benefit they bring. Whilst the first option would clearly be the

preference of those living on or owning land along the coast, this has to be put into context of how the general UK taxpayer wishes to see their money used. Given that the cost to provide defences that are both effective and stable currently averages between £2million and £5million per kilometre, the number of privately owned properties that can be protected for this investment has to be weighed up against how else that money can be used, for example education, health and other social benefits. Furthermore, because of the climate changes being predicted, which will accelerate the natural changes already taking place, these recent studies have also established that the equivalent cost of providing a defence will increase during the next century, possibly in some areas to between 2 and 4 times the present cost. Consequently those areas where the UK taxpayer is prepared to continue to fund defence may well become even more selective and the threshold at which an area is economically defensible could well shift. Whilst it is not known how attitudes might change, it is not unreasonable to assume that future policy-makers will be more inclined to resist investing considerable sums in protecting property in high risk areas, such as the coast, if there are substantially cheaper options, such as constructing new properties further inland. It is extremely important that the long-term policies in the SMP recognise these future issues and reflect likely future constraints. Failure to do so within this Plan would not ensure future protection; rather it would give a false impression of a future shoreline management scenario which could not be justified and would fail to be implemented once funding was sought. The implications of these national financial constraints are that protection is most likely to be focussed upon larger conurbations and towns, where the highest level of benefit is achieved for the investment made, i.e. more properties can be protected per million pound of investment. The consequence is that more rural communities are more likely to be affected by changing financial constraints, but from a national funding perspective, i.e. best use of the taxpayer's money, this makes economic sense.

However, sustainability cannot only be judged on the effort necessary to defend areas. There has also to be consideration of what values, what heritage may be passed on to future generations. This is not just in the bricks and mortar that is being defended but is the character and vitality of the coastal communities. There has, therefore, to be a sensible balance achieved between those areas where the increasing pressure from the changing shoreline will make defence unacceptable in reality and those where defences can be maintained but at increased cost. The SMP has to consider this in terms of:

- What is the value that is being defended, whether this is in terms of a viable community or merely from the economic perspective of a hard asset.
- Whether defences themselves are causing a further deterioration in conditions which makes their maintenance increasingly difficult.
- How management practice will itself evolve. For example in moving down one course of action will this lead to further defence, and further resource being put into defence.

In this latter case the SMP attempts to identify where there is a need to possibly take earlier action to support existing natural structures or to take advantage of existing width, so as to provide a more sustainable defence system in the future.

In many respects sustainability and the balance which we are attempting to achieve may be considered in terms of how the consequence of our action now will be considered in the future. Either in terms of these consequences or in deciding to defend or not defend, a simple test of sustainability is the degree of regret that might be felt in the

future of the decision which is being made now. Will we wish that we had taken a different course of action?

Future revisions to this SMP will also need to take into consideration evolving or emerging issues, such as changes in economic appraisal procedures and the importance placed, as a nation, on different economic (and other) values of the coast (e.g. agricultural food production, industrial, etc.).

3.2.3 Natural Environment

The importance of the natural habitats and geological or geomorphological interest features on the NCAG frontage is recognised by the number of national and international designations that it holds. International designated sites are protected by the following statutory legislation:

- Council Directive 92/43/EEC was established relating to the conservation of Natural Habitats and Wild Fauna and Flora - the Habitats Directive - within the European Union. The Habitats Regulations, as amended, implement the Habitats Directive on the conservation of natural habitats and of wild flora and fauna. One of the means by which this is achieved is through the designation of SACs.
- Council Directive 79/409/EEC protects bird species within the European Union through the conservation of populations of certain birds and the habitats used by these species. In England and Wales, the provisions of this directive are implemented through the Wildlife and Countryside Act 1981 and the Habitat Regulations. The Birds Directive 1979 allows for the classification of SPAs to protect birds that are considered rare or vulnerable within the European Union, in addition to all regularly occurring migratory birds.
- The Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention) aims to promote the wise-use of all wetlands in the territory of each country and international co-operation with other countries to further the wise-use of wetlands and their resources. The Convention extends the same protection at a policy level, in respect of new development, as that afforded to sites which have been designated under the EC Birds and Habitats Directives as part of the EU Natura 2000 network.

National designations, such as SSSIs, are protected by the Wildlife and Countryside Act, 1981 (as amended by the Countryside and Rights of Way Act, 2000). Section 28 of this Act states that notice should be given to the appropriate authority before carrying out or causing, or permitting to be carried out, any operation within the area of notification.

There is a legal requirement to ensure that any 'plan' or 'project' does not negatively effect nationally and internationally designated sites. The Defra High Level Target for Flood and Coastal Defence (Target 9 – Biodiversity) also requires all local councils and other operating authorities to:

- avoid damage to environmental interests;
- ensure no net loss to habitats covered by Biodiversity Action Plans; and
- seek opportunities for environmental enhancement.

A key requirement for the SMP is therefore to promote the maintenance and enhancement of biodiversity through identifying biodiversity opportunities. Coastal

management can have a significant impact on habitats and landforms, both directly and indirectly. In places, coastal defences may be detrimental to nature conservation interests (e.g. producing coastal squeeze), but in other locations defences may protect the interest of a site, (freshwater lagoons). Coastal habitats may also form the coastal defence (e.g. the sand dune complex at Bamburgh), therefore, coastal management decisions need to be made through consideration of both nature conservation and risk management.

Although the conservation of ecological features in a changing environment remains a priority, in terms of environmental sustainability, future management of the coast needs to allow habitats and features to respond and adjust to change, such as accelerated sea level rise. It is recognised that true coastal habitats cannot always be protected *in-situ* because a large element of their ecological interest derives from their dynamic nature, which is important to ensure the continued functionality of any habitat. Similarly, in terms of the geological designations many of these rely on fresh exposure of the cliffs. This poses a particular challenge for nature conservation and shifts the emphasis from site 'preservation' to 'conservation'. Therefore, accommodating future change requires flexibility in the assessment of nature conservation issues, possibly looking beyond the designation boundaries to consider wider scale, or longer term, benefits. The SMP also needs to consider opportunities for enhancing biodiversity throughout the SMP area, not just at designated sites.

The natural environment of the SMP coastline, quite apart from its intrinsic value, is acknowledged to be of exceptional importance to tourism and to the very way of life of people living in the area. In looking to sustain this environment, therefore, the SMP has to consider how the natural and built environment can co-exist on this dynamic coastline.

3.3 Thematic Review (A review of the different themes is given in Appendix D)

It is evident from Section 3.1 and Appendix D that there is a high degree of diversity over the SMP2 coastline, in terms of the physical processes, natural and cultural heritage and socio economic drivers; and in considering sustainability (Section 3.2) that there is significant interaction within each theme and between the different themes or individual sectors of interest. Furthermore, depending on the scale at which the coast is considered there are different interactions. Nominally, for example, it may be appropriate to say that over the whole SMP2 coastline there is a north to south sediment drift. At a high level this might be valid but it ignores, at a slightly more detailed level, the presence of local drift reversals and the variability of time-averaged processes to particular storm events.

The aim of the SMP is to provide an assessment of flood and erosion risk at a high level of assessment and, associated with this, an indication of the overall level of commitment to defence in these areas. Equally the SMP aims to provide a general assessment of appropriate policy for risk management at a level that will assist direct management of defences in a manner which will support other management objectives for the areas. Clearly to address both levels there needs to be a layered approach to the SMP analysis. To achieve this, despite maintaining a clear awareness of the broader levels of interactions between areas, it is necessary, to allow focus on all issues, to consider sections of the coast in detail and within which individual policy units can then be derived. In taking such an approach consideration has also to be given to the higher level issues, such that the interaction between these is not lost.

The public consultation undertaken at the start of the SMP allowed issues to be identified for individual features within the area. This was used to develop an overall characterisation of the coast, which in turn assisted in agreeing specific objectives for management. Consideration of this overall characterisation allows the coast to be divided into sections, through which more detailed consideration could be given to the development of policy. This process is discussed in Section 3.4.

3.4 Development of Policy

3.4.1 Derivation of Policy Development Zones

There is quite clearly no single issue which dominates the development of policy on the coast. In many respects both from the human socio-economic scale and from that of the physical processes the coast may be divided into relatively short sections with little interaction between. This adds to the ability of the SMP2 to provide a good high level perspective at a relatively local scale.

In terms of the natural environment there is potentially greater connectivity between areas of the coast, with many of the designations extending over significant continuous sections of the whole length of coastline. While this has to be recognised in terms of possible cumulative impact, the direct linkage between elements of habitat or landscape is relatively limited. These issues may initially be considered in relatively discrete sections and therefore not constraining the relatively localised approach in developing policy.

From whichever perspective the coast is viewed, there are always overlapping issues and interests between sections. Purely from the manageability of developing policy in sufficient detail, however, the coast has to be divided. This has been done in such a manner as to minimise the residual linkages between one section of the coast and the adjacent section, but also to ensure that in developing and discussing policy, all major interactions across all themes are able to be considered.

Figure 3.1 shows, in broad terms, the way in which the coast has been subdivided at different scales. This subdivision is not intended to define hard barriers to thought about the coast as a whole but solely a practical means of examining the coast in detail.

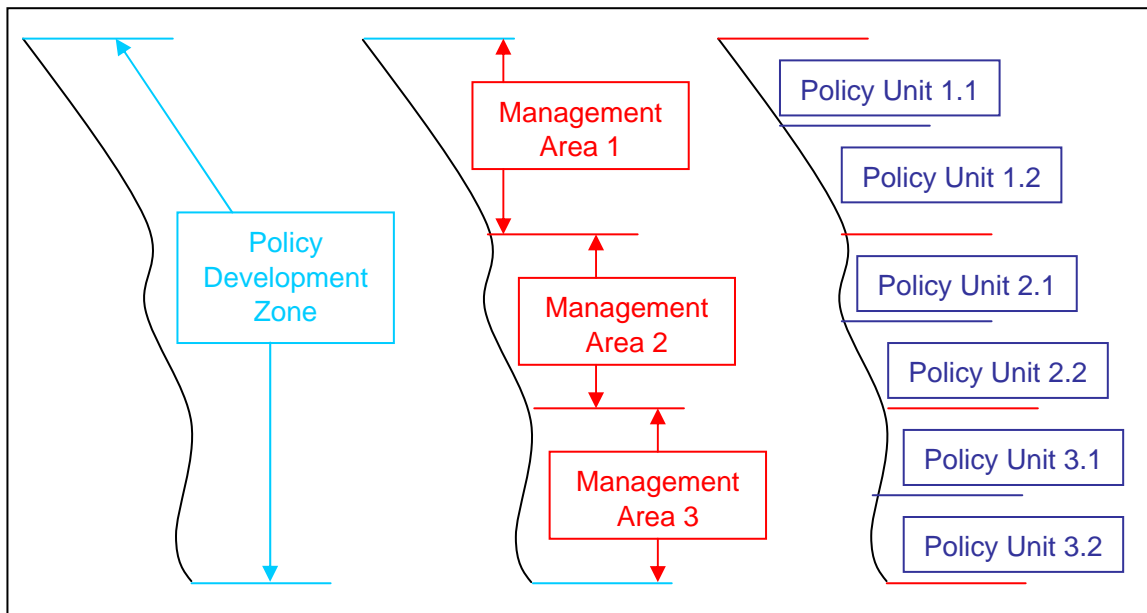
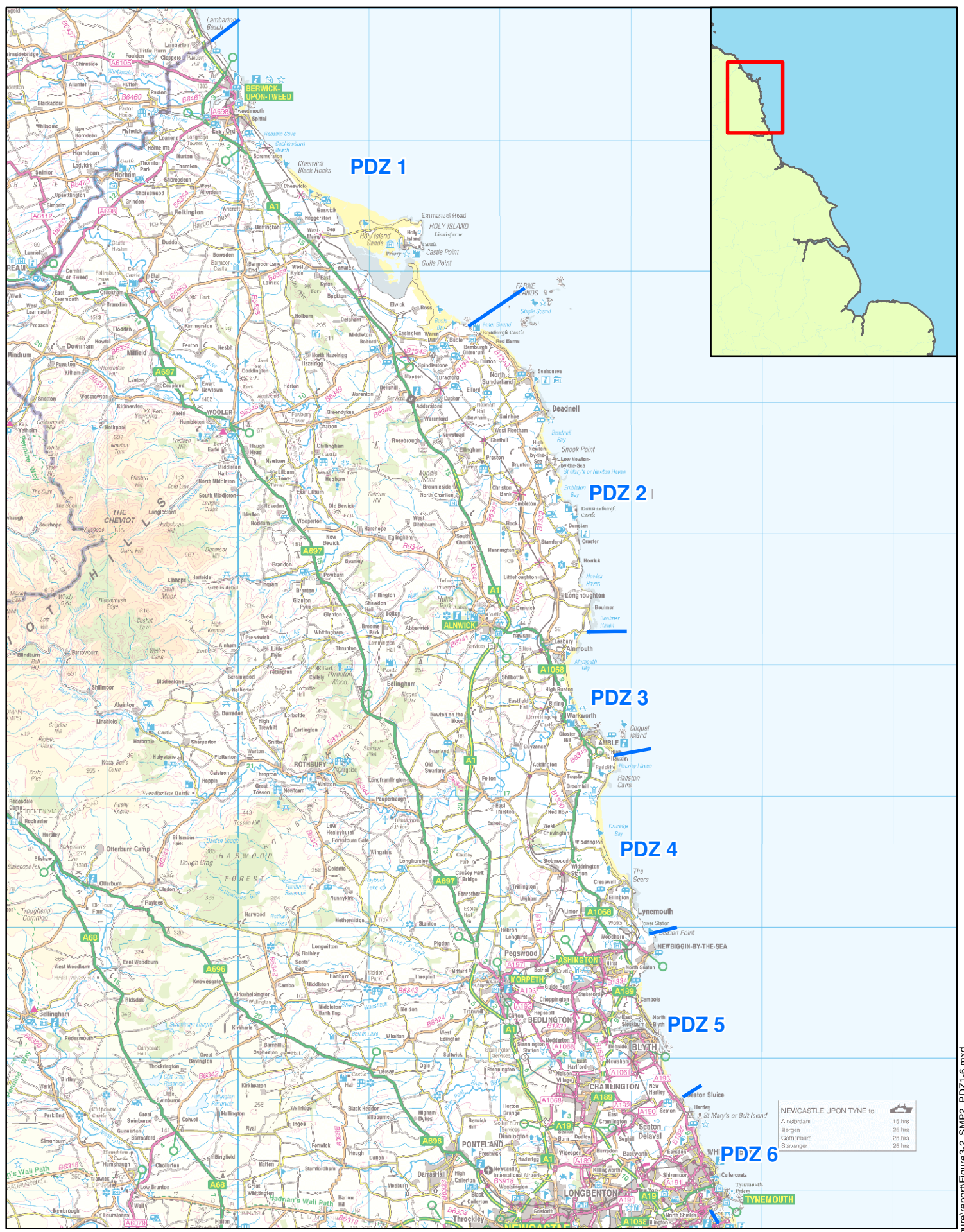


Figure 3.1 Schematic Representation of the Frontage Subdivisions

At the highest level, the coast is split into “Policy Development Zones” (PDZ). Within each of these zones are identified the principal management issues which need to be addressed.

The six Policy Development Zones covering the SMP2 frontage are shown in Figure 3.2 and are described below:

- From the Scottish Border through to Holy Island, reflecting the strong geological controls on this entire section of coast.
- From Bamburgh through to Seaton Point reflecting a degree of physical linkage along the northern section of this zone together with links associated with transport routes; but also recognising that many of the individual bays could be considered independently.
- From Seaton Point through to Beacon Hill. Although cutting across the characterisation of the area it is sensible to consider management of Alnmouth Bay in a physical sense as one zone.



Key:

PDZ 3 - Policy Development Zone

Title: Policy Development Zones

Project: NCAG SMP2

Client: Northumbrian Coastal Authority Group

Date: Sept 2008

Figure: 3.2

Drawn: TC

Checked: NC

Scale: 1:370,000



- From Beacon Hill through to Beacon Point, drawing together the management issues associated with the northern end of Druridge Bay, the potential linkage at Snab Point with development within Lynemouth Bay and the close association between Lynemouth Bay and Newbiggin Bay.
- From Beacon Point to Seaton Sluice, recognising the fundamental control imposed on the coastline within this section of Blyth Harbour and the potential flood risk areas to the north and south of the harbour.
- From Seaton Sluice to the River Tyne, although recognising that the estuarine areas within the Tyne may be quite distinct from the coastal areas along the rest of this zone.

3.4.2 Identification of Policy Units

Within each PDZ two different scenarios are considered; always starting with the policy for “No Active Intervention” (NAI) for all locations within the PDZ to provide a base case against which other active management policies can be assessed. The second scenario is based on the policy developed from SMP1, taking into account further detail or modification which may have been developed during strategy studies undertaken since SMP1. These are termed “With Present Management” (WPM) (i.e. that policy which the SMP2 is reviewing¹) and provides the starting point for considering future management.

The two initial scenarios are compared and the way in which they allow the coast to develop and the manner in which they meet or fail to meet objectives defined within the SMP2 is considered. For some sections of coast the scenarios may in effect be the same. In other areas one scenario may address certain issues but fail to address others. In this comparison, therefore, there may be the opportunity to introduce adaptation which will move forward to a more sensible approach to long term management. In such cases new scenarios are then considered, looking how best to deliver the objectives of the SMP.

From this approach of initially testing both the NAI and WPM scenarios across the broader PDZ and understanding the implications of each, management policies are then assessed for individual subsections of shore within each PDZ and a preferred policy is defined. This section of coast is defined as the Policy Unit (PU). This defines how each individual section of coast should be managed over the lifetime of the SMP.

There is appreciation that there may in some cases be a need for transition from present management through to the longer term policy where this differs from the present approach. This may be a result of a new policy being recommended or it may be in recognition of the way in which the coast is likely to evolve. To allow adaptation there is scope within the SMP for changes in policy over time. Policy for each unit is therefore defined over time periods; from now to 2025 (short term), from 2025 to 2055 (medium term) and from 2055 to 2105 (long term).

The aim of developing policy for individual units of the coast within the framework of the PDZ is to ensure the broader implications of managing one Policy Unit with respect to

¹ It is recognised that the purpose of the SMP is to review this present management, making recommendations where necessary for these policies to be updated. As such the SMP2, on completion and approval, will define present management for the future.

another PU is considered; hence the scenario approach. These implications are discussed in the process of developing each policy within Section 4. Inevitably, therefore, there are dependencies between Policy Units, the intent being to manage groups of Policy Units to best deliver objectives for management of areas of the coast.

3.4.3 Management Areas

Policy Development Zones, as described above, are merely a convenient mechanism for ensuring that policy is developed over appropriate lengths of the coast to ensure wider-scale interactions are fully taken into account. Policy Units are then sections of the coast for which a specific defence management policy (No Active Intervention, Hold the Line, Managed Realignment, or Advance or Retreat the Line) are defined. However, as discussed above, there may be dependencies between Policy Units (to justify a policy of retreat in one area may be on the assumption that an adjacent section of coast is held). Having defined these policies, therefore, it is equally important to group Policy Units where this dependency exists. Such groups of Policy Units are defined as "Management Areas" (MA). It is within these Management Areas that the overall intent of management of the coast can best be described.

The definition of the Management Area is only at the end of the policy development process. A statement can then be produced providing the necessary understanding of why a specific area of the coast is to be managed in this way and how individual policies work to deliver that intent.

3.5 PDZ Analysis

The analysis and discussion for each zone aims to provide an understanding of the issues and nature of the area in such a manner which is logical and rigorous but also in a manner that may be referred to and understood by both coastal managers and people who use or live on the coast. This analysis is undertaken in Section 4 and for each Policy Development Zone a standard approach, in line with the SMP guidance, has been taken. This has been set out in three sections:

- Description;
- Physical Characteristics; and
- Management.

These are explained below and provide merely a summary of the more detailed discussions provided in the relevant Appendices.

DESCRIPTION

Physical

This section summarises where things are and what they are, in terms of: the underlying physical nature of the coast, the existing defences and, where appropriate, their overall condition, together with the use being made of specific areas. This section aims to set the scene, starting to pull together the overall picture. More detail on the physical processes is provided in Appendix C.

Environment

In association with the physical description, this draws on the thematic review (Appendix D) summarising the values for each area within the zone; issues and interests associated with the specific zone. Again the aim of this is to provide an overall reference to the way in which elements of how the coast is valued come together.

Key Principles

There are common SMP-scale governing principles addressing basic issues over the whole length of coastline.

Key Objectives

The final element in this first section is a list of key objectives quite specific to each Policy Development Zone. These objectives and principles attempt to summarise the overall aim derived from the more detailed list of objectives in Appendix E.

PHYSICAL CHARACTERISTICS

Basic Parameters

These provide direct information on wave climate and water level within each zone, together with a synopsis of rates of erosion for different sections of the coast within the zone.

Existing Processes

A brief summary of how the coast is behaving is provided, aiming to explain exposure conditions and where the coast is attempting to change. From this may be understood where there may be pressure developing in relation to the use of the coast and an initial appreciation of what may or may not be sustainable in the long term.

Unconstrained Evolution

Although recognised to be a totally theoretical scenario where there has been or is still major modification of the coast, this section briefly examines what would happen if all man's influence were suddenly removed. The aim of this is to provide a better understanding of how we are influencing the coastal behaviour and therefore the stresses and broader scale impact that are introduced. This assists in assessing first how the coast might wish to change but also in defining the limits of interaction within each zone which the SMP should be considering.

MANAGEMENT

Present Management

Present management is summarised in terms of the policies developed during SMP1 and with respect to subsequent strategy studies.

Baseline Scenarios

The section provides a more detailed description and assessment of the two baseline scenarios for the whole zone. This starts with the 'No Active Intervention' (NAI) scenario and then considers the 'With Present Management' scenario (WPM). The SMP2 extends the implication and intent of the current management policy over the full 100 years and comments, where appropriate, on the further implications of this beyond this period of time. The aim of the No Active Intervention scenario, is to identify what is at risk if defences were not maintained. In a similar way, the With Present Management scenario aims is to examine how the coast may develop, identifying where there are benefits in this management approach and where there may be issues arising in the future. Associated with each scenario is a brief summary of the key risks based on outputs from the Modelling and Decision Support Framework (MDSF) and enhanced, where possible, with findings from previous Coastal Defence Strategy Studies. This provides a headline assessment of how each scenario achieves the key objectives set out in section one above.

Discussion and Detailed Development of Policies

This sub-section uses the two baseline scenarios to consider specific issues in more detail, looking at both the long term implications of the current policies and stepping back from the more local strategy development areas to consider any impacts on the coast as a whole. This initially considers any key drivers in terms of policy for the coast as a whole. For example at this stage the significance of major structures such as one of the major Breakwaters might be considered. This along with other decisions or locally controlling features are identified allowing the zone to be further subdivided and different scenarios considered in detail. The discussion also considers any detailed proposals put forward in strategies and comments on these from the broader perspective. Where the current policy is felt not fully to address some of the issues being identified, further scenarios are developed. Typically this has been found to be a variation within one of the baseline scenarios, rather than a scenario with such wide reaching impacts that the influence of management affects area outside the development zone being considered. From this discussion and from the analysis of different approaches and their consequences, recommendations are made for the SMP policy. This principally starts with where management would take the coast in the long term, working back to how policy should therefore be adapted over the short and medium term periods.

Management Areas

Policy Units are grouped as Management Areas, providing coherent intent as to the management and dependencies over the area.

3.6 Management Area Policy Statements

The Policy Units and Management Areas are developed in the analysis described above. A summary or statement is presented for each Management Area. This is set out in the following manner.

SUMMARY OF POLICY

The format for this summary is based on the Policy Unit summary suggested by the procedural guidance. However, because of the nature of the coast and in particular, in many cases, because distinct Policy Units have an association and cannot really be managed independently, the policy summaries have been summarised by Management Area. A brief overview of the preferred plan recommendations is presented together with an overview of implementation for the short and medium term, followed by the long term intent. Finally the specific policies are identified.

CHANGES FROM PRESENT MANAGEMENT

Any changes from the current management regime are described in this section.

IMPLICATIONS

For each Management Area a summary is provided of the potential impacts these policies will have in terms of the various specific themes and in term of residual risk and risk reduction.

Implications with respect to Built Environment

Assessments are provided covering the impact on the built environment, together with a summary of the economics, the impact on the heritage and amenity.

Implications with respect to Natural Environment

The Management Area statement also includes a qualitative assessment of potential loss or gain of designated habitats, or habitats supporting designated species, as a result of the preferred policies within that Management Area. Also included is any mitigation or compensation that has been proposed.

MANAGEMENT AREA ACTION PLAN

The Management Area statement concludes with an Action Plan relevant to each specific area.

4 APPRAISAL OF OPTIONS AND RATIONALE FOR PREFERRED PLAN

This section contains the analysis leading to the preferred plan. The basis for this has been set out in Section 3 of the report.

The analysis is undertaken covering Policy Development Zones (PDZ), as described in Section 3. The six PDZs are:

- PDZ1 – Scottish Border to Holy Island
- PDZ2 – Bamburgh to Seaton Point
- PDZ3 – Seaton Point to Beacon Hill
- PDZ4 – Beacon Hill to Beacon Point
- PDZ5 – Newbiggin Moor to Seaton Sluice
- PDZ6 – Seaton Sluice to River Tyne (North Shields Fish Quay)

Following the PDZ analysis, the Policy Units (PU) are grouped together within appropriate Management Areas (MA). Individual statements of policy are provided for each Management Area.

On each of the following Management Area maps the bold numbers represent a chainage (distance in kilometres) along the coast from north to south.

4.1 PDZ 1 Scottish Border to Holy Island (chainage 0 to 44.5)

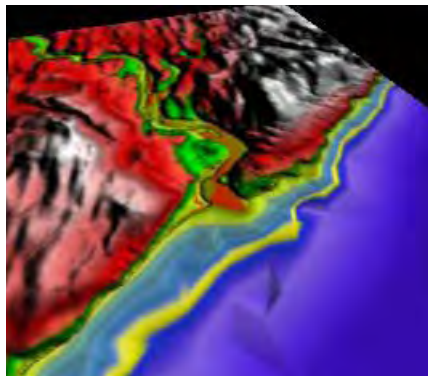
4.1.1 Policy Development Analysis

DESCRIPTION

Physical

The zone extends some 45km from the Scottish Border through to Budle Point on the southern side of Budle Bay. The area takes in the hard rock cliff line north of Berwick to the softer areas of sediment accumulation in the area of Holy Island. The physical coast, therefore, may be described in three quite distinct sections: the narrow rocky foreshore of the Berwick section, the wide soft sediment coastline associated with the area around Holy Island and Holy Island itself.

The Berwick Section. The coast to the north of Berwick generally comprises high hard rock cliffs backing a foreshore of rock scar. The rock is laid down as a series of thick horizontal strata and within each stratum there is a variation in strength and resistance to erosion. This has resulted in a series of headlands, areas where there are a series of slopes and platforms and sections of vertical cliff; in some areas undercut, forming caves and stacks. The major coastal cell boundary is located at St. Abb's Head in Scotland. However, there are insignificant coastal process interactions between here and the Scottish Border, meaning that the Border is an appropriate northern boundary for this PDZ. From the Border through to Marshall Meadows Bay (Ch. 0.5km) and beyond, as far as Needles Eye (Ch. 2.5km), the cliff comprises a relatively well vegetated upper slope, with a steep exposed rock cliff giving way to a lower vegetated slope down to the foreshore. Within Meadows Bay, although



having comprising this basic structure, the cliff is overall steeper, particularly over its northern side. From Needles Eye through to the start of the Magdalene Fields (Ch. 4.5km), the cliff is in places deeply caved, with the Needles Eye natural arch being an example of the high degree of local variability of strengths within strata. At the crest of the cliff the land forms a plateau of primarily open farmland, with the caravan park at Marshall Meadows, the golf course extending to the cliff at Magdalene Fields and the main railway line (some 25m at its closest, but more typically some 50m to 300m from the crest) being the only other physical assets.

To the south of Magdalene Fields through to the North Breakwater the cliff tends to be slightly lower, with a typically low steep profile at the shoreline and a milder boulder clay slope to the crest. The cliff continues to drop to the northern side of the breakwater, eventually forming no more than an accumulation of well vegetated sand in the crook of the breakwater itself. This area runs back to the old rock cliff line some 100m back from the front of the dune area. The crest of the cliff remains open land but is more intensively used with paths over the recreational land and car parks, extending down to the foreshore. The only major physical development is the large caravan park at Berwick Holiday Centre, although there are car parks and roads in the area. Behind the Breakwater, at its root, is the Pier House.

The foreshore to the whole of this frontage is dominated by intertidal rock outcrop, and the nearshore zone then falls away steeply to the 10m CD contour within 500m of the cliff line.

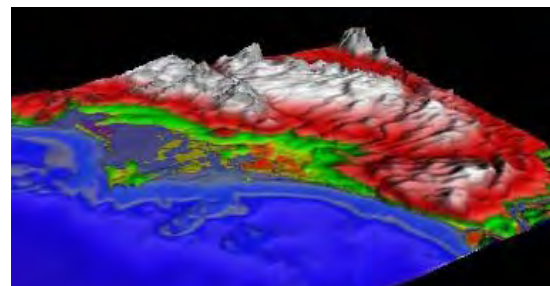
The breakwater extends some 750m initially over the rock outcrop of the Innerstell Battery, across to the Tweedmouth Stell Battery Rocks; the breakwater apparently closing a gap between these two areas of foreshore Scar. Within the shelter of the breakwater, to the northern side of the river, is a wide area of sand, mud and rock scar (the Calot Shad Sand) formed in a bay between the breakwater

and Gardo's Battery (Ch. 9km). Upstream of here the estuary shore is narrow sandy mud in front of defences to the lower part of the town. To the south side of the river, the shore rises gently up from the shore to higher ground of Spittal. Most of the southern frontage is developed, with the main harbour area running around to the dunes of Sandstell Point (Ch. 11.5km). The seaward face of Sandstell Point running through to the steeper cliff at Bear's Head (Ch. 13km) comprises a relatively wide sand beach backed by a sea wall, with a substantial number of properties close to the shoreline.

The Tweed flows from the hinterland through a relatively wide river valley, curving up in a northerly direction before cutting back south against the high rock mass underlying Berwick. At the north of this curve, at the railway bridge, the river sets on both flood and ebb against the northern town walls, flowing down through the two road bridges against Gardo's Battery. From this point it tends to set more against the southern bank, passed the RNLI station, forcing north in a curve against the North Breakwater and out to sea in an east by south direction. The main flood plain of the river lies upstream of the railway bridge; although here it is still quite small in extent, only moderately effecting the lower lying land to the southern bank. Within the estuary, downstream of the railway bridge, the flood risk zone only covers a narrow strip on the southern shoreline, together with the lower lying area on Sandstell Point and a limited width along the Spittal sea front.

South of Berwick, the cliff line again rises with steep vegetated coastal slopes above a rock scar foreshore extending south to Saltpan How (Ch 15.5km). The crest mainly comprises agricultural land, with isolated properties and with the main railway line running along the crest, set back some 20m in places. The foreshore, which includes some areas of upper sand beach, runs out to a gentler nearshore slope than to the north of Berwick. The 10m CD contour is about 1km offshore.

Holy Island Hinterland Section: This section of the coast, dominated by the presence of Holy Island and the increasing width of foreshore, is in four areas: the extensive area of dunes developed between the set back higher ground; running southwest from the Saltpan headland, and the shoreline curving to the east southeast towards Holy Island; the area of sandy mudflats behind Holy Island; and, separated from this by the Ross peninsula, Budle Bay.



In the first of these areas, from Saltpan Rocks (Ch. 15.5km) to Beal Point (Ch. 25km), the land levels to the rear of the shoreline are, initially, reasonably high (between 7m and 11m AOD), with local areas of rock outcrop to the foreshore. This level decreases within the flood plains of the North and South Low; these lower lying areas extending back some 3km in places to the A1 road and the outskirts of Haggerston. The area includes the Goswick road, the village of Goswick and the Berwick upon Tweed Golf course, in addition to various farms and individual properties. These various assets are protected against flood by sluices on the two main rivers and by local low banks.

At the shore, there is a series of dune ridges extending south across the front of the golf course and through to Beachcomber House (Ch. 22.5km). Where the North Low cuts this dune there is a localised dune apparently associated with the outfall and the valley extending over the shore. The South Low runs south cutting the coast to the north of the higher ground of Beal Point (Ch. 25km). The shelter provided by the dune headland at Beachcomber House has allowed growth of saltmarsh in the area of the South Low.

The causeway to Holy Island starts at Beal Point, linking to the extended dune spit of Holy Island at the narrowest point between the mainland and the Island. The causeway cuts across the main

entrance to the wide basin of the Holy Island Sands and Fenham Flats; this area comprising extensive mud and sand banks, with fringing saltmarsh. Along the shore of the mainland, the land behind the shore lies above sea level rising in level in land, except where the shoreline is cut by small creeks such as Back Low (Ch. 27km) and Fenham Burn (Ch 30km). The land is predominantly agricultural with local hamlets of Fenham Moor and Ross.

At the southern extent of the Fenham Flats the area is closed to the sea by the Ross Back Sands and dunes. This feature, cut in places by tidal channels, acts as a system of barrier islands rather than being a spit. It would appear that the feature is located over a harder sub-structure of rock or rock scree. This barrier island is formed as an easterly facing back beach feature of the shallow bay between Holy Island and the hard headland at Budle Point (Ch. 45km).

This area is cut by Budle Bay, a square shaped inlet formed by the higher ground to the rear of Waren Mill (Ch. 42km). Ross Low and the Waren Burn run in to the Bay at the north-west and southern corners respectively. Only the Ross Low has any substantial coastal flood plain behind the defences and sluice, linking through behind the Ross Island to the southern corner of the Fenham Flats. Waren Burn lies in a long steep valley extending in to hinterland to the south.

Holy Island: the Island is formed between the northern hard rock coastline of Castlehead Rocks and Snipe Point, the southern hard rock frontage between the Castle, at Emmanuel Point, and the rock underlying the main village and Priory. Between these ridges is lower lying boulder clays. Over the southern frontage, the rock is cut by a lower lying shingle backed bay cut into the boulder clay. This bay forms the main harbour area to the north of the village. The entrance to the bay is formed by Steel End, extended by a concrete breakwater. There is a lower lying flood risk area extending across the Island from the back of the bay. The eastern frontage comprises a series of clay and dune backed bays sitting over foreshore rock outcrops and scree. West of the main rocky northern frontage is the narrow dune ridge running through to Snook Point and the landfall of the causeway. The road to the village runs from the causeway along the inshore southwest facing side of the dune ridge, linking through to the clay cliffs at the western side of the village. The village is generally set back from the cliffs and harbour area, although various individual buildings are at the shoreline. The road to the village, along the shore, is in areas below high tide levels and the dune ridge at its narrowest point is only of the order of 150m wide, although typically some 5m to 7m AOD in level.

Environment

This area has great natural conservation importance. It includes the following designated sites:

- Berwickshire and North Northumberland Coast SAC
- Tweed Estuary SAC
- North Northumberland Dunes SAC
- River Tweed SAC
- Northumbria Coast SPA
- Lindisfarne SPA
- Berwickshire and North Northumberland Coast EMS
- Northumbria Coast Ramsar Site
- Lindisfarne Ramsar Site
- Lindisfarne SSSI
- Northumberland Shore SSSI
- Tweed Catchment Rivers - England: Lower Tweed and Whiteadder SSSI
- Northumberland Coast AONB

Further detail regarding these sites can be found in **Appendix D**. Where proposed policies may have potential impacts on designated features these are discussed in the discussion and detailed policy development section and listed in the summary of preferred plan recommendations and justification

section under implications with respect of the natural environment.

In the UK these Natura 2000 sites have legal requirements for protection (The Conservation (Natural Habitats, *et.c.*) Regulations 1994, and the Wildlife & Countryside Act 1981, as amended) to maintain their designated conservation value. Any activity that occurs within any of these designated sites, or is likely to impact upon them, must first have approval from the relevant statutory authority. As well as Natura 2000 sites, SSSIs and AONBs are protected under the Countryside and Rights of Way Act 2000 (CROW Act) as well as the proposed Marine Bill which contains provisions for Coastal Access. The nature conservation value of these designated sites greatly contributes to the levels of tourism that this area enjoys. Berwick is an important regional economic centre and tourist destination. This area also contains existing residential development, and has cultural and heritage value.

The coast to the north of Berwick acts to support the development of the whole town in providing tourism accommodation and open space, relying on the natural value of this section of the coast to promote tourism.

The Tweed Estuary is still largely natural and undisturbed, with water quality classified as excellent throughout and supporting a wide range of habitats compared to other estuaries in north-east England. There are substantial sandbanks and some areas of rocky shore around the mouth, with large areas of estuarine boulders and cobbles overlying sediment flats and extending into subtidal areas of the channel further upstream. Mud and sandflats can also be found in more sheltered locations along with fringing saltmarsh. The estuary supports a wide range of littoral sediments, from exposed sandy shores and sheltered sand-spit to muddy gravels. Species and habitat diversity increases with lower exposure to the estuarine wave regime until further upstream where low salinity leads to naturally low infaunal diversity and brackish water species become more dominant. The Tweed has a wide variety of intertidal mudflat and sandflat communities. Sandstell Point, at the mouth, is a wide spit of clean mobile sand characterised by mobile infauna (mainly crustaceans such as *Eurydice pulchra* and *Bathyporeia* spp. and a few polychaetes) which reflect the exposed conditions. On the more sheltered west-facing shore of this spit, and on Calot Shad on the opposite bank, are more stable conditions which allow more robust polychaetes (e.g. *Scolecopsis squamata* and *Paraonis fulgens*) to occur, along with crustaceans.

The nature conservation value of the Tweed Estuary is great. This was highlighted recently in a study showing that, due to the designated interest features within the estuary, it is not currently environmentally acceptable to develop the harbour into a leisure marina. Any future plans for development of the estuary need take the designated conservation areas into account. Issues of concern within the estuary include variability in the channel alignment and trampling of the saltmarsh. Further upstream, saltwater inundation has led to a loss of habitats in the Tweed Catchment Rivers SSSI.

To the south of Berwick, the area exhibits a variety of landscape features, including sandy beaches, extensive mudflats and saltmarsh, sand dunes, rocky shores, and coves within the sea cliffs. Large portions of the intertidal and surrounding area are inaccessible and as such form pristine and isolated environments. The open coast flats of Holy Island are cited as being the most extensive examples of clean sandflats in north-east England. The North Northumberland Dunes SAC also incorporates part of this coast, with Holy Island supporting a number of rare species, including coralroot (*Corallorhiza trifida*), dune helleborine (*Epipactis leptochila* var. *dunensis*) and seaside centauray (*Centaureum littorale*). Petalwort has been recorded on Holy Island and at two locations on the mainland, the only place it has been recorded in north-east England.

The Lindisfarne SPA and Ramsar site includes Holy Island, the extensive mudflats to the south and

Budle Bay. The area is comprised of a variety of coastal habitats including rocky shore, sand dunes, saltmarsh and intertidal sand and mudflats, which make up over 95% of the total area. The site is also directly managed by Natural England as a National Nature Reserve (NNR). A small number of common seals breed at Holy Island. The Lindisfarne SSSI includes Goswick, Holy Island and Budle Bay, and is a key site for coastal geomorphology. It comprises three main units: (i) the dunes and barrier beaches of Cheswick and Goswick Sands, (ii) the dunes of the Snook and the cliff top dunes and cliff-beach system on the north coast of Holy Island, and (iii) the dunes and sandy beaches of Ross Links and Budle Bay. The significance of the site lies first in the extensive progradation of sandy beaches; secondly in illustrating the role of different wave energy distributions north and south of Holy Island on beach forms and processes, and thirdly in the total assemblage and variety of contemporary and older coastal features. It is one of only four locations in England and Wales where barrier-type beaches occur, and is the sole example in the North Sea wave climate which coincides with conditions of coastal emergence rather than submergence. Holy Island dunes support the recently described Lindisfarne Helleborine (*Epipactis sancta*) which is found nowhere else in the world. There is a large haul out (sometimes up to 100s of animals) of grey seals on Fenham Flats.

The Lindisfarne SPA supports populations of European importance of species listed on Annex I of the Directive and by supporting populations of European importance of migratory species. The site regularly supports at least 20,000 waterfowl over winter, with the area regularly supporting 41,870 individual waterfowl (5 year peak mean 1991/2 - 1995/6) including: Pink-footed goose (*Anser brachyrhynchus*), golden plover, bar-tailed godwit (*Limosa lapponica*), greylag goose, light-bellied brent goose, wigeon, whooper swan, knot, redshank (*Tringa totanus*), shelduck (*Tadorna tadorna*), eider (*Somateria mollissima*), common scoter (*Melanitta nigra*), ringed plover, lapwing (*Vanellus vanellus*), dunlin (*Calidris alpina alpina*) and grey plover. The Berwickshire and North Northumberland Coast EMS is made up of the Berwickshire and North Northumberland SAC and the Lindisfarne SPA (Fast Castle Head in Berwickshire to Alnmouth in Northumberland).

The two dominant aspects of this area include the nature conservation importance and the importance of Lindisfarne as a cultural, tourism and residential centre derived in part from the nature conservation interests. Holy Island, which gains much of its value from its natural conservation feature, is limited in its actual physical extent but extended by the infrastructure such as access, which must be maintained.

Issues of concern in the Lindisfarne SPA, Ramsar Site and SSSI include invasive species (*pirri-pirri*, *Spartina*), lack of management, overgrazing in places, and reduction in *Enteromorpha* coverage. There is the potential for Managed Realignment at Brockmill Farm in Goswick, helping to reduce coastal squeeze which has the potential to lessen flood risk and recreate important habitats, as identified in the Environment Agency's 4shores project.

The Northumbria Coast SPA includes much of the coastline between the Tweed and Tees Estuaries in north-east England. In summer the SPA supports important numbers of breeding little tern, whilst in winter the mixture of rocky and sandy shore supports large numbers of turnstone and purple sandpiper.

There are a number of relevant Biodiversity Action Plans (BAPs) that are relevant to this area including rocky shore and islands, maritime cliffs and slopes, saltmarsh and mudflat, sand dune and common seal. More information on the specifics of these BAPs can be found in **Appendix D**.

It is recognised that the rural communities have regional and local significance and rely to a degree upon the agricultural industry of the area. Recreational activities are also important, as represented by the low level access provision to the coast north of Beal Point and by the golf course. As with the whole area, however, this is underpinned by the important natural heritage of the area.

This PDZ includes five Grade II listed structures in close proximity to the coast. Three along Scremerston Cliffs (lime kiln, boundary markers and Cheswick Shiel), one at Ross Low (navigation beacons) and one on Holy Island (Snook House stable and tower). Details of these listed structures can be found in **Appendix D**.

Appendix E details the issues and objectives that were brought up through public consultation. These issues and objectives have informed this review as well as the main decision making process. The SEA directive suggests out various receptors that should be included in any SEA. The themes within **Appendix D** and **Appendix E** address the various receptors as shown below. All the SEA receptors as shown below are assessed within this PDZ (note: some SEA receptors are covered by more than one theme):

Issues and Objectives	Thematic review	SEA Receptor
Environment	Natural Environment	Biodiversity Fauna and flora Water
	Contaminated land	Soil
	Landscape and character	Landscape Material assets Population
Heritage	Historic environment	Cultural heritage
Commercial	Current and future land use	Population Material assets
Recreational		Population
Hard assets		Material assets Population

It can be seen from the above table that Air, Human Health and Climactic Factors are not included. Air and Human Health were scoped out of the assessment as a receptor because the SMP is a high level planning document and as such these receptors are not applicable to this plan. Climatic Factors (especially sea level rise) are integral to the assessment of the SMP and have been considered within each PDZ (Physical Characteristics section).

Environmental issues identified through consultation in this area include:

- Variability in channel alignment in the Berwick Estuary.
- Saltwater inundation in the Tweed Catchment.
- Invasive species in the Lindisfarne SSSI.
- Lack of management of wetland habitats.
- Conflicts between wildfowl and farmers.
- Recreational disturbance.
- Pressure for development of coastal habitats.

KEY PRINCIPLES

- To contribute to a sustainable and integrated approach to land use planning.
- To protect and enhance the natural environment.
- To support the cultural heritage.
- To protect people's home from flooding and loss through erosion.
- To protect opportunities for employment.
- To support adaptation by the local coastal communities.
- To maintain or enhance the high quality landscape.
- To minimise reliance on defence.
- To seek opportunity for habitat enhancement.

KEY OBJECTIVES (a full list of objectives for this zone is presented in Appendix E)

- To maintain or enhance coastal biodiversity and geological features of interest, in particular those that are designated for features of international or national importance.
- To support appropriate ecological adaptation of habitat.
- To maintain and enhance Berwick as a viable commercial centre and tourist destination in a sustainable manner.
- To maintain designated heritage features.
- To manage and reduce flood and erosion risk to the existing commercial and residential area around the Estuary along the Spittal frontage.
- To sustain commercial activity and maintain the opportunity for potential recreational use and operation of the harbour area.
- To maintain navigation of the estuary.
- To maintain in a sustainable manner regeneration opportunities in the area of Sandstell Point.
- To enhance the overall amenity of the frontage recognising the different nature of use of the areas within the Estuary and along the Spittal frontage and those to the north of the Town.
- To maintain critical transport links.
- To support adaptation of the uses to the north of the town.
- To promote ways to maintain access to the coast.
- To maintain community of Holy Island as a viable residential and cultural centre and a tourist destinations whilst protecting the internationally and nationally important features of conservation interest.
- To support adaptation by the local coastal communities.
- To support adaptation and maintain the agricultural industry's function within the area.
- To support adaptation of recreational opportunities along the foreshore, including the golf course.
- To maintain or enhance the high quality landscape.
- To maintain access to the foreshore for Search and Rescue purposes.

PHYSICAL CHARACTERISTICS

Water levels (in mODN)

MLWS	MHWS	HAT	1:10yr	1:25yr	1:50yr	1:100yr	1:200yr
-1.9	2.2		3.08	3.2	3.3	3.38	3.43

Wave climate

Return Period (1:X years)	Wave Height H _s (m)
1	4.62
10	6.37
100	7.46
1000	8.12

Baseline Erosion Rates

Marshall Meadows to Brotherston's Hole	0.01m/yr	Over 100 years potential erosion of the order of 2m. Possible cliff falls.
Brotherston's Hole to N. Breakwater	0.2 to 0.3m/yr	Locally erosion could be of the order of 40m, more typically 20m, with local land slips.
N. Breakwater to Bear's Head	0.2 to 0.4m/yr	Over 100 years potential erosion between 30m and 75m.
Bear's Head to Saltpan Rocks	0.1m/yr	Over 100 years potential erosion of the order of 4m. Possible local land slips.
Saltpan Rocks to Cheswick Shiel	0.2m/yr	Over 100 years potential erosion up to 20m.
Cheswick Shiel to Goswick	0.5m/yr	Over 100 years potential erosion up to 20m. Potential opening up of flood plain.
Goswick to Beal Point	0.1 to 0.2m/yr	Over 100 years potential erosion up to 65m. Potential opening up of flood plain.
Beal Point to Ross*	0.1m/yr	Over 100 years potential erosion up to 26m. Potential squeeze of saltmarsh against rising land.
Budle Bay	0.1m/yr, locally 0.5m/yr	Over 100 years potential erosion up to 70m on the northern side and 26m to the south. Potential opening of Ross Low flood plain.
Snipe Point to Emmanuel Head	0.01m/yr	Over 100 years potential erosion up to 2m.
Emmanuel Head to Castle Head	0.1m/yr	Over 100 years potential erosion up to 5m.
Castle Head to Priory	0.01m/yr	Over 100 years potential erosion up to 2m. Potential erosion within bay of 10m.
Priory to Chare End	0.2m/yr	Over 100 years potential erosion up to 20m.
Shell Road South	0m/yr	Over 100 years potential erosion up to 5m, solely due to sea level rise.
Shell Road North	0.1m/yr	Over 100 years potential erosion up to 26m.
Ross Dunes	0.05m/yr	Over 100 years potential erosion up to 10m.

Sea Level Rise assumed rates: 0.05m to year 2025, 0.26m to year 2055, 0.8m to year 2105. Coastal evolution has been examined based on lower rates and higher rates in addition to those assessed above.

- Note that amongst this general overall trend the dunes at Ross Back Sands have accreted seawards by about 150m over the past 50 years.

Evolutionary Trend

Existing Processes:

Coastal processes are driven principally by wave action, locally influenced by outflow of rivers. The coast is held by natural hard rock cliffs and outcrops on the foreshore. The principal controls being imposed by the coast to the north of Berwick, the cliffed section between Bear's Head and Saltpan Rocks, Holy Island and Budle Point. More locally, Beal Point acts as a control at the entrance to the Holy Island Sands, with Snook Point acting as the control on the Holy Island side. There is potentially harder material underlying Ross Dunes allowing development of the barrier Island between here and Holy Island. On Holy Island, control is imposed by the two ridges of hard rock to the north and south of the island.

The dominant wave direction is from the north-east sector, although there is substantial energy from the south-east.

Tidal streams flow on the flood from north to south and, on the ebb, from north to south. The typical tidal range (springs) is 4.1m.

The general movement of sediment on the coast is from north to south, although this is constrained along the actual shore by various rock headlands. Sediment supply from the northern section is limited, the main supply system working in the nearshore area. This is assessed as being low. Holy Island has acted historically as a barrier to sediment drift to the south, resulting in the massive accumulation of sediment to the south of the zone. Holy Island limits wave action from the south-east, allowing the coast to build out towards the Island with the coast orientated to the dominant north-east wave energy. Part of this process has allowed development of dune ridges, developing from Saltpan Rocks and Far Skerr towards Cheswick Sands. This has resulted initially as protection to the boulder clay of Cheswick and then as barrier island ridges to the low lying land of North Low. These ridges have formed as a result of a good sediment supply and a stable or decreasing sea level. At present, monitoring would suggest that the frontage is quite finely balanced. There have been periods where the beach face, some 500m seaward of the dune line at Goswick, has built a ridge clear of normal tidal range, indicating the possibility of a new dune ridge developing, continuing that of the foremost Cheswick dune. This formation is, however, very vulnerable and has, during other times, been swept away, leaving a wide tidally swept sand foreshore back to the Goswick Dunes. It is unlikely that the whole coast would advance seaward of the forward beach face because of the geomorphological shape determined by Holy Island. There are, however, two scenarios depending on the balance of dune accumulation as a ridge and the rate of sea level rise.

In one scenario, this dune ridge will develop as sea level rises quite slowly over the next 50 years. This narrow ridge, having in effect moved the shoreline forward, would then roll back as sea level rises more rapidly over the third period of the SMP (2055 to 2105). The second scenario is that sea level rise outweighs the ability for the coast to develop this forward dune. In effect, the shoreline will be forced back to the current dune line. Under this scenario, increased wave energy on the foreshore would result in increased supply to these backshore dunes, creating a more substantial, higher dune line along the existing shoreline.

Further north, beyond the influence of Holy Island, the net balance of wave energy results in a stable orientation facing east. To the south of Holy Island, the Island protects the coast from north-easterly waves and Ross Dunes barrier is orientated to a net easterly wave energy. On the exposed north and east frontages of Holy Island, the hard controls limit drift allowing the shore to adopt a stable configuration.

Within the shelter of the Island, wave energy is low allowing the development of the extensive areas

of sand and mud flats and fringe saltmarsh. Tidal flows within this area are locally strong at the entrances and in relative balance with the channels. The tidal prism of this area has been artificially reduced by defence of the larger natural flood plain.

Over most of the frontage erosion continues but is low. Only limited lengths of defence are in place, principally around Berwick and the low lying flood plains within the influence of Holy Island. There are local defences north of Berwick and within Budle Bay. The main influence of man made defences is on the coast is at Berwick. The North Breakwater retains a limited amount of sediment to the north but, more significantly, both affects the stability of the beach along Spittal and controls the flow into and out of the Tweed. The breakwater shelters the whole estuary from the north-east, with waves otherwise entering the area across and between Innerstell Battery and Tweedmouth Stell.

Unconstrained:

Apart from the defence at Berwick and the defence of the low lying land around Goswick and Ross Low, the coast is effectively acting in an unconstrained manner. In this way, the coast would continue to erode slowly, with the main natural controls still acting to determine the shape of the coast. The northern rock cliff line would continue to erode as would the cliffs south of Berwick. The behaviour of the Cheswick and Goswick dune system is discussed above. The unconstrained difference is that the low lying area behind these dunes would be regularly flooded, increasing the influence of the North and South Lows on the shoreline. In both cases, addition tidal prism would tend to reinforce the development of the front dune system creating ebb tide deltas upon which the dune line would tend to develop. Potentially this would increase the area of salting at Beal Point, affecting the balance of flow into the area behind Holy Island. There is potential, coupled to the influence of foreshore being forced back as a ridge across the entrance to the Holy Island Sands, for the northern entrance to the flats to be substantially closed, increasing accretion of finer sediments over the whole of this area. Closure, or partial closure, of this northern entrance would disrupt the balance of flow within the flats. Depending on the balance of tidal prism and the availability of sediment, flows into and out of the eastern entrance would change.

No defence to the area around the Ross peninsula could result in an entrance opening up to the flats into Budle Bay, separating the barrier dunes from the mainland. The barrier islands would become more distinct but would remain as a competent barrier. The wide entrance to Budle Bay, while initially having an increased tidal prism that tends to rework sediment at the southern end of Ross Links, may, in the longer term, tend to close.

This general behaviour of the whole area behind Holy Island would need to be examined in more detail and would depend on significant uncertainty with respect to balances between tidal prism and sediment supply.

In other areas, the unconstrained scenario is most significant at Berwick and the Tweed Estuary. In the absence of the breakwater, there would be increased wave energy working on the Spittal Frontage. This would tend to remove sediment to the south, exposing the Spittal coastline to significant pressure from erosion. The Tweed would tend to flow out to the north-east with little opportunity to develop an ebb tide delta. Sediment would be removed offshore by the power of the river. Sandstell Point would suffer erosion, widening the overall mouth of the river.

Around Holy Island itself there is little defence, in the unconstrained scenario the northern dune line would tend to roll back. The bay to the south of the Island would come under increased pressure to erode, potentially opening up the flood plain to the rear.

MANAGEMENT

Present Management

SMP1 divides the zone into 10 Management Units (MUs) covering the main land and a further 2 units covering Holy island. The current policies are:

Management Unit	Policy
MU 6 Scottish Border to Needles Eye	Selectively Hold the Line
MU 7 Needles Eye to Berwick Breakwater	Do Nothing
MU 8, 9 and 10, Berwick Breakwater to Bear's Head	Hold the Line
MU 11 Bear's Head to Saltpan Rocks	Selectively Hold the Line
MU 12 Saltpan Rocks to Cheswick Black Rocks	Do Nothing
MU 13, 14 and 15	} Selectively Hold the Line
MU H1 Village	
MU H2 Northern Island	Do Nothing
Strategies	
There are no formal strategies for the zone.	
A study at Spittal has resulted in new defences.	Hold the Line

Baseline scenarios for the zone

No Active Intervention (Scenario 1):

Under this scenario no further action would be taken in defence of the coast. Existing defences would remain but would over time deteriorate and fail. In several areas this would be as management at present. The main frontages where this would result in substantial change would be at Berwick and in the area behind Holy Island, extending into Budle Bay.

Between the Border and Brotherston's Hole, predicted erosion is relatively low and over the next 100 years this is unlikely to impact on use of the cliff crest. Within Marshall's Meadow Bay the caravan park is relatively close to the cliff crest. There is a risk of loss, but this results more from instability of the cliff rather than as a result of erosion at the toe of the cliff. There is no suggestion that the railway line is at risk over this period. At Brotherston's Hole the main risk of failure is due to the increased under cutting and caving. Higher estimated rates of erosion may cut back the cliff by some 70m, taking out part of the golf course and the coastal path over the 100 year period of the SMP. More typical erosion rates might be of the order of 40m over the next 100 years. Erosion would be considerably less during the initial 50 years, erosion increasing with the anticipated increase in sea level over the latter period.

South of Brotherston's hole these higher rates of erosion may occur. This could result in loss of areas of the Berwick Holiday Park but this would not extend back to the main centre of the park. This would again be most significant over the long term with only minor erosion over the initial epoch of the SMP. Erosion within Greens Haven and Fisherman's Haven would occur as the small breakwater and local defences at the back of the small beach fail. This would, if no action were taken, result in loss of access to the beach and may result in loss of the road. This loss would in part be due to increased stability of the upper slope.

This gradual erosion of the cliffs would maintain their geological interest, although sea level rise and submergence of the rock outcrops is likely to outpace the fresh exposure of rock foreshore. As such there would be a net loss of important habitat.

The North Breakwater is assessed as failing fully in year 75, although the structure, without maintenance, would start breaking up much earlier. A recent study has shown significant areas of deterioration. It is because of this relatively long residual affect that erosion at the root of the breakwater is predicted as being quite low. However, erosion would become more severe soon after the end of the SMP period of 100 years. This applies equally to the section of coast to the north as to areas within the estuary discussed below. In effect, decisions made now would set in train a process of deterioration leading to long term loss.

Over the period of the SMP, erosion would result in loss of the northern dunes initially, followed by loss of Pier House and Pier Road. Along the northern side of the estuary, failure of the walls and defences would result in substantial loss of properties and heritage value. The loss of the breakwater would also significantly change exposure of the sand and mudflats at Calot Sands, having an impact on the designated nature conservation interest.

As the breakwater fails the Tweed is likely to force its course out to the north-east. This would make use of the harbour untenable. The course of the river is likely to develop as distinct flood and ebb channels with the possibility of a sand bank being developed in the centre of the estuary. Quite apart from the increased exposure, this would make navigation of the estuary mouth difficult. The increased exposure of the southern bank would result in on-going erosion along the harbour area. It is unlikely that the RNLI location would be sustainable without the breakwater.

Sandstell Spit and Point would be eroded, potentially cutting back by as much a 100m over the full

period of the SMP. This area would not be sustainable for development. Erosion of this point, together with the increased exposure, would result in loss of the beach in front of Spittal, undermining and causing failure of the Spittal defences. While erosion to Sandstell Point may be significant over the next 20 years, failure along the Spittal frontage may be delayed until year 50. Once the defence has failed, erosion may typically be of the order of 70m but could be up to 130m over the longer term given higher levels of sea level rise. This would take out much of the lower part of Spittal. Eventually, the shore, with a narrow beach, would stabilise.

While initially providing some additional sediment drift to the south, the beaches under the cliffs down to Saltpan Rocks would only gain a small benefit as the cliffs would still cut back at a slow rate. The crest of the cliff may move back more rapidly in local areas due to instability. This could potentially affect the railway line in the long term.

A discussion of the behaviour of the area leading down to Holy Island and behind is provided under the unconstrained scenario. Under a No Active Intervention policy this development is likely to be much the same. Some of the interactions may be delayed while defences actually fail, but in the longer-term the development of the frontage would be similar. There is significant uncertainty but quite probably the shoreline and dunes would be driven landward, tending to close the northern entrance to the Holy Island Sands and Fenham Flats. This would result in significant change of habitat. In terms of the built environment, there would be increased risk of flooding with principal damages to Goswick and the Berwick upon Tweed Golf Course, and large areas of agricultural land. The opening up of the North Low flood plain, in particular, may have a beneficial impact in terms of maintaining a wider foreshore and protection to Goswick.

Around Holy Island the only significant modification of the coast is the breakwater extension of Steel End. Loss of this structure will result in increased erosion within the bay to the east of the village. This could open the flood plain behind, potentially exposing properties to flood risk. Erosion is unlikely to break through between the northern dunes to Shell Road. Similarly, erosion of the clay cliffs to the south and west of the village is unlikely to be severe enough to cause substantial loss. There may, however, be loss of the building and boat house at the shoreline to the south of the priory and the building to the west of the priory. This loss being due to sea level rise, rather than direct erosion.

<u>MDSF Evaluation</u> <u>(Appendix H)</u>	<i>Assets lost over the time period of the SMP</i>	<i>PValue Damages</i>
<i>Erosion</i>	Berwick area: 132 No. residential 38 No. Commercial	£2,734k £1,126k
	Holy Island area and Waren Mill: 14 No. residential 1 No. Commercial	£427k £89k
<i>Flooding</i>	Berwick area Holy Island hinterland	£3,432k £493k
<u>Other Information</u>	Some loss to caravan park area to north of Berwick in the longer term. Loss of use of Berwick Harbour. Potential long term loss of B1342.	
<i>Assessment of Key Objectives</i>	The scenario fails to deliver the overall objectives with respect to the Berwick area. With other objectives the scenario partially addresses: <ul style="list-style-type: none"> To support adaptation of the uses to the north of the town. 	

With Present Management (Scenario 2):

To the north of Berwick there are only short lengths of protection within Fisherman's Haven. This comprises a short breakwater acting to retain the narrow beach and reduce exposure to short lengths of erosion protection at the toe of the cliff. Maintaining these structures would maintain access to the beach in the short to medium term (50 years) as well as acting to stabilise sections of the upper slope. Longer term cliff instability is likely to limit access and would still result in retreat at the crest of the cliff.

The main protection to the Tweed Estuary is the breakwater. All defences within the estuary and along the Spittal frontage rely on this strategic structure. The breakwater also maintains the shape and habitat within the estuary, although increasing sea level will tend to reduce intertidal area. There is, however, limited scope for recreating such lost areas due to the rising built-up land. All defences would be maintained.

Recent monitoring results show a link in behaviour between the northern section of the Spittal frontage and the development of the Sandstell spit. Over the last few years the spit has tended to be lower with a slight channel developing across the spit. This is seen as being most probably a cyclical effect, possibly linked to high flows in the river during 2003. As the volume of the spit reduced, the volume of beach along the Spittal frontage increased. Subsequently, the volume of the Spittal beach has reduced and growth has been seen in the spit. Even with existing defences, the spit and Sandstell end of the frontage remains vulnerable to sudden change in beach volume. With potential loss of sediment to the frontage with sea level rise and possible increased spate flows in the river, this area could become increasingly vulnerable.

At the southern section of the Spittal frontage, there is only limited width of beach. This section will come under increasing pressure for erosion and increased wave energy may reduce beach levels progressively to the north.

From Bear's Head through, in effect, to Holy Island there are no defences at the shoreline; flood defences being set back from the active zone of the foreshore. The behaviour will be similar to No Active Intervention. As the shoreline rolls back the natural dune defence is likely to increase but gradually exposing the rear flood defences such as the sluices at North and South Low. Maintaining these defences in the long term would require extending defences to either side. This in turn could result in increasing squeeze of the saltmarsh area.

The access causeway to Holy Island would presumably require raising under this scenario. This may, unless further drainage is provided through the causeway, encourage the tendency for this northern entrance to close. Other areas of the Holy Island hinterland frontage would respond in a manner similar to NAI, but without the opening up of the low lying land there would be the potential loss of intertidal area and particularly saltmarsh.

Within Budle Bay, defences would be maintained to Ross Low and to Waren Mill. There may be, in consequence, some loss of finer sediment within the bay and increasing loss of upper saltmarsh. Currently no defence is identified to the B1342 and this would still be subject to loss in the future.

Around Holy Island maintenance of the breakwater at the harbour would help reduce retreat within the harbour bay. Apart from this, with present management would be the same as NAI.

<i>MDSF Evaluation (Appendix H)</i>	<i>Assets lost over the time period of the SMP</i>	<i>PValue Damages</i>
<i>Erosion</i>	Berwick area: no loss Holy Island area: 14 No. residential	£427k

	1 No. Commercial	£89k
<i>Flooding</i>	No flood losses	
<i>Other Information</i>	<p>Some loss to caravan park area to north of Berwick in the longer term. The harbour use would be maintained as would heritage value within the estuary.</p> <p>Potential long term loss of B1342.</p>	
<i>Assessment of Key Objectives</i>	<p>Over the northern section of the zone all principal objectives would be met except:</p> <ul style="list-style-type: none"> • The potential vulnerability of Sandstell Point would constrain regeneration opportunity. • There would be an overall loss of amenity along the Spittal frontage. <p>To the southern section of the zone, there would be increasing pressure on key areas of flood defence. This may result in coastal squeeze. As such:</p> <ul style="list-style-type: none"> • There could be impact on the high quality landscape. • Coastal biodiversity would be reduced with less scope for adaptation. <p>In the longer term there would be increased pressure to abandon flood defences. This could result in dramatic change failing to allow adaptation of agricultural use.</p>	

DISCUSSION AND DETAILED POLICY DEVELOPMENT

Neither With Present Management nor No Active Intervention provides a fully sustainable approach to long term management. In the case of the former, the main issues are in relation to the hinterland of Holy Island and to a degree management of the Spittal Sandstell frontage. In the case of NAI, the scenario leads to substantial loss within the Berwick area but also results in potential uncontrolled flooding in the area behind Holy Island, potentially affecting the railway line and the area through to Haggerston. Management of Holy Island is principally the same under both scenarios with minor variation.

In terms of general management, key decisions for the zone are in relation to The Berwick Breakwater and in terms of the general approach to flood defence behind Holy Island. These two feature areas are discussed initially, allowing further sub-division and more detailed discussion of specific areas.

Key Interactions in terms of Management Policy

Feature 1 Berwick North Breakwater	
Influence	The breakwater provides essential control of the shore immediately to the north and to the estuary area, extending as far south as Bear's Head. Retaining the structure would not significantly impact beyond Bear's Head.
Management Options	The simple choice at this high level is whether to maintain the breakwater or not.
<p>Discussion of High Level Policy Decision</p> <p>Abandoning the structure would have serious consequence on the Berwick area, making defence and use of the estuary and harbour area unsustainable in the long term. It would cause significant impact to the Tweed Estuary SAC and the Lower Tweed and Whiteadder SSSI. In particular, loss of the breakwater would result in an impact upon SAC Annex I habitats (estuaries and mudflats and salt flats not covered by seawater at low tide) as well as habitats (estuary, intertidal mud and salt flats, riverine floating vegetation communities) and species (river lamprey, sea lamprey, Atlantic salmon and common otter) designated under the SSSI. Loss of the breakwater would also cause loss of existing assets, loss of the harbour area, and loss of opportunity for regeneration.</p> <p>The North Breakwater is not a coastal defence structure that is preventing erosion in this area, but a harbour structure protecting the estuary. Maintaining the North Breakwater, therefore will not cause a direct loss of designated reef and rocky shore habitat from the Berwickshire and North Northumberland Coast SAC and Northumberland Coast SSSI to the north.</p> <p>Judged against all key objectives the policy is to maintain the breakwater both as a coast protection structure and in maintaining harbour use. From this the coast may be sub-divided at this point, such that the coast to the north becomes a management area, the estuary and Spittal frontage becomes a management area, separate from the management of the coast to the south.</p>	
High Level Policy: Hold the Line (maintain the breakwater)	

Feature 2 Flood defence management in the Goswick, Cheswick and Ross areas.	
Influence	The existing defences obviously reduce flood risk to the hinterland. Opening up these flood areas would influence the development of the

	foreshore and the long term behaviour of the Holy Island and Fenham Flats. As such at a high level an overall high level policy has links over the whole of this area.
Management Options	<p>Holding the line of defence, particularly at the location of the northern sluices will necessitate increasing defences at these points in the long term. This will affect the behaviour of the beach development north of Beal Point and the tidal prism of the Fenham Flats and Budle Bay. Holding the line would provide protection to large areas of potential flood plain and protection to the golf course and Goswick. This defence, possibly towards the end of the SMP period and beyond, is likely to become increasingly difficult to maintain. Future abandonment would have significant subsequent consequence on the adapting shoreline and on use of the land in the longer term future.</p> <p>Taking a No Active Intervention policy at this present time would result in potentially significant impacts on land use and little opportunity for adaptation. It could, however, result in benefits in terms of management of the development of the dunes, potentially increasing seaward protection to Goswick and the golf course; but both of these areas might be impacted by flooding from the hinterland. No Active Intervention at Ross Low could similarly have beneficial impact on Budle Bay but this is unlikely to have significant benefit to defence of the frontage at Waren Mill.</p> <p>Managed realignment in these areas has the potential to maintain a degree of defence to key assets against flooding, while potentially deriving benefits in terms of foreshore management.</p>
<p>Discussion of High Level Policy Decision</p> <p>Further study would be required before any final decisions could be made, however, the main intent of management coming from the SMP is to allow adaptation of this whole area. The intent would be to minimise reliance on defence where such defences may interfere with the natural development of the shoreline, while allowing use of an increased tidal prism to encourage development of the dunes. If this is achieved, the seaward defence of assets such as the golf course and Goswick is likely to improve despite sea level rise. Associated with this, local defences may still be possible against flooding from the hinterland.</p> <p>To achieve this balance it is recommended that further detailed study is undertaken but that the overall policy should be for managed realignment of defences. As such the whole area must be considered as one unit.</p>	
<p>High Level Policy: Managed Realignment of Flood Defences</p>	

Sub-Division and Detailed Assessment

In addition to these high level decisions there are, as identified earlier, basic natural control features which allow sensible sub-division of the policy development zone.

To the north of Berwick there is little scope for significant management. The principal difference between WPM and NAI scenarios is in the area of Fisherman's Haven. Here, continued maintenance of the limited existing length of defences and the short breakwater would maintain both a degree of stability to the cliff and retention of the beach whilst maintaining access. Maintaining existing defences in the first epoch would possibly delay loss at the cliff crest over the short to medium term but may be more

difficult into the final period of the SMP. There are principally only amenity losses envisaged in this local area but over the coast as a whole there may, in the long term, be more significant loss to the golf course and Holiday Park. Loss due to erosion of this frontage is unlikely to be so severe, however, as to impact on the sustainability of these interests. As such, the long term policy for the whole frontage is one of No Active Intervention.

In the short term, however, the existing defences at the shoreline and the breakwater could be maintained without significant loss of designated reef habitat from the Berwickshire and North Northumberland Coast SAC or impact to the Northumberland Shore SSSI due to coastal squeeze. This would allow continued existing access to the foreshore. However, new defences are not considered appropriate given the longer term policy being proposed.

In the longer term, to move towards a policy of No Active Intervention, there will be the need to adjust land use to ongoing erosion pressures. Planning for this change should start at the earliest opportunity. This will require a flexible approach to foreshore access in the medium term, hence a policy of managed realignment.

This overall approach to management is in line with objectives for the area. While there is limited interaction at the shoreline, adaptation of the golf course and Holiday Park may require long term planning in association with the use of the recreational land closer to Berwick. As such this whole section from the Scottish Border down to the North Breakwater is identified as a single management area with three policy units; culminating in a long term policy of No Active Intervention over the whole length.

Having determined a long term policy of holding the main breakwater, the area within the estuary may be further sub-divided by more local issues. Defence of the northern side of the estuary does not significantly constrain the development of the estuary, this being controlled more by the underlying geological structure behind the defences. Holding defence at Gardo's Battery both maintains a key point in the defence of the frontage and maintains shelter to the Calot sands area; maintaining habitat in this area. Each section of individual defence along this northern structure acts overall to protect important areas of heritage and residential and commercial property as well as the road access to these properties. While there may be a future long term need to increase defence levels and significant effort in bringing all defences up to a good standard, this is seen as being a sustainable form of defence, given the high values of the area in association with the character of the town.

The policy in this area is to Hold the Line, continuing the existing policy. This will result in loss of designated habitat from the Tweed Estuary SAC and the Lower Tweed and Whiteadder SSSI, in particular intertidal mudflats and sandflats, due to coastal squeeze. This will be mitigated by both the managed realignment of Sandstell Point to create areas of mudflat and the area of Managed Realignment at South Low (PU 4.1) which will create saltmarsh and intertidal mudflat and sandflat. It should be noted that the proposed mitigation is intended to offset the loss of designated habitat caused by coastal defences over the lifetime of the plan. Any new development within the estuary should be assessed and should there be any further impact on designated habitats adequate mitigation / compensation must be provided.

Similarly along the southern bank, downstream of the railway bridge and extending along to the Spittal Quay, the defences are under no great pressure and provide

important protection to areas of the harbour, the road and property. This section is also, therefore, given a policy of Hold the Line. The recent development master plan for this section identifies the importance of the waterfront. In developing this area, there needs to be recognition of future sea level rise and in particular the need to allow scope for increased defence along the frontage. At present there is useful width to the rear of the defence such that such increase in defence standard may be achieved without intrusive linear defences. A similar policy is preferred over the main Spittal frontages protecting the main sea front properties and recreational areas. In the longer term, works may be required to retain better the beach in front of the sea wall, particularly at the southern end and thereby prevent impact to the Berwickshire and North Northumberland coast SAC designated intertidal sandflat and mudflat habitat. Retention of beach sediment would not significantly affect the shoreline to the south. Such consideration would depend on continuing monitoring of beach levels, associated with managing the threat of increased overtopping due to climate change. The southern tip of the Spittal frontage and Scremerston Cliffs fall within the Northumbria Coast SPA and Lindisfarne SSSI. This area will be unconstrained and will be allowed to behave naturally.

The main area where change may be needed is that of Sandstell Point and Sandstell Spit. This area is vulnerable both to erosion and flooding. It is also an area considered for regeneration. The current defence is linear protection around the head of the point, allowing natural variation in the spit. This gives rise to significant variation in behaviour and in erosion and accretion of sediment; potentially giving rise to a need for continuing increase in defence effort. There is scope in this area to modify the defences to realign the shoreline configuration and hence change the flow pattern around the head, creating more stable conditions for associated dune development and possibly limited areas of low lying saltmarsh or mudflat. The greatest scope for realignment is along the dunes within the estuary, with more limited scope towards the head. Indeed, the present configuration at the head offers shelter to the important natural habitats further upstream within the estuary. At the same time, such shoreline realignment may assist in retaining material along the northern section of the Spittal frontage if the flow patterns are altered favourably.

The estuary at this point would be very sensitive to change, influencing flow patterns, and this approach could only be developed following a more detailed study. Any possible modification of Sandstell Point must take into consideration the legal requirement to protect the Tweed Estuary SAC and the Lower Tweed and Whiteadder SSSI, together with discussion with respect to navigation. Initial regeneration plans are understood to be focussed on areas set back from the shoreline. However, as regeneration of the whole of Sandstell develops this needs to take account of the potential increase in pressure at the shoreline and the need to design in improved long term resilience to flooding. Detailed development of the frontage, therefore needs to consider how defence may best be provided in a sustainable manner.

South of Bear's Head the suggested policy would revert to No Active Intervention and this would extend through to Cheswick Shiel. There is one property partially at risk but this is principally due to slope instability. Similarly, local areas of instability might affect the railway line. These areas may require intervention in the long term but might typically be in relation to stabilising the upper slope. Any intervention works should protect the designated sites in this area and aim to conserve and enhance the natural environment. There are three Grade II listed buildings along the Scremerston Cliffs frontage. It is not believed that a policy of No Active Intervention in this area would impact upon these assets but, similarly, and intervention works should aim to protect

them. The only other assets at risk would be the various small car parks and the access road. In maintaining the high natural value of the frontage served by these assets, the appropriate intent would be to reposition car parking as necessary, thereby ensuring no need for intervention.

As discussed already the section of coast further south, including Cheswick and Goswick Sands, would have a general policy of Managed Realignment. This provides opportunity potentially for habitat re-creation as well as providing a longer term natural resilience to Goswick and the golf course. Further examination would need to be given to: (i) local defence within the hinterland (set back landward of the future shoreline position) to counter flooding; (ii) the impact on the Holy Island Sands and Fenham Flats, and (iii) the influence of the causeway. Within this overall Managed Realignment approach, Beal Point would remain as a natural headland and consideration would need to be given as to how this interacts with the causeway. The section of coast between Beal Point and White Hall is unlikely to suffer any significant erosion and a policy here would be NAI.

At Ross peninsula, the general policy is Hold the Line, which would involve maintenance of the existing flood embankments either side, but due to ongoing natural accretion along Ross Back Sands would not require any intervention to the dunes in the short to medium term. In the longer term, anticipated rates of sea level rise are likely to cause a reversal of the present accretion and the dunes are likely to roll back. This process should be managed so as to avoid breaching through the dunes, hence a policy of Managed Realignment is appropriate. Within this context, existing flood defence either side of the headland should continue to be maintained. Defences to Waren Mill and future defence to the road to Bamburgh is considered to be sustainable. The navigation beacons off Ross Links are Grade II listed structures and any intervention in this area should aim to protect these assets.

On Holy Island, along the northern and eastern open coast, the policy would be for NAI. No assets are at risk and there is not considered to be, under anticipated sea level rise, a risk of breach through to Shell Road. With sea level rise, the causeway and south shore road would become more frequently inundated for longer periods of time than at the present day. Recognising the importance of maintaining access to the island, it will be important to plan for this in light of anticipated sea level changes.

Along the cliffed section of the village frontage, the policy of NAI would be recommended as possible additional supply of material to the area of the Flats. The only area of continued intervention recommended for Holy Island would be around the Harbour, maintaining adequate flood defence. This would be supported by maintenance of the breakwater. There will be a natural loss of rocky shore habitat in this area due to sea level rise, although this is not being exacerbated by the breakwater. Snook House stable and Tower on the east end of Holy Island are Grade II listed structures and any intervention in this area should aim to protect these assets.

In summary, therefore, the zone is sub-divided into five Management Areas these being:

- The Scottish Border to the North Breakwater (three policy units).
- The Breakwater and Estuary through to Bear's Head (five policy units).
- Bear's Head to Cheswick Shiel (one policy unit).

- Far Skerr to and including Budle Bay and the southern coast of Holy Island (eight policy units with a general policy of managed realignment).
- The north and east coast of Holy Island (two policy units).

The conclusions for each area are summarised in the Management Area statements which follow. First, however, an assessment of the strategic environmental objectives for the three epochs under the scenarios of No Active Intervention, With Present Management and Preferred Policy has been carried out below.

Assessment of Environmental Receptors in the First Epoch (up to 2025)

MA	Policy	Biodiversity	Population	Fauna and Flora	Soil	Water	Material Assets	Cultural Heritage	Landscape
MA1	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA2	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA3	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA4	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA5	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●

Major positive significance ● Minor positive significance ● Major negative significance ● Minor negative significance ●

In the first epoch, NAI may cause a slight deterioration of defences to the north of Berwick and around Holy Island. The minor negative impacts that this may have upon population, material assets and cultural heritage have been avoided in the Preferred Policy by the use of Hold the Line in relevant locations. In MA2, both policies of NAI and WPM (Hold the Line) would cause a minor negative impact upon biodiversity, flora and fauna in the short term through coastal squeeze. PP does not differ greatly from WPM and any loss of habitat within the Tweed Estuary in the short term is to be mitigated through a policy of Managed Realignment in MA4. A policy of NAI in MA4 would, in the first epoch, cause minor negative impacts on biodiversity, population, flora, fauna, material assets and cultural heritage due to combined sea level rise and increased erosion and flood risk. PP in this area aims to protect population and material and cultural assets whilst enhancing biodiversity and flora and fauna through a policy of Managed Realignment.

Assessment of Environmental Receptors in the Second Epoch (up to 2055)

MA	Policy	Biodiversity	Population	Fauna and Flora	Soil	Water	Material Assets	Cultural Heritage	Landscape
MA1	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA2	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA3	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA4	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA5	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●

Major positive significance ● Minor positive significance ● Major negative significance ● Minor negative significance ●

In the second epoch, a policy of NAI is likely to lead to minor negative impacts upon population and material assets in MA1, MA2 and MA4 through deterioration of defences leading to increased erosion and flood risk. The impacts upon biodiversity, fauna and flora through PP, and the actions needed to mitigate those impacts are the same in the second epoch as they were in the first epoch.

Assessment of Environmental Receptors in the Third Epoch (up to 2105)

MA	Policy	Biodiversity	Population	Fauna and Flora	Soil	Water	Material Assets	Cultural Heritage	Landscape
MA1	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA2	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA3	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA4	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA5	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●

Major positive significance ● Minor positive significance ● Major negative significance ● Minor negative significance ●

In the third epoch, a policy of NAI would cause major negative impacts to biodiversity, population, fauna, flora, material assets and cultural heritage in both MA2 and MA4. The impacts upon biodiversity, fauna and flora through PP, and the actions needed to mitigate those impacts are the same in the third epoch as they were in the first epoch.

MANAGEMENT AREAS

4.1.2 Management Area Policy Statements (MA01- 05)

Location reference:	NORTH OF BERWICK (CH. 0 TO 7.5)
Management Area reference:	01
Policy Development Zone:	PDZ 1

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: The intent of the plan is to maintain the naturalness of the coast. Loss of assets, such as the seaward limits of the Holiday Park and the general recreational use of the area are only significantly affected in the latter epoch of the SMP. Maintaining the natural development of the coast maintains its high ecological and landscape value; both important to the use of the coast.

PREFERRED POLICY TO IMPLEMENT PLAN

From present day	The short term policy would be for the maintenance of existing short sections of defence, including maintenance of the Fisherman's Haven breakwater.
Medium-term	In the medium term, as defences no longer become viable, the intent is to adapt access and land use to allow longer term no active intervention.
Long-term	To allow the coast to respond naturally.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			Comment
		2025	2055	2105	
1.1	St John's Cliffs	NAI	NAI	NAI	
1.2	Fisherman's Haven	HTL	MR	NAI	HTL in the first epoch involves maintenance of existing defences; no new defences are appropriate given future policies
1.3	Pier Cliffs	NAI	NAI	NAI	

Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment

CHANGES FROM PRESENT MANAGEMENT

No substantial change from existing policy

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	0	0	0	0
	Preferred Plan Damages £k PV	0	0	0	0
	Benefits £k PV	0	0	0	0
	Costs of Implementing plan £k PV	22	5	0	27
Costs estimated for maintaining the short section of breakwater and maintenance to short lengths of defence. Description of damage and benefits under preferred plan. Possible longer term impact on Golf Course and Holiday Park. Impact on recreation space.					
Heritage	No loss identified				
Amenity	Some loss of recreational land				

IMPLICATION WITH RESPECT OF NATURAL ENVIRONMENT

N.B. The table below is a summary of the potential impacts on sites designated for reasons of national or international nature conservation importance. This table should not be read in isolation, please refer to the narrative included in the Discussion and Detailed Policy Development section of this PDZ.

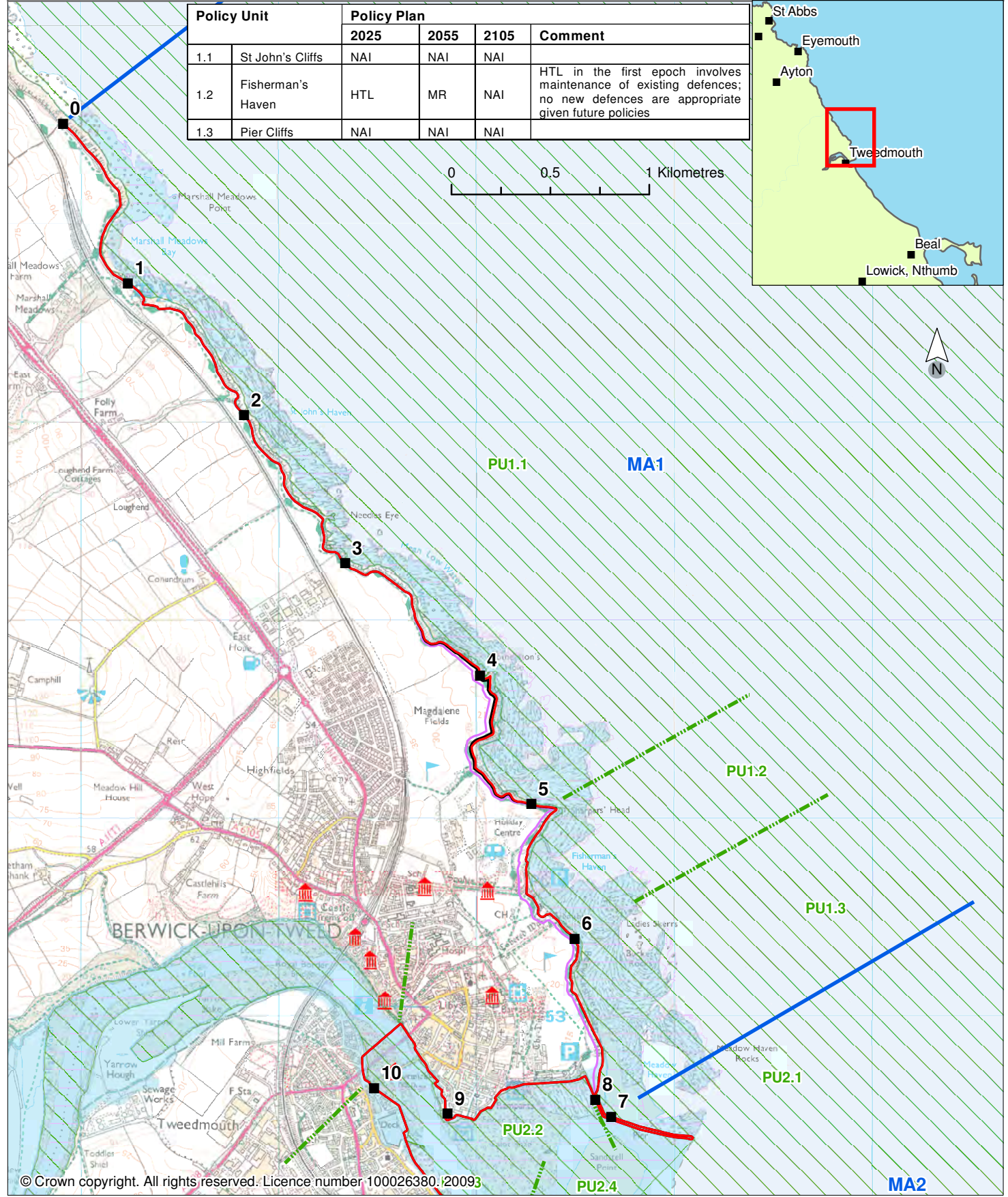
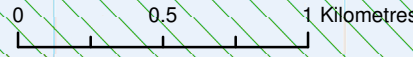
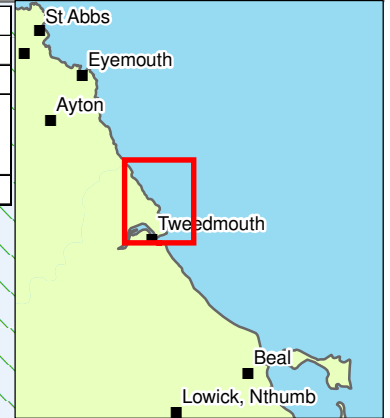
Details of the boundaries of the policy unit can be seen in the Management Area map overleaf.

Designated Site	Habitat / Species	Policy Unit	Impact			Mitigation / compensation
			by 2025	by 2055	by 2105	
Berwickshire and North Northumberland Coast SAC	Submerged or partially submerged sea caves	1.1	No impact	No impact	No impact	N/A
		1.2	No impact	No impact	No impact	N/A
	Intertidal reefs	1.1 1.2 1.3	No impact	No impact	No impact	N/A
Northumberland Shore SSSI	Rocky shore	1.1	No impact	No impact	No impact	N/A
		1.2	No impact	No impact	No impact	N/A
		1.3	No impact	No impact	No impact	N/A

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan reference should be made to the baseline data.

Policy Development Zone 1 - Scottish Border to Holy Island Management Area 1 - North of Berwick (Ch 0 to 7.5)

Policy Unit		Policy Plan			
		2025	2055	2105	Comment
1.1	St John's Cliffs	NAI	NAI	NAI	
1.2	Fisherman's Haven	HTL	MR	NAI	HTL in the first epoch involves maintenance of existing defences; no new defences are appropriate given future policies
1.3	Pier Cliffs	NAI	NAI	NAI	



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Predicted Shoreline Position under Preferred Policy	SPA	Scheduled Ancient Monuments
20 Years	RAMSAR	EA Flood Zone - Sept 07
50 Years	SAC	Management Areas
100 Years	SSSI	Policy Units
	NNR	



ACTION PLAN MANAGEMENT AREA 01

Action	By when	Responsibility	Indicative Cost
<ul style="list-style-type: none"> Improve access to areas of interest and to the foreshore. 	2050	Berwick BC	Nominal
<ul style="list-style-type: none"> Adapt land use to accommodate coastal change. 	2050	Golf Club & Holiday Park	Nominal
<ul style="list-style-type: none"> Coastal monitoring. 	Ongoing	Berwick BC	Ongoing
Schemes:			
<ul style="list-style-type: none"> Berwick Breakwater - urgent repairs. 	2009	Berwick BC	£160k
<ul style="list-style-type: none"> Berwick Breakwater – refurbishment. 	2012	Berwick BC	£500k
<ul style="list-style-type: none"> Maintenance of other defence assets. 	Ongoing	Berwick BC	Revenue

In addition to this detailed Action Plan for this specific Management Area, a high-level strategic Action Plan for the whole SMP area is provided in Section 7.

Coastal monitoring is also discussed in Section 7 and this is relevant to the whole SMP2 area as well as some specific frontages.

Location reference:	TWEED ESTUARY (CH. 7.5 TO 13)
Management Area reference:	02
Policy Development Zone:	PDZ 1

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: The principal intent of the plan is to maintain the high economic and socio-economic value of the area. Within this, there will be a natural loss of ecological value due to rising water levels. Abandoning defences would not significantly address this. There is scope within the plan to modify the defence of Sandstell Point and, in the long term, along the Spittal frontage, with the intent of creating a more stable condition for retaining sediment. This would need to be examined further but could provide opportunity for some minor enhancing of the dunes and saltmarsh, while supporting a sustainable approach to defence and regeneration in the area.

PREFERRED POLICY TO IMPLEMENT PLAN

From present day	The short term policy would be to maintain defences and maintain use of the estuary for navigation. Repairs to the North Breakwater would be required. This would also include consideration of Managed Realignment of Sandstell Point.
Medium-term	Maintain defences.
Long-term	Maintain defences and undertake work to sustain Spittal beach.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			
		2025	2055	2105	Comment
2.1	North Breakwater	HTL	HTL	HTL	Maintain and repair as coast protection
2.2	Inner Estuary North	HTL	HTL	HTL	Improve defence and raise in 50 years
2.3	Inner Estuary South	HTL	HTL	HTL	Improve defence and raise in 50 years
2.4	Sandstell Point	MR	HTL	HTL	Detailed study
2.5	Spittal	HTL	HTL	HTL	Retain beach

Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment

CHANGES FROM PRESENT MANAGEMENT

No substantial change from existing policy.

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	1821	2974	2496	7294
	Preferred Plan Damages £k PV	0	0	0	0
	Benefits £k PV	1821	2974	2496	7294
	Costs of Implementing plan £k PV	801	1195	268	2264
Costs include estimated repair works to breakwater and a nominal sum for management of Sandstell Point.					
Description of damage and benefits under preferred plan.					
Maintains integrity of area					
Realignment to provide opportunity for regeneration, habitat enhancement and navigational requirements					
Heritage	No loss identified				
Amenity	No loss of amenity subject to maintaining the beach				

IMPLICATION WITH RESPECT OF NATURAL ENVIRONMENT

N.B. The table below is a summary of the potential impacts on sites designated for reasons of national or international nature conservation importance. This table should not be read in isolation, please refer to the narrative included in the Discussion and Detailed Policy Development section of this PDZ.

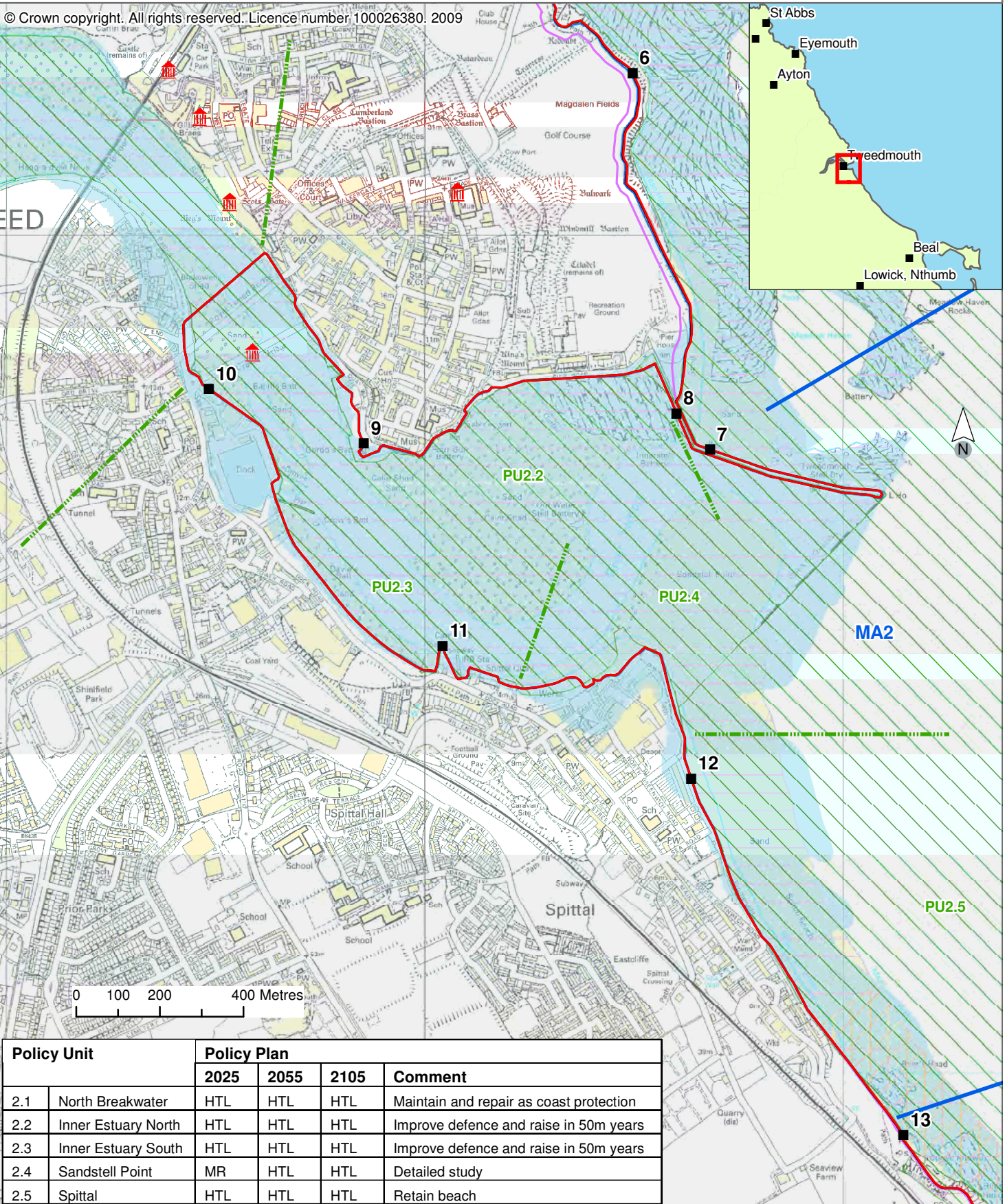
Details of the boundaries of the policy unit can be seen in the Management Area map overleaf.

Designated Site	Designated / supporting habitat	Policy Unit	Impact			Mitigation / compensation
			by 2025	by 2055	by 2105	
Berwickshire and North Northumberland Coast SAC	Intertidal reefs	2.1	No impact	No impact	No impact	N/A
		2.5				
		2.4				
	Intertidal mudflat and sandflat	2.4	Habitat gain	No impact	No impact	Works to increase beach width in the first epoch.
		2.5	Habitat loss	Habitat loss	Habitat loss	Works to retain beach sediment
Tweed Estuary SAC	Intertidal mudflat and sandflat	2.4	Habitat gain	No impact	No impact	Works to increase beach width in the first epoch
		2.5	Habitat loss	Habitat loss	Habitat loss	Partially mitigated by habitat creation at Sandstell Point (2.4). Compensation proposed at South Low (4.1)
Northumbria Coast SPA	Rocky shore	2.5	No impact	No impact	No impact	N/A
Northumberland Shore SSSI	Intertidal rock	2.1	No impact	No impact	No impact	N/A
		2.5				
	Sandy beaches	2.5	Habitat loss	Habitat loss	Habitat loss	Works to retain beach sediment
Lower Tweed and Whiteadder SSSI	Intertidal mudflat and sandflat	2.5	Habitat loss	Habitat loss	Habitat loss	Mitigated by habitat creation at Sandstell Point (2.4) and at South Low (4.1)
Lindisfarne SSSI	Intertidal rock	2.5	No impact	No impact	No impact	N/A

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan reference should be made to the baseline data.

Policy Development Zone 1 - Scottish Border to Holy Island Management Area 2 - Tweed Estuary (Ch 7.5 to 13)

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Policy Unit		Policy Plan			
		2025	2055	2105	Comment
2.1	North Breakwater	HTL	HTL	HTL	Maintain and repair as coast protection
2.2	Inner Estuary North	HTL	HTL	HTL	Improve defence and raise in 50m years
2.3	Inner Estuary South	HTL	HTL	HTL	Improve defence and raise in 50m years
2.4	Sandstell Point	MR	HTL	HTL	Detailed study
2.5	Spittal	HTL	HTL	HTL	Retain beach

Predicted Shoreline Position under Preferred Policy

- 20 Years
- 50 Years
- 100 Years

- SPA
- RAMSAR
- SAC
- SSSI
- NNR

- Scheduled Ancient Monuments
- EA Flood Zone - Sept 07
- Management Areas
- - - - Policy Units



ACTION PLAN MANAGEMENT AREA 02

Action	By when	Responsibility	Indicative Cost
<ul style="list-style-type: none"> Investigate long-term need to increase defence crest levels through Tweed Estuary Strategy. 	2009-10	Berwick BC	£70k
<ul style="list-style-type: none"> Recognise sea level rise in development plans for the area. 	Ongoing	Developers / Master Planners / Berwick BC Planners	Nominal
<ul style="list-style-type: none"> Assess need for longer-term works to retain beach in front of sea wall at Spittal. 	2055	Berwick BC	£50k
<ul style="list-style-type: none"> Detailed study to modify defences around Sandstell Point, thereby changing flow patterns around the head, creating more stable conditions for dune development and possibly limited areas of saltmarsh or mud flat. 	2010	Berwick BC	£50k
<ul style="list-style-type: none"> Coastal monitoring. 	Ongoing	Berwick BC	Ongoing
Schemes:			
<ul style="list-style-type: none"> Raise defence crests on northern bank. 	2055	Berwick BC	£5,000k
<ul style="list-style-type: none"> Raise defence crests on southern bank. 	2055	Berwick BC	£5,000k
<ul style="list-style-type: none"> Modify defences around Sandstell Point subject to study and development plans. 	2015	Berwick BC	£2,000k
<ul style="list-style-type: none"> Maintenance of existing defence assets recommended. 	Ongoing	Berwick BC	Revenue

In addition to this detailed Action Plan for this specific Management Area, a high-level strategic Action Plan for the whole SMP area is provided in Section 7.

Coastal monitoring is also discussed in Section 7 and this is relevant to the whole SMP2 area as well as some specific frontages.

Location reference:	SCREMERSTON CLIFFS (CH. 13 TO 19.5)
Management Area reference:	03
Policy Development Zone:	PDZ 1

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: The aim of the plan is to allow natural behaviour of the coastline supporting the ecological interest while maintaining amenity benefits.

PREFERRED POLICY TO IMPLEMENT PLAN	
From present day	The short term policy would be to allow natural development of the frontage.
Medium-term	Allow natural development of the frontage. Managed Realignment of the access road and car parking to retain recreational value of the frontage.
Long-term	Allow natural development of the frontage. Some local stabilisation of the upper slope may be required to protect the railway line. Any intervention works should protect the designated sites in this area and aim to conserve and enhance the natural environment.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			
		2025	2055	2105	Comment
3.1	Scremerston Cliffs	NAI	NAI	NAI	
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment					

CHANGES FROM PRESENT MANAGEMENT

No substantial change from existing policy.

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	1	1	1	3
	Preferred Plan Damages £k PV	1	1	1	3
	Benefits £k PV	0	0	0	0
	Costs of Implementing plan £k PV	0	0	0	0
No costs included.					
Description of damage and benefits under preferred plan.					
Maintains high landscape and natural integrity of area.					
Possible loss of part of one property in third epoch.					
Heritage	No loss identified				
Amenity	No loss of amenity				

IMPLICATION WITH RESPECT OF NATURAL ENVIRONMENT

N.B. The table below is a summary of the potential impacts on sites designated for reasons of national or international nature conservation importance. This table should not be read in isolation, please refer to the narrative included in the Discussion and Detailed Policy Development section of this PDZ.

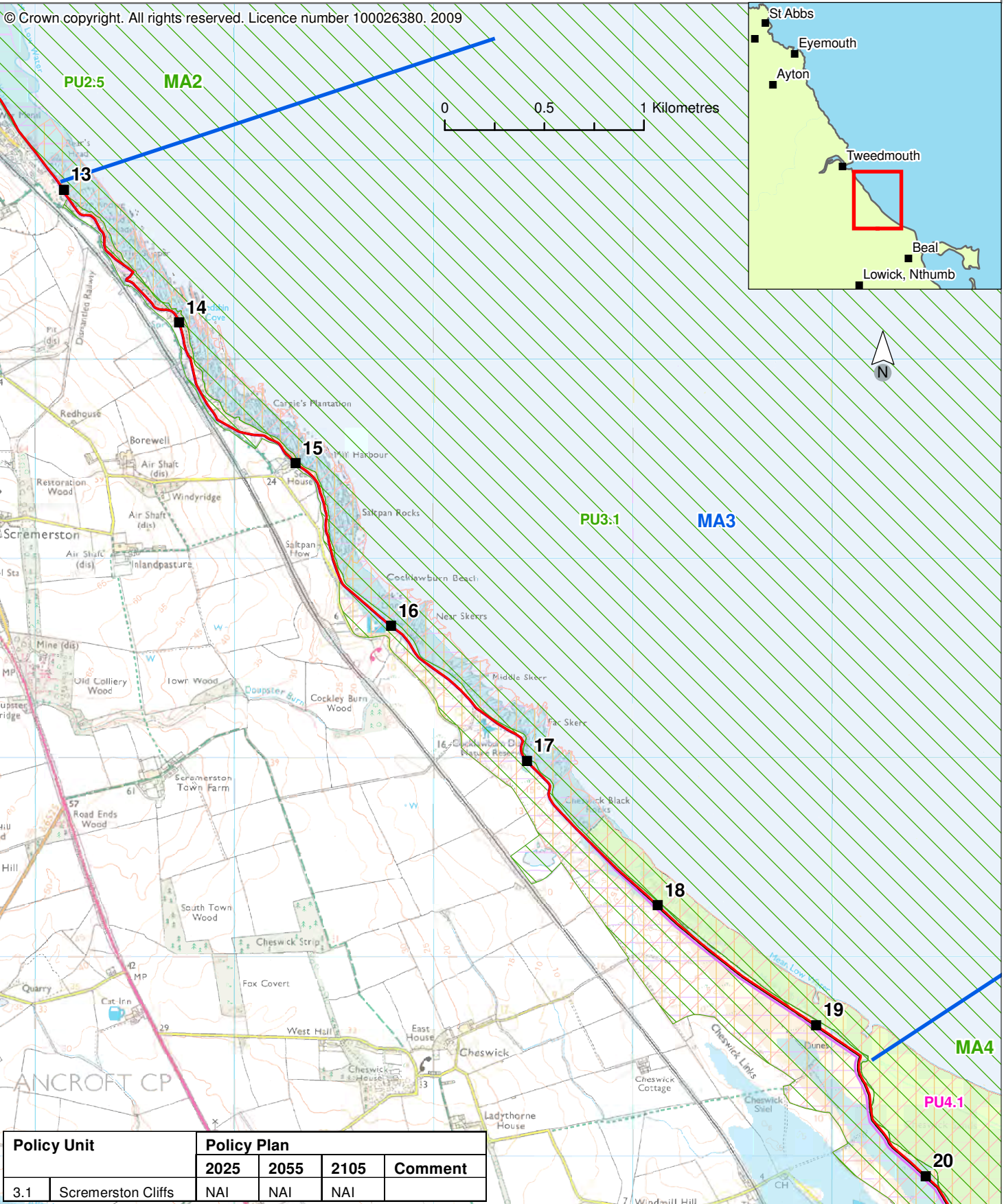
Details of the boundaries of the policy unit can be seen in the Management Area map overleaf.

Designated Site	Designated / supporting habitat	Policy Unit	Impact			Mitigation / compensation
			by 2025	by 2055	by 2105	
Berwickshire and North Northumberland Coast SAC	Reef	3.1	No impact	No impact	No impact	N/A
Northumbria Coast SPA	Rocky shore	3.1	No impact	No impact	No impact	N/A
Lindisfarne SPA	Intertidal rock	3.1	No impact	No impact	No impact	N/A
Northumberland Shore SSSI	Intertidal rock	3.1	No impact	No impact	No impact	N/A
Lindisfarne SSSI	Intertidal rock	3.1	No impact	No impact	No impact	N/A

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan reference should be made to the baseline data.

Policy Development Zone 1 - Scottish Border to Holy Island Management Area 3 - Scremerston Cliffs (Ch 13 to 19.5)

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Policy Unit		Policy Plan			
		2025	2055	2105	Comment
3.1	Scremerston Cliffs	NAI	NAI	NAI	

Predicted Shoreline Position under Preferred Policy 20 Years 50 Years 100 Years	SPA	Scheduled Ancient Monuments
	RAMSAR	EA Flood Zone - Sept 07
	SAC	Management Areas
	SSSI	Policy Units
	NNR	



ACTION PLAN MANAGEMENT AREA 03

Action	By when	Responsibility	Indicative Cost
<ul style="list-style-type: none"> Relocate car parks as necessary to avoid structural intervention. Coastal monitoring. 	2030 - 2055	Nature Reserve	£50k
	Ongoing	Berwick BC	Ongoing
Schemes:			
<ul style="list-style-type: none"> Possible slope stabilisation works to protect property and railway line. No new coast protection schemes proposed, but maintenance of existing defence assets recommended. 	2055	National Rail	£250k
	Ongoing	Berwick BC	Revenue

In addition to this detailed Action Plan for this specific Management Area, a high-level strategic Action Plan for the whole SMP area is provided in Section 7.

Coastal monitoring is also discussed in Section 7 and this is relevant to the whole SMP2 area as well as some specific frontages.

Location reference:	HOLY ISLAND HINTERLAND (CH. 19.5 TO 44.5)
Management Area reference:	04
Policy Development Zone:	PDZ 1

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: The overall long term aim of the plan is to support natural development of the coastal system in such a manner as to enhance ecological function while attempting to derive more sustainable natural defence to communities and recreational aspects. While there remains considerable uncertainty as to coastal behaviour, which would require detailed examination, such an approach is likely to be best supported by Managed Realignment in the areas of the existing northern flood defence. The plan also aims to maintain access to Holy Island and locally to maintain use and defence of the Holy Island harbour area.

PREFERRED POLICY TO IMPLEMENT PLAN

From present day	Examine and undertake Managed Realignment in support of the above intent.
Medium-term	Continue with Managed Realignment approach.
Long-term	Limited maintenance of hinterland defences within a resilient natural defence system at the coast.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			Comment
		2025	2055	2105	
4.1	North Low and South Low	MR	MR	MR	Investigate need for hinterland defences set back from shore to counter flooding.
4.2	Beal Point	NAI	NAI	NAI	No action required but intent to maintain access to Holy Island.
4.3	Fenham Flats	NAI	NAI	NAI	Encourage development of intertidal natural defence to rising hinterland.
4.4	Ross Low	HTL	HTL	MR	Maintain existing flood defences and allow natural dune accretion. In final epoch dunes may roll back due to higher sea level. MR of this process required.
4.5	Waren Mill	HTL	HTL	HTL	Including new defence to road as required.
4.6	Shell Road (Holy Island)	MR	MR	MR	Subject to detailed examination raise road level.
4.7	Holy Island Clay Cliff	NAI	NAI	NAI	
4.8	Holy Island Harbour	HTL	HTL	HTL	Maintain back defence to harbour area.
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment					

CHANGES FROM PRESENT MANAGEMENT

Potentially significant change to management and to intertidal area behind Holy Island.

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	1194	611	486	2294
	Preferred Plan Damages £k PV	268	219	149	637
	Benefits £k PV	926	392	337	1655
	Costs of Implementing plan £k PV	390	609	230	1229
<p>Costs associated with realignment and hinterland defences requires detailed study. Costs include for defence at Ross Low and Waren Mill.</p> <p>Costs associated with maintaining access are not included.</p> <p>Description of damage and benefits under preferred plan.</p> <p>Maintains natural integrity of area.</p> <p>Aims to provide sustainable defence both from erosion and flooding to Goswick and golf course and retired defence to hinterland area.</p> <p>Significant change of current agricultural use of existing land.</p> <p>Maintains access to and defence of Holy Island village.</p>					
Heritage	Potential loss of buildings on foreshore at Holy Island in long term due to sea level rise.				
Amenity	No loss of amenity				

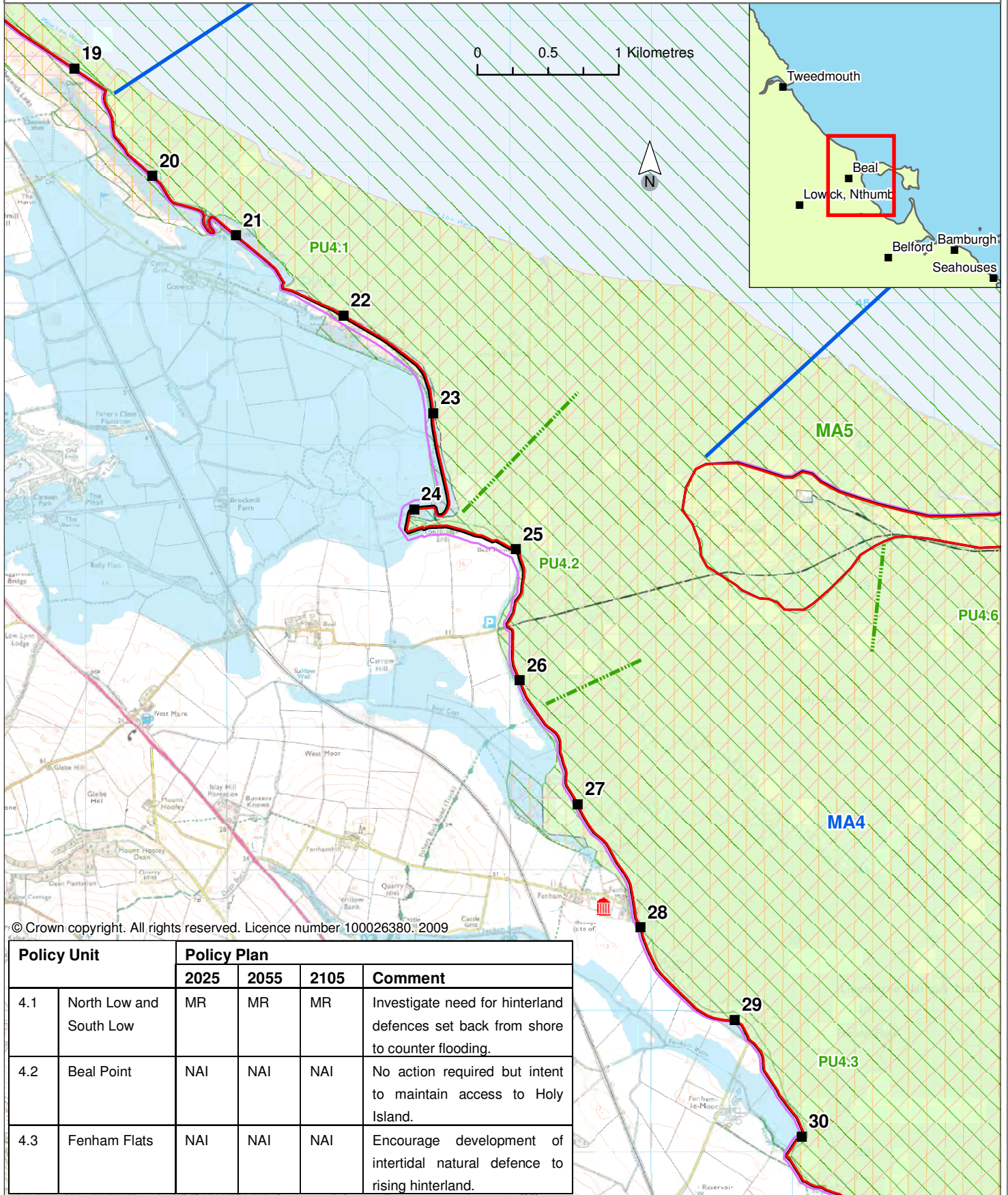
IMPLICATION WITH RESPECT OF NATURAL ENVIRONMENT

N.B. The table below is a summary of the potential impacts on sites designated for reasons of national or international nature conservation importance. This table should not be read in isolation, please refer to the narrative included in the Discussion and Detailed Policy Development section of this PDZ. Details of the boundaries of the policy unit can be seen in the Management Area map overleaf.

Designated Site	Designated / supporting habitat	Policy Unit	Impact			Mitigation / compensation
			by 2025	by 2055	by 2105	
Berwickshire and North Northumberland Coast SAC	Intertidal sandflats and mudflats	4.1	Habitat creation	Habitat creation	Habitat creation	N/A
	Large shallow inlets and bays	4.1 4.3 4.4	No impact	No impact	No impact	N/A
	Intertidal reef	4.8	No impact	No impact	No impact	N/A
North Northumberland Dunes SAC	Embryonic shifting dunes	4.4	Habitat creation	Habitat creation	Habitat creation	N/A
	White dunes	4.4	Habitat creation	Habitat creation	Habitat creation	N/A
	Grey dunes	4.4	Habitat creation	Habitat creation	Habitat creation	N/A
Lindisfarne SPA	Intertidal sand and mudflats	4.1 4.6	Habitat creation	Habitat creation	Habitat creation	N/A
	Intertidal rock	4.8	No impact	No impact	No impact	N/A
	Saltmarsh	4.1 4.6	Habitat creation	Habitat creation	Habitat creation	N/A
Lindisfarne SSSI	Intertidal sand and mudflats	4.1 4.6	Habitat creation	Habitat creation	Habitat creation	N/A
	Intertidal rock	4.8	No impact	No impact	No impact	N/A
	Saltmarsh	4.1 4.6	Habitat creation	Habitat creation	Habitat creation	N/A

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan reference should be made to the baseline data.

Policy Development Zone 1 - Scottish Border to Holy Island
Management Area 4 - Holy Island Hinterland (Ch 19.5 to 44.5; Map1)



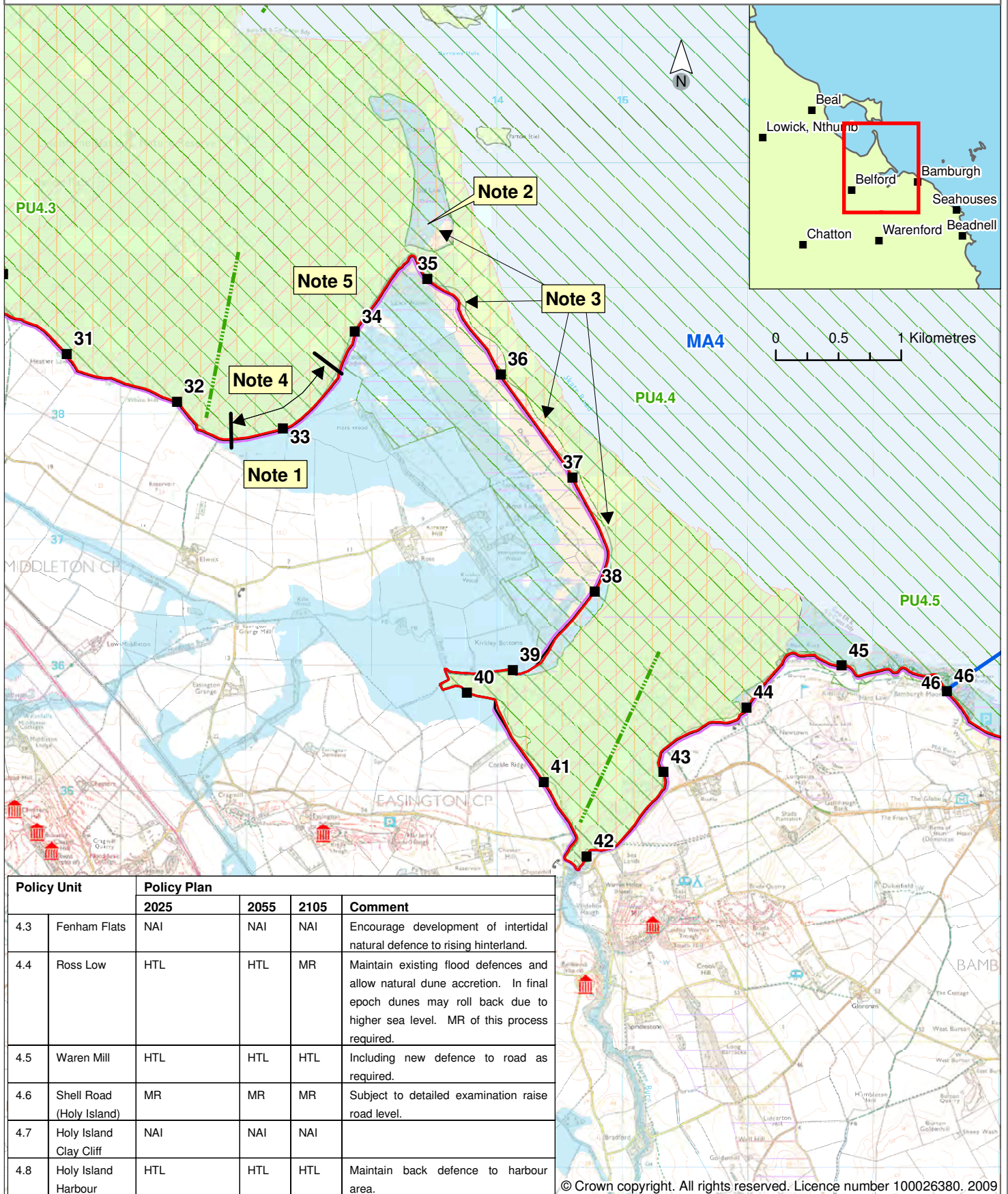
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Policy Unit		Policy Plan			
		2025	2055	2105	Comment
4.1	North Low and South Low	MR	MR	MR	Investigate need for hinterland defences set back from shore to counter flooding.
4.2	Beal Point	NAI	NAI	NAI	No action required but intent to maintain access to Holy Island.
4.3	Fenham Flats	NAI	NAI	NAI	Encourage development of intertidal natural defence to rising hinterland.

Predicted Shoreline Position under Preferred Policy 20 Years 50 Years 100 Years	SPA RAMSAR SAC SSSI NNR	Scheduled Ancient Monuments EA Flood Zone - Sept 07 Management Areas Policy Units
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Policy Development Zone 1 - Scottish Border to Holy Island
Management Area 4 - Holy Island Hinterland (Ch 19.5 to 44.5; Map2)



Policy Unit		Policy Plan			Comment
		2025	2055	2105	
4.3	Fenham Flats	NAI	NAI	NAI	Encourage development of intertidal natural defence to rising hinterland.
4.4	Ross Low	HTL	HTL	MR	Maintain existing flood defences and allow natural dune accretion. In final epoch dunes may roll back due to higher sea level. MR of this process required.
4.5	Waren Mill	HTL	HTL	HTL	Including new defence to road as required.
4.6	Shell Road (Holy Island)	MR	MR	MR	Subject to detailed examination raise road level.
4.7	Holy Island Clay Cliff	NAI	NAI	NAI	
4.8	Holy Island Harbour	HTL	HTL	HTL	Maintain back defence to harbour area.

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Predicted Shoreline Position under Preferred Policy 20 Years 50 Years 100 Years	SPA RAMSAR SAC SSSI NNR	Scheduled Ancient Monuments EA Flood Zone - Sept 07 Management Areas Policy Units
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Accompanying Notes to Management Area 4 (Map 2):

During consultation on the draft SMP, Mr Sutherland of Ross Farm kindly provided a number of points of clarification relating to the information provided around the Ross peninsula.

Note 1:

Between chainage 32.5km and chainage 33.5km (the chainages are the numbers placed in bold font on the map), there is a formal sea defence in the form of an embankment.

This is presently missing from the Environment Agency's National Flood and Coastal Defence Database (NFCDD), which refers to the whole north-western facing frontage of the Ross peninsula as a 'soft/natural coastal slope' in good condition (NFCDD asset reference 121AA901A1401C25 named Cockly Knowes). The embankment reduces flood risk to the peninsula.

Clarification of this issue has resulted in some minor changes to the text in relevant parts of the PDZ statement since the draft report.

Note 2:

The Environment Agency's Flood Zone Map shows the island of dunes immediately off the northern-most tip of the peninsula to be within the flood zone. These dunes are at an elevation that leaves substantial sections dry at high tide and therefore the Flood Zone Map is incorrect in this locality.

Note 3:

Over the past 50 or so years, there has been substantial accretion of the dunes along the north-eastern facing side of the peninsula (the dunes running parallel to Skate Road). This has resulted in natural progradation (a seaward movement) of the shoreline position by up to about 150m in places. This has been confirmed through comparisons of the present day shoreline with an aerial photograph from 1947.

Note 4:

Spartina was planted in this vicinity around the 1920s. This has prograded seaward and encouraged vertical accretion of the inter-tidal area due to sedimentation. The growth of the *Spartina* has now slowed and gives way to *Zostera* further offshore. *Spartina* is particularly evident in front of the flood embankment.

The name of the channel or gut that discharges to sea in this vicinity is the Stinking Goat.

Note 5:

There is an oysterbed located off the north-western facing shore.

Note 6:

The key attributes of the land at Ross are farming, recreation and nature conservation. Notable flooding of the peninsula took place in August 1948 and on 30th January 1953. Considerable work was undertaken after the latter event to repair defences and rebuild the sluice gate at Budle Water.

Other References:

Mr Sutherland has in his possession some very useful references of a wider historical or ecological interest. These include:

- 1866. *Holy Island Reclamation – Plans and Sections of Embankments and Other Works for Enclosing Certain Sands near Holy Island.* J.F. Bateman.
- 1917. *Report of Suitability of Holy Island as a Base for Sea Planes.*
- 1955. *The Ecology of the Sand Dune Vegetation of Ross Links, Northumberland, with Special Reference to Secondary Succession in the Blow Outs.* D.A. Robertson, PhD Thesis, University of Durham.

ACTION PLAN MANAGEMENT AREA 04

Action	By when	Responsibility	Indicative Cost
<ul style="list-style-type: none"> Investigate need for local defence to low lying hinterland under a MR policy, impact on Holy Island causeway and impact on adjacent sandflats. 	2012	Environment Agency	£50k
<ul style="list-style-type: none"> Discussions with landowners as part of Northumberland 4shores Project involving MR 	Ongoing	Environment Agency	£15k
<ul style="list-style-type: none"> Coastal monitoring. 	Ongoing	Berwick BC	Ongoing
Schemes:			
<ul style="list-style-type: none"> New defence to the road at Waren Mill. 	2055	Environment Agency	£250k
<ul style="list-style-type: none"> Possible need for causeway works at Shell Road on Holy Island. 	2025	Berwick BC	£250k
<ul style="list-style-type: none"> Maintenance of existing defence assets recommended. 	Ongoing	Berwick BC	Revenue

In addition to this detailed Action Plan for this specific Management Area, a high-level strategic Action Plan for the whole SMP area is provided in Section 7.

Coastal monitoring is also discussed in Section 7 and this is relevant to the whole SMP2 area as well as some specific frontages.

Location reference:	HOLY ISLAND NORTH AND EAST
Management Area reference:	05
Policy Development Zone:	PDZ 1

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: The plan is to allow the natural development of the coastline in line with designations for nature conservation interests.

PREFERRED POLICY TO IMPLEMENT PLAN	
From present day	Maintain natural coastline.
Medium-term	Maintain natural coastline.
Long-term	Maintain natural coastline.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			
		2025	2055	2105	Comment
5.1	North coast	NAI	NAI	NAI	Maintain natural dunes.
5.2	East coast	NAI	NAI	NAI	

Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment

CHANGES FROM PRESENT MANAGEMENT

No change in policy

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	0	0	0	0
	Preferred Plan Damages £k PV	0	0	0	0
	Benefits £k PV	0	0	0	0
	Costs of Implementing plan £k PV	0	0	0	0
No costs associated with defence. Description of damage and benefits under preferred plan. Maintains natural integrity of area.					
Heritage	No loss identified				
Amenity	No loss of amenity				

IMPLICATION WITH RESPECT OF NATURAL ENVIRONMENT

N.B. The table below is a summary of the potential impacts on sites designated for reasons of national or international nature conservation importance. This table should not be read in isolation, please refer to the narrative included in the Discussion and Detailed Policy Development section of this PDZ.

Details of the boundaries of the policy unit can be seen in the Management Area map overleaf.

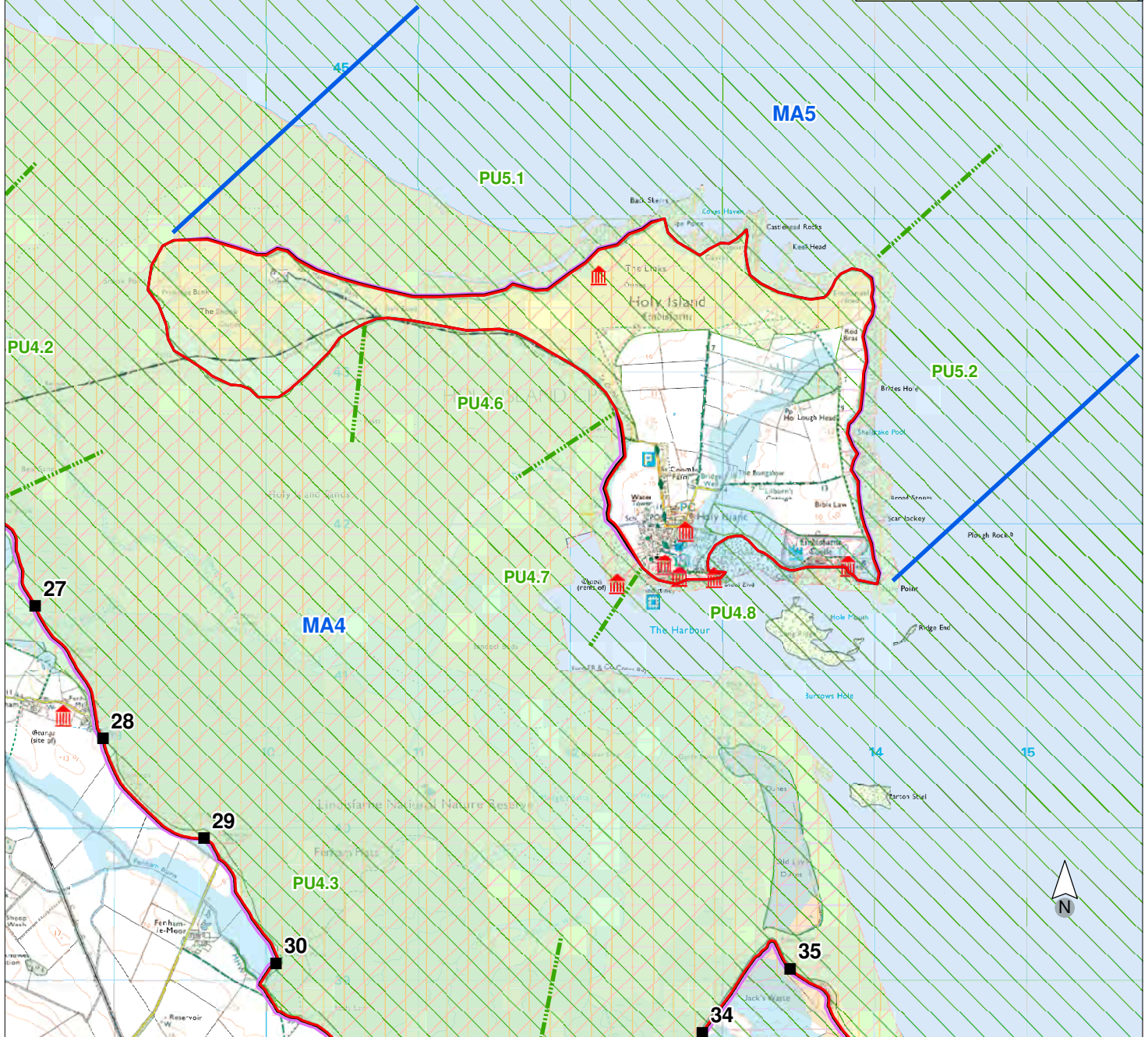
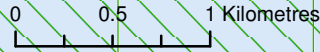
Designated Site	Designated / supporting habitat	Policy Unit	Impact			Mitigation / compensation
			by 2025	by 2055	by 2105	
Berwickshire and North Northumberland Coast SAC	Intertidal sandflats and mudflats	5.1 5.2	No impact	No impact	No impact	N/A
	Intertidal reef	5.1 5.2	No impact	No impact	No impact	N/A
North Northumberland Dunes SAC	Embryonic shifting dunes	5.1	No impact	No impact	No impact	N/A
	White dunes	5.1	No impact	No impact	No impact	N/A
	Grey dunes	5.1	No impact	No impact	No impact	N/A
Lindisfarne SPA	Intertidal sand and mudflats	5.1 5.2	No impact	No impact	No impact	N/A
	Saltmarsh	5.1 5.2	No impact	No impact	No impact	N/A
Lindisfarne SSSI	Intertidal sand and mudflats	5.1 5.2	No impact	No impact	No impact	N/A
	Saltmarsh	5.1 5.2	No impact	No impact	No impact	N/A

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan reference should be made to the baseline data.

Policy Development Zone 1 - Scottish Border to Holy Island Management Area 5 - Holy Island North and East

Policy Unit		Policy Plan			
		2025	2055	2105	Comment
5.1	North coast	NAI	NAI	NAI	Maintain natural dunes.
5.2	East coast	NAI	NAI	NAI	

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Predicted Shoreline Position under Preferred Policy

- 20 Years
- 50 Years
- 100 Years

- SPA
- RAMSAR
- SAC
- SSSI
- NNR

- 🏛️ Scheduled Ancient Monuments
- EA Flood Zone - Sept 07
- Management Areas
- - - - Policy Units



ACTION PLAN MANAGEMENT AREA 05

Action	By when	Responsibility	Indicative Cost
<ul style="list-style-type: none"> Coastal monitoring. 	Ongoing	Berwick BC	Ongoing
Schemes: <ul style="list-style-type: none"> No new coast protection schemes proposed, but maintenance of existing defence assets recommended. 	Ongoing	Berwick BC	Revenue

In addition to this detailed Action Plan for this specific Management Area, a high-level strategic Action Plan for the whole SMP area is provided in Section 7.

Coastal monitoring is also discussed in Section 7 and this is relevant to the whole SMP2 area as well as some specific frontages.

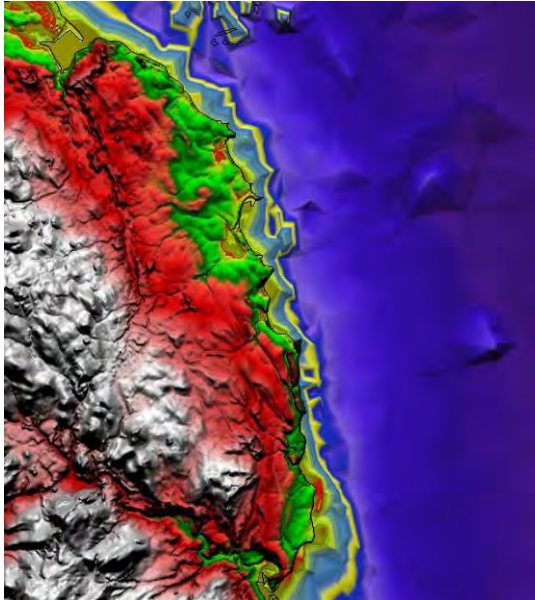
4.2 PDZ 2 Bamburgh to Boulmer (Chainage 44.5 to 79.5)

4.2.1 Policy Development Analysis

DESCRIPTION

Physical

The zone extends some 35km from the south of Budle Bay through to Seaton Point just south of Boulmer. The coast forms a broad resistant headland bounded by Budle Bay and the Harkess Rocks to the north, with the Farne Islands offshore, and Longhoughton Steel to the south. The coast is geologically controlled, with a succession of outcropping Carboniferous sedimentary rocks, augmented by the resistant igneous intrusive suite of the Whin Sill at Harkess Rocks, Bamburgh, Islestone, the Farne Islands and Craster. The rocks are exposed as a discontinuous shore platform with backing cliffs at Seahouses, Beadnell and Craster. In places, the shales occur at the base of the cliff (e.g. south of Seahouses Harbour) forming a layer of weakness which has been differentially eroded to form a wave-cut notch.



The bedrock is overlain by glacial and post-glacial sediments forming a rolling coastal landscape. These deposits are tills, coastal dune sand and small areas of estuarine sediments centred on existing rivers. At the coast, the till forms a cap on the bedrock cliffs and dunes are formed at the back of the more major bays.

The overall orientation of the coastline turns from facing north-east, to east north-east, to east, with the main tangent points being at Seahouses (Ch. 53km) and Castle Point (Ch. 68km), south of Embleton. Over the northern two sections the nearshore area shoals quite gradually (of the order of 1km from the shore to the 10m CD contour), steepening over the Craster frontage (400m to 10m CD) before shoaling again at Boulmer (with a nearshore width of over 1.5km). Between each major control feature (tangent points) are secondary headlands, such as at Beadnell (Ch. 58km) and Snook Point (Ch. 62km); dividing Beadnell and Embleton Bays, and at other more minor features.

Considering initially the section between Harkess Rocks (Ch. 46km) and Seahouses, there is short section of dunes between Harkess and Budle Bay, with a small number of properties and the golf course at Bamburgh Moor sat above a well vegetated dune slope, with an exposed rock platform over the foreshore. The access road to village runs close to the shore between here and Bamburgh, with Bamburgh Castle and the main Bamburgh village located on a rock headland, now fronted by the start of the Bamburgh Dunes. These dunes, held forward by the foreshore rock of Islestone (Ch. 48km), narrow at the Greenhill Rocks (Ch. 49km), being little more than a dune covered coastal slope up to the road. Between the road and the toe of the dune is an individual property of Monks House. The dunes (St Aiden's) to the south form a narrow band between the shore and the coastal road to the rear, through to the outskirts of Seahouses.

At the northern limit of the town, the coastline comprises till cliffs above the wide expanse of rock outcrop making up the Seahouses headland. The first defence in this zone occurs over this northern section of Seahouses, with a short section of wall protecting the coastal road. Seahouses is strongly protected by the harbour works of the Main Pier and the North and South Breakwater. Within the harbour and across the town frontage there are a variety of defences at the back of the harbour.

South of the harbour the unprotected coast continues, with till coastal slopes over a low rock base; above the wide rock platform. To the back of the coast is a major caravan park, the new treatment works, well set back from the coastal slope, and the Seahouses golf course.

The coast cuts back sharply at the southern end of the Seahouses headland, with the start of the Annstead Dunes that continue down to Beadnell. At this northern end, the dunes are cut by the Annstead Burn, which runs behind a northward orientated dune spit, beneath the road and into a low lying flood plain inland of the road. The Annstead dunes are generally wider than the St. Aiden's dunes to the north and are fronted by a nearshore barrier of rock outcrop. The dunes run out to the low till cliff and wide rock platform of the Beadnell Headland (Ch. 58km). There is a Northumberland Wildlife Trust Nature Reserve covering the dunes and along the coast.

The main Beadnell Village is set back from the shore. The road to the harbour runs along the back of the shore and a row of houses continues down to the south and behind this road. Behind this front row of houses, sloping down to the rear of Beadnell Bay, is an area of new housing. The northern frontage of Beadnell comprises lengths of defence, protecting the road and property, between more substantial rock headlands. The rock platform of this section of Beadnell acts as anchor to the coast to the north, while a substantial ridge of rock, running north-east/south-west, acts as the headland of the coast to the south. This is reinforced by the effect of the harbour continuing the rock ridge offshore to the south-west.

South of Beadnell is Beadnell Bay, the first of a series of strongly curved bays down to Castle Point. Beadnell Bay is backed by a quite extensive width of high dunes. To the north is the new development area noted above. This gives way to the recreational centre and caravan parks. The bay is cut by the Brunton Burn (Ch. 60km), which opens to a relatively wide flood plain of agricultural land to the rear of the dunes.

The southern end of the bay is characterised by the accumulation of shingle against the rock outcrop and headland of Snook Point (Ch. 62km). Beyond the point is Football Hole Bay and beyond the southern headland of this bay, that of Newton Haven. Low Newton village (Ch. 64km) sits at the northern corner of the bay and is protected by a low length of wall, partially overgrown by dune. This dune rises in level to the south behind the protection of Emblestone Out Carr, which also forms the northern headland of the main Embleton Bay. At the crest of this soft dune-capped till headland is a collection of chalets variously positioned close to or set back from the crest. These properties extend along the northern section of Embleton Bay as far as where the Embleton Burn cuts through the wider backshore dune ridge. The bay is fixed at its southern limit by the shingle backed rock scar of Greymare Rocks and Castle Point, upon which sits the ruins of Dunstanburgh Castle (Ch. 68km).

The coast to the south of Castle Point takes on a very different nature. The foreshore through to Seaton Point (Ch. 79.5) is almost continuous rock outcrop. Through to Rumbling Kern (Ch. 74km), this is backed in general by hard rock cliffs with, only immediately south of Craster (Ch 70.5), there being a short length of coastal till slope. South of Rumbling Kern, this backshore rock reduces in level and the backshore through to Boulmer and Seaton Point is a low till cliff. There is little sand over the area, appearing at the shore only locally where the rock foreshore dips. There are corresponding local areas of dune within Howick Haven and to the south of Boulmer.

At Craster, the centre of the village is protected by the harbour works comprising two substantial piers. Either side of the harbour are short sections of defence to properties.

The main coastal road joins the coast just north of Howick and where it joins it is close to the slowly eroding cliff.

There is an isolated property built just back from the shore, and this is protected by a concrete wall on to the rock outcrop.

The road leaves the coast at Howick and rejoins to the back of Boulmer. Boulmer comprises a small collection of properties close to the crest of the till bank, this bank being protected by light rock revetments. To the south of Boulmer the road, and the continuation of the village, sets back slightly from the shoreline, although at a level that remains in the potential coastal flood plain. Beyond Boulmer to Seaton Point, there are a collection of chalets or caravans located, generally back from the soft till cliff crest.

Environment

This area has great natural conservation importance. It includes the following designated sites:

- Berwickshire and North Northumberland Coast SAC
- North Northumberland Dunes SAC
- Northumbria Coast SPA
- Farne Islands SPA
- Berwickshire and North Northumberland Coast EMS
- Northumbria Coast Ramsar Site
- Farne Islands Ramsar Site
- Northumberland Shore SSSI
- Bamburgh Coast and Hills SSSI
- Bamburgh Dunes SSSI
- Newton Links SSSI
- Castle Point to Cullernose Point SSSI
- Howick to Seaton Point SSSI
- Northumberland Coast AONB
- Farne Islands NNR
- North Northumberland Heritage Coast

Further detail regarding these sites can be found in Appendix D. Where proposed policies may have potential impacts on designated features these are discussed in the discussion and detailed policy development section and listed in the summary of preferred plan recommendations and justification section under implications with respect of the natural environment.

In the UK these Natura 2000 sites have legal requirements for protection (The Conservation (Natural Habitats, *et.c.*) Regulations 1994, and the Wildlife & Countryside Act 1981, as amended) to maintain their designated conservation value. Any activity that occurs within any of these designated sites, or is likely to impact upon them, must first have approval from the relevant statutory authority. As well as Natura 2000 sites, SSSIs and AONBs are protected under the Countryside and Rights of Way Act 2000 (CROW Act) as well as the proposed Marine Bill which contains provisions for Coastal Access.

The Bamburgh Dunes SSSI is a wide coastal sand dune system formed to the north and east of the Whin Sill outcrop on which Bamburgh Castle is built, and abuts the Northumberland Shore SSSI along the seaward edge of the sand dunes. Bamburgh is also cited in the North Northumberland Heritage Coast designation for its coastal sand dunes protected behind a row of reefs.

The Berwickshire and North Northumberland Coast SPA cites the Farne Islands as being of particular importance as they represent some of the few rocky islands with extensive reefs in the North Sea. The Farne Islands are designated in their own right as an SPA, a SSSI and a National Nature Reserve (NNR) for their populations of arctic tern, common tern, sandwich tern, guillemot and puffins.

The Berwickshire and North Northumberland Coast SAC cites Beadnell Bay and Embleton Bay as characteristic, sediment dominated embayments, relatively exposed and uniform in nature. They form

sandy breaks in an otherwise continuous reef habitat and are characterised by large areas of clean sand. Details of the individual designations can be found in Appendix D. The Berwickshire and North Northumberland Coast EMS is made up of the Berwickshire and North Northumberland SAC and the Lindisfarne SPA (Fast Castle Head in Berwickshire to Alnmouth in Northumberland).

Newton Links SSSI is one of the best examples of calcareous sand dunes supporting species-rich vegetation on the Northumberland coast. The Castle Point to Cullernose Point SSSI includes rare plant species found on the Whin Sill that are thought to be unique to Northumberland. The cliffs of Dunstanburgh support the largest mainland seabird colony in the county. This site is also cited for its geological interests, and as such is included in the Geological Conservation Review (GCR). The Howick to Seaton Point SSSI is cited mainly for its geological interests, and is included in the GCR.

The Northumbria Coast SPA includes much of the coastline between the Tweed and Tees Estuaries in north-east England. In summer the SPA supports important numbers of breeding little tern, whilst in winter the mixture of rocky and sandy shore supports large numbers of turnstone and purple sandpiper.

Northumberland Coast AONB is designated as a nationally important landscape, under the National Parks and Access to the Countryside Act (1949), whose primary purpose is to conserve and enhance natural beauty. Section 85 of the Countryside and Rights of Way Act 2000 ensures that relevant authorities have regard to this primary purpose.

Heritage Coasts are a non-statutory landscape definition, and are defined by agreement between the relevant maritime local authorities and Natural England. The North Northumberland Heritage coast stretches from the Scottish border in the north to the sand dunes of Druridge Bay in the south. The impacts of tourism are growing on the coast, and there is a need to safeguard its fine scenery and quiet, almost isolated character.

There are seven Scheduled Ancient Monuments (SAMs) in this area:

- Dovecote 140m north east of Leper' Hospital at Bamburgh.
- Round barrow 520m west north west of Quarry Cottage at Bamburgh.
- Benthall round cairn at Beadnell.
- St. Ebba's chapel and monastic site at Beadnell.
- Dunstanburgh Castle.
- Craster defended settlement.
- Longhoughton defended settlement.

As well as the SAMs listed above, there are three Grade II listed structures within this PDZ that are within 1 km of the coast. These are the Armstrong Cottages and Monk's House in the region of Bamburgh and St Aiden's dunes and the Bathing House at Howick. Details of these listed structures can be found in **Appendix D**.

This area falls within both Berwick Upon Tweed Borough Council and Alnwick District Council. Two of the four principal settlements of the Berwick district, Beadnell and Seahouses, fall within the northern end of this area. The prosperity of these settlements is of considerable importance to their immediate surroundings, and their decline has been identified in the Local Plan as it would have a significant impact on the population and economy of the surrounding rural areas.

Berwick Upon Tweed Borough Council's proposed core strategy identifies the need to protect, conserve and enhance the areas landscape and coastline, its towns, villages, environment quality and

biodiversity. The strategy also identifies the need to develop tourism facilities and services on the coast and to balance the exploitation of naturally occurring sources of renewable energy, such as shore wind development, with the capacity for the landscape and environment to accommodate the structures and services that would be required.

Seahouses, Wooler and Belford have been identified in the Local Plan for the accommodation of new development which will maintain and enhance their communities and surrounding rural hinterland. Sustainable visitor economy will continue to be developed through by identifying locations for strategic tourism facilities, including marina and inshore water based recreation, the interpretation of the marine environment of the Northumberland coast and a gateway to the Northumberland National Park.

Alnwick District Council recognises the importance of the natural environment which includes the Northumbria Coast SPA and the Northumberland Coast AONB. This natural heritage plays a key role in shaping the sense of place in the district, and is a vital component of the local residences quality of life whilst also being a major factor in visitors' perception of the district. In addition to the natural heritage, the district also has an important and attractive built environment. The AONB is a major tourism attraction to the area; however, the extra private traffic and variety of sports and recreational activities can pose threats to the fabric of the landscape. If not managed properly, this could affect the experience that most visitors come to enjoy.

There are a number of relevant Biodiversity Action Plans (BAPs) that are relevant to this area including rocky shore and islands, maritime cliffs and slopes, saltmarsh and mudflat, sand dune and common seal. More information on the specifics of these BAPs can be found in **Appendix D**.

Appendix E details the issues and objectives that were brought up through public consultation. These issues and objectives have informed this review as well as the main decision making process. The SEA directive suggests out various receptors that should be included in any SEA. The themes within **Appendix D** and **Appendix E** address the various receptors as shown below. All the SEA receptors as shown below are assessed within this PDZ (note: some SEA receptors are covered by more than one theme):

Issues and Objectives	Thematic review	SEA Receptor
Environment	Natural Environment	Biodiversity Fauna and flora Water
	Contaminated land	Soil
	Landscape and character	Landscape Material assets Population
Heritage	Historic environment	Cultural heritage
Commercial	Current and future land use	Population Material assets
Recreational		Population
Hard assets		Material assets Population

It can be seen from the above table that Air, Human Health and Climactic Factors are not included. Air and Human Health were scoped out of the assessment as a receptor because the SMP is a high level planning document and as such these receptors are not applicable to this plan. Climatic Factors (especially sea level rise) are integral to the assessment of the SMP and have been considered within each PDZ (Physical Characteristics section).

Environmental issues identified within this area are:

- Lack of management to the Bamburgh Coast and Hills SSSI leading to unfavourable condition.
- Lack of management of Bamburgh Dunes SSSI leading to unfavourable condition. Need to identify potential for dune roll back.
- Recreational disturbance, pollution/ water quality, commercial exploitation of marine animals, in the Farne Islands SPA.
- Potential for creating saline lagoons behind coast road in Seahouses.
- Proximity of caravan sites within dunes at Newton Links SSSI leads to increased informal access and recreational damage as well as loss of species diversity.
- Potential for short-term saline lagoon opportunities in Beadnell Bay and Embleton Bay.
- Dune erosion at Embleton Bay.

KEY PRINCIPLES

- To contribute to a sustainable and integrated approach to land use planning.
- To protect and enhance the natural environment.
- To support the cultural heritage.
- To protect people's home from flooding and loss through erosion.
- To protect opportunities for employment.
- To support adaptation by the local coastal communities.
- To conserve and enhance the high quality landscape.
- To minimise reliance on defence.
- To seek opportunity for habitat enhancement.

KEY OBJECTIVES (a full list of objectives for this zone is presented in Appendix E)

- To maintain the main centres of Seahouses, Beadnell and Craster as viable commercial centres and tourist destinations in a sustainable manner.
- To protect also opportunities for employment within these centres.
- To sustain recreational opportunities of beaches and associated facilities.
- To conserve and enhance the nationally important landscape.
- To maintain or enhance coastal biodiversity and geological features of interest, in particular those that are designated for features of international or national importance.
- To encourage an integrated approach between development and sustaining the natural function of the coastline.
- To maintain the character, navigation to and commercial and recreational function of Seahouses, and Beadnell harbours.
- To support maintenance of and adaptation of the regional transport link and transport links throughout the area.
- To support adaptation of caravan parks and camping sites along the coast.
- To support adaptation by the local coastal communities.
- To support opportunity for migration of coastal habitat landward.
- To maintain or enhance access to the coast.
- To maintain access to the foreshore for Search and Rescue purposes.

PHYSICAL CHARACTERISTICS

Water levels (mODN)

MLWS	MHWS	HAT	1:10yr	1:25yr	1:50yr	1:100yr	1:200yr
-1.7	2.4	2.8	3.19	3.3	3.38	3.47	3.53

Wave climate

Return Period (1:X years)	Wave Height H _s (m)
1	5.37
10	6.98
100	8.8
1000	10

Baseline Erosion Rates

Harkess Rocks to Green Hill Rocks	0.1m/yr	Over 100 years potential erosion of the order of 26m.
St Aiden Dunes and Seahouses	0.3m to 0.4m/yr	Over 100 years potential erosion between 26m and 40m assuming no defence. Locally 100m.
Seahouses to Beadnell	0.1m/yr, locally 0.5m/yr	Over 100 years potential erosion of the order of 10m, but locally up to 90m.
Beadnell Bay	0.2 to 0.3m/yr	Over 100 years potential erosion between 40m and 60m.
Low Newton to Embleton Bay	0.1m/yr	Over 100 years potential erosion of the order of 13m but locally up to 50m.
Craster to Boulmer	0.1m/yr to 0.3m/yr	Over 100 years potential erosion of typically 2m but in areas up to 40m.
Boulmer to Seaton Point	0.2m/yr	Over 100 years potential erosion varying between 7m and 30m.

Sea Level Rise assumed rates: 0.05m to year 2025, 0.26m to year 2055, and 0.8m to year 2105. Coastal evolution has been examined based on lower rates and higher rates in addition to those assessed above.

Evolutionary Trend

Existing Processes:

The whole coast is held by its geological structure. There are several principal headlands including Harkess Rocks, Seahouses, Beadnell, Snook Point and the Craster frontage down to Rumbling Kern and Longhoughton Steel. Reinforcing these points are the associated rock outcrops on the foreshore. Between these major control features other rock outcrops act to hold softer sections of the coast in a forward position. A good example of this is at Emblestone Out Rocks south of Low Newton.

Several studies have been undertaken for the frontage, at Seahouses, Beadnell and Boulmer. In each, and supporting the conclusion of the SMP1, it has been assessed that there is very little transfer of sediment across the major headlands. Supply of the foreshore from the backshore is quite low and provides in effect local sediment input that tends to be retained locally. The main supply to the coast has been from the nearshore area but this is considered to be relatively low as well. In principle, the coast is seen as being relatively stable with interaction contained within the various bays.

The behaviour of the various bays within the zone is determined substantially by its location on the coast (and by the general orientation of the coast), by the width between control feature and the

degree to which the bay may indent between the controls. This also potentially affects the degree of movement within each bay.

The very square, or even convex, frontages to the north between Harkess and Seahouses, face to the north-east and gain a degree of shelter from the Farne Islands. These frontages seem very sensitive to rock outcrop on the foreshore, such as at Islestone Rocks, suggesting no great movement of sediment across the frontages. The principal change in these areas would be the rolling back of the shore in response to sea level rise. The frontages are sensitive to the influence of the rock outcrops and, as this diminishes with sea level rise, the coast is likely to flatten, with erosion of the dune width at Bamburgh.

Quite similar are the frontages between Seahouses and Beadnell. There is slightly greater curve to the bays suggesting an oblique net wave angle, as also suggested by the orientation of the coast as a whole. This indicates more influence from the up-drift headland. This is seen on the southern side of Seahouses, with the tendency for material to be moved north in the north of each bay, as indicated by the spit in front of the outfall of the Annstead Burn. The overall change within the bays and behaviour of the dune frontages is likely to be a rolling back with sea level rise.

The above behaviour is quite distinct from that of the larger bays south of Beadnell. Here the bays are sensitive to wave direction with the spread of energy coming from both the north east and south east. The strategy at Beadnell has demonstrated the importance of the harbour structures in shaping and stopping significant erosion to the north of the bay, in effect reinforcing the affect of the up-drift headland. The central and southern sections are relatively stable but erosion of the Newton Links frontage is evidence of greater sensitivity to wave climate. Within these bays local rock outcrops do hold the dunes forward of the general bay shape and with sea level rise this will result in local erosion back to this larger bay shape. The Embleton Bay is really in two parts, the Emblestone Out Rocks provides sufficient restraint of the shore to stop the bay becoming one from Low Newton to Castle Rocks. This anomaly in the shoreline will reduce with sea level rise and this soft headland will tend to be lost particularly during the latter epoch of the SMP period.

From Caster to Seaton Point the near continuous rock outcrop acts as a barrier reducing exposure at the shore. There is little sand at the shoreline but where sand exists it is vulnerable to greater movement as sea levels rises, tending to erode back the till areas of the backshore.

Unconstrained:

With the principal exception of Beadnell Harbour, man's defence of the frontage has very little impact on the coast's unconstrained behaviour. At Beadnell, the influence of the harbour at the shore to the south is to hold the northern part of the bay forward. In all other areas, defence, although locally important, is really only reinforcing the natural control over the frontage. The whole frontage is tending to erode back slowly (in many areas very slowly). In the absence of defences, local erosion would occur at a faster rate. There is, therefore, very little additional stress placed on the natural behaviour of the coast by existing defences.

MANAGEMENT

Present Management

The SMP1 divided the coast into 12 Management Units (MU). The current policies are:

Management Unit	Policy
MU 15 Budle Bay south	Selectively Hold the Line
MU 16 Harkess to Seahouses	Do Nothing
MU 17 Seahouses to Beadnell	Selectively Hold the Line
MUs 19 to 26 Beadnell to Seaton Point	Do Nothing

Strategies

Strategies have refined the general policy provide by the SMP1.

The following revised policy has been determined.

North of Seahouses, maintain defence to the road	Hold the line
Seahouses inner defences and harbour	Hold the line
Beadnell North	Hold the line
Beadnell Harbour and North Beadnell Bay	Manage Realignment
Boulmer	Limited intervention

Baseline scenarios for the zone

No Active Intervention (Scenario 1):

As indicated in earlier, man made defences only tend to influence local areas, rather than the coast as a whole. As such, No Active Intervention is largely similar to the unconstrained behaviour. The specific difference is at a local scale where existing defences, under this scenario, will eventually fail but current hold the coastline, delaying response to the general pattern of erosion. Working south along the coast the principal impacts of this scenario are described below.

Between Budle Bay and the north of Seahouses, the coast will continue to develop naturally. There will be slow erosion of the frontages affecting the road access in the longer term to the area of Bamburgh Moor and resulting in loss of Monks House. In both cases this is probably within the latter part of the SMP2 period (50 to 100 years) as sea level rise increases. The reduction in shelter from the Islestone Rocks will cause a loss of width to the Bamburgh Dunes, providing some additional sediment to the adjacent frontages. There will also be a loss in width to St. Aiden's Dunes and overall reduction in the area of dune land. There is little scope to address this loss over the southern length, as this is a low dune fronting and lying as veneer over the higher levels of till. The road is not acting as a physical barrier apart from defining the boundary between agricultural land and the scrub dune area. Clearly, however, land use does restrict migration of dune land landward of the road.



To the North of Seahouses, the till cliff will continue to erode and failure of the short section of wall will result in the loss of the road in the medium term, with wider-spread loss to the road over the long term. The main harbour structures would act to prevent major erosion to Seahouses, but as these fail under this scenario the coast behind will erode with substantial loss to the town and harbour. Despite this, the overall shape of the coast and the division between north and south would be maintained.

To the south of Seahouses, the soft frontage will erode, although given its stable condition this would only a relatively short distance. The northern part of this dune is built as a dune structure within the valley of Annstead Burn, overlying peat. As such the dune is likely to move back as a complete entity and, as such, the road might provide a physical barrier to such movement. However, the width between road and dune face, over this northern section is such that this is unlikely to be a constraint over the next 100 years. The road does act as a demarcation of land use and land management does prevent migration of dune habitat landward of the road. Potentially, more significantly would be increased regular flooding within the flood plain of the stream. This provides potential for development of saline lagoons and, with increasing tidal prism, could result in opportunity for dune growth on the foreshore at the northern end of the bay. The southern end of the bay, to the north of Beadnell, the dune again becomes more of a veneer over the till. As discussed earlier, the road is less of a physical barrier being more a line defining different land use, which then constrains migration of the dune habitat.



Erosion would result in loss of the road branching off to Beadnell Harbour in the latter part of the SMP2. Further along Harbour road, this loss would occur sooner, even within the first epoch. There would also be substantial loss of property early in the SMP period and access to the harbour would be lost. Over the longer term most of the front row of housing would be lost, potentially opening the lower land and housing to flooding due to wave overtopping. In effect the harbour and associated

development around the harbour would be lost over the next 100 years. The loss of the harbour structures themselves, together with loss of the Lime Kiln, would also result in a significant realignment of the north of Beadnell Bay such that substantial amounts of new property, the recreational centre and parts of the caravan park would be lost.

Over the central and southern sections of Beadnell Bay the dunes will erode back with sea level rise. The hinterland behind the dunes would become subject to more extensive coastal flooding and the increased tidal prism would tend to reinforce the development of dunes, spits and potentially saltmarsh at the shoreline. There would, however, be a significant redistribution of sediment within the bay with areas of increased erosion and accretion.

At Low Newton, as sea level rises and as defences fail, the coast could step back quite considerably. This would result in significant loss of property in this area. Further south, as the influence of Emblestone Out Rocks reduces, so Chuck Bank will erode faster. The coastline will tend to straighten and there would be loss of both the dune land above the bank and the chalets in the area.

Within the main part of Embleton Bay, the dunes would benefit from the supply of sediment from the north and would roll back a short distance in response to sea level rise. There is no major constraint to this movement and the flood plain behind is relatively small.

At Craster, the village is protected by the harbour structures. Eventual loss of these, under this scenario, would result in significant loss of the village harbour front; the loss of the beach within the harbour and increasing pressure and loss of properties to north and south. Any gain in sediment to the coastal system would dissipate offshore.

To the south of Craster, there would be slow erosion. The road north of Howick may be lost in the long term (between 50 to 100 years in the future) as the cliff is destabilised due to erosion. Loss of this would be significant locally. Areas of the coast south of here would erode back with little constraint.

Boulmer is protected by the high rock outcrop of the foreshore. The village is protected by light revetments at present. Pressure for erosion would increase during the SMP period and with the loss of these defences most of the front line of properties, comprising the main part of the village would be lost. This could also potentially affect the road and inshore life boat station, as well as opening up the area immediately behind to flooding. In effect, the village of Boulmer would be reduced to a small collection of newer properties along the Beach View road, separated from Boulmer Hall by saltmarsh.

Along Seaton Point, erosion would threaten some of the chalets but overall the point is likely to remain as a feature of the coast, retaining the dunes to the north.

The principal physical assets lost at the coast have been determined from MDSF and are reported by area below. There are no substantial flood risk damages identified apart from potential loss of agricultural land within the small areas south of Seahouses and within Beadnell Bay.

<u>MDSF Evaluation</u> <u>(Appendix H)</u>	<i>Assets lost over the time period of the SMP</i>	<i>PValue Damages</i>
<i>Erosion</i>	<p>Bamburgh: 1 residential property</p> <p>Seahouses: 80 residential 44 commercial</p> <p>Beadnell: 60 residential 13 commercial</p> <p>Low Newton: 6 residential 3 commercial</p> <p>Craster: 9 residential 5 commercial</p> <p>Boulmer: 11 residential 4 commercial</p>	<p>£13.9k</p> <p>£1,960k £543k</p> <p>£2,455k £425k</p> <p>£148k £141k</p> <p>£218k £195k</p> <p>£674k £644k</p>
<i>Flooding</i>	Only at Boulmer would there be significant flood damage to property and this property would be substantially lost as a result of erosion.	£141k
<u>Other Information</u>	The above assessment is refined in more detailed studies and this is reported and discussed in Appendix H	
<i>Assessment of Key Objectives</i>	<p>In terms of the key objectives, No Active Intervention would fail to meet those set in respect of the built environment. There would be some benefits derived for the natural coast; in particular, there would be local areas of increased saline flooding with potential for intertidal and saltmarsh development. In other areas there would still be loss of specific habitat. This would be due principally to submergence of the rock foreshore and loss of dune area. In the case of the former, there would be some natural compensation as the till above rock erodes back exposing new rock outcrop. Due to the level of the rock this may not fully compensate for the area lost. In the latter case, land management, rather than physical features such as the coastal road may limit migration of the dune habitat.</p> <p>Overall there would be loss in the complex use and value of the coast.</p>	

With Present Management (Scenario 2):

The principal difference between this scenario and that of No Active Intervention is at specific locations as discussed below.

Seahouses, the main sea front and harbour would be maintained, sustaining the value of the town. Extension of the Hold the Line policy to the north would maintain the road access but would also increasingly impact on the ecological value, in particular in reducing area of foreshore rock habitat. The current approach adopted in relation to the road is maintaining the existing short section of defence to the road. From the broader perspective of the SMP under this scenario this would assume a need for progressive protection either side of this existing defence.

Beadnell, present policy would maintain the defences to the north of the village, protecting harbour road and associated properties. In maintaining the harbour structures, this would also maintain control of the shape to the northern section of the bay, protecting properties and use of this area. This policy would also encourage and allow retention of a more natural dune frontage around the bay.

Low Newton, the defences in this area under present policy would be allowed to fail. The SMP1 only considered a period of 50 years. As such, the defences would have been assumed to be functional over this period of time. It is assumed under this scenario that the defences would be maintained in the short term hence delaying loss to the village.

Craster, the SMP1 looking over a 50 year period assumed that the harbour structures would remain in place. Taking the longer term of 100 years it is assumed that despite the identified policy of NAI, these structures would in fact be maintained under present management.

Boulmer, although not yet formally adopted, a recent study at Boulmer indicates that it would be appropriate to undertake minor works to the frontage in support of the village. In the longer term, the study has suggested that additional defence is built in terms of structures intended to retain beach material. The success of this in the longer term would depend critically on beach behaviour and the rate of sea level rise. As such, it is assumed that With Present Management would be to Hold the Line for 50 years and then to manage some retreat of the frontage in the future.

In all other areas it is assumed that the scenario is as No Active Intervention.

The following economic damages are determined from MDSF.

<u>MDSF Evaluation</u> <u>(Appendix H)</u>	<i>Assets lost over the time period of the SMP</i>	<i>PValue Damages</i>
<i>Erosion</i>	<p>Bamburgh: 1 residential property</p> <p>Low Newton: 2 residential</p> <p>Boulmer: 11 residential 4 commercial</p>	<p>£13.9k</p> <p>£34k</p> <p>£242k £147k</p>
<i>Flooding</i>	Flooding would still occur to local areas but it is assumed that property at Boulmer would be defended over the short to medium term.	£48k
<u>Other Information</u>		
<u>Assessment of Key Objectives</u>	The With Present Management scenario substantially meets many of the key objectives in relation to the built environment. However, it introduces increased pressure on the ecological system in some areas.	

DISCUSSION AND DETAILED POLICY DEVELOPMENT

Key Interactions in terms of Management Policy

No Active Intervention over the whole zone fails to deliver key objectives. However, adopting the With Present Management policies also raises issues and conflict in terms of the highly valued and important ecological natural function of the shoreline. These issues primarily focus in local areas. The earlier discussion, based on the conclusions of the strategies, identifies that it is the natural underlying geological structure of the coast which divides sections of the shore and there are no real high level choices being made, which fundamentally impose constraint on such a division. As such, the development of policy can be undertaken and discussed at a more detailed level.

Sub-Division and Detailed Assessment

This detailed assessment is made with respect to the different sections of the coast divided by the main physical control points identified earlier.

Budle Bay to Seahouses.

The main issues are the loss of dunes, the potential loss of foreshore rock outcrop and the management of defences at Seahouses.

With respect to the first, the threat to the existing dune systems come primarily from rising sea level, submergence of the rock outcrops and hence natural squeeze of the dune against a higher coastline. As a natural process this loss has to be accepted. Opportunity has to be taken where possible to create an environment for roll back of the dunes or management that will encourage growth in other areas. This becomes an issue for management of the whole coast as much as for this section. Within this area, there is no physical barrier created by man-made assets; the road merely defines a division in land use. The road is vulnerable to erosion just to the south of Bamburgh Moor. In attempting to manage this, the appropriate approach would be to retreat the line of the road. This only likely to become an issue in the latter part of the SMP period (50 to 100 years). Even so it such an approach should be agreed now allowing planned management in the future.

Further south, there is a threat to Monk's House. Defence of this property is really outwith the scope of the SMP, with a typical policy for No Active Intervention being sensible for the frontage as a whole. However, because of the location of this property within a small bay, as well as its designation as a Grade II listed structure, there is scope for local management that has the potential to encourage dune development. This is identified solely as an opportunity for management, not as a policy.

As with the issue of dune management, the submergence of important rock outcrops is overall a natural process. It has been identified that high water roosting should also be considered in this respect. Allowing the coast to retreat will allow some new outcrop to emerge and the general policy of No Active Intervention would allow this. However, natural lateral erosion is unlikely to compensate, in the latter part of the SMP2 period, for submergence. Every effort should therefore be made to allow erosion, exposing new rock outcrop where sensibly practical. This is then becomes a key consideration with respect to the management of the road frontage north of Seahouses. While current management indicates over the short to medium term a policy for retaining the existing defence, in the longer term this would require extending defence along most of the length of Seafield road, limiting the scope for re-creation of exposed rock foreshore. The road is a vital access at present to Seahouses. The anticipated erosion seems

unlikely to affect properties behind the road over the 100 year period. In line with the general principle for minimising dependence on defence, over the latter epoch of the SMP (50 to 100 years) it is recommended that erosion should be allowed to continue. The opportunity should be taken to explore options for maintaining access to the properties behind the road and to developing the main road to the back of the properties (Broad Road) to allow this to take the main flow of traffic. This approach needs to be considered now so that appropriate planning is put in place. This approach, effectively Managed Realignment, would result in the potential loss of properties to the front of the road. The implication of this within the longer term policy of Managed Realignment in the third epoch would need to be considered in detail.

Over the main Seahouses frontage the recent strategy is for Hold the Line. This is seen as being essential for maintaining the integrity of the town and harbour and the values placed upon this settlement. This will result in loss of rocky shore habitat from the Berwickshire and North Northumberland Coast SAC, Northumbria Coast SPA and Northumberland Shore SSSI that will be partially mitigated in the 3rd Epoch by realignment of the coast road to the north of Seahouses. Defences at Seahouses form part of the Northumbria Coast SPA and Ramsar Site. Any defence works should aim to improve this functionality for SPA species.

Seahouses to Beadnell.

There are no significant management issues in relation to the built environment within this area. As such the decision on policy is driven solely by issues relating to nature conservation. The policy in this respect would be for No Active Intervention supporting natural development of designated habitat with the Berwickshire and North Northumberland SAC, Northumbria Coast SPA and Northumberland Shore SSSI. This is in line With Present Management. There is, however, opportunity for developing the local flood plain of the Annstead Burn to create new saltmarsh. This and the possible need to provide protection to individual properties to the edge of this flood plain needs to be discussed in detail with landowners. The additional benefit in this approach could be improving the resilience of dunes in the northern corner of the bay, providing some minor compensation for loss elsewhere.

Beadnell and Beadnell Bay.

The headland settlement and the harbour has been demonstrated through the strategy for the area to be an essential part of this overall community. The harbour and the associated Lime Kiln are of important heritage and cultural value. Management of both north and south areas of the village, and by association the whole of Beadnell Bay, has to be considered as a whole; in part because the defence of the northern frontage provides defence against overtopping to the area behind, which in turn is an area protected from erosion by the harbour, and in part because the use and sustainability of the harbour use relies on the access road along the northern frontage. There is no scope for retreat of the harbour road without loss of properties. The strategies have indicated a strong economic benefit for maintaining protection to the village. This is in line with key objectives. There will, however, be continuing loss of designated rocky shore habitat due to submergence and it is essential that the vegetated rock headlands along the frontage (Red Brae and the undeveloped section of Beadnell Point) remain undeveloped and allowed to erode. This will provide partial mitigation for loss of designated rocky shore habitat.

Maintaining the harbour structures, helps maintain the defence to the northern section of the bay. While there will still be some erosion this is unlikely to require additional protection during the period of the SMP2. This harbour structure is not causing coastal

squeeze as it is built around the rocky outcrop. At present there is a natural buffer zone between the shore and developed areas behind. To maintain this policy of minimising intervention it is important that this undeveloped width is maintained.

Further south along the bay, the shoreline will retreat. Any attempt to intervene is likely to create difficulty in maintaining the natural shape of the bay. There is opportunity to allow increased flooding of the flood plain of the Brunton Burn over the longer term. As at Annstead Burn, this needs to be developed in conjunction with landowners. The potential benefits of increasing this tidal prism would be in the development of designated dune, spit and saltmarsh habitat at the shoreline; also in tending to hold forward the general dune line of the bay.

Embleton Bay

There are two main issues in this area, although also potential opportunity to encourage development of the natural dune system within the main bay. At Low Newton, current management is assumed to allow deterioration of the defences and eventual loss of parts of this community. This would have significant consequence to a small but highly valued development. The main threat is in the longer term, with sea level rise increasing exposure along the rock shoreline from Newton Point and a reduction in shelter provided by the Emblestone Out Rock. The local frontage is, however, well supplied with sediment and minor works to maintain defences and potentially enhance the general protection to the east would ensure sustainable defence to the village. The aim is to retain dunes and sediment rather than use hard defences that could cause loss of designated habitat.

Further south, however, at Chuck Bank, the increased exposure is likely to drive the dunes landward in the future. This process is already ongoing and some chalets are vulnerable to erosion. Erosion of this soft frontage does supply important sediment source to the main Embleton Bay and a Managed Realignment policy along Chuck Banks would assist in developing a resilient dune system in the centre of the bay, where the dunes are of particularly high ecological value. Such a policy also is compatible with the national coastal policy of The National Trust, who is landowner in this area.

Castle Point to Boulmer.

This frontage is predominantly hard rock cliff or rock outcrop with low erodable back till. Only at Craster is there a settlement and this is protected by its harbour structures. To maintain Craster requires maintaining these structures. This in turn provides a degree of protection to properties to north and south. While more detailed justification for defence of these adjacent areas would need to be undertaken, the overall intent of SMP policy would be for Holding the Line, sustaining the value of the community. Maintenance of these defences would result in loss of designated rocky foreshore habitat.

In other areas, the policy is sensibly No Active Intervention. It is recommended, therefore, that in the longer term realignment of the road north of Howick is considered. This has been identified as an important way-point along the coastal path and in re-aligning the road there might be opportunity to improve access to the coast. The threat to the road is seen as being in the third epoch of the SMP but this policy for realignment needs to be considered as a long term potential for the area to allow adaptation. Any scheme for intervention should aim to protect the Grade II listed structure at Howick (Bathing House).

Boulmer and Seaton Point.

Seaton Point or more specifically the wide area of rock outcrop is likely to continue to maintain control of the general shore to the north, including retention of the sandy shore line to Boulmer. It is, however, recognised that there may be a general southerly drift of sediment over the lower rock foreshore. Boulmer, itself, is protected very largely by the high rock outcrop in front of the village. This allows a low level approach to defence management. The intent of the recent strategy developed for the area looks forward principally over the next 50 years, attempting, however, to set up potential management that would assist in longer term management of the frontage over the following 50 years. This approach allows adaptation to the relative rise in sea level from an initial improvement in defences and management of the soft clay bank to an approach of retaining beach material over the longer term in protecting this bank and thereby not impacting on designated habitat. The strategy, recognises that the approach is very dependent in its timing and ultimate sustainability on rates of sea level rise. Given the associated uncertainty, the SMP concurs with this general approach in avoiding pre-emptive defence and minimising possible need for heavier defence works in the future. The policy in support of this is, therefore, Managed Realignment, with potential retreat but also local advance in terms of specific structures.

In general terms the policy in the long term is to Hold the Line to the community as a whole, but with the potential in the long term for a possible need to retreat specific areas. Due to the uncertainty associated with the impacts of sea level rise, it is not possible to be definitive as to how best this may be achieved.

Over the frontage, south of Boulmer, the policy would continue to be No Active Intervention.

In summary, therefore, the zone is sub-divided into six Management Areas, these being:

- Budle Bay to, and including, Seahouses – comprising four policy units.
- Seahouses to Beadnell - comprising two policy units.
- Beadnell and Beadnell Bay – comprising five policy units.
- Embleton Bay – comprising four policy units.
- Castle Rock to Boulmer – comprising three policy units.
- Boulmer to Seaton Point – comprising two policy units.

The conclusions for each area are summarised in the Management Area statements which follow. First, however, an assessment of the strategic environmental objectives for the three epochs under the scenarios of No Active Intervention, With Present Management and Preferred Policy has been carried out below.

Assessment of Environmental Receptors in the First Epoch (up to 2025)

MA	Policy	Biodiversity	Population	Fauna and Flora	Soil	Water	Material Assets	Cultural Heritage	Landscape
MA6	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA7	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA8	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA9	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA10	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA11	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●

Major positive significance ● Minor positive significance ● Major negative significance ● Minor negative significance ●

In the first epoch there are not expected to be any major negative impacts under any of the scenarios. It can be seen in MA6, MA8 and MA10 that policies of Hold the Line are impacting upon biodiversity, fauna and flora due to coastal squeeze.

Assessment of Environmental Receptors in the Second Epoch (up to 2055)

MA	Policy	Biodiversity	Population	Fauna and Flora	Soil	Water	Material Assets	Cultural Heritage	Landscape
MA6	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA7	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA8	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA9	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA10	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA11	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●

Major positive significance ● Minor positive significance ● Major negative significance ● Minor negative significance ●

In the second epoch it can be seen that a policy of NAI would have major negative impacts upon population and material assets due to increased erosion and flood risk. This impact has been avoided by a policy of Hold the Line in relevant locations. This policy of Hold The Line will, however cause a minor negative impact on biodiversity, fauna and flora due to coastal squeeze.

Assessment of Environmental Receptors in the Third Epoch (up to 2105)

MA	Policy	Biodiversity	Population	Fauna and Flora	Soil	Water	Material Assets	Cultural Heritage	Landscape
MA6	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA7	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA8	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA9	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA10	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA11	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●

Major positive significance ● Minor positive significance ● Major negative significance ● Minor negative significance ●

Under the NAI scenario there could be major negative impacts upon population, material assets and cultural heritage due to increased erosion and flood risk. This impact has been avoided by a policy of Hold the Line in relevant locations. This policy of Hold the Line will, however cause a major negative impact on biodiversity, fauna and flora due to coastal squeeze. This must be mitigated through the implementation of a Regional Habitat Creation Plan.

MANAGEMENT AREAS

4.2.2 Management Area Policy Statements (MA06- 11)

Location reference:	Budle Bay to Seahouses
Management Area reference:	06
Policy Development Zone:	PDZ 2

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: The aim of the plan is to allow natural development over the majority of the frontage with the intention of realigning the road where this comes in to conflict with natural erosion. The plan accepts that there will be a natural loss of rock outcrops and some loss of dune extent. This has to be considered as an issue throughout the SMP area with opportunity sought elsewhere to address this as far as possible. The plan would, however, support defence of Seahouses itself. This is not seen as conflicting with the overall intent of natural realignment and aims to sustain this important regional town. To the north of Seahouses the long term intent would be to allow loss of the coastal road with the need to identify suitable rerouting of this important access.

PREFERRED POLICY TO IMPLEMENT PLAN	
From present day	No Active Intervention over the northern section but maintaining access to and defences to Seahouses.
Medium-term	No Active Intervention over the northern section but maintaining access to and defences to Seahouses.
Long-term	No Active Intervention over the northern section realigning access to Seahouses but maintaining defences to Seahouses.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			Comment
		2025	2055	2105	
6.1	Bamburgh and St Aiden's Dunes	NAI	NAI	NAI	Potential realignment of road in the long term.
6.2	North Seahouses	HTL	HTL	MR	Examine alternative access road with the aim to reroute access.
6.3	Seahouses	HTL	HTL	HTL	Maintain harbour defences as front line, thereby maintaining defence to the back of the harbour.
6.4	South Seahouses	NAI	NAI	NAI	

Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment

CHANGES FROM PRESENT MANAGEMENT

The plan is generally in line with previous policy. Only to the north of Seahouses is there a change in policy to one of eventually realignment of the road.

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	1044	1225	750	3019
	Preferred Plan Damages £k PV	0	0	0	0
	Benefits £k PV	1044	1225	750	3019
	Costs of Implementing plan £k PV	0	251	177	428
Costs have been based on the Seahouses strategy. Description of damage and benefits under preferred plan. Maintains the integrity of village and harbour. Longer term consideration should be given to abandoning defence to road to north of village. This needs to be examined in terms of land use.					
Heritage					
Amenity					

IMPLICATION WITH RESPECT OF NATURAL ENVIRONMENT

N.B. The table below is a summary of the potential impacts on sites designated for reasons of national or international nature conservation importance. This table should not be read in isolation, please refer to the narrative included in the Discussion and Detailed Policy Development section of this PDZ.

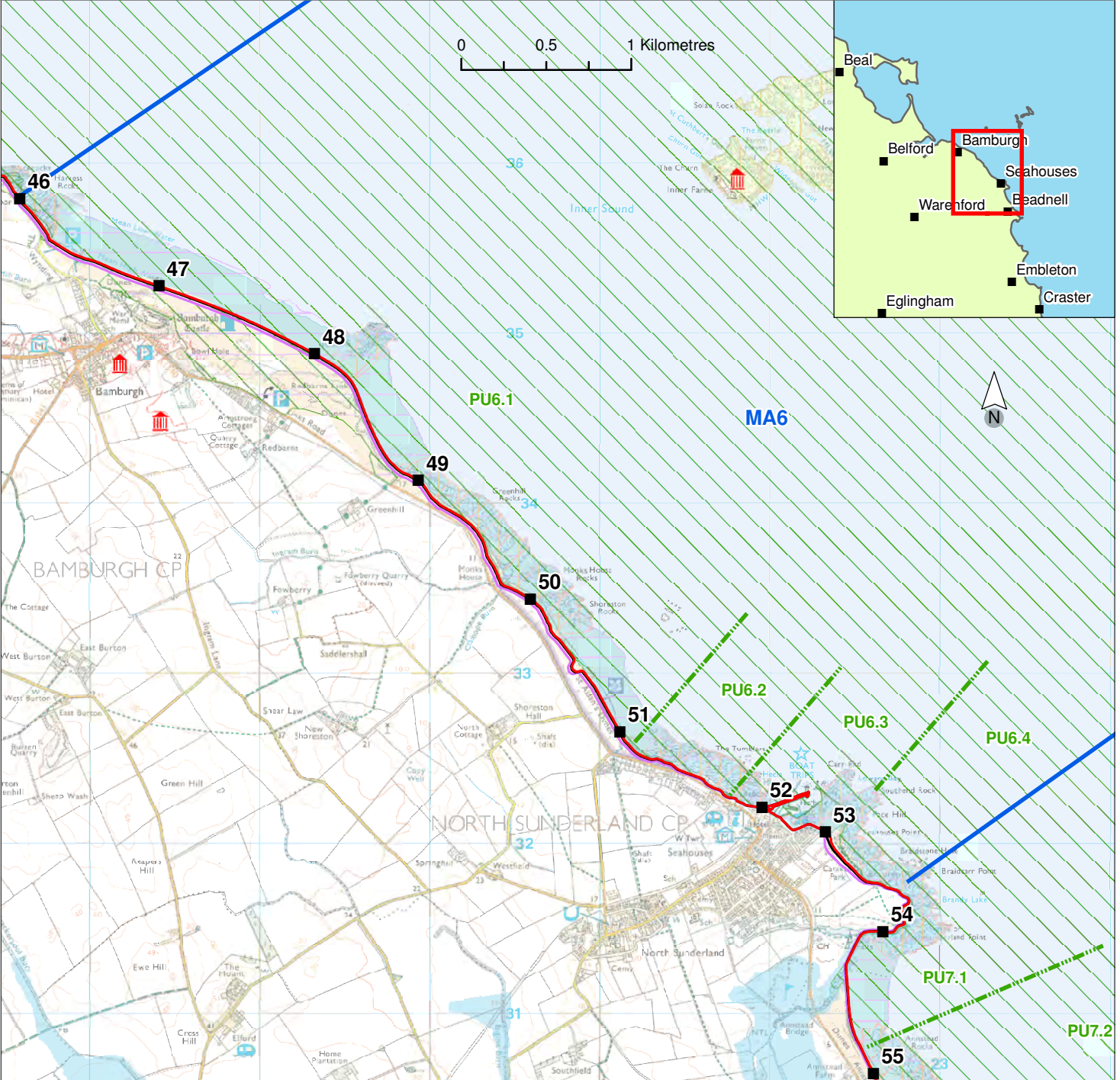
Details of the boundaries of the policy unit can be seen in the Management Area map overleaf.

Designated Site	Designated / supporting habitat	Policy Unit	Impact			Mitigation / compensation
			by 2025	by 2055	by 2105	
Berwickshire and North Northumberland Coast SAC	Intertidal reef	6.2 6.3	Habitat loss	Habitat loss	MR in PU 6.2 creating habitat	Partial mitigation in 3 rd epoch. Regional habitat compensation plan needed.
Northumbria Coast SPA	Rocky shore	6.2 6.3	Habitat loss	Habitat loss	MR in PU 6.2 creating habitat	Partial mitigation in 3 rd epoch. Regional habitat compensation plan needed.
Farne Islands SPA	N/A	N/A	No impact	No impact	No impact	N/A
Northumberland Shore SSSI	Intertidal rock	6.2 6.3	Habitat loss	Habitat loss	MR in PU 6.2 creating habitat	Partial mitigation in 3 rd epoch. Regional habitat compensation plan needed.
Bamburgh Coast and Hills SSSI	Whin Sill exposures	6.1	No impact	No impact	No impact	N/A
Bamburgh Dunes SSSI	Coastal dunes	6.1	No impact	No impact	No impact	N/A

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan reference should be made to the baseline data.

Policy Development Zone 2 - Bamburgh to Boulmer
Management Area 6 - Budle Bay to Seahouses (Ch 46 to 53.5)

0 0.5 1 Kilometres



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Policy Unit		Policy Plan			Comment
		2025	2055	2105	
6.1	Bamburgh and St Aiden's Dunes	NAI	NAI	NAI	Potential realignment of road in the long term.
6.2	North Seahouses	HTL	HTL	MR	Examine alternative access road with the aim to reroute access.
6.3	Seahouses	HTL	HTL	HTL	Maintain harbour defences as front line, thereby maintaining defence to the back of the harbour.
6.4	South Seahouses	NAI	NAI	NAI	

Predicted Shoreline Position under Preferred Policy

- 20 Years
- 50 Years
- 100 Years

- SPA
- RAMSAR
- SAC
- SSSI
- NNR

- Scheduled Ancient Monuments
- EA Flood Zone - Sept 07
- Management Areas
- Policy Units



ACTION PLAN MANAGEMENT AREA 06

Action	By when	Responsibility	Indicative Cost
<ul style="list-style-type: none"> Planning for longer-term realignment of the road south of Bamburgh Moor. Incorporate within Development Plans. 	2025	Berwick BC Planners	Nominal
<ul style="list-style-type: none"> Local management to encourage dune development at Monk's House. 	2055	Berwick BC	£20k
<ul style="list-style-type: none"> Planning to use alternative road (Broad Road) as main thoroughfare at Seahouses in the longer-term. Incorporate within Development Plans. 	2075	Berwick BC Planners	Nominal
<ul style="list-style-type: none"> Coastal monitoring. 	Ongoing	Berwick BC	Ongoing
Schemes:			
<ul style="list-style-type: none"> Realign road south of Bamburgh Moor. 	2090	County Council Highways	£500k
<ul style="list-style-type: none"> Use Broad Road as main thoroughfare at Seahouses in the longer-term. 	2090	County Council Highways	£500k
<ul style="list-style-type: none"> Maintenance of existing defence assets recommended. 	Ongoing	Berwick BC	Revenue

In addition to this detailed Action Plan for this specific Management Area, a high-level strategic Action Plan for the whole SMP area is provided in Section 7.

Coastal monitoring is also discussed in Section 7 and this is relevant to the whole SMP2 area as well as some specific frontages.

Location reference:	Seahouses to Beadnell
Management Area reference:	07
Policy Development Zone:	PDZ 2

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: The aim of the plan is to allow retreat of the natural coastline, maintaining the valuable ecological value and landscape. The plan recommends allowing increased flooding to the rear of the road, with the specific aim of creating a more resilient shoreline and potentially enhancing ecological value of the area. It is, however, recognised that this has to be considered in detail in association with land owners.

PREFERRED POLICY TO IMPLEMENT PLAN	
From present day	Maintain natural development of the dunes.
Medium-term	Maintain natural development of the dunes, with potential increased flooding to the hinterland.
Long-term	Maintain natural development of the dunes.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			Comment
		2025	2055	2105	
7.1	Annstead Dunes	NAI	NAI	NAI	Potential increased flood plain.
7.2	Beadnell Links	NAI	NAI	NAI	

Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment

CHANGES FROM PRESENT MANAGEMENT

No changes from present management.

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	4	3	2	9
	Preferred Plan Damages £k PV	3	2	2	7
	Benefits £k PV	1	1	0	2
	Costs of Implementing plan £k PV	0	0	57	57
Potential costs associated with protection to property in hinterland to allow natural development of the coast. Description of damage and benefits under preferred plan. Maintains a more robust dune.					
Heritage					
Amenity					

IMPLICATION WITH RESPECT OF NATURAL ENVIRONMENT

N.B. The table below is a summary of the potential impacts on sites designated for reasons of national or international nature conservation importance. This table should not be read in isolation, please refer to the narrative included in the Discussion and Detailed Policy Development section of this PDZ.

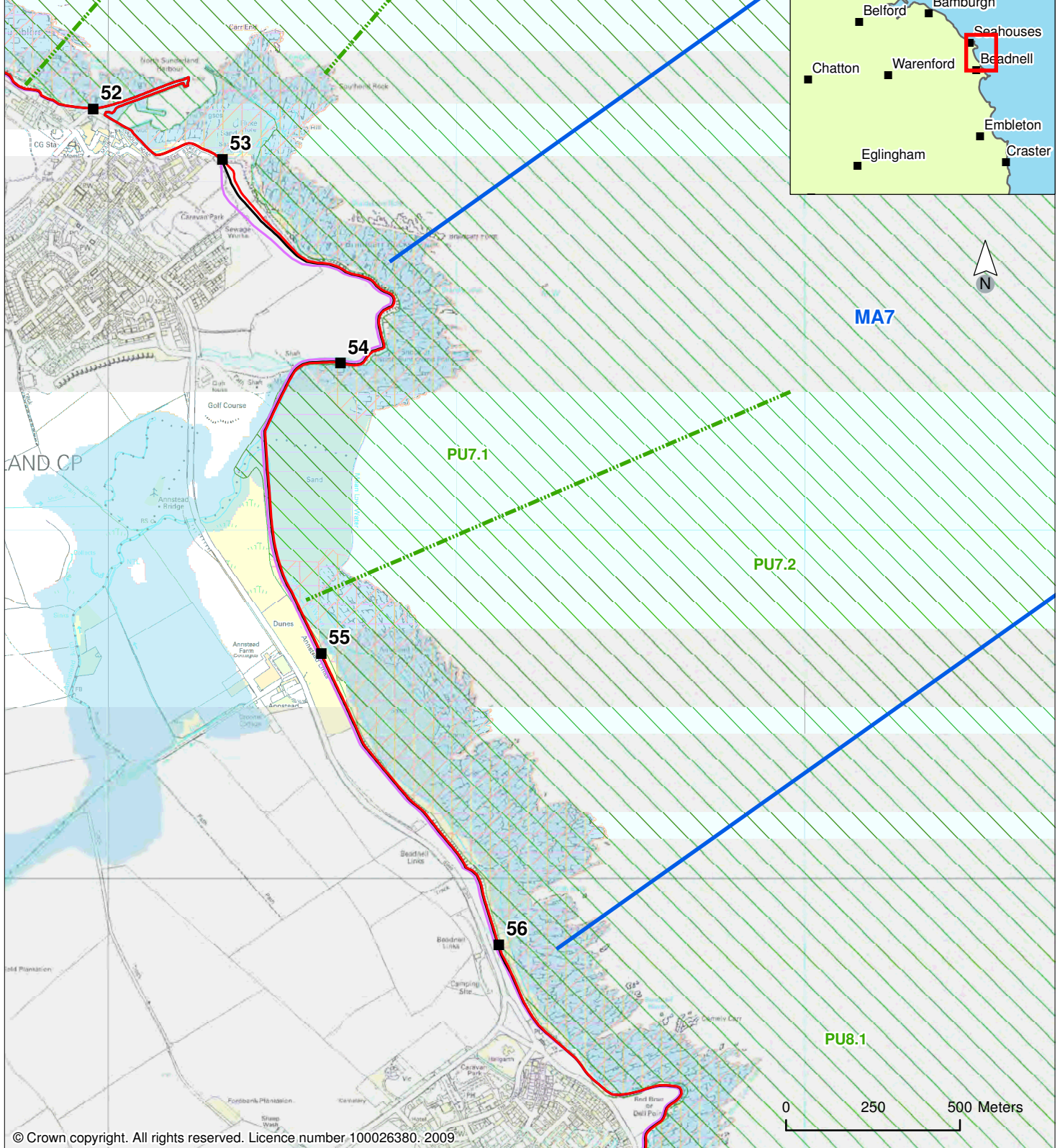
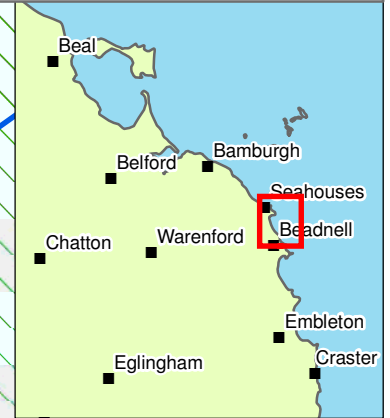
Details of the boundaries of the policy unit can be seen in the Management Area map overleaf.

Designated Site	Designated / supporting habitat	Policy Unit	Impact			Mitigation / compensation
			by 2025	by 2055	by 2105	
Berwickshire and North Northumberland Coast SAC	Intertidal reef	7.1 7.2	No impact	No impact	No impact	N/A
Northumbria Coast SPA	Rocky shore	7.1 7.2	No impact	No impact	No impact	N/A
Northumberland Shore SSSI	Intertidal rock	7.1 7.2	No impact	No impact	No impact	N/A

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan reference should be made to the baseline data.

Policy Development Zone 2 - Bamburgh to Boulmer
Management Area 7 - Seahouses to Beadnell (Ch 53.5 to 56)

Policy Unit		Policy Plan			
		2025	2055	2105	Comment
7.1	Annstead Dunes	NAI	NAI	NAI	Potential increased flood plain.
7.2	Beadnell Links	NAI	NAI	NAI	



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Predicted Shoreline Position under Preferred Policy	SPA	Scheduled Ancient Monuments
20 Years	RAMSAR	EA Flood Zone - Sept 07
50 Years	SAC	Management Areas
100 Years	SSSI	Policy Units
	NNR	



ACTION PLAN MANAGEMENT AREA 07

Action	By when	Responsibility	Indicative Cost
<ul style="list-style-type: none"> Discussion with landowners regarding potential increase in flood plain of Annstead Burn for nature conservation purposes. 	2010	Environment Agency	Nominal
<ul style="list-style-type: none"> Coastal monitoring. 	Ongoing	Berwick BC	Ongoing
Schemes:			
<ul style="list-style-type: none"> No new coast protection schemes proposed, but maintenance of existing defence assets recommended. 	Ongoing	Berwick BC	Revenue

In addition to this detailed Action Plan for this specific Management Area, a high-level strategic Action Plan for the whole SMP area is provided in Section 7.

Coastal monitoring is also discussed in Section 7 and this is relevant to the whole SMP2 area as well as some specific frontages.

Location reference:	Beadnell and Beadnell Bay
Management Area reference:	08
Policy Development Zone:	PDZ 2

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: The plan aims to protect Beadnell Village and Beadnell Harbour, in association with the use and value of the semi-natural development of Beadnell Bay. The intent is for an approach of retaining beach material over the longer term in protecting the village and harbour and thereby not impacting on designated habitat. The plan recommends allowing increased flooding of the hinterland to the centre of the bay, with the specific aim of creating a more resilient shoreline and potentially enhancing ecological value of the area. It is, however, recognised that this has to be considered in detail in association with land owners.

PREFERRED POLICY TO IMPLEMENT PLAN

From present day	Maintain the integrity of defences to Beadnell and Beadnell Harbour while allowing natural change within the bay.
Medium-term	Maintain the integrity of defences to Beadnell and Beadnell Harbour while allowing natural change within the bay. Consider allowing increased flooding to the hinterland at the centre of the bay.
Long-term	Maintain the integrity of defences to Beadnell and Manage Realignment to the centre of the bay.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			Comment
		2025	2055	2105	
8.1	Beadnell North	HTL	HTL	HTL	Control development seaward of the harbour road.
8.2	Beadnell South	HTL	HTL	HTL	
8.3	Beadnell Harbour	HTL	HTL	HTL	Maintaining harbour as a coastal management structure.
8.4	Beadnell Bay north	MR	MR	MR	Relies on maintenance of buffer zone.
8.5	Beadnell Bay south	NAI	NAI	NAI	Potential increase of flood plain.
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment					

CHANGES FROM PRESENT MANAGEMENT

No significant change from previous policy.

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	1067	612	1245	2924
	Preferred Plan Damages £k PV	14	12	8	33
	Benefits £k PV	1053	600	1237	2891
	Costs of Implementing plan £k PV	283	110	3	396
Costs are taken from the Strategy studies.					
Description of damage and benefits under preferred plan.					
Maintains integrity of village					
Heritage	No adverse impact				
Amenity	Maintains amenity values				

IMPLICATION WITH RESPECT OF NATURAL ENVIRONMENT

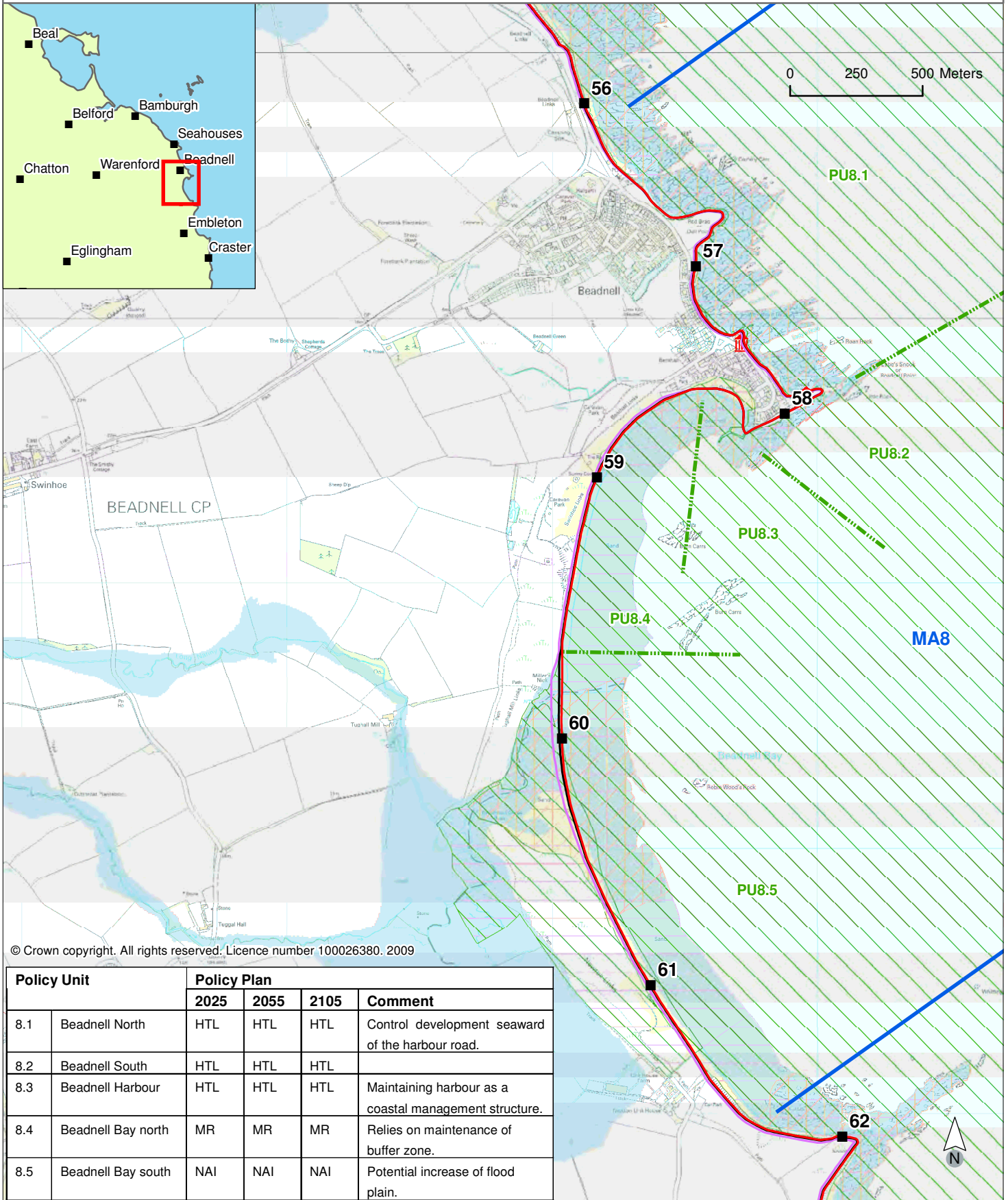
N.B. The table below is a summary of the potential impacts on sites designated for reasons of national or international nature conservation importance. This table should not be read in isolation, please refer to the narrative included in the Discussion and Detailed Policy Development section of this PDZ.

Details of the boundaries of the policy unit can be seen in the Management Area map overleaf.

Designated Site	Designated / supporting habitat	Policy Unit	Impact			Mitigation / compensation
			by 2025	by 2055	by 2105	
Berwickshire and North Northumberland Coast SAC	Large shallow inlet and bays	8.4 8.5	Habitat creation	Habitat creation	Habitat creation	N/A
	Intertidal reef	8.1 8.2	Habitat loss	Habitat loss	Habitat loss	Partial mitigation by keeping vegetated headlands undeveloped and allowing to erode. Regional habitat compensation plan needed.
North Northumberland Dunes SAC	Embryonic dunes	8.4 8.5	Habitat creation	Habitat creation	Habitat creation	N/A
	White dunes	8.4 8.5	Habitat creation	Habitat creation	Habitat creation	N/A
	Grey dunes	8.4 8.5	Habitat creation	Habitat creation	Habitat creation	N/A
Northumbria Coast SPA	Rocky shore	8.1 8.2	Habitat loss	Habitat loss	Habitat loss	Partial mitigation by keeping vegetated headlands undeveloped and allowing to erode. Regional habitat compensation plan needed.
Northumberland Shore SSSI	Sandy beaches	8.4 8.5	Habitat creation	Habitat creation	Habitat creation	N/A
	Intertidal rock	8.1 8.2	Habitat loss	Habitat loss	Habitat loss	Partial mitigation by keeping vegetated headlands undeveloped and allowing to erode. Regional habitat compensation plan needed.
Newton Links SSSI	Dunes	8.4 8.5	Habitat creation	Habitat creation	Habitat creation	N/A

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan reference should be made to the baseline data.

Policy Development Zone 2 - Bamburgh to Boulmer
Management Area 8 - Beadnell and Beadnell Bay (Ch 56 to 62)



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Policy Unit		Policy Plan			Comment
		2025	2055	2105	
8.1	Beadnell North	HTL	HTL	HTL	Control development seaward of the harbour road.
8.2	Beadnell South	HTL	HTL	HTL	
8.3	Beadnell Harbour	HTL	HTL	HTL	Maintaining harbour as a coastal management structure.
8.4	Beadnell Bay north	MR	MR	MR	Relies on maintenance of buffer zone.
8.5	Beadnell Bay south	NAI	NAI	NAI	Potential increase of flood plain.

Predicted Shoreline Position under Preferred Policy	SPA	Scheduled Ancient Monuments
20 Years	RAMSAR	EA Flood Zone - Sept 07
50 Years	SAC	Management Areas
100 Years	SSSI	Policy Units
	NNR	



ACTION PLAN MANAGEMENT AREA 08

Action	By when	Responsibility	Indicative Cost
<ul style="list-style-type: none"> Development control seaward of the harbour road. 	Ongoing	Berwick BC Planners	Nominal
<ul style="list-style-type: none"> Discussion with landowners regarding potential increase in flood plain of Brunton Burn for nature conservation purposes. 	2009	Environment Agency	Nominal
<ul style="list-style-type: none"> Beadnell North Sea Wall Improvements Project Appraisal Report 	2010	Berwick BC	£75k
<ul style="list-style-type: none"> Development control on northern section of Beadnell Bay to maintain 'buffer zone'. 	Ongoing	Berwick BC Planners	Nominal
<ul style="list-style-type: none"> Coastal monitoring. 	Ongoing	Berwick BC/Alnwick DC	Ongoing
Schemes:			
<ul style="list-style-type: none"> Beadnell North Sea Wall Improvements 	2010-2012	Berwick BC	£335k

In addition to this detailed Action Plan for this specific Management Area, a high-level strategic Action Plan for the whole SMP area is provided in Section 7.

Coastal monitoring is also discussed in Section 7 and this is relevant to the whole SMP2 area as well as some specific frontages.

Location reference:	Embleton Bay
Management Area reference:	09
Policy Development Zone:	PDZ 2

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: The overriding intent of the plan is to allow natural development of the frontage maintaining the highly important assemblage of habitats. Within this the value of Low Newton is recognised and the intent would be to continue defence locally in supporting this community. Defence of this area should aim to encourage and work with the development of the dunes in the area.

PREFERRED POLICY TO IMPLEMENT PLAN	
From present day	Minimise intervention allowing natural retreat but maintaining Low Newton.
Medium-term	Minimise intervention allowing natural retreat but maintaining Low Newton.
Long-term	Minimise intervention allowing natural retreat but maintaining Low Newton.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			
		2025	2055	2105	Comment
9.1	Football Hole and headlands	NAI	NAI	NAI	
9.2	Low Newton	HTL	HTL	HTL	With the aim to retain dunes and sediment.
9.3	Chuck Bank	MR	MR	NAI	
9.4	Embleton	NAI	NAI	NAI	

Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment

CHANGES FROM PRESENT MANAGEMENT

No substantial change to previous policy.

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	0	227	62	289
	Preferred Plan Damages £k PV	0	0	0	0
	Benefits £k PV	0	227	62	289
	Costs of Implementing plan £k PV	0	46	0	46
Cost estimates for defence of Low Newton. Description of damage and benefits under preferred plan. Maintains village but allows natural development of dunes					
Heritage	No adverse impact				
Amenity	Maintains amenity value				

IMPLICATION WITH RESPECT OF NATURAL ENVIRONMENT

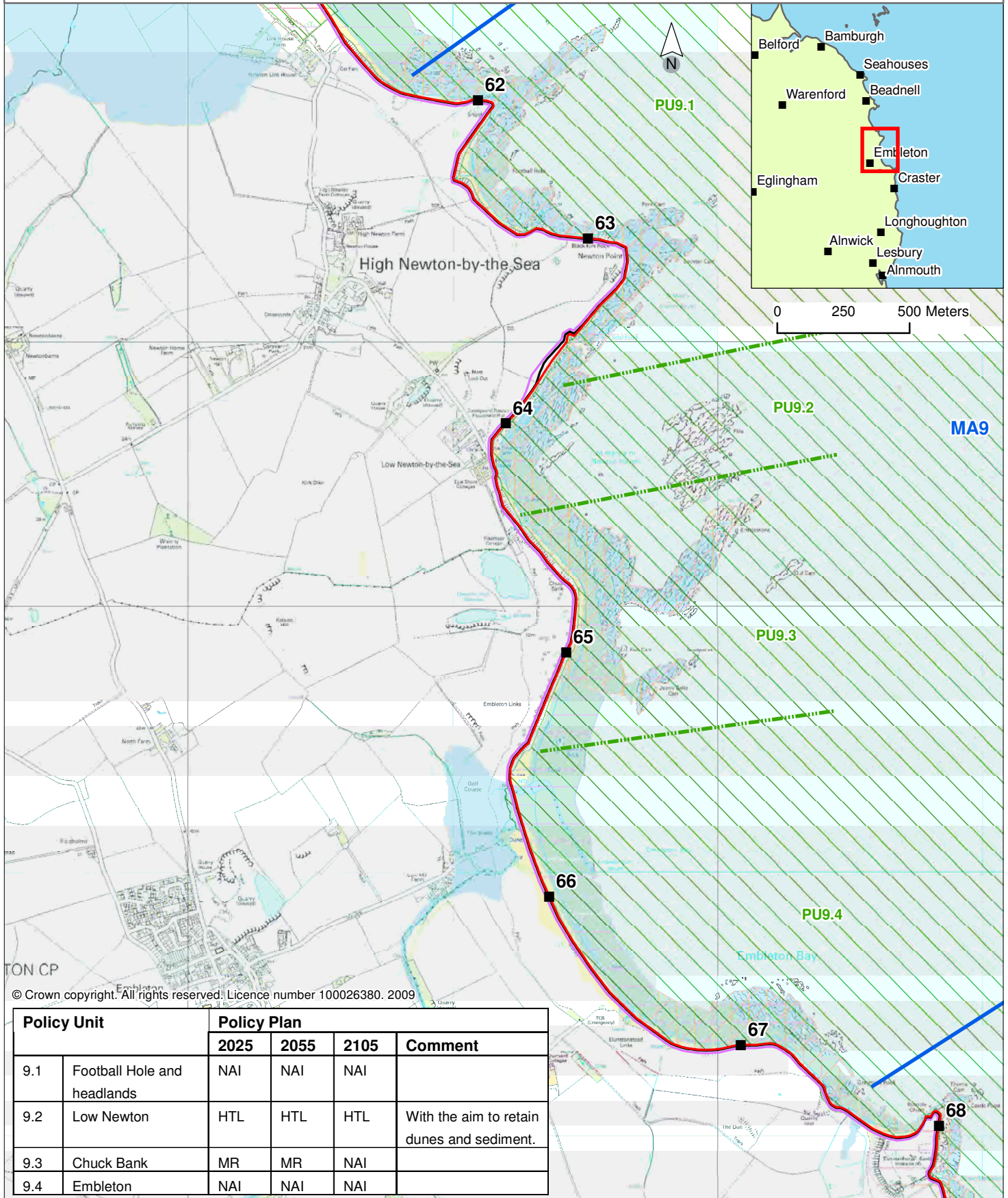
N.B. The table below is a summary of the potential impacts on sites designated for reasons of national or international nature conservation importance. This table should not be read in isolation, please refer to the narrative included in the Discussion and Detailed Policy Development section of this PDZ.

Details of the boundaries of the policy unit can be seen in the Management Area map overleaf.

Designated Site	Designated / supporting habitat	Policy Unit	Impact			Mitigation / compensation
			by 2025	by 2055	by 2105	
Berwickshire and North Northumberland Coast SAC	Large shallow inlet and bays	9.3 9.4	Habitat creation	Habitat creation	Habitat creation	N/A
	Intertidal reef	9.2	No impact	No impact	No impact	N/A
Northumbria Coast SPA	Rocky shore	9.2	No impact	No impact	No impact	N/A
Northumberland Shore SSSI	Sandy beaches	9.3 9.4	Habitat creation	Habitat creation	Habitat creation	N/A
	Intertidal rock	9.2	No impact	No impact	No impact	N/A

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan reference should be made to the baseline data.

Policy Development Zone 2 - Bamburgh to Boulmer
Management Area 9 - Embleton Bay (Ch 62 to 68)



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Policy Unit		Policy Plan			
		2025	2055	2105	Comment
9.1	Football Hole and headlands	NAI	NAI	NAI	
9.2	Low Newton	HTL	HTL	HTL	With the aim to retain dunes and sediment.
9.3	Chuck Bank	MR	MR	NAI	
9.4	Embleton	NAI	NAI	NAI	

Predicted Shoreline Position under Preferred Policy	SPA	Scheduled Ancient Monuments
20 Years	RAMSAR	EA Flood Zone - Sept 07
50 Years	SAC	Management Areas
100 Years	SSSI	Policy Units
	NNR	



ACTION PLAN MANAGEMENT AREA 09

Action	By when	Responsibility	Indicative Cost
<ul style="list-style-type: none"> Coastal monitoring. 	Ongoing	Alnwick DC	Ongoing
Schemes:			
<ul style="list-style-type: none"> Minor works to enhance general protection at Low Newton in light of sea level rise. 	2055	Alnwick DC	£20k
<ul style="list-style-type: none"> Maintenance of existing defence assets recommended. 	Ongoing	Alnwick DC	Revenue

In addition to this detailed Action Plan for this specific Management Area, a high-level strategic Action Plan for the whole SMP area is provided in Section 7.

Coastal monitoring is also discussed in Section 7 and this is relevant to the whole SMP2 area as well as some specific frontages.

Location reference:	Castle Rock to Boulmer
Management Area reference:	10
Policy Development Zone:	PDZ 2

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: The overall intent of the plan is to allow natural development of the frontage, specifically to ensure continued exposure of the rock platform and to maintaining the important natural value of the rocky shoreline and cliffs. Locally maintaining the harbour structures at Craster is not seen as being in contradiction to this overall aim and this intervention aims to maintain the regionally important community. In maintaining defence to the main village it is likely to be possible to maintain local defence to either side. Further defence beyond these areas would be precluded.

PREFERRED POLICY TO IMPLEMENT PLAN

From present day	Maintain natural erosion of frontage and exposure of rock outcrops. Maintain defence to the village of Craster and sustain Harbour use.
Medium-term	Maintain natural erosion of frontage and exposure of rock outcrops. Maintain defence to the village of Craster and sustain Harbour use.
Long-term	Maintain natural erosion of frontage and exposure of rock outcrops. Maintain defence to the village of Craster and sustain Harbour use. Potential realignment of road at Howick.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			Comment
		2025	2055	2105	
10.1	Dunstanburgh	NAI	NAI	NAI	
10.2	Craster	HTL	HTL	HTL	Areas adjacent to harbour require detailed examination.
10.3	Howick	NAI	NAI	NAI	Potential realignment of road.
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment					

CHANGES FROM PRESENT MANAGEMENT

Local specific change in policy with respect to Craster considering future period beyond that defined by SMP 1.

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	104	326	87	517
	Preferred Plan Damages £k PV	0	0	18	18
	Benefits £k PV	104	326	69	499
	Costs of Implementing plan £k PV	0	127	0	127
Costs estimated for management of Craster area. Description of damage and benefits under preferred plan. Maintains village					
Heritage	Maintains heritage				
Amenity					

IMPLICATION WITH RESPECT OF NATURAL ENVIRONMENT

N.B. The table below is a summary of the potential impacts on sites designated for reasons of national or international nature conservation importance. This table should not be read in isolation, please refer to the narrative included in the Discussion and Detailed Policy Development section of this PDZ. Details of the boundaries of the policy unit can be seen in the Management Area map overleaf.

Designated Site	Designated / supporting habitat	Policy Unit	Impact			Mitigation / compensation
			by 2025	by 2055	by 2105	
Berwickshire and North Northumberland Coast SAC	Intertidal reef	10.2	Habitat loss	Habitat loss	Habitat loss	No mitigation identified. Regional habitat compensation plan needed.
Northumbria Coast SPA	Rocky shore	10.2	Habitat loss	Habitat loss	Habitat loss	No mitigation identified. Regional habitat compensation plan needed.
Northumberland Shore SSSI	Intertidal rock	10.2	Habitat loss	Habitat loss	Habitat loss	No mitigation identified. Regional habitat compensation plan needed.
Castle Point to Cullernose Point SSSI	Whin Sill exposures	10.2	Habitat loss	Habitat loss	Habitat loss	No mitigation identified. Regional habitat compensation plan needed.
Howick to Seaton Point SSSI	Millstone Grit exposures	10.3	No impact	No impact	No impact	N/A

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan reference should be made to the baseline data.

Policy Development Zone 2 - Bamburgh to Boulmer
Management Area 10 - Castle Rock to Boulmer (Ch 68 to 77)



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Policy Unit		Policy Plan			
		2025	2055	2105	Comment
10.1	Dunstanburgh	NAI	NAI	NAI	
10.2	Craster	HTL	HTL	HTL	Areas adjacent to harbour require detailed examination.
10.3	Howick	NAI	NAI	NAI	Potential realignment of road.

Predicted Shoreline Position under Preferred Policy 20 Years 50 Years 100 Years	SPA	Scheduled Ancient Monuments
	RAMSAR	EA Flood Zone - Sept 07
	SAC	Management Areas
	SSSI	Policy Units
	NNR	



ACTION PLAN MANAGEMENT AREA 10

Action	By when	Responsibility	Indicative Cost
<ul style="list-style-type: none"> Detailed examination of benefits of protecting areas adjacent to the harbour at Craster. 	2015	Alnwick DC	£30k
<ul style="list-style-type: none"> Plan for longer-term realignment of the road north of Howick. Incorporate within Development Plans. 	2055	County Council Highways	Nominal
<ul style="list-style-type: none"> Coastal monitoring. 	Ongoing	Alnwick DC	Ongoing
Schemes:			
<ul style="list-style-type: none"> Realignment of the road north of Howick. 	2090	County Council Highways	£500k
<ul style="list-style-type: none"> No new coast protection schemes proposed, but maintenance of existing defence assets recommended. 	Ongoing	Alnwick DC	Revenue

In addition to this detailed Action Plan for this specific Management Area, a high-level strategic Action Plan for the whole SMP area is provided in Section 7.

Coastal monitoring is also discussed in Section 7 and this is relevant to the whole SMP2 area as well as some specific frontages.

Location reference:	Boulmer to Seaton Point
Management Area reference:	11
Policy Development Zone:	PDZ 2

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: The intent of the plan is to maintain the overall integrity of the Boulmer community. In the medium term (over the next 50 years) the intent would be to maintain the existing line of defence. This would be reviewed such that adaptation of the defence and potential local retreat may be required in the longer term.

PREFERRED POLICY TO IMPLEMENT PLAN	
From present day	Maintain and improve defence to Boulmer, with No Active Intervention in other areas.
Medium-term	Maintain defence to Boulmer with intention of retaining sand beach, with No Active Intervention in other areas.
Long-term	Review defence to Boulmer with intention of retaining sand beach, with No Active Intervention in other areas.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			
		2025	2055	2105	Comment
11.1	Boulmer Village	HTL	HTL	MR	
11.2	Seaton Point	NAI	NAI	NAI	

Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment

CHANGES FROM PRESENT MANAGEMENT

No substantial change in policy from SMP1.

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	1255	49	51	1355
	Preferred Plan Damages £k PV	59	187	256	502
	Benefits £k PV	1196	-138	-205	853
	Costs of Implementing plan £k PV	166	0	0	166
Costs estimates taken from Boulmer study. Description of damage and benefits under preferred plan. Maintains defence of Boulmer over 50 years. Potential loss of property following this.					
Heritage					
Amenity					

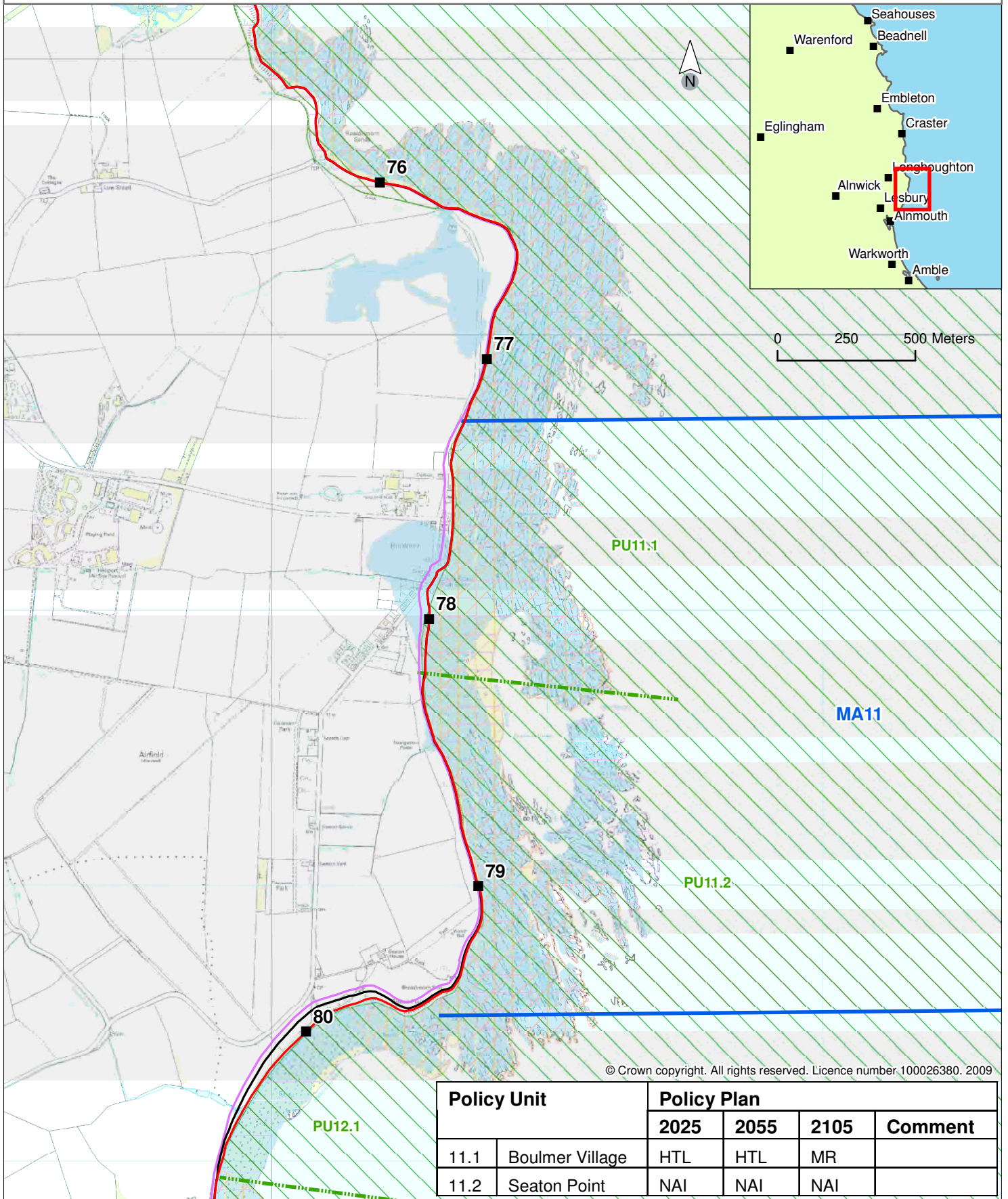
IMPLICATION WITH RESPECT OF NATURAL ENVIRONMENT

N.B. The table below is a summary of the potential impacts on sites designated for reasons of national or international nature conservation importance. This table should not be read in isolation, please refer to the narrative included in the Discussion and Detailed Policy Development section of this PDZ. Details of the boundaries of the policy unit can be seen in the Management Area map overleaf.

Designated Site	Designated / supporting habitat	Policy Unit	Impact			Mitigation / compensation
			by 2025	by 2055	by 2105	
Berwickshire and North Northumberland Coast SAC	Intertidal reef	11.1	No impact	No impact	No impact	N/A
Northumbria Coast SPA	Rocky shore	11.1	No impact	No impact	No impact	N/A
Northumberland Shore SSSI	Intertidal rock	11.1	No impact	No impact	No impact	N/A
Howick to Seaton Point SSSI	Millstone Grit exposures	11.1	No impact	No impact	No impact	N/A

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan reference should be made to the baseline data.

Policy Development Zone 2 - Bamburgh to Boulmer
Management Area 11 - Boulmer to Seaton Point (Ch 77 to 79.5)



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Policy Unit		Policy Plan			
		2025	2055	2105	Comment
11.1	Boulmer Village	HTL	HTL	MR	
11.2	Seaton Point	NAI	NAI	NAI	

Predicted Shoreline Position under Preferred Policy

- 20 Years
- 50 Years
- 100 Years

- SPA
- RAMSAR
- SAC
- SSSI
- NNR

- Scheduled Ancient Monuments
- EA Flood Zone - Sept 07
- Management Areas
- - - - Policy Units



ACTION PLAN MANAGEMENT AREA 11

Action	By when	Responsibility	Indicative Cost
<ul style="list-style-type: none"> Coastal monitoring. 	Ongoing	Alnwick DC	Ongoing
Schemes:			
<ul style="list-style-type: none"> Boulmer. 	2009-2013	Alnwick DC	£70k
<ul style="list-style-type: none"> Maintenance of existing defence assets recommended. 	Ongoing	Alnwick DC	Revenue

In addition to this detailed Action Plan for this specific Management Area, a high-level strategic Action Plan for the whole SMP area is provided in Section 7.

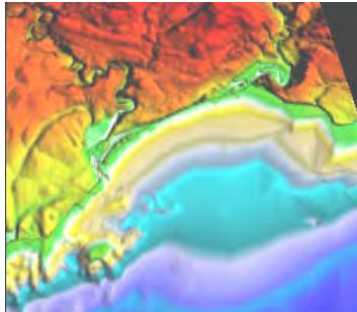
Coastal monitoring is also discussed in Section 7 and this is relevant to the whole SMP2 area as well as some specific frontages.

4.3 PDZ 3 Seaton Point to Beacon Hill (Ch 79.5 to 97)

4.3.1 Policy Development Analysis

DESCRIPTION

Physical



The main part of the frontage comprises Alnmouth to Amble Bay. The backshore to the bay rises at its centre with exposure of the underlying hard geology as rock outcrop over the foreshore in the form of the Birling Carrs. Over this central section are superficial dune deposits overlying the rising coastal slope. To north and south these dunes cover a more extensive width, infilling as a coastal barrier at the northern (Aln) and southern (Coquet) estuary mouths. Both the River Aln and Coquet have changed course, as seen from comparison of historical maps.

Also both rivers have broke through the dunes during storms; in the case of the Coquet, this resulted in a change in the location of the estuary mouth, which was subsequently artificially fixed in its current position, allowing the development of the dune infill.



To the south of the main bay is Coquet Island, associated with the rock outcrops of the shoreline at Amble: at Pan Point, Wellhaugh Point and Beacon Hill.

To the north of the main bay a ridge of high land runs through from Longhoughton, inland of Boulmer, to the coast at Foxton, with the exposure of the underlying hard geology in the extensive rock outcrops at Marden Carr. This then forms the smaller Foxton Bay through to the north of the zone at Seaton Point and the rock outcrops at this headland. The ridge runs parallel to, but set back from, the coast to Alnmouth and the Aln Estuary.

Foxton Bay is backed by clay cliffs; exposed and eroding in the centre and north of the bay, and being more vegetated to the south as a coastal slope. The sand beach of the bay runs up to the toe of the cliff over the central and northerly section, with the southerly section having a wider wedge of shingle and cobbles at the toe of the slope.

Behind Marden Carr the coast straightens, with a steep coastal slope rising, effectively, directly from the rock exposure on the foreshore. South of the rock outcrop, an increasingly wide, low lying platform has developed, fronted by a narrow width of dunes through to the higher ridge upon which the town of Alnmouth has been developed. In front of the town, the dune forms a wider nose at the entrance to the Aln Estuary, with defence now generally to the rear of the dunes; although still dominant immediately within the entrance.

South of the Aln Estuary entrance, the main bay dune system forms as a wide lobe of material anchored to the rear by Church Hill. The estuary entrance channel is constrained between these two dune systems, widening within the estuary itself, with areas of saltmarsh both to the west of the town (the eastern side of the estuary) and as a transition between the channel, mud flats and rising farmland to the east and in behind Church Hill. The estuary's tidal limit is further inland at Lesbury, with the channel running through main road bridge, curving against the steep ridge of land to the east.

Within the estuary, defence of former reclaimed land has been returned to the estuary downstream of the road bridge, while land contained within the bend of the river, between the bridge and the tidal limit has been realigned under 4shores and scrape creation on the upper estuary.

The area behind the main bay is typically open agricultural land, with a caravan parks at Birling Carr and to the higher ground, set well back from the dunes to the south of the area.

To the southern end of the main bay, the Coquet Estuary is constrained by harbour works; the most prominent being the main North Breakwater. Within the estuary, there are secondary pier structures to the northern bank and hard defences extending along the whole of the southern flank through to the Marina. The estuary channel sets hard against these southerly defences, with the north side being areas of sandflats and transitional mudflat and saltmarsh through to higher ground.

The South Jetty, between the defended harbour frontage and the entrance to the harbour, is an open structure and the coastline sets back as a wide sandy spending beach within the shelter of the Pan Rocks and South Pier. The southern entrance to the harbour is, therefore, formed in part by the natural rock outcrop, reinforced by the South Pier extending to Pan Point.

Pan Point, itself, is a higher platform of rock, with a major concrete wall running some 100m along the shore to the south.

Between Pan Point and Beacon Hill, are a series of rock and clay headlands formed to the back of the rock outcrops to the foreshore. Between these promontories are clay slope backed embayments, overlain generally with superficial dunes. Seaward of the shore is the rock based Coquet Island.

Environment

This area has great natural conservation importance. It includes the following designated sites:

- Berwickshire and North Northumberland Coast SAC
- North Northumberland Dunes SAC
- Northumbria Coast SPA
- Coquet Island SPA
- Berwickshire and North Northumberland Coast European Marine Site
- Northumbria Coast Ramsar Site
- Northumberland Shore SSSI
- Alnmouth Saltmarsh and Dunes SSSI
- Warkworth Dunes and Saltmarsh SSSI
- Coquet Island SSSI
- Northumberland Coast AONB
- Farne Islands NNR
- North Northumberland Heritage Coast

Further detail regarding these sites can be found in Appendix D. Where proposed policies may have potential impacts on designated features these are discussed in the discussion and detailed policy development section and listed in the summary of preferred plan recommendations and justification section under implications with respect of the natural environment.

In the UK these Natura 2000 sites have legal requirements for protection (The Conservation (Natural Habitats, *et.c.*) Regulations 1994, and the Wildlife & Countryside Act 1981, as amended) to maintain their designated conservation value. Any activity that occurs within any of these designated sites, or is likely to impact upon them, must first have approval from the relevant statutory authority. As well as Natura 2000 sites, SSSIs and AONBs are protected under the Countryside and Rights of Way Act 2000 (CROW Act) as well as the proposed Marine Bill which contains provisions for Coastal Access.

The Northumbria Coast SPA includes much of the coastline between the Tweed and Tees Estuaries in north-east England. In summer the SPA supports important numbers of breeding little tern, whilst in winter the mixture of rocky and sandy shore supports large numbers of turnstone and purple sandpiper.

This whole stretch of coast is included in the Northumberland Shore SSSI. Alnmouth Saltmarsh and Dunes SSSI comprise mature saltmarsh and mudflats behind a single sand dune ridge in the Aln Estuary. This saltmarsh is the largest between Lindisfarne and the Tees Estuary. The sand dunes extend south in a single ridge from the river mouth, and are of interest for the varied plant communities they exhibit, including the transition zone along the saltmarsh interface.

Warkworth Dunes and Saltmarsh SSSI are situated at the mouth of the River Coquet, and comprise an ungrazed dune ridge extending into a kilometre-long spit which shelters an area of saltmarsh. The sand dunes are considered to be amongst the richest in the county, supporting an exceptional diversity of plants and invertebrates. The saltmarsh is the third largest in the county and is one of only five substantial areas on the coast of north-east England.

The whole of Coquet Island is designated as an SPA and SSSI for its breeding seabirds and is also an RSPB reserve. Several species occur at nationally important levels; in excess of 1% of the British breeding population. Of particular note are the significant populations of various tern species: common tern; arctic tern; sandwich tern and the largest colony of roseate terns in the UK. Also, some 500 pairs of eider breed here at their most southerly colony on the east coast and there is also a large population of black-headed gulls, some 2,400 pairs. Details of the individual designations can be found in Appendix D.

Northumberland Coast AONB is designated as a nationally important landscape, under the National Parks and Access to the Countryside Act (1949), whose primary purpose is to conserve and enhance natural beauty. Section 85 of the Countryside and Rights of Way Act 2000 ensures that relevant authorities have regard to this primary purpose. The southern boundary of the AONB is the Coquet Estuary.

Heritage Coasts are a non-statutory landscape definition, and are defined by agreement between the relevant maritime local authorities and Natural England. The North Northumberland Heritage coast stretches from the Scottish border in the north to the sand dunes of Druridge Bay in the south. The impacts of tourism are growing on the coast, and there is a need to safeguard its fine scenery and quiet, almost isolated character.

There are five Scheduled Ancient Monuments (SAMs) in this area:

- Lesbury Bridge.
- The Norse Camp at Alnmouth.
- Warkworth Bridge and defensive gateway.
- St. Mary Magdalene's medieval chapel and associated earthworks, 90m north of Mauldin in Warkworth.

As well as the SAMs listed above, there are four Grade II listed structures within this PDZ. These are the lifeboat station and roadside pant at Alnmouth golf links, the barn / guano storage shed at Buston Links and the mortuary chapel at Church Hill.

Alnwick District Council recognises the importance of the natural environment, which includes the Northumbria Coast SPA and the Northumberland Coast AONB. This natural heritage plays a key role in shaping the sense of place in the district, and is a vital component of the local residences quality of

life, whilst also being a major factor in visitors' perception of the district. In addition to the natural heritage, the district also has an important and attractive built environment. The AONB is a major tourism attraction to the area; however, the extra private traffic and variety of sports and recreational activities can pose threats to the fabric of the landscape. If not managed properly, this could affect the experience that most visitors come to enjoy. Key areas of recreational use are the seafront to the north of Alnmouth and associated golf courses in the area, the more remote use of the shoreline of the main bay and the water use associated with the marina and harbour area at Amble. However, the general coast provides an important resource and access, such as within Foxton Bay, and associated car parks to the south of Amble are important.

The council has identified the importance for social and economic regeneration to provide scope for new business development in Amble. The expected growth in houses, coupled with the growing demand for second, holiday and retirement homes means a continued pressure on development for housing.

The economy of the District of Alnmouth is primarily based on agriculture, and to a lesser extent, deep coal mining, tourism and fishing. Industry has significantly declined in the district; however, there is still a significant fishing operation at Amble, with in excess of 30 vessels employing around 100 people. The harbour is now the second largest on the north-east coast after Eyemouth, in terms of vessel numbers. As such, fishing is an integral part of the local community and vital to the continued prosperity of the town.

There are a number of relevant Biodiversity Action Plans (BAPs) that are relevant to this area including rocky shore and islands, maritime cliffs and slopes, saltmarsh and mudflat, sand dune and common seal. More information on the specifics of these BAPs can be found in **Appendix D**.

Appendix E details the issues and objectives that were brought up through public consultation. These issues and objectives have informed this review as well as the main decision making process. The SEA directive suggests out various receptors that should be included in any SEA. The themes within this **Appendix D** and **Appendix E** address the various receptors as shown below. All the SEA receptors as shown below are assessed within this PDZ (note: some SEA receptors are covered by more than one theme):

Issues and Objectives	Thematic review	SEA Receptor
Environment	Natural Environment	Biodiversity Fauna and flora Water
	Contaminated land	Soil
	Landscape and character	Landscape Material assets Population
Heritage	Historic environment	Cultural heritage
Commercial	Current and future land use	Population Material assets
Recreational		Population
Hard assets		Material assets Population

It can be seen from the above table that Air, Human Health and Climactic Factors are not included. Air and Human Health were scoped out of the assessment as a receptor because the SMP is a high level planning document and as such these receptors are not applicable to this plan. Climatic Factors (especially sea level rise) are integral to the assessment of the SMP and have been considered within each PDZ (Physical Characteristics section).

Environmental issues identified within this area are:

- Variability in channel alignment in Aln Estuary.
- Management and potential loss of amenity in the area north of Alnmouth.
- Potential for Managed Realignment between Alnmouth Bay and Buston Links.
- Erosion of dunes from Alnmouth to Warkworth.
- Potential for Managed Realignment within Warkworth Dunes and Saltmarsh SSSI.
- Recreational disturbance on Coquet Island.
- Variability in channel alignment in Coquet Estuary.
- Potential for saltmarsh/ mudflat creation in Coquet Estuary.
- Erosion of dunes at Amble.
- Erosion of the dunes of Alnmouth Bay (Buston Links).

There are also local areas of potential contaminated land, most specifically associated with the infilled quarry to the rear of Pan Point, but also generally along the Amble harbour frontage. These are currently contained by defences. Other areas of potential risk are identified associated with former military use of land behind Foxtan Bay and at specific points to the back of the main bay.

KEY PRINCIPLES

- To contribute to a sustainable and integrated approach to land use planning.
- To protect and enhance the natural environment.
- To support the cultural heritage.
- To protect people's home from flooding and loss through erosion.
- To protect opportunities for employment.
- To support adaptation by the local coastal communities.
- To maintain or enhance the high quality landscape.
- To minimise reliance on defence.
- To seek opportunity for habitat enhancement.

KEY OBJECTIVES (a full list of objectives for this zone is presented in Appendix E)

- To maintain the main centres of Alnmouth and Amble as viable commercial centres and tourist destinations in a sustainable manner.
- To protect opportunities for employment within these centres.
- To sustain the commercial and recreational operation of the Amble Harbour.
- To maintain the character, navigation to and recreational function of Alnmouth harbour.
- To maintain and enhance the overall amenity of the frontage in general and, in particular, in support of economic regeneration of Amble.
- To manage and reduce flood and erosion risk to the commercial area the harbour and associated areas.
- To sustain recreational opportunities of beaches and associated facilities.
- To maintain or enhance the cultural value of the high quality the landscape.
- To maintain and enhance coastal biodiversity and geological features of interest, in particular those that are designated for features of international or national importance.
- To support appropriate ecological adaptation of habitat.
- To support opportunity for migration of coastal habitat landward.
- To support maintenance of and adaptation of the regional transport link and transport links throughout the area.
- To support adaptation of caravan parks along the coast.
- To support adaptation by the local coastal communities.
- To encourage an integrated approach between development and sustaining the natural function of the coastline.
- To maintain or enhance access to the coast.
- To maintain access to the foreshore for Search and Rescue purposes.

PHYSICAL CHARACTERISTICS

Water levels (mODN)

MLWS	MHWS	HAT	1:10yr	1:25yr	1:50yr	1:100yr	1:200yr
-1.9	2.4	3.1	3.18	3.27	3.36	3.46	3.53

Correction CD to AOD -2.65m

Wave climate

Return Period (1:X years)	Wave Height H_s (m)
1	5.51
10	7.31
100	9.03

Baseline Erosion Rates

Foxtton Bay	0.2m/yr	Over 100 years potential erosion of the order of 70m over central section, reducing to 40m to the south.
Alnmouth dunes	0.1m/yr	Variation in erosion over the 100 years of between 7m and 30m.
Buston Links	0.1m/yr	Variation in erosion over the 100 years of between 25m and 40m.
Warkworth Dunes	0.1 to 0.3m/yr	Variation in erosion over the 100 years of between 25m and 35m.
Amble South	0.1m/yr	Variation in erosion over the 100 years of between 30m and 40m.
High Hauxley Dunes	0.1m/yr	Typical erosion over the 100 years of 15m.

Sea Level Rise assumed rates: 0.05m to year 2025, 0.26m to year 2055, 0.8m to year 2105. Coastal evolution has been examined based on lower rates and higher rates in addition to those assessed above.

Evolutionary Trend

Existing Processes:

The recent strategy study for Alnmouth Bay (Babtie Group 2003), modelled sediment transport over the whole bay, examining five profiles (one in Foxtton Bay, three to the northern end of the main bay and one to the south of Birling Carrs). The results of this, in general terms, confirmed the findings of SMP1, suggesting sediment transport, generally, from the north towards Birling Carrs and from the south over the southern section. Rates varied, with the largest values (larger than predicted by SMP1) occurring to the north of Alnmouth (268,000 m³/yr net movement), with this rate being less within Foxtton Bay and to the south of the River Aln. Northerly net rates of 153,000 m³/yr (compared to 55,000m³ from SMP1) were predicted for the area south of Birling Carrs. A subsequent report (F. Bettess 2007) reviews the historical development of the Alnmouth Beach frontage, indicating significantly less variation of the beach in this area than might be anticipated from the sediment modelling of either the SMP1 or the strategy study, and the prediction of erosion that might accompany such predictions over this area.

The historical evidence with respect to the estuaries, would, however, support the general trends of movement: from north to south in the northern section, and south to north in the southern. The subsequent breach and maintenance of the channel of the River Aln would indicate a far lower sediment net transport rate than modelled. Recent monitoring of the beach behaviour at Alnmouth similarly indicates the ability of the estuary channel to migrate north over the foreshore, and a general onshore/ offshore movement of sand.

Overall, the main bay is seen as being controlled quite strongly by the headland and Coquet Island at its southern end, and by the Marden outcrops to the north, with Foxtan Bay being a relatively independent bay to the north. The shoreline from Amble to Beacon Hill is protected by Coquet Island and relatively well aligned to the south. The main bay is also held, in terms of its inland depth, by the outcrop and harder material associated with Birling Carrs in the centre. Accepting that in the nearshore area there is quite significant movement of sediments, the northern and southern sub-bays, of the main bay, defined by the estuary mouths and Birling Carrs, are considered to be quite stable zones and in combination with nearshore sediment recirculation, relatively closed systems.

The North Breakwater of Coquet Estuary is clearly a significant control of the southern sub-bay. There is a weak point to the root of this breakwater where energy, concentrated down the breakwater, tends to move material away to the north.

The overall pressure is for retreat of the various frontages due to potential sea level rise but, with the exception of Foxtan Bay, with little overall change in alignment. It is concluded that over the main bay the backshore line is relatively stable, being influenced locally by the Aln, to the north, and the local interactions around the North Breakwater, to the south. In Foxtan Bay, the bay continues to erode at the northern end. This re-adjustment continues over the central section but with the southern section remaining relatively stable.

The most southerly section of coast, south of Amble, is stable at present but this depends on the influence of the local headlands.

Unconstrained:

It is only at the southern end of the Foxtan Bay that man-made structures have a significant influence on overall coastal behaviour.

With the absence of any defence, Foxtan Bay would tend to continue to erode back to a more stable configuration. The mouth of the Aln would tend to move to a greater extent, free from the lateral constraint of man-made influence just within the estuary mouth and Alnmouth Beach, and the northern end of Buston Links would tend to erode back.

Within the Aln Estuary, the road bridge potentially imposes some control of the channel, but overall there is little man-made influence on alignment. The increase in tidal prism, due to realignment and sea level rise, will tend to increase the influence of the Aln on the open coast and, in the absence of control at the mouth, there would be widening of the mouth with potentially an increase in the ebb delta, resulting in more prominence seaward of the dune noses to the north. To the south, potentially, as Church Hill is eroded, there would be a tendency for increased infill across the old channel behind Church Hill.

The central section of the main bay would erode back, whilst at the southern end there would be considerably greater variation at the mouth and within the Coquet Estuary. The absence of the North Breakwater would significantly increase wave exposure within the estuary and, in the absence of the defence, there would be substantial erosion back towards the town.

The defence at Pan Point and Island View acts to anchor the coast and within this unconstrained scenario there would be substantially greater erosion of both this frontage and that to the south as a larger bay develops.

MANAGEMENT

Present Management

SMP1 divides the zone into 5 Management Units (MUs). The current policies are:

Management Unit	Policy
MU27 Seaton Point to Alnmouth Bay	Do Nothing
MU28 Alnmouth Estuary	Selectively Hold the Line
MU29 Alnmouth Bay to Amble North Breakwater	Do Nothing
MU30 Amble North Breakwater to Amble South Breakwater	Selectively Hold the Line
MU31 Amble South Breakwater to Hauxley Haven	Do Nothing

Strategies

Alnmouth Bay Strategy

Alnmouth Beach – long term aim to protect but with inadequate economic justification to do so.

Effectively Do Nothing, although subsequent low level management has been carried out.

Alnmouth Estuary – maintain defences

Hold the Line

Alnmouth to Warkworth Dunes – No Active Intervention

Do Nothing

Aln Estuary

Recent realignment of defences within the outer estuary and planned realignment upstream of road bridge

Managed Realignment

Island View Study

The strategy identified a significant economic benefit in providing defence to Island View, taking account of the potential erosion to either side.

Hold the Line

Baseline scenarios for the zone

No Active Intervention (Scenario 1):

With the limited influence of defences over the zone, much of the area would act in the same manner as the unconstrained scenario. There would be differences locally, where defence is in place and this is discussed below.

Foxton Bay would continue to erode and adjust as the influence of the rock outcrops to the north diminishes due to sea level rise, and there is an overall increased pressure for the coast to roll back. The limited defence at Foxton Hall would limit erosion initially but, over the period of the SMP, the Hall could come under threat. The access point in the centre of the bay would eventually be outflanked. Various chalet properties within the area of Seaton Point would also be lost. There would be some limited sediment supply, generally to the south, but this would have only a limited contribution to the general volume in the nearshore area.

Currently along the Alnmouth Beach frontage tank trap blocks are positioned along the backshore. These provide very little protection to direct erosion, although they do tend to reinforce dune development during periods of accretion. Further north along the frontage, works have been undertaken to stabilise the clay bank, this offers some additional reinforcement of the backshore slope. There will continue to be a general retreat with variable rates of erosion of the frontage, particularly in the area of the car park, with the likelihood of an eventual breach of the ridge protecting the golf course. This general behaviour of erosion tends to be intermittent, tending to recreate width for natural dune development. As the erosion continues, the dune would then tend to remain intact as the frontage erodes back. The frontage would be influenced by behaviour at the mouth of the Aln. As the tidal prism within the Aln estuary increases and, eventually, as the defence at the northern side of the mouth is exposed and fails, there is likely to be a movement north of the dune nose, increasing stability in front of southern area of the car park; however, this area would have eroded in the interim period.

At the northern point of the estuary mouth, failure of the defences in the long term would result in loss of the road. Within the estuary, withdrawal of defences would result in increased flood risk to the town and failure of the bank defences just south of the road bridge, on the eastern side of the estuary. This would allow for some realignment of the channel which could result in outflanking of the bridge and eventual loss of the road. Abandoning defences in the upper estuary could impact on the sewage works as sea level rise increases. In the short term, abandoning defences in this area would not substantially increase tidal prism. Long term, the increase in area subject to tidal inundation would increase the prism over the upper period of the tide. This increase in flows through the bridge, is likely to increase erosion of the neck of land south of the bridge, realign the estuary channel and increase pressure on the southern side of the estuary mouth.

To the south of the estuary, defence at Church Hill would fail potentially towards the end of the second epoch, allowing a migration of the estuary mouth to the south. There would be an increasing tendency for sediment to enter the southern side of the estuary, closing off the old channel behind Church Hill and reducing the existing area of saltmarsh. The existing dune line on the open coast to the south of the estuary would erode back.

The main bay frontage would erode back. This would impact locally on the caravan park in the longer term but would also allow natural development of the dunes.

At the southern area of this main bay frontage, even with no maintenance, the North Breakwater would continue to provide shelter of the Amble frontage into the third epoch of the SMP. However, within probably the second epoch, the dunes at the root of the breakwater are likely to breach. This would open a new, secondary channel onto the estuary. The development of this would be uncertain, but it is likely to reduce navigation to the harbour and increase wave exposure to the marina and

areas upstream of the marina. There would be substantial change to the habitat of the estuary, however, such change cannot be predicted from current information.

Within the estuary, increasing sea level rise would result in regular flooding of the main coastal road and a general increase of mudflats, with squeezing of saltmarsh against the natural rising land. This might be compensated by saline inundation of the low lying land to the west of the coastal road; however, this would result in flooding of property to the rear of the marina.

As the breakwater begins to fail, this would increase exposure within the harbour, causing further failure of defences and probable significant erosion to the town. Coupled to the slightly earlier failure of the South Pier, erosion within the harbour area of Amble would be extensive. Under this scenario, use of Amble Harbour would not be tenable and there would be significant economic and socio-economic loss, although occurring to the end of the SMP period.

To the south of the harbour, there would be failure of the defence at Pan Point and failure of the defence at Island View. This would result in loss of property and exposure of potentially contaminated land south of Pan Point. Further south, erosion would continue without significant loss of assets.

<u>MDSF Evaluation</u> <i>(Appendix H)</i>	<i>Assets lost over the time period of the SMP</i>	<i>PValue Damages</i>
<i>Erosion</i>	Foxton Bay: 3 No. residential	£70k
	Alnmouth: No erosion loss within SMP period. Property at risk thereafter.	
	Amble: 1 No. residential 3 No. commercial	£39k £83k
	South Amble: 3 No residential	£75k
<i>Flooding</i>	Aln Estuary Potential high level flood risk to property. Potential Agricultural loss.	£38k £67k
	Amble and Coquet Estuary Potential high level flood risk to property. Potential Agricultural loss.	£328k £73k
<u>Other Information</u>	The Aln Bay strategy identifies potential damages to the Alnmouth Beach area as being £940k. The above damages do not include loss of value in relation to Amble Harbour. Island View PAR identifies potential damages of £352k, although based on this, protection works have now been undertaken.	
<i>Assessment of Key Objectives</i>	Under this option, management fails to maintain the integrity of Alnmouth and Amble, principally in the second and third epochs. It also fails to maintain use of either harbour, failing to support economic regeneration of Amble. It also fails to maintain more formal recreational coastal use and, in particular, use of the Alnmouth Beach area. Reducing intervention does, however, promote a natural coastline supporting the landscape value. Furthermore, removal of defences within the Aln would encourage and support greater ecological diversity. Similarly, abandoning defences within the Coquet addresses concern over saltmarsh loss due to coastal squeeze potentially creating some opportunities for habitat creation within the Coquet estuary.	

With Present Management (Scenario 2):

Over much of the coastline the behaviour and management of the coast would be as the NAI scenario. The key differences are discussed below.

There is no specific policy in relation to Foxton Bay. It is assumed that access to the bay would be adapted and no long term defence, restraining natural development, would be maintained. In the area of Foxton Hall there is no policy for defence and this would resort to No Active Intervention as existing defences fail. As such Foxton Bay would be as NAI.

The strategy for Alnmouth Beach identified inadequate justification for major linear defence. There has, however, been works to manage the frontage. Without a clear policy it is assumed that this is a policy of adaptation to NAI with loss due to flooding of the golf course. Within the estuary, there is a policy to maintain flood defence to the town but with an emerging policy for withdrawal of flood defences to agricultural land. This would increase the tidal prism. With no intervention to the mouth of the estuary to the south, the mouth will widen with erosion and potential infill of the estuary in its southern area. There would be the loss of Church Hill and potential infill of the area behind.

The main bay frontage would respond as in NAI.

The policy for the Amble area is to Hold the Line. This would imply addressing the breach to the north of the North Breakwater and continued defence of the road, the area behind the road and the harbour frontage. Within the estuary there would be a squeeze of saltmarsh, principally over the last epoch. Works to prevent the breach of the dunes would not significantly impact on processes to the main bay.

The policy to the south of Amble is defined by the project appraisal for Island View. Additional protection has been undertaken in this local area and this limits erosion to the area between Island View and Pan Point. At Pan Point itself the policy is for Hold the Line, maintaining protection to the potential infill site. Defence of these areas restricts erosion so that other assets are not lost. South of here the general policy is for NAI, although the protection to Island View assists protection of the church graveyard immediately to the south.

<u>MDSF Evaluation</u> <u>(Appendix H)</u>	<i>Assets lost over the time period of the SMP</i>	<i>PValue Damages</i>
<i>Erosion</i>	Foxton Bay: 3 No. residential Alnmouth: No erosion loss Amble: No erosion loss South Amble: No erosion loss	£42k
<i>Flooding</i>	Aln Estuary Potential Agricultural loss.	£67k

Other Information

Assessment of Key Objectives The WPM scenario maintains the general integrity of Amble and Alnmouth. Although at Alnmouth there would be significant recreational loss through the loss at Foxton and of the Alnmouth golf course. The general area of Alnmouth Beach would be retained as an amenity but alternative access and car parking would be required.

The emerging policy for realignment within the Aln Estuary would redress some loss due to saltmarsh squeeze; however this would be potentially mitigated, in

terms of overall diversity, by the change to the south of the estuary mouth.

There would also be potential loss in diversity within the Coquet Estuary.

In general, landscape values would be maintained but with a potential balance against ecological value.

DISCUSSION AND DETAILED POLICY DEVELOPMENT

Key Interactions in terms of Management Policy

Much of the significant difference between the two scenarios considered above, is in the long term management to the area. This is really in terms of local management, even though quite significant in terms of overall regional values. NAI would be setting a trend whereby there would be substantial change and loss of value to the two main development areas. Overall WPM would be setting a trend for long term loss of ecological value, particularly in terms of habitat development within the Coquet Estuary. With these broader management implications in mind, development of policy can, however, be considered in more detail than that provided by the SMP1.

Marden Rocks provides, and is likely to continue to provide, an effective breakpoint between Foxton Bay and Alnmouth Bay. There is no suggestion that there should be defence over the central section of the main bay and this effectively separates the management around the Aln from that around the Coquet.

Sub-Division and Detailed Assessment

The zone may be split into five management areas, within which individual policy may be determined.

Foxton Bay.

There are four main issues: the threat to properties at Seaton Point and along the northern frontage, the access point to the bay, the management of the golf course and the threat to Foxton Hall.

The north section is naturally realigning and this is likely to increase with sea level rise. This frontage also provides a supply of sediment to the bay allowing the bay shoreline to adjust. At present, the access steps provide a degree of control north and south; however, over the long term this would need to be significantly strengthened with the potential for the hard point to result in increased erosion to the south. It seems improbable that strengthening works to the access point would be justified against risk to assets. Safe access to the bay is, however, considered to be important. Over probably the second epoch, as the steps come under greater pressure, it would be most appropriate to set back the access. Various approaches could be adopted, ranging from actually cutting back an access into the cliff or using steps independent of the slope that can be moved back with erosion.

To the south, the adjustment to the bay has tended to provide sediment in support of defences below Foxton Hall. Any significant action to stop erosion over the centre of the bay would tend to have a negative impact on this supply. Foxton Hall is a valued asset and while this needs to be considered in terms of possible option for protection the intent of management is maintain this asset. The aim would be to manage retention of sediment and slope stability rather than reliance on a hard line of defence. The position within the bay and the influence of the Marden Rocks should make this possible. Over the short term defence in this area can be maintained. Management needs to be reviewed in the medium to long term.

Marden Rocks to the south anchors the coast, limits direct movement of sediment between Foxton Bay and acts to retain material beneath Foxton Hall. The wide expanse of rock outcrop is also highly valued in terms of ecological function.

The overall management scenario is seen as one of adapting to the continued erosion while maintaining the important naturalness and ecological value of the shore. As such, management in the short term of the existing access point reduces the erosion to the north, providing some increase in time before properties are lost. However, their loss, progressively over the next 20 years, needs to be expected. The access point would be retreated during the second epoch, as it starts to dominate the shape of the bay.

Between the access and the Hall, the main issue at present is slope instability. In the short term, over the next 20 years, it is probable that with appropriate management this may be addressed without significant works required to resist erosion. Over that period it would be seen as appropriate that consideration be given as to how the specific aspects of the golf course may be moved such that in the longer term there is no requirement for harder defence of the frontage. This would maintain the important provision of sediment to the south. At Foxton Hall, the existing *ad hoc* defences would be maintained, but with a medium term examination of how these defences may be adjusted and improved to encourage sediment retention and support to the cliff. The intent in the long term would be to Hold the Line in this location, reinforcing the affect of the Marden Rocks and maintaining a high level of beach to the cliff toe. This may result in a minor loss of designated rocky foreshore, although as the intent for the unit to the south is NAI, it is not considered that this loss will be significant. Justification for this, in terms of public funding, would need to be examined in detail.

This management would be specific to the area of the Hall and the coastal slope, to the south, would be allowed to retreat.

Alnmouth Bay and Aln Estuary.

Management within the estuary influences management at the coast. The aim within the estuary is to maintain and improve the ecological function of this important designated area, while still providing important local use and maintaining defence to the town. Potential flood risk to the lower part of the town is relatively low at present, with properties only potentially affected on extreme conditions. The standard of defence has not been determined in detail but is assessed as being of the order of 1:200. This risk would increase with sea level rise. However, raising defences is unlikely to be a significant issue. Furthermore, given the peripheral nature and extent of the area affected, it is unlikely to have a significant impact on the behaviour of the system, or provide significant gains in terms of habitat. It is reasonable to conclude that an appropriate standard of defence may be maintained and the policy to the town frontage would therefore be for Hold the Line. This would be in line with objectives for maintaining the integrity of the town.

In other areas of the estuary, the WPM policy has been to allow abandonment of defences to agricultural land downstream of the road bridge. This again is thought to have minimal impact, at present, on estuary behaviour, although sea level rise will have increased the tidal prism. Upstream of the bridge, a larger area is being considered for realignment. The linear extent of defences and, therefore, the potential cost associated with increasing the standard of defence is unlikely to be justified. Potentially, this increases the area of estuary from the current 40ha to some 70ha; although much of this additional space would only flood on more extreme conditions. More significant would be the long term increase in tidal prism with sea level rise. An increase of 0.8m would tend to result in the upper area of the estuary flooding every tide. Very approximately, the existing estuary prism is of the order of 400,000m³. With a sea level rise of some 0.8m over the 100 years, this might increase by 200,000m³, with potentially an additional 150,000m³ provided by the area upstream of the bridge. While some areas

might be expected to accrete or warp up with increased areas of saltmarsh, this abandonment of defences could increase flow substantially through the road bridge and potential by a factor of two at the mouth of the estuary.

The net effect will be for the mouth of the estuary to widen. At present, there is width enough between the man-made control points for this to happen, although potentially the channel depth may increase in the longer term. As pressure at the mouth increases, should the defences to north and south be abandoned, there is likely to be increased movement of the sand noses, to north and south, to move into the estuary. The consequence to the north would be the loss of the main road access to the estuary frontage of the town. This would be considered to be a major detrimental impact on the town. Maintaining the defence in this area would not be unsustainable and the policy here is for Hold the Line.

The defence at Church Hill is under little pressure at present but this would increase. Failure of this defence would allow the mouth to widen to the south and is likely to reduce overall channel depth. It seems probable that the nose of sand to the south would then extend into the estuary, closing off the saltmarsh area behind Church Hill and resulting in increased erosion of the front face of the dunes. This would change rather than specifically damage the biodiversity in the area, although there would be a slight net loss of intertidal area. To the north of the estuary, the existing sand nose may develop more as a spit, further pushing the estuary to the south. This in turn would encourage movement of sand from the coast to the north, increasing exposure of the Alnmouth Beach frontage.

Holding the Line at Church Hill would control the estuary mouth, maintaining both the saltmarsh area to the rear but also the navigation channel. Holding the mouth in its present position would tend to support the development of the sand noses to the north and south, supporting the coast in these areas.

Overall, in achieving a balance between the natural values of the estuary and the use of the area, the preferred approach would be to encourage withdrawal of defences within the upper estuary but maintaining control at the estuary mouth. In doing this, there is likely to be a need to support defence just downstream of the road bridge on the eastern side, to stop outflanking of the bridge, and further investigation of the potential flood risk to the sewage works south of Lesbury.

Taking this approach within the estuary, and at the estuary mouth, allows consideration of management of Alnmouth Beach. Any future scheme within this area should aim to protect the four Grade II listed buildings at Alnmouth Golf Links, Buston Links and Church Hill.

Based on monitoring, the beach area is seen as being relatively stable but subject to periods of erosion and general pressure for roll back. This latter pressure will increase with sea level rise. At present the management of the frontage has involved minor strengthening of the existing bank and dune ridge, with the use of groynes, light rock toes and matting. The groynes to the northern end of the frontage would appear to reinforce the protection provided by Marden Rocks. These defences are not acting in a classical manner to trap sediment driven through the area by a large consistent drift system. Rather they appear to impose a degree of control during more extreme events, tending to limit or compartmentalise large event driven pressure on the frontage. Similarly, the works protecting the bank act to restrain event driven erosion and still allow accumulation of sediment under more normal conditions. With sea level rise,

there will be increased pressure for erosion from the coast wishing to roll back. The opportunity for sediment accumulation will, therefore, decrease over the longer term. There is likely to be a need over the second and third epochs of the SMP to rethink this approach, allowing some realignment; either setting back these low level defences or introducing harder control points and allowing set back between these. There is little economic justification for major works and a combination of low level control coupled with management of the land behind is the preferred approach. The scope of works should be seen as being limited to management of the narrow dune and bank system, rather than major works which might strongly influence the designated foreshore. An important aspect of the management in the long term is consideration of land use.

The strategy study identified the importance of maintaining the more central golf links frontage in relation to the overall value to the area. However, it also identified that there was no economic justification for major linear defences such as a revetment. Subsequent assessment of potential ecological value indicated that there was no overriding benefit to the ecology in such a linear approach. Indeed, significant hard linear defence of the frontage may damage the important dune system and may act, in the longer term, to reduce the recreational value of the area. The current defence against flooding is an artificial bank which suffers from occasional periods of erosion, most probably associated with change in the estuary channel position. The bank is protected by natural accumulation of sand dunes, although the full value of this is lost due to trampling. There will be increased pressure for roll back of the frontage but because of the nature of the bank, the use of the bank as a car park and the potential risk to the hinterland, the situation is different to the frontage to the north. The frontage is more subject to sudden set backs of several metres, followed by periods of little erosion. The alignment is never fully regained following erosion, with a continuing thinning of the flood defence. The existing bank and the impact of use of the coast, constrain development of a coherent dune system that could then be allowed roll back as a long term defence to the land behind. The intent of management needs to adapt the current management and use of the area to encourage a more natural system approach. This may require a combination of land use management and adaptation, with the possible need for local controls.

The policy for both these frontages will require Managed Realignment with the potential introduction of man-made control but also adaptation of land use. The potential zone of management is estimated to be some 30m in the case of each frontage, but with potential impact due to flood risk extending over the whole golf course width in the case of the central golf links frontage. As over the northern section, the emphasis is in managing the line of dunes and the bank without significant influence with respect to the foreshore.

In terms of the designated habitats within this area the HTL policy within the estuary is likely to cause loss of estuarine habitat through coastal squeeze although this will be mitigated through the realignment in the Inner Estuary. The policy of MR to the north of Amble will create designated intertidal sand banks and intertidal rock whilst the policy of NAI to the south of Amble will encourage the natural development of the dunes systems that are designated within the North Northumberland Dunes SAC.

Birling Links.

The current policy for the main bay frontage of the zone, from the AIn through to the North Breakwater, is for NAI. There is no justification for altering this, with the possible minor exception at the root of the North Breakwater. Here there is a risk of breach in the dunes, with significant consequence to the use and navigation of Amble Harbour.

Maintenance of the breakwater is considered fundamental to the sustaining use of the harbour area and part of this consideration would need to be given to reducing the threat of this breach. The intent of management in this local area would, therefore, be for Managed Realignment, encouraging build up of sediment in this corner. Having established this change over the first two epochs, it would be anticipated that natural development of the slightly realigned coast would be allowed. It is probable that action to realign the dunes in this area would be required in the second epoch but the policy applies across the first and second.

There are identified local points of potential contamination from former use along the main frontage and these would need to be examined in specific detail. However, it is not considered likely that such areas would influence the policy for No Active Intervention. At Birling Carrs, the caravan park may be affected in the long term due to coastal slope instability. No intervention would be recommended; rather adaptation of use of the area should be planned for over the intervening years.

Amble.

The Coquet Estuary and harbour area has undergone significant modification over time tending to reduce the tidal prism, resulting in a tendency for the estuary to accumulate sediment. The changes, particularly in reconfiguring the entrance channel, has allowed development of important intertidal and fringe habitat areas within the inner estuary, within the old course of the river.

The harbour area and town is also important to the region and as an area of economic growth.

Under an overall NAI scenario, the ecological value would be supported to a degree but at significant and unacceptable loss to the socio-economic environment. Under the WPM scenario, the socio-economic environment would be sustained but with potential squeeze of the natural environmental features due to sea level rise, such that there would be reduced value. Rather than being in direct conflict in terms of the key values to the area, such as the harbour and main part of the town where realignment would allow little or no opportunity for ecological gain, it is in management of the inner estuary where opportunity exists.

In terms of the town and harbour, therefore, maintaining defences are essential to meeting the objectives for the area. Key to this, both in terms of defence risk management and in terms of maintaining recreational and commercial use of the area, is the need to maintain the North Breakwater. This conclusion was supported during the study and subsequent work to improve the condition of the breakwater during the late 1980's. Altering this policy would significantly change the overall configuration of the estuary, changing, but not substantially enhancing, habitat development within the estuary. With sea level rise, there would be some increase in the tidal prism and flow regime to the estuary but maintaining the entrance to the estuary is not seen as being unsustainable, and would not substantially alter the depositional nature of the inner estuary. There would be a need to increase flood defence along the harbour frontage but this is assessed as being proportional to the risk and would not affect overall policy for Hold the Line. The South Jetty is founded to, and reinforces the protection afforded by, the natural rock outcrop. A policy of Hold the Line at the South Jetty would not cause coastal squeeze to the rock outcrop directly adjacent to the south side of the South Jetty and the defences are on top of a natural hard rock outcrop. Again, while there would be a need to further improve the defence of this area to provide equivalent standard of protection, the policy for Hold the Line is appropriate.

Management of the navigation to the harbour needs to take account of local impacts on the environment, looking, where possible, to enhance natural biodiversity. This, within the general policy for Hold the Line, needs to be examined at a local scale.

Within the inner estuary, there is concern that increasing sea level rise will result in squeeze of the intertidal areas. Within the area of the old channel, running north from the main harbour, there is little scope for adjustment due to the natural rise in land of the ridge running through from Birling. The caravan park, developed upon this ridge, is not seen as being at risk and the prevention of development within the flood plain in this area would maintain the small opportunity for habitat readjustment.

The main constraint on further natural adjustment is in the area of the road to the north of the marina, to the western flank of the main channel. Behind the road is some 40ha of potential intertidal area. Maintaining the road is seen as being important both locally and regionally. This feature will need to be further protected or raised in the event of sea level rise. However, this would not preclude consideration of opening the area behind to tidal inundation. There are significant assets around the fringe of this low lying land such that detailed consideration would need to be given to high level protection to the back of the area. Regular flooding of the area would potentially contribute significantly to maintaining the ecological value of the estuary. Potentially, the increase in tidal prism would be of the order of 200,000m³ on normal tides, increasing to possibly 600,000m³ with sea level rise. This compares with the existing and potential prism of 800,000m³ and 1,500,000m³, respectively (taking no account of the likely natural sediment infill). Such increases could impact on the dynamics of the estuary and would need to be considered in detail.

Even so, subject to more detailed examination, including the intent to maintain the transport link and potential increase and management of flood risk, the preferred policy within this area is for Managed Realignment.

With regard to the designated sites within this area, there is likely to be loss of designated rocky foreshore habitat at the South Jetty. It is likely that any scheme for maintenance of these defences would require a decision from the Secretary of State stating interests of over-riding public opinion and compensation should be identified. Loss of designated salt marsh, beach and estuarine habitat due to a policy of HTL towards the mouth of the estuary will be mitigated by a policy of MR towards the middle of the estuary. Designated dune habitat which is part of the North Northumberland Dunes SAC will also be enhanced by this policy of MR.

South Amble.

Maintaining the defence to Island View has been examined and found to be justified, works having subsequently been undertaken. In association with the existing defence at Pan Point, this controls the development of the soft frontage between, resulting in no anticipated loss of assets while allowing the coast in this area to develop relatively naturally. The defence running to the south of Pan Point, in addition, provides protection to the potentially contaminated infill area behind Pan Point. Maintenance of both the defence at Pan Point and at Island View, founded as they are to rock, are seen as being sustainable for the period of the SMP. Further development between these two hard points should be prevented allowing natural development of the shoreline.

The graveyard and church to the south of Island View are seen as being under limited threat, although slope instability could impact on the corner of the graveyard. Further

south there is only the car park to the north of Signal Cottage that is at risk; the cottage itself is not anticipated to be at risk. Addressing the potential risk to the graveyard would be seen as a local issue, not precluded by a policy of general MR for the Amble Links frontage. Any loss of designated rocky shore habitat at Island View Bay will be mitigated by the policy of general MR for the Amble Links frontage.

To the south of Signal Cottage, there are no conflicts with the natural development of the shoreline and the current policy of NAI intervention is proposed.

In summary, therefore, the zone is sub-divided into five Management Areas, these being:

- Foxton Bay (three policy units).
- Alnmouth Bay (nine policy units).
- Birling Links (two policy units).
- Amble and Coquet Estuary (five policy units).
- South Amble (three policy units).

The conclusions for each area are summarised in the Management Area statements which follow. First, however, an assessment of the strategic environmental objectives for the three epochs under the scenarios of No Active Intervention, With Present Management and Preferred Policy has been carried out below.

Assessment of Environmental Receptors in the First Epoch (up to 2025)

MA	Policy	Biodiversity	Population	Fauna and Flora	Soil	Water	Material Assets	Cultural Heritage	Landscape
MA12	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA13	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA14	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA15	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA16	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●

Major positive significance  Minor positive significance  Major negative significance  Minor negative significance 

In the first epoch there are not predicted to be any major negative impacts under any of the scenarios. There are likely to be significant positive impacts to biodiversity, flora and fauna from the Managed Realignment at Foxhole Bay and the AIn and Amble estuaries.

Assessment of Environmental Receptors in the Second Epoch (up to 2055)

MA	Policy	Biodiversity	Population	Fauna and Flora	Soil	Water	Material Assets	Cultural Heritage	Landscape
MA12	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA13	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA14	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA15	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA16	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●

Major positive significance ● Minor positive significance ● Major negative significance ● Minor negative significance ●

Under the NAI scenario there are predicted to be significant negative impacts upon population and material assets due to failure of coastal defences leading to increased erosion and flood risk. The WPM and PP scenarios avoid these impacts by protecting the relevant locations. There are likely to be significant positive impacts to biodiversity, flora and fauna from the Managed Realignment at Foxhole Bay and the AIn and Amble estuaries.

Assessment of Environmental Receptors in the Third Epoch (up to 2105)

MA	Policy	Biodiversity	Population	Fauna and Flora	Soil	Water	Material Assets	Cultural Heritage	Landscape
MA12	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA13	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA14	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA15	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA16	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●

Major positive significance ● Minor positive significance ● Major negative significance ● Minor negative significance ●

Under the NAI scenario there are predicted to be significant negative impacts upon population material assets and cultural heritage due to failure of coastal defences leading to increased erosion and flood risk. The WPM and PP scenarios avoid these impacts by protecting the relevant locations. There are likely to be significant positive impacts to biodiversity, flora and fauna from the Managed Realignment at Foxhole Bay and the AIn and Amble estuaries.

MANAGEMENT AREAS

4.3.2 Management Area Policy Statements (MA012- 16)

Location reference:	FOXTON BAY (CH 79.5 TO 81.5)
Management Area reference:	12
Policy Development Zone:	PDZ 3

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: The overall intent of the plan is to maintain the natural development of the bay maintaining the important ecological and landscape values; also to allow natural erosion exposing of the rock outcrops maintaining the ecological function. Within this overall long term intent, access to the bay would be maintained as long as the steps do not significantly alter or constrain transfer of sediment around the bay. At some point, however, it is envisaged that this access point would be to be recreated further back. The slight initial control imposed by the steps does tend to slow erosion to the northern cliff line and while this is maintained, opportunity should be taken in considering how to address medium to long term loss of these properties. Maintaining defence to Foxtton Hall is not seen as imposing significant constraint on the long term general policy for realignment and, although there may be a need too review the manner and funding of defence, the plan does not preclude such works.

PREFERRED POLICY TO IMPLEMENT PLAN

From present day	To allow the bay to develop naturally but proving short term control over the central section and maintaining defences at the southern end.
Medium-term	To allow the bay to develop naturally but retaining access in the centre and realigning defences at the southern end.
Long-term	To allow the bay to develop naturally realigning access in the centre but retaining defences at the southern end.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			Comment
		2025	2055	2105	
12.1	Foxtton Bay	MR	NAI	NAI	Adjust access as bay erodes.
12.2	Golf Club	HTL	MR	HTL	Adjust defences as bay develops.
12.3	Marden Rocks	NAI	NAI	NAI	

Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment

CHANGES FROM PRESENT MANAGEMENT

No significant change from existing policy.

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	0	38	32	70
	Preferred Plan Damages £k PV	0	0	0	0
	Benefits £k PV	0	38	32	70
	Costs of Implementing plan £k PV	0	51	0	51
Costs include for management at Foxton Hall. Description of damage and benefits under preferred plan.					
Heritage	No impacts				
Amenity	Maintains amenity				

IMPLICATION WITH RESPECT OF NATURAL ENVIRONMENT

N.B. The table below is a summary of the potential impacts on sites designated for reasons of national or international nature conservation importance. This table should not be read in isolation, please refer to the narrative included in the Discussion and Detailed Policy Development section of this PDZ. Details of the boundaries of the policy unit can be seen in the Management Area map overleaf.

Designated Site	Designated / supporting habitat	Policy Unit	Impact			Mitigation / compensation
			by 2025	by 2055	by 2105	
Berwickshire and North Northumberland Coast SAC	Large shallow inlets and bays	12.1	Habitat creation	No impact	No impact	N/A
	Intertidal reef	12.2	No impact	No impact	No impact	N/A.
Northumbria Coast SPA	Rocky shore	12.2	No impact	No impact	No impact	N/A.
Northumberland Shore SSSI	Sandy beaches	12.1	Habitat creation	No impact	No impact	N/A
	Intertidal rock	12.2	No impact	No impact	No impact	N/A.
Howick to Seaton Point SSSI	Millstone Grit exposures	12.1	Habitat creation	No impact	No impact	N/A

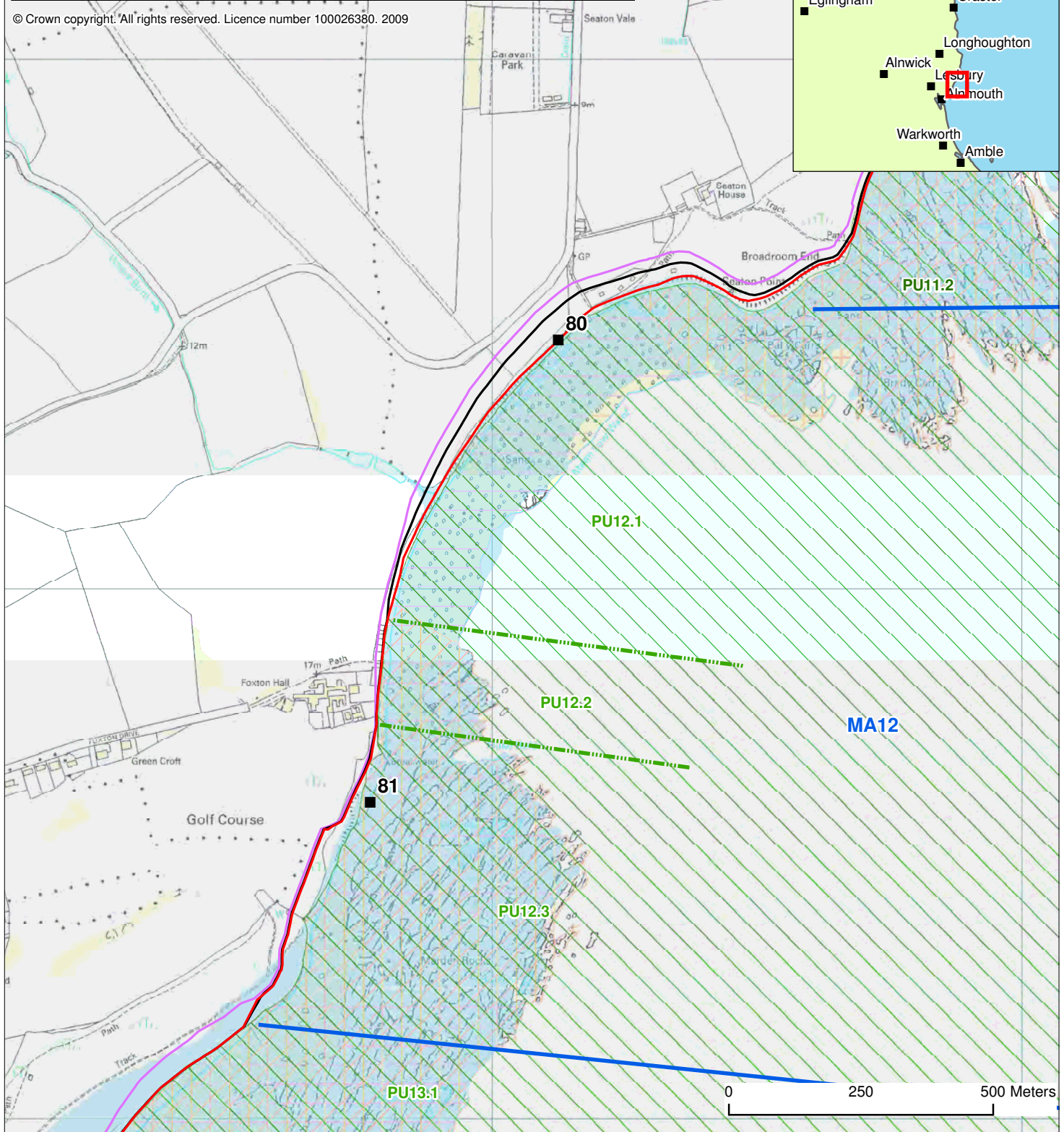
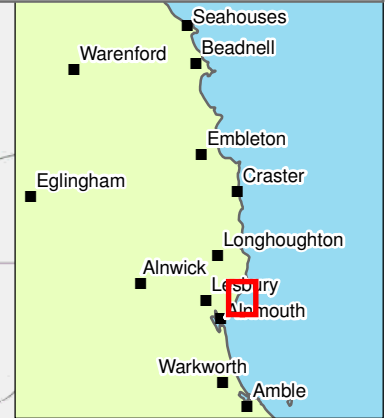
* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan reference should be made to the baseline data.

Policy Development Zone 3 - Seaton Point to Beacon Hill

Management Area 12 - Foxhole Bay (Ch 79.5 to 81.5)

Policy Unit		Policy Plan			
		2025	2055	2105	Comment
12.1	Foxton Bay	MR	NAI	NAI	Adjust access as bay erodes.
12.2	Golf Club	HTL	MR	HTL	Adjust defences as bay develops.
12.3	Marden Rocks	NAI	NAI	NAI	

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Predicted Shoreline Position under Preferred Policy	SPA	Scheduled Ancient Monuments
20 Years	RAMSAR	EA Flood Zone - Sept 07
50 Years	SAC	Management Areas
100 Years	SSSI	Policy Units
	NNR	



ACTION PLAN MANAGEMENT AREA 12

Action	By when	Responsibility	Indicative Cost
<ul style="list-style-type: none"> Planning now to set back the access steps in Foxton Bay. 	2030	Alnwick DC	Nominal
<ul style="list-style-type: none"> Investigate how <i>ad hoc</i> defences at Foxton Hall can be adapted to encourage sediment retention. 	2025	Alnwick DC	£10k
<ul style="list-style-type: none"> Coastal monitoring. 	Ongoing	Alnwick DC	Ongoing
Schemes:			
<ul style="list-style-type: none"> Set back the access steps. 	2030	Alnwick DC	£10k
<ul style="list-style-type: none"> Maintenance of existing defence assets recommended. 	Ongoing	Alnwick DC	Revenue

In addition to this detailed Action Plan for this specific Management Area, a high-level strategic Action Plan for the whole SMP area is provided in Section 7.

Coastal monitoring is also discussed in Section 7 and this is relevant to the whole SMP2 area as well as some specific frontages.

Location reference:	ALNMOUTH BAY (81.5 TO 85.5)
Management Area reference:	13
Policy Development Zone:	PDZ 3

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: The overall intent for management of the area comprises three distinct but interlinked aspects. Within the Estuary, the plan supports the emerging policy for realignment of defences to low lying agricultural land in an attempt to redress the impact of sea level rise on designated habitat. This would require management of the estuary mouth so as to maintain the integrity of Alnmouth and allow management of issues in relation to the open coast. The town would continue to be defended. On the open coast to the south, natural processes would be sustained and to the north, actions would be developed to allow necessary realignment while reducing the impact on the land use and recreational value.

PREFERRED POLICY TO IMPLEMENT PLAN	
From present day	Maintain overall position of the bay through realignment along the golf course frontage, maintaining the entrance channel to the estuary by holding either side. Allow realignment with the estuary but maintaining local flood defence to properties.
Medium-term	Maintain overall position of the bay through realignment along the golf course frontage, maintaining the entrance channel to the estuary by holding either side. Allow realignment with the estuary but maintaining local flood defence to properties.
Long-term	Maintain overall position of the bay through realignment along the golf course frontage, maintaining the entrance channel to the estuary by holding either side. Allow realignment with the estuary but maintaining local flood defence to properties.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			
		2025	2055	2105	Comment
13.1	North Links	MR	MR	MR	Maintain and adjust bank with groyne.
13.2	Golf Links	MR	MR	MR	Re-shape frontage to retain sediment.
13.3	Alnmouth Corner	HTL	HTL	HTL	To maintain estuary shape.
13.4	Estuary Outer North	HTL	HTL	HTL	Maintain flood defence.
13.5	Bridge frontage	HTL	HTL	HTL	
13.6	Estuary Inner	MR	MR	MR	Local flood defence.
13.7	Estuary Outer South	NAI	NAI	NAI	
13.8	Church Hill	HTL	HTL	HTL	To maintain shape of estuary.
13.9	Buston Links	NAI	NAI	NAI	

Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment

CHANGES FROM PRESENT MANAGEMENT

The policy within areas of the estuary would change in detail to allow more sustainable development. The policy for the open coast to the north of the town changes from NAI to Managed Realignment, recognising the values identified by the strategy and to allow management of this.

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	44	36	25	105
	Preferred Plan Damages £k PV	28	23	16	67
	Benefits £k PV	16	13	9	38
	Costs of Implementing plan £k PV	108	4	24	136
Costs estimated for retreat of existing line.					
Description of damage and benefits under preferred plan.					
Management of dune frontage to maintain amenity and long term stability for town.					
Manage long term risk to town					
Heritage	Maintains heritage				
Amenity	Maintains amenity				

IMPLICATION WITH RESPECT OF NATURAL ENVIRONMENT

N.B. The table below is a summary of the potential impacts on sites designated for reasons of national or international nature conservation importance. This table should not be read in isolation, please refer to the narrative included in the Discussion and Detailed Policy Development section of this PDZ. Details of the boundaries of the policy unit can be seen in the Management Area map overleaf.

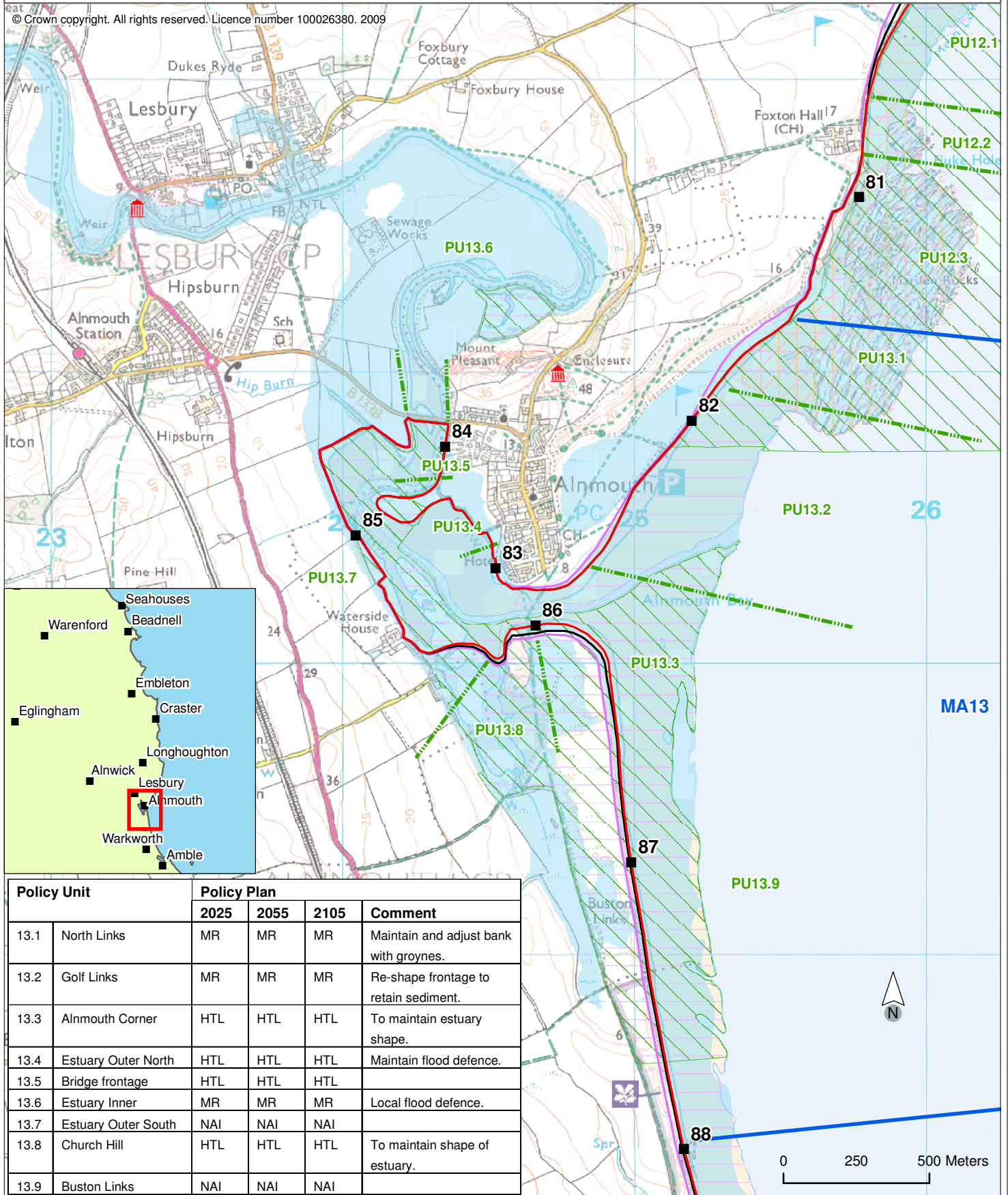
Designated Site	Designated / supporting habitat	Policy Unit	Impact			Mitigation / compensation
			by 2025	by 2055	by 2105	
Berwickshire and North Northumberland Coast SAC	Intertidal mudflat and sandbanks	13.1 13.2	Habitat creation	Habitat creation	Habitat creation	N/A
	Estuaries	13.3 13.4 13.5	Habitat loss	Habitat loss	Habitat loss	Mitigated through MR in Inner Estuary (13.6)
	Intertidal reef	13.1	No impact	No impact	No impact	N/A
	Large shallow inlets and bays	13.1 13.2	Habitat creation	Habitat creation	Habitat creation	N/A
North Northumberland Dunes SAC	Embryonic dunes	13.7 13.8 13.9	No impact	No impact	No impact	N/A
	White dunes	13.7 13.8 13.9	No impact	No impact	No impact	N/A
	Grey dunes	13.7 13.8 13.9	No impact	No impact	No impact	N/A
Northumbria Coast SPA	Rocky shore	13.1	No impact	No impact	No impact	N/A
Northumberland Shore SSSI	Salt marsh	13.3 13.4 13.5	Habitat loss	Habitat loss	Habitat loss	Mitigated through MR in Inner Estuary (13.6)
	Estuarine areas	13.3 13.4 13.5	Habitat loss	Habitat loss	Habitat loss	Mitigated through MR in Inner Estuary (13.6)
	Sandy beaches	13.1 13.2	Habitat creation	Habitat creation	Habitat creation	N/A
	Intertidal rock	13.1	No impact	No impact	No impact	N/A

Alnmouth Saltmarsh and Dunes SSSI	Salt marsh	13.3 13.4 13.5	Habitat loss	Habitat loss	Habitat loss	Mitigated through MR in Inner Estuary (13.6)
	Dunes	13.7 13.8 13.9	No impact	No impact	No impact	N/A
	Mudflats	13.3 13.4 13.5	Habitat loss	Habitat loss	Habitat loss	Mitigated through MR in Inner Estuary (13.6)

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan reference should be made to the baseline data.

Policy Development Zone 3 - Seaton Point to Beacon Hill Management Area 13 - Alnmouth Bay (Ch 81.5 to 85.5)

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Policy Unit		Policy Plan			
		2025	2055	2105	Comment
13.1	North Links	MR	MR	MR	Maintain and adjust bank with groynes.
13.2	Golf Links	MR	MR	MR	Re-shape frontage to retain sediment.
13.3	Alnmouth Corner	HTL	HTL	HTL	To maintain estuary shape.
13.4	Estuary Outer North	HTL	HTL	HTL	Maintain flood defence.
13.5	Bridge frontage	HTL	HTL	HTL	
13.6	Estuary Inner	MR	MR	MR	Local flood defence.
13.7	Estuary Outer South	NAI	NAI	NAI	
13.8	Church Hill	HTL	HTL	HTL	To maintain shape of estuary.
13.9	Buston Links	NAI	NAI	NAI	

Predicted Shoreline Position under Preferred Policy

- 20 Years
- 50 Years
- 100 Years

- SPA
- RAMSAR
- SAC
- SSSI
- NNR

- Scheduled Ancient Monuments
- EA Flood Zone - Sept 07
- Management Areas
- Policy Units



ACTION PLAN MANAGEMENT AREA 13

Action	By when	Responsibility	Indicative Cost
<ul style="list-style-type: none"> Adapt the present land use to allow a more natural system approach to management. 	Ongoing	Alnwick DC Planners	Nominal
<ul style="list-style-type: none"> Formal review of Alnmouth Strategy 	2010	Alnwick DC	£25k
<ul style="list-style-type: none"> Coastal monitoring. 	Ongoing	Alnwick DC	Ongoing
Schemes:			
<ul style="list-style-type: none"> Alnmouth Bay adaptation 	2011 onwards	Alnwick DC	£450k
<ul style="list-style-type: none"> Possible reinforcement of management at the mouth of the River Aln to HTL. 	2055	Alnwick DC	£100k
<ul style="list-style-type: none"> Maintenance of existing defence assets recommended. 	Ongoing	Alnwick DC	Revenue

In addition to this detailed Action Plan for this specific Management Area, a high-level strategic Action Plan for the whole SMP area is provided in Section 7.

Coastal monitoring is also discussed in Section 7 and this is relevant to the whole SMP2 area as well as some specific frontages.

Location reference:	BIRLING LINKS (CH 85.5 TO 92)
Management Area reference:	14
Policy Development Zone:	PDZ 3

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: The intent of the plan is to allow natural development of the frontage. However, there needs to be some intervention at the southern end to allow transition between the natural behaviour of the coast and the policy of maintaining the entrance to the harbour and estuary.

PREFERRED POLICY TO IMPLEMENT PLAN

From present day To allow natural realignment but maintaining integrity of North Breakwater.

Medium-term To allow natural realignment but reinforcing defence at root of North Breakwater.

Long-term To allow natural realignment but maintaining integrity of North Breakwater.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			
		2025	2055	2105	Comment
14.1	Birling Links	NAI	NAI	NAI	
14.2	Breakwater Dunes	MR	MR	NAI	Encourage sediment build up in corner.

Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment

CHANGES FROM PRESENT MANAGEMENT

No substantial change in policy.

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	13	10	7	14
	Preferred Plan Damages £k PV	13	10	7	14
	Benefits £k PV	0	0	0	0
	Costs of Implementing plan £k PV	0	36	0	36
Costs estimated for management to the root of the North Breakwater. Description of damage and benefits under preferred plan. Maintains integrity of breakwater.					
Heritage	No impacts				
Amenity	Maintains amenity				

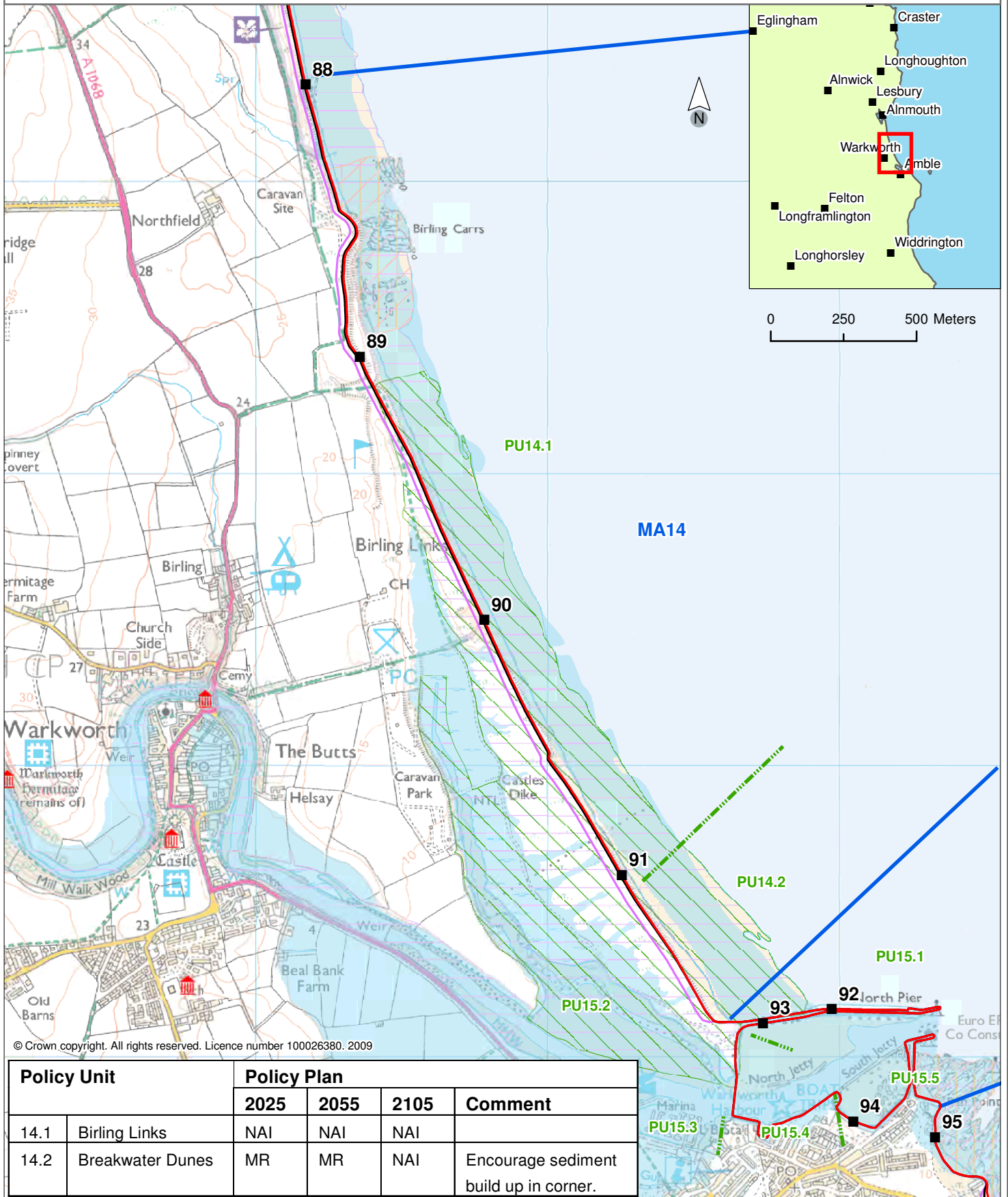
IMPLICATION WITH RESPECT OF NATURAL ENVIRONMENT

N.B. The table below is a summary of the potential impacts on sites designated for reasons of national or international nature conservation importance. This table should not be read in isolation, please refer to the narrative included in the Discussion and Detailed Policy Development section of this PDZ. Details of the boundaries of the policy unit can be seen in the Management Area map overleaf.

Designated Site	Designated / supporting habitat	Policy Unit	Impact			Mitigation / compensation
			by 2025	by 2055	by 2105	
North Northumberland Dunes SAC	Embryonic dunes	14.1 14.2	No impact	Habitat creation	No impact	N/A
	White dunes	14.1 14.2	No impact	Habitat creation	No impact	N/A
	Grey dunes	14.1 14.2	No impact	Habitat creation	No impact	N/A
Northumbria Coast SPA	Rocky shore	14.1	No impact	No impact	No impact	N/A
Northumberland Shore SSSI	Sandy beaches	14.1 14.2	No impact	Habitat creation	No impact	N/A
Warkworth Dunes and Saltmarsh SSSI	Dunes	14.1 14.2	No impact	Habitat creation	No impact	N/A

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan reference should be made to the baseline data.

Policy Development Zone 3 - Seaton Point to Beacon Hill
Management Area 14 - Birling Links (Ch 85.5 to 92)



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Policy Unit		Policy Plan			
		2025	2055	2105	Comment
14.1	Birling Links	NAI	NAI	NAI	
14.2	Breakwater Dunes	MR	MR	NAI	Encourage sediment build up in corner.

Predicted Shoreline Position under Preferred Policy 20 Years 50 Years 100 Years	SPA RAMSAR SAC SSSI NNR	Scheduled Ancient Monuments EA Flood Zone - Sept 07 Management Areas Policy Units
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ACTION PLAN MANAGEMENT AREA 14

Action	By when	Responsibility	Indicative Cost
<ul style="list-style-type: none"> Plan for longer-term adaptation of Birling Carrs Caravan Park. 	2105	Caravan Park	Nominal
<ul style="list-style-type: none"> Coastal monitoring. 	Ongoing	Alnwick DC	Ongoing
Schemes:			
<ul style="list-style-type: none"> Locally encourage build up of sediment adjacent to North Breakwater to prevent breaching t root. 	2055	Alnwick DC	£50k
<ul style="list-style-type: none"> Maintenance of existing defence assets recommended. 	Ongoing	Alnwick DC	Revenue

In addition to this detailed Action Plan for this specific Management Area, a high-level strategic Action Plan for the whole SMP area is provided in Section 7.

Coastal monitoring is also discussed in Section 7 and this is relevant to the whole SMP2 area as well as some specific frontages.

Location reference:	AMBLE (92 TO 94.5)
Management Area reference:	15
Policy Development Zone:	PDZ 3

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: The intent of the plan is to maintain the long term viability of the harbour and town. While such a policy will not directly compromise the integrity of the important natural habitats, it is recognised that sea level rise will tend to reduce this overall integrity and Hold the Line within the estuary mouth will not act to address this. As such, the plan recommends consideration of realignment inland of the road within the inner estuary. This needs to consider the impact on flood risk and potential influence of flows at the mouth.

PREFERRED POLICY TO IMPLEMENT PLAN

From present day	Maintain shape and integrity of the entrance and defence to the harbour but to allow natural development with the inner estuary.
Medium-term	Maintain shape and integrity of the entrance and defence to the harbour but to investigate potential for realignment within the inner estuary.
Long-term	Maintain shape and integrity of the entrance and defence to the harbour but to investigate potential for realignment within the inner estuary, with the potential need for local flood defence.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			Comment
		2025	2055	2105	
15.1	North Breakwater	HTL	HTL	HTL	
15.2	Inner Estuary	MR	MR	MR	Maintain and enhance habitat.
15.3	Marina Area	HTL	HTL	HTL	
15.4	Harbour	HTL	HTL	HTL	
15.5	South Jetty	HTL	HTL	HTL	

Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment

CHANGES FROM PRESENT MANAGEMENT

The policy within areas of the estuary would change in detail to allow more sustainable development but the overall SMP1 policy for sustaining Amble remains unchanged.

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	169	261	34	524
	Preferred Plan Damages £k PV	24	19	13	56
	Benefits £k PV	145	242	21	408
	Costs of Implementing plan £k PV	7	12	464	483
Costs for management of the Harbour and town area. Description of damage and benefits under preferred plan. Maintains harbour and harbour area of the town.					
Heritage	No impacts				
Amenity	Maintains amenity				

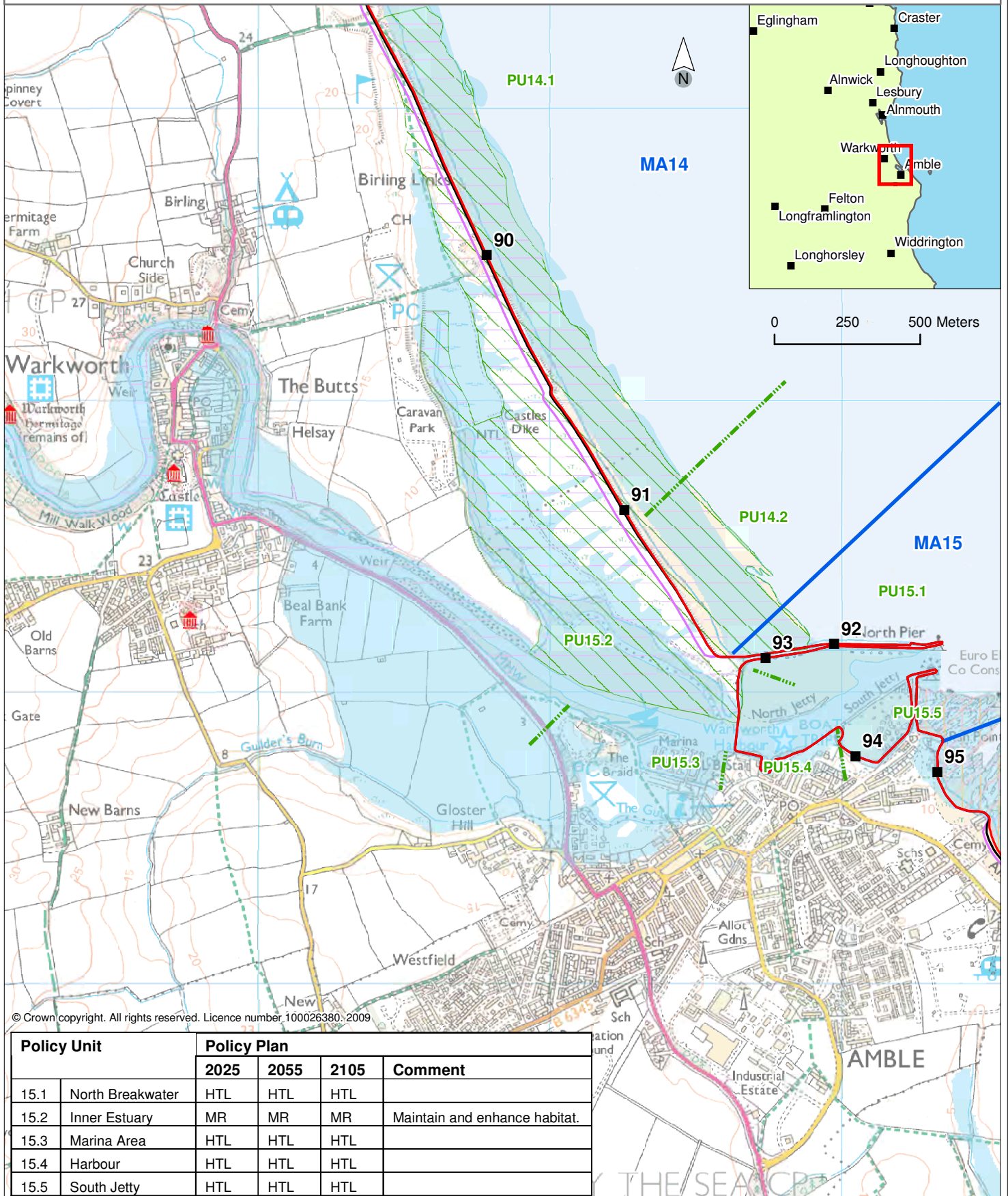
IMPLICATION WITH RESPECT OF NATURAL ENVIRONMENT

N.B. The table below is a summary of the potential impacts on sites designated for reasons of national or international nature conservation importance. This table should not be read in isolation, please refer to the narrative included in the Discussion and Detailed Policy Development section of this PDZ. Details of the boundaries of the policy unit can be seen in the Management Area map overleaf.

Designated Site	Designated / supporting habitat	Policy Unit	Impact			Mitigation / compensation
			by 2025	by 2055	by 2105	
North Northumberland Dunes SAC	Embryonic dunes	15.2	Habitat creation	Habitat creation	Habitat creation	N/A
	White dunes	15.2	Habitat creation	Habitat creation	Habitat creation	N/A
	Grey dunes	15.2	Habitat creation	Habitat creation	Habitat creation	N/A
Northumbria Coast SPA	Rocky shore	15.5	No impact	No impact	No impact	N/A
Northumberland Shore SSSI	Rocky shore	15.5	No impact	No impact	No impact	N/A
	Estuarine areas	15.3	Habitat loss	Habitat loss	Habitat loss	Mitigated by MR in Inner Estuary (15.2)
		15.4				
	Salt marsh	15.3	Habitat loss	Habitat loss	Habitat loss	Mitigated by MR in Inner Estuary (15.2)
15.4						
Sandy beaches	15.3	Habitat loss	Habitat loss	Habitat loss	Mitigated by MR in Inner Estuary (15.2)	
	15.4					
Warkworth Dunes and Saltmarsh SSSI	Salt marsh	15.3	Habitat loss	Habitat loss	Habitat loss	Mitigated by MR in Inner Estuary (15.2)
		15.4				
	Dunes	15.2	Habitat creation	Habitat creation	Habitat creation	N/A

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan reference should be made to the baseline data.

**Policy Development Zone 3 - Seaton Point to Beacon Hill
Management Area 15 - Amble (Ch 92 to 94.5)**



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Policy Unit		Policy Plan			
		2025	2055	2105	Comment
15.1	North Breakwater	HTL	HTL	HTL	
15.2	Inner Estuary	MR	MR	MR	Maintain and enhance habitat.
15.3	Marina Area	HTL	HTL	HTL	
15.4	Harbour	HTL	HTL	HTL	
15.5	South Jetty	HTL	HTL	HTL	

Predicted Shoreline Position under Preferred Policy

- 20 Years
- 50 Years
- 100 Years

- SPA
- RAMSAR
- SAC
- SSSI
- NNR

- Scheduled Ancient Monuments
- EA Flood Zone - Sept 07
- Management Areas
- - - - Policy Units



ACTION PLAN MANAGEMENT AREA 15

Action	By when	Responsibility	Indicative Cost
<ul style="list-style-type: none"> Investigations into structural condition of North Breakwater. 	2009	Alnwick DC	£50k
<ul style="list-style-type: none"> Investigate need to raise road and habitat enhancement opportunities to west of marina. 	2025	Alnwick DC	£30k
<ul style="list-style-type: none"> Coastal monitoring. 	Ongoing	Alnwick DC	Ongoing
Schemes:			
<ul style="list-style-type: none"> Improvement works to North Breakwater. 	2025	Alnwick DC	£500k
<ul style="list-style-type: none"> Improvement works to seawalls in Little Shore Wave Basin. 	2011	Alnwick DC	£200k
<ul style="list-style-type: none"> Maintenance of existing defence assets recommended. 	Ongoing	Alnwick DC	Revenue

In addition to this detailed Action Plan for this specific Management Area, a high-level strategic Action Plan for the whole SMP area is provided in Section 7.

Coastal monitoring is also discussed in Section 7 and this is relevant to the whole SMP2 area as well as some specific frontages.

Location reference:	SOUTH AMBLE (CH 94.5 TO 97)
Management Area reference:	16
Policy Development Zone:	PDZ 3

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: The plan aims to maintain the strategic and local control to areas immediately south of Amble but this being within a general long term policy to allow natural readjustment of the coast to pressure of sea level rise.

PREFERRED POLICY TO IMPLEMENT PLAN	
From present day	Maintain defence immediately south of Amble but allow other areas to develop naturally.
Medium-term	Maintain defence immediately south of Amble but allow other areas to develop naturally.
Long-term	Maintain defence immediately south of Amble but allow other areas to develop naturally.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			
		2025	2055	2105	Comment
16.1	Island View Bay	HTL	HTL	HTL	By maintaining defence at Pan Point and Island View but allow the coast between to adjust.
16.2	Amble Links	MR	NAI	NAI	Retreat the area of the car park but review need for maintaining stability of the coastal slope to the graveyard.
16.3	Coquet Bay	NAI	NAI	NAI	

Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment

CHANGES FROM PRESENT MANAGEMENT

No substantial change from policy implied by the Island View Study.

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	0	62	12	75
	Preferred Plan Damages £k PV	0	0	0	0
	Benefits £k PV	0	62	12	75
	Costs of Implementing plan £k PV	23	25	11	59
Costs for management of currently defended areas. Description of damage and benefits under preferred plan. Maintains property and defends potentially contaminated land fill.					
Heritage	No impact				
Amenity	Maintains amenity				

IMPLICATION WITH RESPECT OF NATURAL ENVIRONMENT

N.B. The table below is a summary of the potential impacts on sites designated for reasons of national or international nature conservation importance. This table should not be read in isolation, please refer to the narrative included in the Discussion and Detailed Policy Development section of this PDZ. Details of the boundaries of the policy unit can be seen in the Management Area map overleaf.

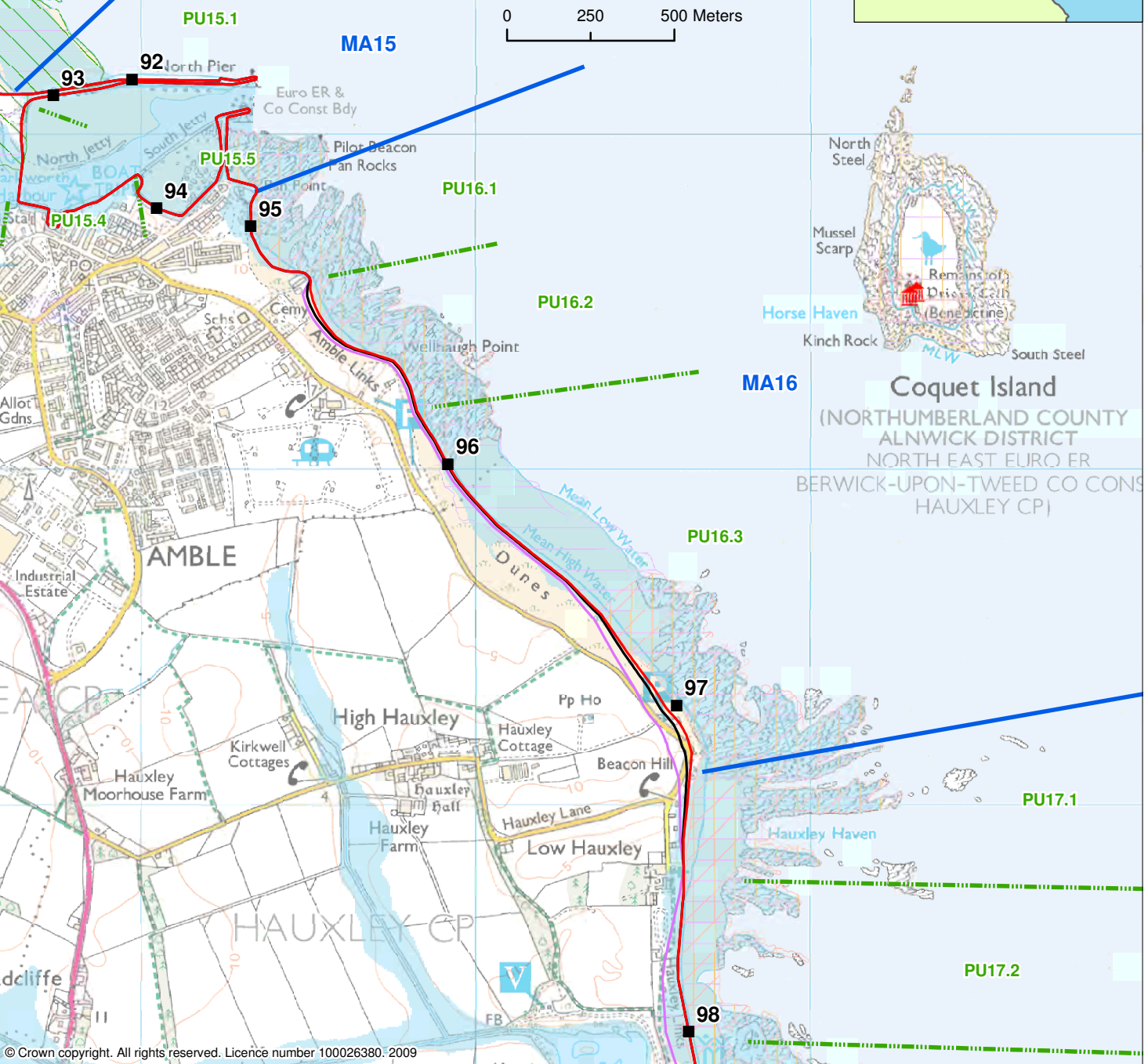
Designated Site	Designated / supporting habitat	Policy Unit	Impact			Mitigation / compensation
			by 2025	by 2055	by 2105	
Coquet Island SPA	Coquet Island*	N/A	No impact	No impact	No impact	N/A
Northumbria Coast SPA	Rocky shore	16.1	Habitat loss	Habitat loss	Habitat loss	Habitat loss mitigated for by MR at Amble Links (16.2)
Northumberland Shore SSSI	Intertidal rock	16.1	Habitat loss	Habitat loss	Habitat loss	Habitat loss mitigated for by MR at Amble Links (16.2)
	Sandy beaches	16.3	No impact	No impact	No impact	N/A
Coquet Island SSSI	Coquet Island*	N/A	No impact	No impact	No impact	N/A

* The whole of Coquet Island is designated for its breeding seabirds

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan reference should be made to the baseline data.

Policy Development Zone 3 - Seaton Point to Beacon Hill
Management Area 16 - South Amble (Ch 94.5 to 97)

Policy Unit		Policy Plan			Comment
		2025	2055	2105	
16.1	Island View Bay	HTL	HTL	HTL	By maintaining defence at Pan Point and Island View but allow the coast between to adjust.
16.2	Amble Links	MR	NAI	NAI	Retreat the area of the car park but review need for maintaining stability of the coastal slope to the graveyard.
16.3	Coquet Bay	NAI	NAI	NAI	



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Predicted Shoreline Position under Preferred Policy	SPA	Scheduled Ancient Monuments
20 Years	RAMSAR	EA Flood Zone - Sept 07
50 Years	SAC	Management Areas
100 Years	SSSI	Policy Units
	NNR	



ACTION PLAN MANAGEMENT AREA 16

Action	By when	Responsibility	Indicative Cost
<ul style="list-style-type: none"> Investigate local risk to the cemetery at South Amble from instability of the coastal slope. 	2011	Alnwick DC	£30k
<ul style="list-style-type: none"> Coastal monitoring. 	Ongoing	Alnwick DC	Ongoing
Schemes:			
<ul style="list-style-type: none"> Future works at South Amble 	2025	Alnwick DC	£500k
<ul style="list-style-type: none"> Maintenance of existing defence assets recommended. 	Ongoing	Alnwick DC	Revenue

In addition to this detailed Action Plan for this specific Management Area, a high-level strategic Action Plan for the whole SMP area is provided in Section 7.

Coastal monitoring is also discussed in Section 7 and this is relevant to the whole SMP2 area as well as some specific frontages.

4.4 PDZ 4 Beacon Hill to Beacon Point (Ch 97 to 113)

4.4.1 Policy Development Analysis

DESCRIPTION

Physical

The zone comprises two main bays, that of Druridge and Lynemouth. To the northern end is a short section of straighter coastline formed between two areas of rocky outcrop (the Beacon Hill Carrs and the Bondi Carr) and forming a general headland to Druridge Bay. Druridge Bay is separated from Lynemouth Bay by a similar, but more prominent, area of rock outcrop starting at Cresswell. Here the rock (the Scars) extends some 500m offshore creating, almost, a low natural breakwater running 1km along the coast. This section concludes at the southern end with the smaller but higher rock outcrop of Snab Point. The rock outcrop from Snab Point extends as a lower feature over the northern end of Lynemouth Bay (the Headagee). To the south of Lynemouth Bay is Beacon Point which extends out into deeper water closing off shoreline sediment movement of the zone.

The northern headland is formed of relatively soft tills. At Beacon Hill this is locally underlain with a harder rock base, while behind Bondi Carr there is softer erodable material to the base of the till cliff. The village of Low Hauxley sits to the centre of this headland at a generally low level, being vulnerable to flooding. To the north is an area occupied by a group of well established chalets, some now having been developed and are permanent residences. These are towards the rising land of Beacon Hill. The main coastal road from South Amble runs behind Beacon Hill, joining the inland road from High Hauxley and then running down to Low Hauxley as the village's only access.

To the south of Low Hauxley is a caravan park, set back from the coast, and the Hauxley Nature Reserve, with its brackish ponds close behind the dune covered till coastline. These wetlands were created by the restoration of an open-cast coal site and are not natural features. Low Hauxley is protected by a large rock revetment providing both flood and coast protection to the village. This protection to the shoreline is continued to the south with a structure composed of concrete blocks.

South of Bondi Carr is the northern end of Druridge Bay. At this northern end, the bay is backed by low eroding till cliffs. The line of the bay is held slightly forward by the small rock outcrop of Hadston Carrs, some 1.5km south of Bondi Carr. It is some 500m south of here that the nature of the backshore to the bay changes in nature to dunes. Just to the rear of this transition is the Druridge Bay Country Park Centre, together with the large Ladyburn freshwater lake. The lake's outfall runs north cutting through the till backed coast as a concrete culvert behind Hadston Carr. The country park included the dune system from just south of Low Hauxley to Chibburn mouth.

South of the Park Centre, the land level, behind the dunes at the shore, decreases such that the initial 600m from the dunes lies within the potential coastal flood plain. This area is scattered with small areas of standing water and ponds within open agricultural land. The dune width is typically 100m wide over the remaining 6.5km to Cresswell, making this the longest length of dune in the SMP area. The form of the dune, typical of the open shoreline of the east coast, is for a relatively natural high single front ridge with a wider more stable back slope. Behind the dune, over most of its length, is an access route. Only to the north of the Country Park centre and between the villages of Druridge and Cresswell, where the land tends to rise, is this a formal road. This southerly section is the main coastal road. The section north of the Country Park Centre is an access road to the shore. The road to the north is vulnerable to loss due to erosion. The road to the south is subject to coastal flooding.

The dune line is cut at several locations by small streams flowing from the ponds inland. These streams are generally, with the exception of the Cresswell Ponds to the south, controlled by sluices and, even in the case of the Cresswell ponds, are frequently closed off by beach material. The dune line and coast is pulled forward by the Scars at Cresswell, with the village situated over the higher

area of till and rock at the southern limit of the bay.

Protection to the village comprises defences founded to the higher rock outcrop, generally having little impact on the behaviour of the shore.

Between Cresswell and Snab Point the coast road runs to the top of a till coastal slope with a limited area of sand to the toe. The cliff shows signs of slumping. To the rear of the road is a caravan park.

Snab Point comprises a mixture of rock and till slopes, and recent works have been undertaken privately to stabilise one section of this, aiming to protect a property behind. There are several other properties set back further from the coastal edge.

The coast to the south of Snab Point is initially steep harder rock, giving way to a well vegetated but softer coastal slope. The coast road continues to the crest of this slope. This section being the start of Lynemouth Bay. The bay used to be subject to tipping of major amounts of mining waste. Since this tipping ceased, a considerable amount of material has eroded away, exposing the rock outcrop foreshore at the northern end. Some material has, however been retained behind the Headagee, in the area of Cresswell Home Farm.

South of here the erosion continues to Lyne Hill and the mouth of the River Lyne. The power station to the south of the river has been recently protected by major improvements to its rock revetment. With erosion to either side, this structure is designed to become a promontory over the next fifty years and will control movement of material along the frontage. Within this controlling influence the short length to the south is forming as a dune, protecting the former industrial area behind.

Environment

This area has great natural conservation importance. It includes the following designated sites:

- Northumbria Coast SPA
- Northumbria Coast Ramsar Site
- Northumberland Shore SSSI
- Low Hauxley Shore SSSI
- Hadston Links SSSI
- Cresswell Ponds SSSI
- Cresswell and Newbiggin Shores SSSI
- Farne Islands NNR
- North Northumberland Heritage Coast

Further detail regarding these sites can be found in Appendix D. Where proposed policies may have potential impacts on designated features these are discussed in the discussion and detailed policy development section and listed in the summary of preferred plan recommendations and justification section under implications with respect of the natural environment.

In the UK these Natura 2000 sites have legal requirements for protection (The Conservation (Natural Habitats, *et.c.*) Regulations 1994, and the Wildlife & Countryside Act 1981, as amended) to maintain their designated conservation value. Any activity that occurs within any of these designated sites, or is likely to impact upon them, must first have approval from the relevant statutory authority. As well as Natura 2000 sites, SSSIs and AONBs are protected under the Countryside and Rights of Way Act 2000 (CROW Act) as well as the proposed Marine Bill which contains provisions for Coastal Access.

The Northumbria Coast SPA includes much of the coastline between the Tweed and Tees Estuaries in north-east England. In summer the SPA supports important numbers of breeding little tern, whilst in winter the mixture of rocky and sandy shore supports large numbers of turnstone and purple sandpiper.

Low Hauxley Shore SSSI, important for Quaternary studies, has been cited for its geological interests and is included in the GCR. Hadston Links SSSI, situated on the north side of Druridge Bay, is a coastal dune ridge system, important for the diverse plant communities associated with a complex of wet and dry dune hollows. Several plants occur here which are uncommon on the Northumberland coast.

Cresswell Ponds SSSI comprises a large pond, which is the only permanent brackish water lagoon on the Northumberland coast, and two, smaller, freshwater ponds, which formed in 1958 as a result of mining subsidence. The main pond is connected to the sea by a short outfall stream which allows an in-flow of sea water during some high tides. Variations in beach morphology affect the flow of water in the outfall stream and lead to variations in water level and salinity within the lagoon according to prevailing conditions. Cresswell Ponds are noted for the occurrence of unusual birds on migration and are used as feeding and roosting areas by wintering waders and wildfowl, although they are poorly managed. The Cresswell and Newbiggin Shore SSSI is included within the Westphalian GCR block and is cited for its geological interests, as such is included in the GCR.

There are two Scheduled Ancient Monuments (SAM) within this zone, both at Cresswell: the Cresswell Tower House and the Dovecote at Cresswell Home Farm. As well as these two SAMs there are two Grade II listed structures within 1 km of the coast in this PDZ. These are the Druridge Farm Cottages and Hemscott Hill Farm and cottages in the region of Druridge Bay South.

This zone falls within Castle Morpeth Borough Council boundaries. Lynemouth is the largest of the coastal settlements and is located just north of the Alcan Aluminium Smelter and Blyth Power Station. The area was formally referred to as the Coalfield Area due to its industrial heritage, but has since undergone regeneration that will continue within the Coastal Villages Regeneration Area (including Ellington, Lynemouth, Hadston, Widdrington Station and Pegswood).

The Borough's draft core strategy identifies Morpeth and the Coastal Villages Regeneration Area as the focus of major development. Proposals for development are to be considered against the need to protect and enhance the landscape character and environment of the Borough. These two areas have also been identified as the preferred areas for employment, leisure and tourism development, with 25-40ha and 45-65ha allocated to Morpeth and the Coastal Villages respectively. The proposals for development will be considered against the need to protect and enhance the landscape character and environment of the Borough. Cresswell will also be investigated as a potential Conservation Area.

The most southern section of this zone, including Alcan Smelter and power station, falls within Wansbeck District Council Boundaries. Ashington is the main settlement and service centre with a population of over 28,000. There are four other secondary centres with Newbiggin-by-the-Sea being the only one situated by the coast. There is a high demand for housing in the district, with a particular need for affordable housing. Problems with the housing market are now found in several locations, including the coastal settlements of Newbiggin by the Sea and East Ashington. A comprehensive programme of house improvement, selective demolition and new build housing schemes being undertaken in the coastal settlements of Newbiggin by the Sea and East Ashington aims to revitalise local housing markets.

The general policy for the coastal zone (GP8) aims to protect and, where possible, improve this environment. Development in the coastal zone will only be permitted if:

- a coastal location is essential and no suitable alternative site exists; and
- development would not cause harm to coastal systems and habitats.

The policy recognises the coastline as an environmental asset and as a valuable recreational and landscape resource, and as such identifies the need to take into account the fragility of the environment in the planning process. Where the coastal zone has been damaged, the opportunity will be sought for enhancement schemes. The policy also recognises the need to take into account the effects developments can have on natural processes, and to avoid developments that can alter processes such as erosion and sediment transport, thus impacting on coastal defences and important habitats.

There are a number of relevant Biodiversity Action Plans (BAPs) that are relevant to this area including rocky shore and islands, maritime cliffs and slopes, saltmarsh and mudflat, sand dune and common seal. More information on the specifics of these BAPs can be found in **Appendix D**.

Land incorporating the existing aluminium smelter and associated power station, near Lynemouth, has also been identified as a major employment zone (Policy EMP4). Further development would be supported.

Appendix E details the issues and objectives that were brought up through public consultation. These issues and objectives have informed this review as well as the main decision making process. The SEA directive suggests out various receptors that should be included in any SEA. The themes within **Appendix D** and **Appendix E** address the various receptors as shown below. All the SEA receptors as shown below are assessed within this PDZ (note: some SEA receptors are covered by more than one theme):

Issues and Objectives	Thematic review	SEA Receptor
Environment	Natural Environment	Biodiversity Fauna and flora Water
	Contaminated land	Soil
	Landscape and character	Landscape Material assets Population
Heritage	Historic environment	Cultural heritage
Commercial	Current and future land use	Population Material assets
Recreational		Population
Hard assets		Material assets Population

It can be seen from the above table that Air, Human Health and Climactic Factors are not included. Air and Human Health were scoped out of the assessment as a receptor because the SMP is a high level planning document and as such these receptors are not applicable to this plan. Climatic Factors (especially sea level rise) are integral to the assessment of the SMP and have been considered within each PDZ (Physical Characteristics section).

Environmental issues identified within this area are:

- Managed Realignment the preferred policy at Low Hauxley Shore SSSI.
- Cresswell Ponds SSSI outfall blocked by sand migration.
- Potential for managed retreat of sand dunes at Druridge Bay and Hadston Links SSSI to enhance saline lagoons.
- Unauthorised placement of timber tiered revetments at Snab Point preventing natural erosion

which maintains the geological features of the Cresswell and Newbiggin Shores SSSI.

- Contaminated land, beach, dunes and groundwater at Lynemouth.
- Loss of saltmarsh habitat in River Lyne due to rising sea levels.

KEY PRINCIPLES

- To contribute to a sustainable and integrated approach to land use planning.
- To avoid damage to and enhance the natural heritage.
- To support the cultural heritage.
- To protect people's home from flooding and loss through erosion.
- To protect opportunities for employment.
- To support adaptation by the local coastal communities.
- To maintain or enhance the high quality landscape.
- To minimise reliance on defence.
- To seek opportunity for habitat enhancement.

KEY OBJECTIVES (a full list of objectives for this zone is presented in Appendix E)

- To maintain or enhance coastal biodiversity and geological features of interest, in particular those that are designated for features of international or national importance.
- To support appropriate ecological adaptation of habitats and in particular with respect to the Country Park.
- To support opportunity for migration of coastal habitat landward.
- To support, maintain and enhance the value of natural heritage.
- To maintain Low Hauxley and Cresswell as a viable communities.
- To support adaptation by the local coastal communities.
- To maintain critical transport local links.
- To maintain or enhance the high quality landscape.
- To support the development of tourism within the area.
- To maintain critical transport links.
- To protect opportunities for employment.
- To support regeneration opportunities to the area around Lynemouth.
- To manage and reduce flood and erosion risk to core industry and residential and commercial centres.
- To maintain or enhance access to the coast.
- To maintain access to the foreshore for Search and Rescue purposes.

PHYSICAL CHARACTERISTICS

Water levels (mODN)

MLWS	MHWS	HAT	1:10yr	1:25yr	1:50yr	1:100yr	1:200yr
-1.9	2.4	3.1	3.18	3.27	3.36	3.46	3.53

Wave climate

Return Period (1:X years)	Wave Height H _s (m)
1	5.51
10	7.31
100	9.03

Baseline Erosion Rates

Low Hauxley	0.4m/yr	Over 100 years potential erosion of the order of 85m.
Bondi Carrs	0.5m/yr	Over 100 years potential erosion of the order of 80m
Hadston Carrs	0.5m/yr	Over 100 years typical erosion of the order of 70m but locally up to 135m.
Druridge Bay	0.1m/yr	Over 100 years potential erosion of the order of 15m.
Snab Point	0.1m/yr	Variation in erosion over the 100 years of between 6m at the point but up to 85m to the north.
Lynemouth Bay	0.3m/yr	Variation in erosion over the 100 years of between 30m and 55m on failure of the power station defences.

Sea Level Rise assumed rates: 0.05m to year 2025, 0.26m to year 2055, 0.8m to year 2105. Coastal evolution has been examined based on lower rates and higher rates in addition to those assessed above.

Evolutionary Trend

Existing Processes:

SMP1 suggested a net drift to the south with Druridge Bay, based on the dredging of sand at the southern end of the bay, a predicted null point at Snab and a drift to the south within Lynemouth Bay. At the northern headland the drift across the Low Hauxley frontage has been assessed as being weakly to the south.

Reviewing the monitoring results since 2001, there has been little accumulation at Cresswell as might have been anticipated now that sand winning has ceased. Furthermore, the uniform width of the dunes and the variation in closure of the various stream channels strongly suggests that Druridge Bay is net stable. There would be some variation in drift under specific wave conditions but overall no significant net drift pattern. The main pattern of change is likely to be a slow roll back of the dunes with some loss and gain between nearshore and foreshore, with periods of erosion and accretion. The headlands, if fixed, to the north and south act, then, merely to limit the overall depth of the bay and to more strongly influence locally shoreline shape. At Cresswell, this is likely to result in some increased pressure, as the Scars become more submerged with sea level rise, but this will be a relatively slow process of deepening of the bay and a slight extension of the dune line. There would appear to be adequate sediment to accommodate this at this southern end and over the bay as a whole.

At the northern end of the bay, there has been continuing erosion behind Bondi Carrs, possibly increasing over the last decade. It has been identified that mining subsidence may have an influence in this area and the area to the north of here; in effect equivalent to net sea level rise. This has meant

that in this area the influence of the headland rock outcrop is less significant and the backshore erodes. This is likely to increase with sea level rise. As such, the northern end of Druridge Bay has not had the opportunity to reach a stable condition, in part because of the more resistant nature of the slightly higher hinterland, and the whole section erodes back. This will continue into the future with sea level rise. Although Bondi Carrs will still exert some influence, the shape of the coast will tend to move inland and the nominal control will move north to the hard defence at Low Hauxley; or if these were allowed to fail, through to the more resistant frontage at Beacon Hill. This will continue to be an issue with respect to level rather than being one of sediment supply. All indications are that there is adequate potential supply to this northern area as well as to the main Druridge Bay.

To the south of the zone, within Lynemouth Bay, sediment drift has previously been assessed with a foreshore held artificially forward by tipping. As erosion of the artificial foreshore position has occurred, the coast is able to adopt a more swash aligned position with, again, the mechanism principally of roll back being dominant. The position and depth of the bay is determined by the two strong headlands. Within the bay, the power station protection works will have an increasing impact. The evidence from the behaviour of the small bay to the south of these works is that a healthy dune can form along the frontage despite this protection in the centre.

Unconstrained:

If all defences were removed, Druridge Bay would behave largely as at present, rolling inland in the future. To the north, there would be an immediate set back of the coast with loss of sediment in front of Low Hauxley and the area between Low Hauxley and Beacon Point. As the coast continued to roll back, eventually, possibly well beyond the period of the SMP, a realigned coast might be able to support a dune backshore.

At Cresswell, there would be a loss of properties but with little influence on the coastal behaviour. Within Lynemouth Bay, there would be a set back of the coast.

MANAGEMENT

Present Management

Management Unit	Policy
MU32 Beacon Hill to Snab Point	Do Nothing
MU33 Snab Point to river Lyne	Do Nothing
MU34 Power Station	Selectively Hold the Line
MU35 Beacon Point	Do Nothing

Strategies

Lynemouth Power Station

The intent of the scheme is to protect the Power Station over the next 50 years.	Hold the Line
--	---------------

Baseline scenarios for the zone

No Active Intervention (Scenario 1):

No Active Intervention is similar to the unconstrained scenario only in that the limited areas of defence would delay onset of erosion.

The most obvious difference would be at Lynemouth; here, even as the revetment fails, it would still maintain significant influence on the frontage while failing to provide protection to the power station. Elsewhere there would be a loss of the community at Low Hauxley and associated with this would be the loss of the properties to the north. At Cresswell, the sea front properties would be lost including the convenience store. There would be loss of the road between Cresswell and Snab Point.

<u>MDSF Evaluation</u> <u>(Appendix H)</u>	<i>Assets lost over the time period of the SMP</i>	<i>PValue Damages</i>
<i>Erosion</i>	Low Hauxley: 33 No. residential Cresswell: 12 No. residential 3 No. commercial Lynemouth: No erosion loss	£1,578k £705k £145k
<i>Flooding</i>	Low Hauxley Property. Druridge Property Potential Agricultural loss	£45k £36k £67k
<u>Other Information</u>	MDSF does not identify potential loss to Power Station. There would also be potential change in the nature of the Hauxley Ponds and loss of access and parking to the shore at the Country Park.	
<i>Assessment of Key Objectives</i>	This scenario leads to significant loss and loss of local communities as well as failing to maintain the power station and hence employment to the area. The scenario does allow the coast to return to a natural condition, including in areas such as the Country Park and at Hauxley Nature Reserve, but fails to support this in terms of access and infrastructure.	

With Present Management (Scenario 2):

Over much of the coast the scenario is similar to that of NAI. Only at Low Hauxley, at Cresswell and at Lynemouth would there be a difference.

At Low Hauxley the main village would be retained. However, in the long term, access to the village would be cut, significantly affecting the community, unless action was taken to protect or divert the coastal road. Setting the road back adjacent to its existing position is unlikely to be sustainable in the long term as even within the period of the SMP this might again come under erosion pressure. It would however be feasible to divert access to the village through the caravan park. This would require improvement to the road and extending the road to the back of the village. It would not be expected that such a diversion would have significant impact on the nature conservation interests to the back of the village. In the longer term, there may still be a need to construct defences to the back of Low Hauxley to prevent flooding and further defence to the northern end of the defended frontage, creating Low Hauxley as a distinct promontory. This might call into question in the long term the sustainability of the main village with the subsequent decision to abandon defence of the frontage. This would expose the main area of the Nature Reserve to more extensive erosion as the whole frontage cuts back to Beacon Hill. Associated with the threat to the road would be the loss of properties to the north of Low Hauxley.

Loss of access and car parking would still be anticipated to the Country Park and there could, subject to the location of drainage control structures, be a significant change to Ladyburn Lake. Maintaining the dune and sluices to the hinterland of Druridge Bay would not be seen as unsustainable, but would not provide additional biodiversity opportunities. Flooding would increase to the road up to Cresswell.

At Cresswell, the village would be protected without significant impact to coastal processes. However, the existing defences to the village do continue to impose on the designated value of the geology. No action is planned in terms of management to the road to the south of Cresswell and this would be expected to be lost over the initial epoch of the SMP. Without plans to realign this route, this could impact both on Cresswell and the regeneration of Lynemouth Bay.

Within Lynemouth Bay, the protection to the power station would be retained and the coast to either side allowed to retreat.

<u>MDSF Evaluation</u> <u>(Appendix H)</u>	<i>Assets lost over the time period of the SMP</i>	<i>PValue Damages</i>
<i>Erosion</i>	Low Hauxley: 7 No. residential Cresswell: 1 No. commercial Lynemouth: No erosion loss	£611k £15k
<i>Flooding</i>	Low Hauxley Property. Druridge No anticipated loss	£45k
<u>Other Information</u>		
<u>Assessment of</u> <u>Key Objectives</u>	Overall this scenario would sustain in the short to medium term the various communities but in the long term management options for Low Hauxley would have to be reviewed with the possible loss of this community. Loss of the road between Cresswell and Snab could constrain future regeneration. There would be no specific gain in terms of ecological value although natural processes would generally be maintained.	

DISCUSSION AND DETAILED POLICY DEVELOPMENT

There are no key areas where decisions affect the management of the coast overall but the essential decisions can be made with respect to specific areas discussed below.

Sub-Division and Detailed Assessment

Low Hauxley Headland.

The intent within this area, in line with the overall objectives, is to sustain the village of Low Hauxley, maintain and enhance the ecological opportunity and minimise reliance on defence into the future. The main issues relate to a general erosion of the frontage. To the south, potentially influenced at present by mining subsidence, the erosion affects the soft cliffs, cutting back the shore line quite severely with little opportunity to create a dune type transition between the foreshore and the clay cliff. This erosion is held over the central section in front of the main village by the hard defences. As the coast to the south retreats, there will tend to be a squeeze of the foreshore width against these defences. To the north of the main village, and between there and the underlying rock headland of Beacon Hill, there is the potential for a bay to develop; assuming the defences to the village are maintained. This bay would, however, develop inland and would affect the road sometime over the 50 to 100 year period, without reaching a stable alignment. Neither NAI nor WPM properly addresses the intent of management in the long term. Holding merely the main village frontage would, in the long term, create this as a promontory which because of the squeeze of the foreshore area in front of the defences, caused by of erosion to either side, would be considered unsustainable. To maintain the main village in a manner compatible with the important nature conservation objectives requires adapting what is fundamentally a linear defence to a situation of continuing coastal retreat to either side; without merely introducing coastal squeeze over a progressively longer length of shoreline. This is discussed below.

The defence could be taken further south, increasing protection to the Nature Reserve and Caravan Park. This would merely extend the problem resulting in longer and longer lengths of defence. This would increase squeeze and is considered to impact too greatly on the management of the coast in this area. Reshaping the defence to the southern end would be the alternative, limiting the length of defence but creating a clear bastion or local headland. This would provide opportunity to manage the erosion to the south, creating opportunity for a more stable transition between foreshore and the clay cliffs. The nature and extent of works to the south would need to be considered in detail. This approach is considered to be viable economically in defence of the village, reducing encroachment on the natural development of the shoreline to the south and providing opportunity in retaining sediment over the main defence length.

The recommendation within the SMP for the section to the north would be that it is considered a transitional zone for shoreline management, creating the opportunity for a sustainable approach to management of the main village frontage. Hence the policy is termed Managed Realignment. The intent would not specifically be for protection of assets, such as the road or the chalets, situated within this frontage, although there remains a need for further examination of this problem and erosion risks to ensure that concerns relating to the potential impact on designated natural environment interest are addressed in scheme proposals.

The recent feasibility study for the local area considered solutions that avoided extending the revetment further north in a piecemeal manner. These included reshaping the northern end of the revetment to provide more strategic control in a planned manner and also a less intrusive approach involving managing the realignment of the developing

bay to the north in alternative ways. The preferred approach to implementing the SMP policy requires further local area consideration.

Druridge Bay.

The overall intent is to allow natural development of the cliffs and dunes over the whole frontage. At the northern end, interaction with the Country Park needs to be managed, although in this area management may merely be the management or drainage to Ladyburn Lake. The Country Park is currently managed by Northumberland County Council. The current outfall is considered to be unsustainable, imposing a need for continual increase in length of defences; and with, still, the likely need to address breach through to the existing drainage channel behind. Similarly, defence of the access and car park areas would require extensive intervention.

Over the main frontage, the dunes would be allowed to roll back. Significant opportunity does exist in terms of opening drainage to areas of flooding behind; creating opportunity for diverse habitat gain. The dune system is considered to be adequately robust that increased flows through the dunes would not damage their integrity. Any change of this nature would need to be discussed with local land owners. There may be areas where the current sluice management was more appropriate in maintaining flood defence to properties within the hinterland. This managed realignment of the dunes system would create designated habitat for the Northumberland Shore and Hadston Links SSSI. Any changes to this area should be done in consideration with the Northumberland Wildlife Trust Druridge Bay Project.

Cresswell.

Continued defence of Cresswell is seen as being sustainable and in line with objectives. Only minor continued maintenance would be anticipated. Defence may result in the loss of rocky foreshore designated under the Northumbria Coast SPA and the Northumberland Shore and Cresswell and Newbiggin Shore SSSIs. This would be mitigated by MR of Broad Sands Rocks to the south

Snab Point.

There is no economic justification for funding significant defence to property, and such intervention would be against the objectives for maintaining internationally important natural heritage. To the north of Snab Point, instability of the cliff threatens the road potentially in the short term. The intent would be to realign the road maintaining a potentially important transport route. However, it is recognised that planning for such realignment, impacting potentially on the caravan park, may take time. As such, it may be necessary to provide limited short term defence to the slope in the interim. Any action would need the agreement of the appropriate organisations and should be aimed at maintaining the natural coast and the geological interest.

Lynemouth Bay.

Maintaining the defence to the power station is seen as important in the short to medium term in meeting socio-economic objectives. The value of the existing revetment would then be reviewed. The structure imposes significant, though not necessarily detrimental, control on the bay. The stretch of coastline in front of the power station currently has no designation for nature conservation interests. Potentially a key factor in this is the managed dissipation of mining waste to the coastal zone. The nature and rate of material lost to the shoreline due to continued erosion would need to be examined to ensure that the adapting natural system is not overburdened with mining waste. The frontages to either side will continue to retreat. In the long term, regeneration of the area, access to and the achieving a sustainable balance within this heavily modified

area, needs also to be considered in terms of land use planning. While the short term policy for the frontage, either side of the revetment would be for NAI, the long term policy would be for Managed Realignment to meet a balance of objectives in restoring this section of the coast to a more natural condition.

In summary, therefore, the zone is sub-divided into three Management Areas, these being:

- Beacon Hill to Creswell (five policy units)
- Broad Sands Rocks to Snab Point (two policy units)
- Lynemouth Bay (three policy units)

The conclusions for each area are summarised in the Management Area statements which follow. First, however, an assessment of the strategic environmental objectives for the three epochs under the scenarios of No Active Intervention, With Present Management and Preferred Policy has been carried out below.

Assessment of Environmental Receptors in the First Epoch (up to 2025)

MA	Policy	Biodiversity	Population	Fauna and Flora	Soil	Water	Material Assets	Cultural Heritage	Landscape
MA17	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA18	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA19	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●

 Major positive
significance


Minor positive significance



Major negative significance



Minor negative significance



Under the scenario of NAI there could be major negative impacts to all receptors except cultural heritage within MA19. This is due to increased erosion reducing protection to the coastline and material assets and the potential for contaminated mine spoil to be released onto the foreshore. This is avoided through a policy of Hold the Line in relevant locations which will bring major positive impacts. In MA18 there is a potential major significant impact under NAI and WPM due to pressure on the coast road from erosion. This is avoided under the PP scenario through a policy of Managed Realignment of this road.

Assessment of Environmental Receptors in the Second Epoch (up to 2055)

MA	Policy	Biodiversity	Population	Fauna and Flora	Soil	Water	Material Assets	Cultural Heritage	Landscape
MA17	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA18	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA19	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●

Major positive significance ● Minor positive significance ● Major negative significance ● Minor negative significance ●

The impacts under a scenario of NAI in the second epoch are similar to those in the first epoch with the addition of a potential major negative impact on material assets in MA19 due to failure of defences. Again this will be avoided through a policy of Hold the Line in relevant locations.

Assessment of Environmental Receptors in the Third Epoch (up to 2105)

MA	Policy	Biodiversity	Population	Fauna and Flora	Soil	Water	Material Assets	Cultural Heritage	Landscape
MA17	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA18	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA19	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●

Major positive
significance



Minor positive significance



Major negative significance



Minor negative significance



The impacts under a scenario of NAI in the third epoch are similar to those in the first and second epochs with the addition of a potential major negative impact on population, material assets and cultural heritage in MA17 due to failure of defences . Again these negative impacts will be avoided through a policy of Hold the Line in relevant locations.

MANAGEMENT AREAS

4.4.2 Management Area Policy Statements (MA17- 20)

Location reference:	BEACON HILL TO CRESWELL (CH. 97 TO 108)
Management Area reference:	17
Policy Development Zone:	PDZ 4

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: The intent of the plan is to manage and potentially enhance the important natural heritage with minimal requirement for intervention, while maintaining sustainable defence to local communities, to access and use of the coast. The main emphasis over the northern headland is in managing a sustainable transition between the natural coast and the defence to the village of Low Hauxley. To the north of the this general headland, the aim is to work with the natural control provided by Beacon Hill, such that transitional management utilises the width of Hauxley Links in protecting the village, rather than ultimately allowing further extension of the linear defence. To the south, the limit of defences to the village needs to be formalised in effective management of the area to the south. Over the northern section of Druridge Bay the intent is to manage land use, operation of and access within the Country Park such that this relies less on defence of the outfall and access road. Particular emphasis needs to be placed on alternative access to the foreshore in association with creating a more natural outfall to the Ladyburn Lake. Over the main length of the bay, the intent is to allow natural roll back of the dunes, considering potential creation and management of tidal incursion behind the dunes. The intent at Cresswell is to maintain the function of the village through continued defence.

PREFERRED POLICY TO IMPLEMENT PLAN	
From present day	Allow natural development of Druridge Bay, maintaining defence to Low Hauxley and Cresswell. At Low Hauxley, this would include an approach of minimally Managing Realignment of the coast to the north.
Medium-term	Allow natural development of Druridge Bay, maintaining defence to Low Hauxley and Cresswell. At Low Hauxley this would include an approach of minimally Managing Realignment of the coast to the north.
Long-term	Allow natural development of Druridge Bay, maintaining defence to Low Hauxley and Cresswell.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			Comment
		2025	2055	2105	
17.1	Beacon Hill Links	MR	MR	MR	Develop a progressive transitional approach to defence in line with erosion pressure to sustain defence to the main village and its access.
17.2	Low Hauxley	HTL	HTL	HTL	With the probable need to realign the southern end.
17.3	Druridge Bay north	MR	MR	MR	Develop drainage plan and access management.
17.4	Druridge Bay south	MR	MR	MR	Examine potential for tidal flooding inland.
17.5	Cresswell	HTL	HTL	HTL	

Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment

CHANGES FROM PRESENT MANAGEMENT

The principal change is in management of the eroding shoreline creating a sustainable approach to long term defence at Low Hauxley.

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	1181	892	507	2600
	Preferred Plan Damages £k PV	118	97	66	281
	Benefits £k PV	1065	795	441	2319
	Costs of Implementing plan £k PV	429	205	78	712
Costs based on future management of transitional defence at Low Hauxley. Management of eroding area of country park Possible need for defence to property in hinterland Maintenance at Cresswell Description of damage and benefits under preferred plan. Maintains villages of Low Hauxley and Cresswell					
Heritage	Maintains heritage				
Amenity	Significant change to amenity use of frontage				

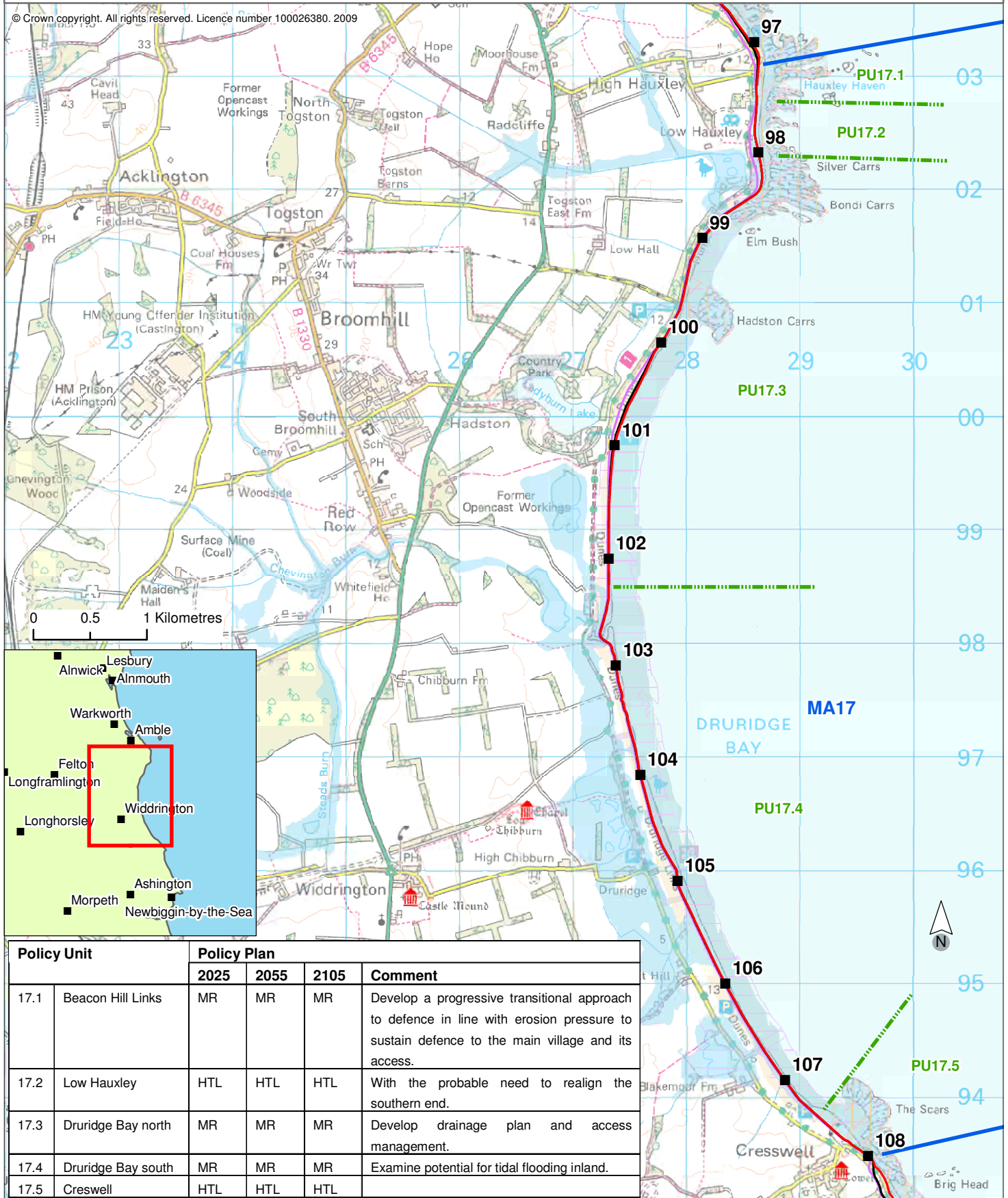
IMPLICATION WITH RESPECT OF NATURAL ENVIRONMENT

Designated Site	Designated / supporting habitat	Policy Unit	Impact			Mitigation / compensation
			by 2025	by 2055	by 2105	
Northumbria Coast SPA	Rocky shore	17.1 17.2	No impact	No impact	No impact	N/A
Northumberland Shore SSSI	Intertidal rock	17.1 17.2	No impact	No impact	No impact	N/A
	Sandy beaches	17.3 17.4	Habitat creation	Habitat creation	Habitat creation	N/A
Low Hauxley Shore SSSI	Quaternary deposits	17.1 17.2	No impact	No impact	No impact	N/A
Hadston Links SSSI	Coastal dunes	17.3 17.4	Habitat creation	Habitat creation	Habitat creation	N/A
Cresswell Ponds SSSI	Brackish lagoon	17.5	No impact	No impact	No impact	N/A
Cresswell and Newbiggin Shores SSSI	Westphalian and Quaternary deposits	17.5	Habitat loss	Habitat loss	Habitat loss	Mitigated in 1 st Epoch by MR of Broad Sands Rocks (18.1).

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan reference should be made to the baseline data.

Policy Development Zone 4 - Seaton Point to Beacon Hill Management Area 17 - Beacon Hill to Creswell (Ch 97 to 108)

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Policy Unit		Policy Plan			
		2025	2055	2105	Comment
17.1	Beacon Hill Links	MR	MR	MR	Develop a progressive transitional approach to defence in line with erosion pressure to sustain defence to the main village and its access.
17.2	Low Hauxley	HTL	HTL	HTL	With the probable need to realign the southern end.
17.3	Druridge Bay north	MR	MR	MR	Develop drainage plan and access management.
17.4	Druridge Bay south	MR	MR	MR	Examine potential for tidal flooding inland.
17.5	Creswell	HTL	HTL	HTL	

Predicted Shoreline Position under Preferred Policy

- 20 Years
- 50 Years
- 100 Years

- SPA
- RAMSAR
- SAC
- SSSI
- NNR

- Scheduled Ancient Monuments
- EA Flood Zone - Sept 07
- Management Areas
- Policy Units



ACTION PLAN MANAGEMENT AREA 17

Action	By when	Responsibility	Indicative Cost
<ul style="list-style-type: none"> Develop a progressive transitional management approach, with ongoing discussion regarding the possible need for further management to the area behind Bondi Carrs. 	Ongoing	Alnwick DC	£10k
<ul style="list-style-type: none"> Consideration of longer-term options for drainage of Ladyburn Lake within a Druridge Bay Adaptation Strategy. 	2011	Castle Morpeth BC Northumberland County Council	£50k
<ul style="list-style-type: none"> Discussion with landowners about potential habitat enhancements associated with opening low lying land to flooding. 	2010	Environment Agency	Nominal
<ul style="list-style-type: none"> Coastal monitoring. 	Ongoing	Castle Morpeth BC	Ongoing
Schemes:			
<ul style="list-style-type: none"> Possible need for further management to the area behind Bondi Carrs. 	2009 – 2015	Alnwick DC	£150k
<ul style="list-style-type: none"> Maintenance of existing defence assets recommended. 	Ongoing	Alnwick DC / Castle Morpeth BC	

In addition to this detailed Action Plan for this specific Management Area, a high-level strategic Action Plan for the whole SMP area is provided in Section 7.

Coastal monitoring is also discussed in Section 7 and this is relevant to the whole SMP2 area as well as some specific frontages.

Location reference:	SNAB POINT (CH 108 TO 109.5)
Management Area reference:	18
Policy Development Zone:	PDZ 4

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: The overall intent of the plan is to allow natural development of the frontage supporting important natural heritage. This, in the short term, would require planning for realignment of the road.

PREFERRED POLICY TO IMPLEMENT PLAN	
From present day	Manage erosion of cliff but allow frontage to develop naturally overall.
Medium-term	Realign road and allow frontage to develop naturally overall.
Long-term	Realign road and allow frontage to develop naturally overall.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			
		2025	2055	2105	Comment
18.1	Broad Sands Rock	MR	NAI	NAI	Realign road.
18.2	Snab Point	NAI	NAI	NAI	

Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment

CHANGES FROM PRESENT MANAGEMENT

Local change to allow adaptation to the NAI previously determined.

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	62	133	0	195
	Preferred Plan Damages £k PV	0	0	15	15
	Benefits £k PV	62	133	-15	180
	Costs of Implementing plan £k PV	84	0	0	84
Costs estimated for potential short term management of risk to the road. Description of damage and benefits under preferred plan. Maintains opportunity for realignment.					
Heritage	No impact.				
Amenity	No impact.				

IMPLICATION WITH RESPECT OF NATURAL ENVIRONMENT

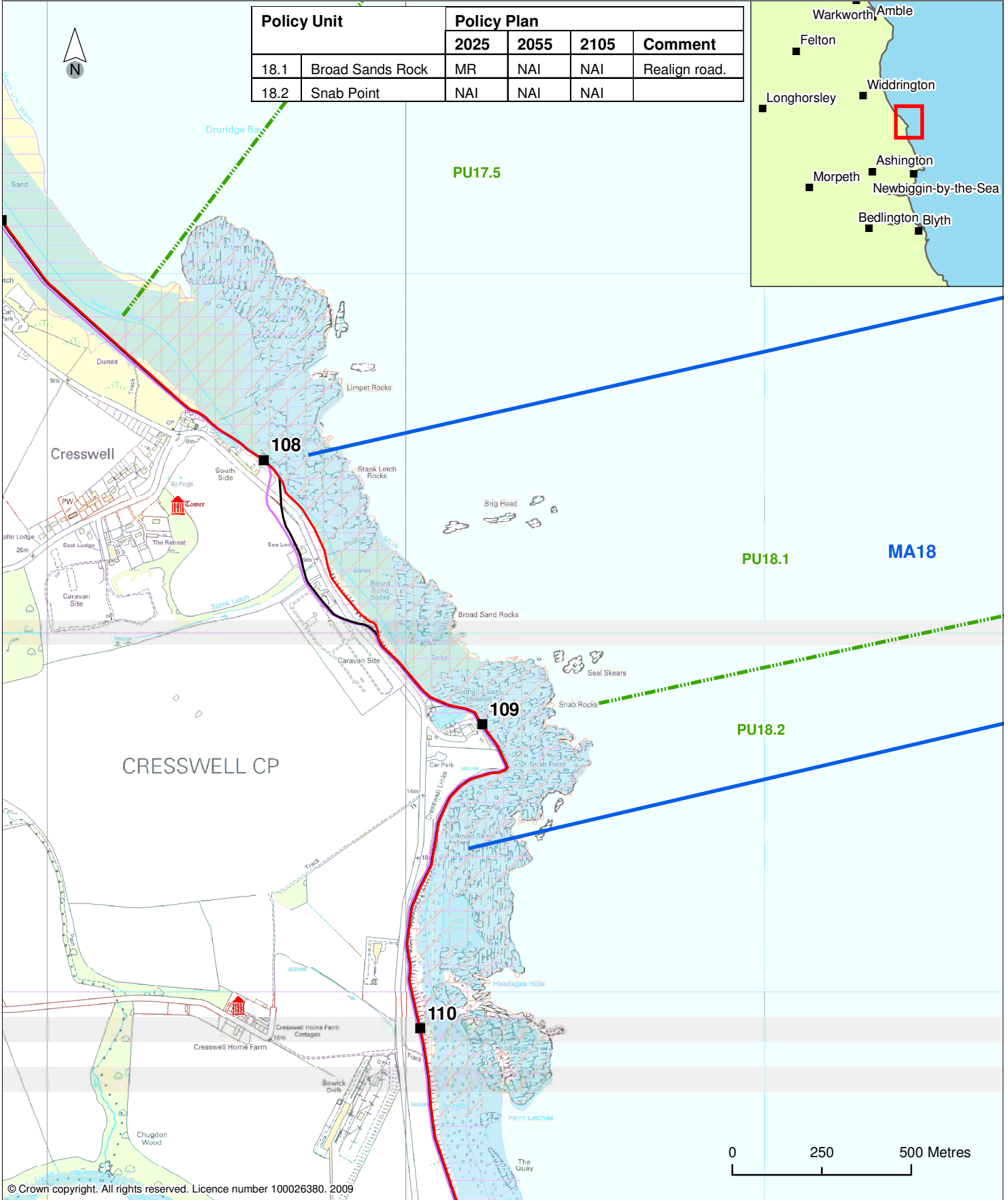
N.B. The table below is a summary of the potential impacts on sites designated for reasons of national or international nature conservation importance. This table should not be read in isolation, please refer to the narrative included in the Discussion and Detailed Policy Development section of this PDZ. Details of the boundaries of the policy unit can be seen in the Management Area map overleaf.

Designated Site	Designated / supporting habitat	Policy Unit	Impact			Mitigation / compensation
			by 2025	by 2055	by 2105	
Northumbria Coast SPA	Rocky shore	18.1	Habitat creation	No impact	No impact	N/A
Northumberland Shore SSSI	Intertidal rock	18.1	Habitat creation	No impact	No impact	N/A
Cresswell and Newbiggin Shores SSSI	Westphalian and Quaternary deposits	18.1	Habitat creation	No impact	No impact	N/A

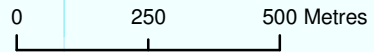
* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan reference should be made to the baseline data.

**Policy Development Zone 4 - Seaton Point to Beacon Hill
Management Area 18 - Snab Point (Ch 108 to 109.5)**

Policy Unit		Policy Plan			
		2025	2055	2105	Comment
18.1	Broad Sands Rock	MR	NAI	NAI	Realign road.
18.2	Snab Point	NAI	NAI	NAI	



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Predicted Shoreline Position under Preferred Policy	SPA	Scheduled Ancient Monuments
20 Years	RAMSAR	EA Flood Zone - Sept 07
50 Years	SAC	Management Areas
100 Years	SSSI	Policy Units
	NNR	



ACTION PLAN MANAGEMENT AREA 18

Action	By when	Responsibility	Indicative Cost
<ul style="list-style-type: none"> Assess short term defence to the road just north of Snab Point, with planning for longer-term realignment of road and Caravan Park within a Creswell Strategy. 	2010-11	Castle Morpeth BC	£50k
<ul style="list-style-type: none"> Coastal monitoring. 	Ongoing	Castle Morpeth BC	Ongoing
Schemes:			
<ul style="list-style-type: none"> Short term defence to road north of Snab Point. 	2012-13	Castle Morpeth BC	£200k
<ul style="list-style-type: none"> Longer-term realignment of the road and Caravan Park. 	2075	County Council Highways / Caravan Park	£500k
<ul style="list-style-type: none"> Maintenance of existing defence assets recommended. 	Ongoing	Castle Morpeth BC	Revenue

In addition to this detailed Action Plan for this specific Management Area, a high-level strategic Action Plan for the whole SMP area is provided in Section 7.

Coastal monitoring is also discussed in Section 7 and this is relevant to the whole SMP2 area as well as some specific frontages.

Location reference:	LYNEMOUTH BAY (109.5 TO 113)
Management Area reference:	19
Policy Development Zone:	PDZ 4

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: Recognising the need to protect the power station, the intent of the plan is to incorporate and adapt rather than necessarily remove this major defence in overall management of the whole bay.

PREFERRED POLICY TO IMPLEMENT PLAN

From present day Allow natural erosion of the frontage in general but maintain defence to power station.

Medium-term Manage retreat of the bay in general, maintaining defence to power station.

Long-term Manage sustainable realignment of the whole bay.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			
		2025	2055	2105	Comment
19.1	Lynemouth north	NAI	MR	MR	Develop land use plan for the area so defining realignment.
19.2	Power station	HTL	HTL	MR	Modify defences to assist realignment plan.
19.3	Lynemouth dunes	NAI	NAI	MR	Maintain flood defence.
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment					

CHANGES FROM PRESENT MANAGEMENT

Change only in detail of management.

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	2	2	2	6
	Preferred Plan Damages £k PV	0	0	0	0
	Benefits £k PV	2	2	2	6
	Costs of Implementing plan £k PV	-	-	-	-
Power station recently protected Subsequent costs would be driven by an overall management plan for regeneration of the area. Description of damage and benefits under preferred plan.					
Heritage	No impact.				
Amenity	No impact.				

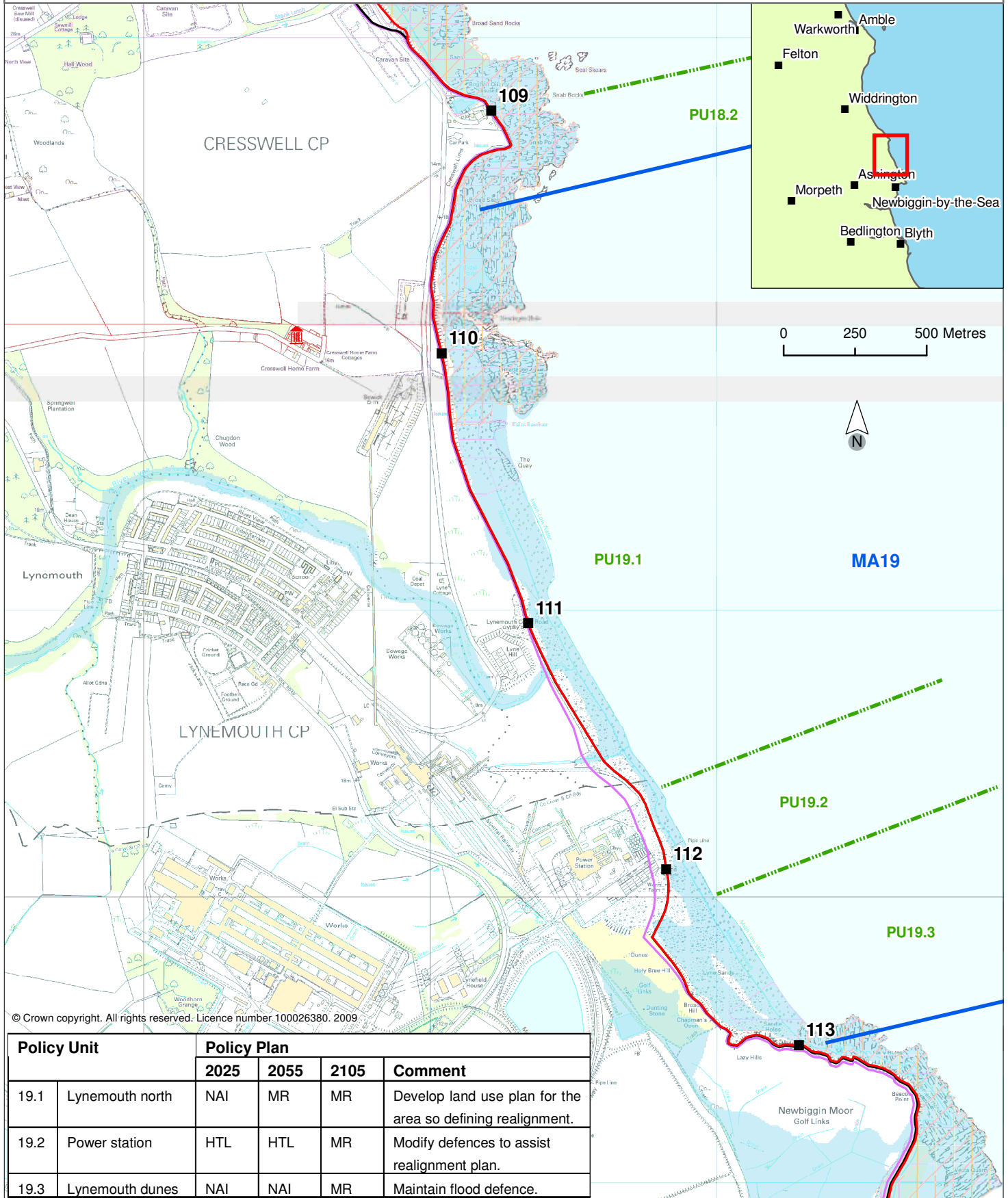
IMPLICATION WITH RESPECT OF NATURAL ENVIRONMENT

N.B. The table below is a summary of the potential impacts on sites designated for reasons of national or international nature conservation importance. This table should not be read in isolation, please refer to the narrative included in the Discussion and Detailed Policy Development section of this PDZ. Details of the boundaries of the policy unit can be seen in the Management Area map overleaf.

Designated Site	Designated / supporting habitat	Policy Unit	Impact			Mitigation / compensation
			by 2025	by 2055	by 2105	
Northumbria Coast SPA	Rocky shore	19.1 19.3	No impact	Habitat creation	Habitat creation	N/A
Northumberland Shore SSSI	Intertidal rock	19.1 19.3	No impact	Habitat creation	Habitat creation	N/A
Cresswell and Newbiggin Shores SSSI	Westphalian and Quaternary deposits	19.1 19.3	No impact	Habitat creation	Habitat creation	N/A

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan reference should be made to the baseline data.

**Policy Development Zone 4 - Seaton Point to Beacon Hill
Management Area 19 - Lynemouth Bay (Ch 109.5 to 113)**



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Policy Unit		Policy Plan			Comment
		2025	2055	2105	
19.1	Lynemouth north	NAI	MR	MR	Develop land use plan for the area so defining realignment.
19.2	Power station	HTL	HTL	MR	Modify defences to assist realignment plan.
19.3	Lynemouth dunes	NAI	NAI	MR	Maintain flood defence.

Predicted Shoreline Position under Preferred Policy

- 20 Years
- 50 Years
- 100 Years

- SPA
- RAMSAR
- SAC
- SSSI
- NNR

- Scheduled Ancient Monuments
- EA Flood Zone - Sept 07
- Management Areas
- - - Policy Units



ACTION PLAN MANAGEMENT AREA 19

Action	By when	Responsibility	Indicative Cost
<ul style="list-style-type: none"> Develop longer-term land use plan for the area. 	2035	Castle Morpeth BC / Wansbeck DC	£50k
<ul style="list-style-type: none"> Coastal monitoring. 	Ongoing	Castle Morpeth BC / Wansbeck DC	Ongoing
Schemes: <ul style="list-style-type: none"> No coast protection schemes presently proposed, but dependent on longer-term land use plan. Maintenance of existing defence assets recommended. 	Ongoing	Castle Morpeth BC / Wansbeck DC / Alcan	Revenue

In addition to this detailed Action Plan for this specific Management Area, a high-level strategic Action Plan for the whole SMP area is provided in Section 7.

Coastal monitoring is also discussed in Section 7 and this is relevant to the whole SMP2 area as well as some specific frontages.

4.5 PDZ 5 Newbiggin Moor to Seaton Sluice (chainage 113 to 130)

4.5.1 Policy Development Analysis

DESCRIPTION

Physical

The zone extends some 17km from the hard rock cliffs at Newbiggin Moor to Seaton Sluice. The area comprises occasional hard rock outcrops of sea cliff and shore platform, soft cliffs, sandy beaches and dunes, and the mouths of the River Wansbeck estuary, the River Blyth estuary and Seaton Burn (sometimes known as Hartley Haven). The physical coast may be described in five distinct sections: the Newbiggin headland; the embayments of Newbiggin, Sandy Bay and Cambois Bay extending from Newbiggin Point to Blyth Harbour; Blyth Harbour itself; the embayment of Blyth South Beach and Hartley Links extending from Blyth Harbour to Seaton Sluice; and Seaton Burn.

Newbiggin Headland. The headland comprises two areas of rock exposed above high water, Beacon Point and Newbiggin Point, but with a near continuous rock platform over the foreshore. Between the two rock promontories the back shore is of softer erodable till with lower lying land behind. This lower lying area being an effective basin behind Newbiggin Point extending into the centre of the town of Newbiggin.



The northern rock headland extends well clear of the shoreline of Lynemouth Bay to the north, with bare rock to deeper water on its northern flank. This rock headland extends around to the south forming a strong, effectively non-erodable control point to the bay to the south. Within the embayment between the points, the northern section has a veneer of sand dune covering the till ridge, with southern part being exposed eroding till cliffs. There is, within the centre of the bay, an area of increased erosion. This is associated with a general depression in the foreshore rock outcrop, facing seaward towards the south east. The area behind is occupied by the Newbiggin golf course and a caravan park to the southern end. The church of St. Bartholomew sits behind Newbiggin Point. There is a secondary higher rock headland, Church Point, extended by a rock breakwater forming the northern control point to Newbiggin Bay. Between the two points on this southern part of the overall headland is an area of softer till protected by a concrete wall founded to the rock outcrop of the foreshore. Directly behind this is a graveyard, which until protected was eroding back, reportedly exposing human remains.

Newbiggin Bay, Sandy Bay and Cambois Bay. The coastline generally extends as an embayment between the hard point controls of Newbiggin Point and Blyth Harbour. There is a further rocky headland at Spital Point which acts to divide Newbiggin Bay from Sandy Bay to the south. Newbiggin Bay has suffered from mining subsidence, resulting in substantial loss of its sandy foreshore. A major coast protection scheme has been undertaken, recharging the beach and retaining this with a rock breakwater. Between the new breakwater and the breakwater to Church Point there is a wide sandy beach to the northern end, now linking through to the recharged area over the centre of the bay.

Spital Point is a wide area of rock outcrop over the foreshore with a more erodable backshore comprising rock and till.

The coast to the south forms a large bay through to Blyth East Pier and is intersected along its length by the mouth of the River Wansbeck estuary. The beach to the north of the mouth of the Wansbeck is often referred to as Sandy Bay, the beach to the south as Cambois Bay. The coastline has historically been subject to both erosion of beaches and subsidence due to past mining activity.

Within Sandy Bay, the sea cliffs at Spital Point (the northern promontory of this frontage) and the associated shore platforms at Spital Carrs are relatively resistant to erosion and form a control point for embayment development to both the north and the south. Just south of Spital Point there is a long sea outfall which is protected at its shore-end by a rock revetment. Further south still, along the remainder of the frontage towards the River Wansbeck estuary, the cliff lithology is softer and the cliffs are actively eroding. The frontage is largely undeveloped with the exception of Sandy Bay Caravan Park to the south. The ongoing recession has recently (2007) prompted regular surveying of the cliff-top position at the Caravan Park and further in the recent past the owner has privately constructed three breakwaters, located slightly away from the shore, in attempt to slow the recession rates. Just to the south of the cliffs, within the shelter of the mouth of the River Wansbeck estuary, a dune system has developed.

The River Wansbeck estuary itself has been influenced by the construction of a weir just upstream of the A189 road bridge, which limits the extent of tidal influence in the estuary to just a very small reach upstream of the mouth. In this reach, there are intertidal mudflats and, on the north bank, sand dunes as discussed above. The weir was installed for aesthetic purposes; by retaining water levels in the reaches upstream of the weir the mudflats that were scarred black with colliery spoil could be covered at all stages of the tide, thus improving the visual appearance of the area. Since then, the upstream area has been developed for recreational purposes as the Wansbeck Riverside Country Park.



The River Wansbeck estuary. Note the retained water levels upstream of the weir (just upstream of the road bridge) compared with the exposed intertidal mudflats further seaward. Also note the dune system on the north bank and the soft clay cliffs on the south bank, both close to the mouth.

Cambois Bay comprises a soft cliff that graduates gradually into a dune system with progression south. This then connects with the East Pier at Blyth Harbour. Historically the coastline of Cambois Bay experienced the tipping of colliery spoil up until around the 1960s. Since then, this soft material has been subject to erosion throughout the length of the bay. Mining subsidence is also reported to have contributed to general recession of the cliffs within Cambois Bay. In the north, close to the mouth of the River Wansbeck estuary, a number of cottages and houses are located, together with an access road. Here the cliffs are undefended. Further south, fronting the now disused foundry and the cliff line to its south, is a rock revetment. As the coastline becomes more dominated by dunes, the hinterland influence of the Port of Blyth can be seen in the form of access roads and mineral railway lines, as well as the tidal basins and the harbour itself. Large parcels of land in this area are currently being considered for re-development under the South East Northumberland and North Tyneside Regeneration Initiative (SENTRI). This includes major proposals for a new coal-fired power station on the site of the former Blyth Power Station and major new housing development being considered as part of the Government's Growth Point initiative. Offshore, two wind farms are fixed to the sea bed, although these are not presently operational due to a severing of the sub-sea shore-connecting cable and long-running discussions about changes in ownership. These were the first offshore wind farms operational in the UK, constructed in 2000. The settlement of North Blyth is located on a thin azimuth of land between the North Sea and the backing Blyth Harbour. At the southern-most end of the bay, the East Pier itself defines the position of the shore. Nine wind turbines are founded on the structure, and these are set to be upgraded.

Blyth Harbour. Blyth Harbour is defined by the East Pier and South Pier at its mouth, and by the main channel of the River Blyth estuary and the associated South Harbour and (North) Tidal Basin. The harbour is subject to maintenance dredging by the Port of Blyth for navigational purposes. There are major re-development plans for areas of land in and around the harbour and in the town of Blyth, with a functioning Port of Blyth remaining a key economic driver to the region. These include conceptual plans to re-develop a power station on the site of the former Blyth Power Station on the north bank. The town of Blyth itself is a low-lying basin that is susceptible to tidal flooding. Ongoing investigations (2008) are aimed at defining the sources and mechanisms of flooding and at better assessing and managing the risk that exists. These investigations include consideration of tidal flooding directly from the harbour and of potential 'back-door' flooding caused by breaching through the dunes.

Blyth South Beach and Hartley Links. Immediately south of the entrance to Blyth Harbour is a spending beach, with Blyth South Beach then extending further south to Seaton Sluice. In the northern section, Blyth South Beach is backed by Blyth South Harbour and then various warehouses and other infrastructure associated with the Port's operations. Slightly further south is an area of land, known as Blyth Links, between the B1329 road and existing promenade which forms part of recent and future re-development plans. South of here to Seaton Sluice the beach is backed by dunes; to the south these are named Hartley Links. Landward of the dunes is the main coast road (Links Road) connecting Blyth and Seaton Sluice. A recreational footpath and various beach access points have been formed through the dunes and annually local residents can deposit their Christmas trees in nearby car parks for recycling; they are deposited on the dune crests by the Council workforce and used to help stabilise areas of known blow-outs or trampling damage. A large (72" diameter) outfall pipe extends across the dunes and beach at Meggie's Burn and this locally causes considerable erosion of the beach. Elsewhere, anti-tank blocks are used to locally help defend storm-damage areas (these blocks are moved around the beach), and sand is recycled from the spending beach to Blyth South Beach to help reinforce beach levels and to prevent the accumulated material from spilling into the navigation channel and then needing dredging. Recently, in 2007, an innovative approach of using bio-degradable geotextile 'sandbags' (large-scale) to help stabilised erosion-prone areas has been adopted.

Seaton Burn. This is a small tidally-influenced burn that runs through the valley of Holywell Dene and hosts a small number of vessels. It is defended by harbour walls along both banks.

Environment

This area has great natural conservation importance. It includes the following designated sites:

- Northumbria Coast SPA
- Northumbria Coast Ramsar Site
- Northumberland Shore SSSI
- Cresswell and Newbiggin Shores SSSI

Further detail regarding these sites can be found in Appendix D. Where proposed policies may have potential impacts on designated features these are discussed in the discussion and detailed policy development section and listed in the summary of preferred plan recommendations and justification section under implications with respect to the natural environment.

In the UK these Natura 2000 sites have legal requirements for protection (The Conservation (Natural Habitats, *et.c.*) Regulations 1994, and the Wildlife & Countryside Act 1981, as amended) to maintain their designated conservation value. Any activity that occurs within any of these designated sites, or is likely to impact upon them, must first have approval from the relevant statutory authority. As well as Natura 2000 sites, SSSIs and AONBs are protected under the Countryside and Rights of Way Act 2000 (CROW Act) as well as the proposed Marine Bill which contains provisions for Coastal Access.

The Piers at Blyth Estuary form part of the Northumbria Coast Ramsar site and SPA. Details of designation can be found in Appendix D. The Cresswell and Newbiggin Shores SSSI extends to the River Wansbeck. It is important for both Westphalian and Quaternary studies. It comprises the best exposure in the Northumberland Coalfield of Middle Carboniferous strata belonging to the Upper *similis-pulchra* Biozone. It includes a thick sequence from the High Main Seam to the Vanderbeckei Marine Band, and is the highest part of this coalfield to be well exposed. The whole coast is included in the Northumberland Shore SSSI, details can be found in Appendix D

The church and graveyard at Newbiggin Point are important to the community. The golf course and recreational water sports have been highlighted as important aspects and assets for amenity use of the area.

There is a coastal artillery battery on Blyth Links that is a Scheduled Ancient Monument. This World War I Battery is well preserved and retains the full range of features characteristic of this type of coastal battery. The fact that it was reused during World War II, when some alterations were made and a new Battery Observation post was constructed, adds to the importance of the monument as a whole. As well as this SAM there is a Grade II listed structure within Blyth Harbour – the Blyth Coal Staithe.

The general land use policy for this coastal zone recognises the coastline as an environmental asset and as a valuable recreational and landscape resource, and as such identifies the need to take into account the fragility of the environment in the planning process. Where the coastal zone has been damaged the opportunity will be sought for enhancement schemes. The policy also recognises the need to take into account the effects developments can have on natural processes, and to avoid developments that can alter processes such as erosion and sediment transport, thus impacting on coastal defences and important habitats.

Land at Cambois has been designated as a zone of economic opportunity for development by businesses requiring large sites in non-estate locations (Policy EMP3). Major environmental improvements will be sought throughout Cambois to enhance the area for local residents and create new areas for recreation and wildlife, as well as improving the aesthetics of the area for prospective investors. Reclamation and landscaping of the former Blyth Power Station and Coal Stocking Yards will also be sought to remove dereliction and provide an attractive setting for future employment, including possible port related development.

The Blyth Estuary Initiative, through the South East Northumberland and North Tyneside Regeneration Initiative (SENTRI), aims to unlock the potential of this sub-region and transform the area by opening up the Blyth waterfront to both investment and the wider community. It aims to do this by de-allocating employment land where supply exceeds demand, enhancing public transport links and establishing a number of housing led development schemes on key waterfront sites in Blyth.

Reclamation and landscaping of the former Blyth Power Station and Coal Stocking Yards will also be sought to remove dereliction and provide an attractive setting for future employment, including possible port related development. The continued operation and development of the Port of Blyth will continue to be supported, with the land at Battleship Wharf also designated as a port related employment zone (EMP5). The port is important for the south-east Northumberland economy and whilst the main operations are carried out on the Blyth Valley side of the Blyth Estuary, Battleship Wharf, on the Wansbeck side of the estuary, is the focus for future development and expansion.

There are a number of relevant Biodiversity Action Plans (BAPs) that are relevant to this area including rocky shore and islands, maritime cliffs and slopes, saltmarsh and mudflat, sand dune and common seal. More information on the specifics of these BAPs can be found in **Appendix D**.

Appendix E details the issues and objectives that were brought up through public consultation. These issues and objectives have informed this review as well as the main decision making process. The SEA directive suggests out various receptors that should be included in any SEA. The themes within **Appendix D** and **Appendix E** address the various receptors as shown below. All the SEA receptors as shown below are assessed within this PDZ (note: some SEA receptors are covered by more than one theme):

Issues and Objectives	Thematic review	SEA Receptor
Environment	Natural Environment	Biodiversity Fauna and flora Water
	Contaminated land	Soil
	Landscape and character	Landscape Material assets Population
Heritage	Historic environment	Cultural heritage
Commercial	Current and future land use	Population Material assets
Recreational		Population
Hard assets		Material assets Population

It can be seen from the above table that Air, Human Health and Climactic Factors are not included. Air and Human Health were scoped out of the assessment as a receptor because the SMP is a high level planning document and as such these receptors are not applicable to this plan. Climatic Factors (especially sea level rise) are integral to the assessment of the SMP and have been considered within each PDZ (Physical Characteristics section).

Environmental issues identified within this area are:

- Cliff erosion, especially immediately south of the River Wansbeck estuary where it is made ground. Management of the conservation value of the Cresswell and Newbiggin Shores SSSI must be taken into account.
- Land drainage, erosion and access issues at Sandy Bay Caravan Park.
- Changes in alignment of the River Wansbeck and Blyth estuaries which can lead to changes in erosion patterns and loss of habitats.
- Loss of high tide roosts in the River Blyth estuary.
- To maintain or enhance access to the coast.

KEY PRINCIPLES

- To contribute to a sustainable and integrated approach to land use planning.
- To protect and enhance the natural environment.
- To support the cultural heritage.
- To protect people's homes from flooding and loss through erosion.
- To protect opportunities for employment.
- To support adaptation by the local communities.
- To maintain or enhance the high quality landscape
- To minimise reliance on defence.
- To seek opportunity for habitat enhancement.

KEY OBJECTIVES (a full list of objectives for this zone is presented in Appendix E)

- To maintain or provide protection, where sustainable, against erosion and flooding to properties, businesses and heritage assets, and infrastructure.
- To maintain adequate drainage of inland areas.
- To maintain navigation in the River Blyth estuary, including the Port of Blyth.
- To maintain, in a sustainable manner, regeneration opportunities at Cambois Bay, Blyth Town, Blyth Power Station, Blyth Links, and in, or adjacent to, Blyth Harbour.
- To maintain or enhance coastal biodiversity and geological features of interest, in particular those that are designated for features of international or national importance.
- To maintain existing recreational areas.
- To maintain opportunities for environmental restoration or enhancement.
- To maintain opportunities for recreational enhancement.
- To maintain navigation in the River Wansbeck.
- To maintain the boat launching facility at Cambois.
- To maintain the opportunity for wind farm development on pier structures and the offshore sea bed.
- To maintain access to the foreshore for Search and Rescue purposes.

PHYSICAL CHARACTERISTICS

Water levels (mODN)

	MLWS	MHWS	HAT	1:10yr	1:25yr	1:50yr	1:100yr	1:200yr
SMP1	-1.8	2.4	3.1	3.24	3.35	3.43	3.54	3.61
Newbiggin				3.24		3.45	3.53	3.62

With minor variation, the water levels determined as part of the Newbiggin Bay study confirm those determined by the SMP1.

Wave climate

Return Period (1:X years)	Wave Height H_s (m)	
	SMP1	Newbiggin (inshore)
1	5.44	3.4
10	7.56	4.0
50		4.3
100	9.63	4.5
200		4.6

The two sets of figures refer to different locations but more specifically to different water depths. The Newbiggin values have been determined from detailed modelling associated with the recent study and are taken close inshore in the area of Newbiggin Bay. They do, however, provide a useful comparison in assessing nearshore wave climate along other sections of the coast.

Baseline Erosion Rates

Newbiggin Headland	0.01m/yr, with local variation	Over 100 years potential erosion between 20m and 60m locally.
Newbiggin Bay	0.3m/yr, prior to scheme.	Prior to scheme erosion risk over the 100 years potentially of the order of 60m.
Spital Point and Sandy Bay	0.1m/yr, locally 0.3m/yr	Over 100 years potential erosion between 15m and 25m, locally up to 60m.
Cambois Bay	0.3m/yr increasing to 0.5m/yr at southern end	Over 100 years potential erosion between 10m and 40m.
Blyth South beach	0.1m/yr to the north increasing to 0.5m/yr over the central section	Over 100 years potential erosion between 20m and 60m.
Hartley Links	0.1m/yr	Over 100 years potential erosion up to 30m but locally up to 70m following defence failure at Seaton Sluice.

Sea Level Rise assumed rates: 0.05m to year 2025, 0.26m to year 2055, 0.8m to year 2105. Coastal evolution has been examined based on lower rates and higher rates in addition to those assessed above.

Evolutionary Trend

Existing Processes:

The embayed nature of this coastline is caused by the presence of harder control points, such as naturally outcropping rock at Newbiggin Headland, Spital Point and Spital Carrs (in the north) and Rocky Island (in the south) or artificial structures at Blyth Harbour (in the centre). In between, the lithology of the coast is softer, resulting in differential erosion rates and the creation of embayments between these harder controls.

The dominant wave direction is from the north-east sector, although there can also be substantial wave energy from the south-east. Tidal streams flow on the flooding tide from north to south and reverse on the ebbing tide.

The general net movement of sediment on the coast is from north to south, although alongshore transport rates are low and such processes are constrained by the presence of rocky features, structures and river outfalls.

Now that deposition of mining waste north of the Newbiggin Headland has ceased, this section of coast is retreating back within the dominant control of the Newbiggin Headland. It has been indicated that there is some nearshore movement of sediment crossing this boundary but this tends to by-pass Newbiggin Bay and feed the nearshore area to the south, contributing generally to sediment supply. There is some onshore/offshore transfer of sediment generally along the coast, but in terms of shoreline drift this is constrained by the various headlands.

The beach width between the two main points of the Newbiggin Headland is very narrow, indicating a general pressure for erosion in addition to roll back. This pressure is especially felt over the central section of the bay potentially cutting back beyond the immediate area of scrub land to the area managed by the golf course. The rock foreshore limits this to a degree but there is potential for the forward ridge at the shoreline to be eroded. This could open the hinterland to increased risk of flooding. The Mile End tower is also at risk.

Defence to the southern side of the headland protects the church and its graveyard from erosion.

The Church Point breakwater, in combination with the new nearshore breakwater within Newbiggin Bay, act to control shoreline sediment, although it is still anticipated that there will be some variation in shoreline position with event driven onshore and offshore transfer of sediment. These structures generally constrain any significant longshore sediment feed to the south.

There is very little sediment interaction around Spital Point and Spital Carrs from the north. The Newbiggin study does indicate a potential low loss through this southern area but this is not seen as a substantial supply to the south. As sea level rise causes submergence of the rock platform at Spital Point, associated with further erosion of the point, this loss may be more significant, but primarily in terms of reducing sediment retention within Newbiggin Bay. This is accounted for within the scheme. Even with such loss this would still be quite minor in terms of sediment supply through to Sandy Bay.

Material released from sea cliff recession in Sandy Bay contributes locally to beach stock and also to the accumulation in the dune system at the mouth of the River Wansbeck estuary. Due to the presence of the weir on the river itself, river-borne sediment has a tendency to settle upstream of the weir and marine-borne sediment rarely passes over the weir due to its crest height. There is likely to be some small scale interaction of sediment between Sandy Bay, the river mouth and the northern section of Cambois Bay. Perhaps more important is the interconnectivity between these different features in terms of exposure conditions. The channel of the River Wansbeck outflows across the beach and can be subject to changes in alignment (although the changes are far less than observed

at unconstrained estuary mouths elsewhere within the SMP area, such as at the River Tweed or the River AIn). Such changes in alignment can change the degree of exposure of the adjacent areas of shore, affecting recession rates locally.

In general, the River Wansbeck estuary is seen as a weak sediment sink, set back as it is within the centre of the larger bay. There will be a tendency for roll back of the shore as seen in the erosion and changes to the spit to the north. The main cause of local variation in erosion, however, would appear to be due to the change in position of the channel as identified above.

Material released from sea cliff recession in Cambois Bay similarly contributes locally to beach stock or is moved offshore to become entrained in the net southerly shore-parallel tidal flows. There are not larger-scale interactions at play here and Cambois Bay may be considered as relatively self-contained.

Due to the large scale of the Blyth Harbour structures, complemented by naturally occurring rocky outcrops on the foreshore seaward of North Blyth and the East Pier, there is little alongshore sediment exchange between Cambois Bay and Blyth South Beach. Some marine-derived sediment carried in suspension in tidal flows does enter the River Blyth estuary and settles, and this, together with river-borne sediment, is regularly dredged by the Port of Blyth.

Along Blyth South Beach, evidence from the beach profile monitoring, that has been ongoing since 2001, together with the longer term monitoring prior to this, indicates that onshore/offshore transport of sediment is more dominant than any net alongshore processes. Typically, during destructive wave conditions associated with storms, sediment is eroded from the dunes and upper beach and transported seawards to the lower intertidal beach or submerged nearshore zone. This material is then observed to return progressively to the beach during calmer, constructive, wave conditions whereupon it is then, in turn, blown back to accumulate in the dunes once again. This process is a classic observation of beach-dune interactions under differing wave conditions, but is also indicative of a generally stable bay configuration; affected more by sea level rise rather than a significant longshore drift system. There has been an indication of greater stability to the south at Harley Links and there is a tendency for material to accumulate towards the harbour. Notwithstanding the earlier assessment of general stability, this does indicate some wish for the bay to deepen in the centre and a weak drift to north and south from the centre.

The foreshore of South Beach is cut across by possible valleys in the underlying clay. The indication from earlier monitoring and aerial photography was that these lower valleys may influence the upper beach and dune line. Meggie's Burn is potentially at one of the locations and coupled to the high flows through the narrow piped outfall, make this area one of particular vulnerability. Associated with this area it is noted that the hard defence to the north of Meggie's Burn is very sensitively located at the crest of the beach. At present, lengths along this defended frontage can suffer significant erosion on more extreme events. There then tends to be a period of recovery. With sea level rise, as the defences in this area are, in effect, moved forward of this beach crest position this vulnerability will increase, potentially exacerbating the problem at Meggie's Burn and also potentially constraining the overall equilibrium of the bay.

Unconstrained:

Large sections of this frontage are currently undefended and therefore are acting in an unconstrained manner around the constrained sections. If no defences were in existence, there would still be a large degree of control exerted on plan shape evolution by the rocky outcrops at the northern and southern ends, and the outcrops of The Rockers, Green Skeer, Crab Law, Sow and Pigs, and Seaton Sea Rocks would be increasingly important in anchoring the centre of the frontage, although far less effectively than the present Blyth Harbour structures.

Ultimately, the hard rock controls would slowly recede (sea cliffs) or become more submerged (shore platforms) and the softer material in between would respond by eroding landwards. There could be breaching through dunes, changing the position of the outfall of the River Blyth estuary and causing sea flooding to large parts of North Blyth or Blyth.

The cliffs along Sandy Bay and the northern sections of Cambois Bay and Newbiggin Bay would erode and the dunes and beaches along the southern section of Cambois Bay and Blyth South Beach would attempt to translate landward in response to rising sea levels. Where constrained in doing this, the beaches would lower. Where unconstrained, the beach-dune systems would maintain their function but move in position over the longer-term.

MANAGEMENT

Present Management

SMP1 divides the zone into 9 Management Units (MUs). The current policies are:

Management Unit	Policy
MU35 Lyne Sands to Newbiggin Point	Do Nothing
MU36 Newbiggin Point to Spital Point	Selectively Hold the Line
MU37 Spital Point to Wansbeck North Bank	Selectively Hold the Line
MU38 Wansbeck North Bank to Wansbeck South Bank	Do Nothing
MU39 Wansbeck South Bank to North Blyth (Cambois Bay)	Selectively Hold the Line
MU40 North Blyth to Blyth North Breakwater	Hold the Line
MU41 Blyth North Breakwater to Blyth South Breakwater	Hold the Line
MU42 Blyth South Breakwater to South Blyth	Hold the Line
MU43 South Blyth to Seaton Sluice	Hold the Line
<hr/>	
Strategies/Studies	
<u>Newbiggin Strategy and Project Appraisal</u>	
The study confirmed the need to defend Newbiggin	Hold the Line
<u>Cambois Bay Pre-feasibility Study</u>	
There are no formal coastal defence strategies for the zone although a Pre-feasibility Study was undertaken at Cambois Bay.	No economic justification for the development of a strategy or management intervention
<u>Blyth Assessment of Flood Risk</u>	
This study is ongoing.	To be confirmed
<u>Blyth South Beach Study</u>	
The study recommended an approach of low intervention managing the natural behaviour of the dunes through local reinforcement of the dunes and sediment recharge.	Managed Realignment
<u>CFMP</u>	
This study is ongoing.	To be confirmed

Baseline scenarios for the zone

No Active Intervention (Scenario 1):

Under this scenario no further action would be taken in defence management of the coast. Existing defences and structures would remain *in-situ* but would not be maintained in condition and over time they would deteriorate and fail. Existing beach and dune management activities, such as sand recycling and dune restoration at Blyth South Beach, would cease.

Initially, the shoreline would function very similarly to the present day. The first signs of notable differences would be observed along Blyth South Beach where, over winter periods, the dunes would start to become damaged and not be repaired. Without intervention, this would progressively worsen over time and large sections of the dunes would become eroded and pose a threat of being breached, resulting in sea flooding of low-lying hinterland.

Elsewhere, undefended cliffs would continue to erode at rates controlled by their lithology, whilst the smaller-scale structural interventions, such as the three rock breakwaters in Sandy Bay, would become progressively less effective and ultimately obsolete as they become damaged and remain un-maintained.

Larger coastal defence structures, such as the works at Newbiggin, the revetment towards the north of Cambois Bay and the seawall and promenade at Blyth Links, would remain effective for longer but over time (e.g. 50 years⁺) they too would ultimately fall into disrepair. In the case of Newbiggin, there would be generally loss of sediment not replaced by further recharge. Their loss or breaching could significantly affect the evolution of the coastline, triggering an initial rapid recession until a new stable form is reached or causing sea flooding into backing areas.

The piers at the mouth of Blyth Harbour would be likely to remain exerting some degree of influence on shoreline evolution to both the north and south over the timescale of the SMP, even if they were not to be maintained, because they are such massive structures. However, breaching or outflanking of these structures would occur and this would adversely affect the sustainability of North Blyth, Blyth Harbour and Blyth Town, as some coastal realignment and increased flood risk would result.

The plan form evolution of the coast would result in only relatively small recession of the Newbiggin Headland, but could result in the long term inundation of the town and loss of the church graveyard. The erosion of the bay between Beacon Point and Newbiggin Point is likely to encroach on the area of the golf course over the period of the SMP. Currently there is a width of some 20m of scrub land acting as an important buffer zone. Similar slow recession would occur at Spital Point headland and this will, therefore, remain a control on evolution of the frontage to the south. Cliff recession will affect Sandy Bay Caravan Park and the undefended section to the north. Some of the houses at the northern section of Cambois Bay, close to the river mouth, will become affected by erosion and the road fronting the disused foundry will become affected in the longer-term as the existing revetment becomes dilapidated. Erosion of the cliffs, and then dunes, further south in Cambois Bay could affect any proposed re-development of this land while further south still, erosion could affect the access road, mineral railway and houses in the vicinity of North Blyth and the industrial assets just to the north of the East Pier.

Further south, a breach would be caused into South Harbour causing a considerable change in the configuration of the harbour mouth. The failure of the promenade at Blyth Links would result in loss of land in this area but further south the Hartley Links should have sufficient accommodation space to enable landward migration without compromising the Links Road to erosion.

<u>MDSF Evaluation</u> <u>(Appendix H)</u> <u>Erosion</u>	<i>Assets lost over the time period of the SMP</i>	<i>PValue Damages</i>
	Newbiggin: 70 No. residential	£1,011k



	13 No. Commercial Spital Point to Blyth Harbour: No erosion damages Blyth Harbour to Seaton Sluice: 1 No. residential 2 No. Commercial Newbiggin area Blyth Harbour	£148k £29k £46k £1,513k £19,633k
<u>Other Information</u>	The Newbiggin Strategy identified a PV benefit of £80,000k associated with the scheme. The above MDSF values reflect the subsequent delay in damages as a result of the scheme. The MDSF values for Cambois Bay are based on medium erosion risk rates, significant loss could occur based on higher rates considered and would be likely to occur shortly beyond the period of the SMP. The MDSF damages do not take account of potential damage arising from traffic disruption, services or amenity.	
<u>Assessment of Key Objectives</u>	Allowing existing defences to fail would compromise a large number of the key objectives, particularly those relating to maintaining opportunities for regeneration, protecting existing properties, business and heritage assets, maintaining navigation, and drainage of inland areas. This would lead to unacceptable consequences in terms of increased flood risk and reduce economic sustainability of the region.	

With Present Management (Scenario 2):

With Present Management regimes remaining in place (both defences and management activities), the present configuration of the coastline would remain broadly similar to the present day as the key controls on shoreline evolution would remain intact. Presently undefended sections would continue to erode but existing local management intervention will assist in slowing the recession rates and ensure the process occurs in a manageable manner.

At Newbiggin, it is assumed that the current scheme would be maintained with additional recharge as allowed for and that defences would be maintained to Church Point. However, With Present Management allows for continued erosion at Newbiggin Moor and this could expose the town to flooding in the long term. More locally erosion may affect the golf course directly over the period of the SMP.

In Sandy Bay and the northern section of Cambois Bay, the evolution will be little different to the NAI scenario, although existing defences will have a local effect on recession rates. This means that Sandy Bay Caravan Park and houses at the northern part of Cambois Bay will be affected in the longer-term by erosion. Maintaining existing defences further south will help reduce recession rates and therefore assist in preventing loss of assets due to erosion in the southern sections of Cambois Bay. Also, it will prevent major changes in configuration of the harbour mouth as breaching through South Harbour is prevented. The promenade fronting Blyth Links will be maintained in position, safeguarding the redevelopment areas and the Schedule Ancient Monument. However in the longer-term the present alignment of this structure will make it more susceptible to damage as sea levels rise and the waterline intercepts the structure.

<u>MDSF Evaluation</u> <u>(Appendix H)</u> <u>Erosion</u>	<i>Assets lost over the time period of the SMP</i> No erosion damages identified by MDSF.	<i>PValue Damages</i>
<u>Flooding</u>	Newbiggin	£1513k
<u>Other Information</u>	No account is taken of loss to caravan parks and the vulnerability of property in	

	the Cambois area is still highlighted.
<u>Assessment Of Key Objectives</u>	Maintaining present management practices would assist in achieving a large number of the objectives along this frontage, through maintenance of existing defences. This would not directly impact on ecological objectives but would potentially fail to support the natural ecological value as a result of natural submergence of rock outcrops. There would still be potential loss of recreational amenity at Newbiggin Moor

DISCUSSION AND DETAILED POLICY DEVELOPMENT

In terms of general management key decisions for the zone are in relation to Newbiggin Bay and the mouth of Blyth Harbour.

Key Interactions in terms of Management Policy

Feature 1 Newbiggin Bay	
Influence	The new defence system protects the town without significant influence on the adjacent coastline.
Management Options	There is a strong economic value in providing this defence in the long term and this has been demonstrated to be sustainable over the period of the SMP.
Discussion of High Level Policy Decision The scheme has undergone detailed examination and is considered appropriate for long term management of the area. Limited intervention will be provided in the form of hard defences to protect the graveyard which may result in the loss of some designated rocky foreshore but on the whole, there will be limited impacts to habitats designated for nature conservation importance. Any future maintenance to defences in this area will need to provide suitable mitigation or compensation.	
High Level Policy. Hold the Line	

Feature 2 Blyth Harbour	
Influence	Key control on the evolution of embayments to both the north and south of the zone.
Management Options	The critical choice is whether or not the structures at the mouth of the harbour, mainly the East Pier and the West Pier, should be maintained or not.
Discussion of High Level Policy Decision Although in the absence of the harbour structures the rocky outcrops would exert a degree of influence on shoreline evolution, this would be in no way as robust as the influence exerted by the existing harbour structures. As well as providing important control on shoreline configuration, the structures help maintain a functioning port at Blyth, which is critical to both the regional and national economies. The decision is therefore made to hold the line to maintain the port and to enable more sustainable management of the coastlines to both the north and the south. Within this area, rock outcrops are being lost through the natural processes of sea level rise. Blyth East Pier is not causing coastal squeeze in this area as it is not protecting any cliffs which would create new rock platform. Within the harbour, designated high tide roosts will not be altered and the area covered by the SMP is the deep water in the port to the limit of the tidal basin. As such, a policy of Hold The Line in this area will not affect designated salt marsh and estuarine habitat which occurs outside of the SMP policy area.	
High Level Policy: Hold the Line (maintain existing harbour mouth structures)	

Sub-Division and Detailed Assessment

The decision to hold the line at Newbiggin and, therefore, defence of the town, influences decisions to the north with respect to potential flooding from Newbiggin Moor. In this area there is a potential for erosion to breach through the shoreline ridge. This more strategic risk could be mitigated through land raising within the open area behind the shoreline, moving flood defence away from the active shoreline. As such, it could not be concluded that in the long term the policy for the frontage should be hold the line. More locally, there is risk of erosion and increased flooding due to potential overtopping

to the golf course area. The golf course has been highlighted as an important amenity asset to the area. Currently it is the central section of the bay which is suffering most from erosion. This principal area of erosion threat is associated with the lower area of foreshore rock outcrop. As such, the rate of erosion here is quite critically dependent on wave direction. This may lead to periods of increased erosion, which may also be influenced by general mining subsidence. The existing increase in erosion is also associated with the reduction of mining waste being transported around Beacon Point as the bay to the north has eroded back. In effect, the shoreline over this bay is re-adjusting to a more natural alignment.

The shoreline, at present, retains a very narrow upper beach and, while the rock headlands and rock outcrop over the foreshore provides sufficient influence to retain this, this beach cannot develop more due to the squeeze against the till and tipped material of the backshore cliff. There is both ecological benefit and management benefit in allowing development of increased width to this back foreshore; in developing room for a natural dune frontage. There is a width of some 20m at the most critical section before erosion directly affects the area of the golf course. This equates to, probably, some 20 to 40 years before the erosion affects operation of the golf course. Any attempt to defend the frontage on the current line will create significant squeeze and loss of the natural beach defence, particularly in to the future. Defence initially over a short section would tend to lead to an intent of extending defences length as the initial defence was outflanked. As the artificially held frontage became more in advance of the natural coastline, this would also run the risk of increasing risk of overtopping.

Allowing the coast to erode back would create a more sustainable natural defence. As such the policy should remain as No Active Intervention, but with the need to review long term this policy. NAI along the whole bay would impact on the mast, which in time could be relocated, the caravan park, where there would be a need to adapt to erosion, and the golf course. In the latter case consideration should be given to how course could be adapted to allow increased width for creation of a natural dune. In addition, local flood defence works set back from the projected shoreline position should be considered to prevent flooding of the town. Each of these issues would need to be considered in terms of potential planning constraints. However, addressing these issues in this manner would support both ecological objectives and enhance the overall landscape value of this important amenity area.

On the general Newbiggin headland, St. Bartholomew's church and graveyard are protected by a sea wall. From a community perspective maintaining this defence is considered to be of significant importance. This would also tend to reduce any potential risk that Church Point may be outflanked, thereby supporting the policy for defence of the town. This will, however, result in the loss of rocky foreshore designated under the Northumbria Coast SPA and the Northumberland Shore and Cresswell and Newbiggin Shores SSSI.

During the development of the coast protection scheme at Newbiggin Bay there were concerns raised with respect to boat launching to the northern end to the bay. This was to be addressed by beach management. While strictly this might be seen as realignment, in reality it is part of the overall approach to holding the line. This aspect should be addressed in the future management in addressing a specific local issue. The scheme itself is designed to improve coastal defence to the town through use of a recharged beach. Effectiveness of the scheme is enhanced through an offshore breakwater which acts effectively in reducing beach sediment transport, making the bay a relatively self-contained sediment system. The scheme is being subjected to ongoing

monitoring to further assess its performance with respect to coastal defence function and beach sediment transport.

Having decided to maintain the breakwaters at the mouth of the River Blyth estuary, the management decisions along both Cambois Bay and Blyth South Beach are far easier to determine as this is a critical control on shoreline evolution. Additionally, having made this high level decision, sensible sub-division of the rest of the Policy Development Zone can readily be made.

At Spital Point, the cliffs are comprised of hard rock and are relatively resistant to erosion. This headland forms an important control on embayment formation to the south and therefore is treated here as an individual Policy Unit. The anticipated recession rates are relatively low and therefore the policy for the frontage is No Active Intervention. Should ongoing observation reveal that rates are higher than forecast it may be necessary for a subsequent revision of the SMP to review this policy so as to ensure a control remains on evolution to the south, but this is not envisaged based on present information. This assumption relates also to the more minor influence this point has on the scheme to the north. This policy aims to maintain the natural exposure of the frontage but would not preclude local protection to the outfall.

Moving south, the presently undefended Hawks Cliff section is eroding, but there is little threat to assets due to the undeveloped nature of the frontage. Therefore a No Active Intervention policy is recommended here. This policy continues further south along Sandy Bay. Here, in preference to defending the existing frontage, consideration should be given to rolling back the location of the caravans within the site to accommodate the projected recession and avoid the need for committing to defences in the longer-term. This location could, in the medium to longer term, also incidentally benefit from management policies at the mouth of the River Wansbeck estuary.

The mouth of the River Wansbeck estuary is subject to (relatively modest) changes in alignment of the channel. Such changes in alignment can alter the exposure conditions of the eroding cliffs either side of the mouth. This appears to be, in part, associated with the growth of a small spit on the north bank, which tends to push the channel closer to the Cambois Farm (southern) shore. Recently, this has led to cliff toe erosion along the coastal section to the south in an area fronting Cambois House. The threat is that continuation of this process will lead to accelerated rates of erosion and ultimately loss of properties on the cliff top. Consequently, management intervention at the mouth of the estuary could incidentally benefit management of the cliffs to both the north (Sandy Bay) and south (Cambois House). Two possible such management options are available at or adjacent to the mouth:

- Removing the weir, which retains upstream freshwater levels. This would result in the restoration of a tidal estuary to this frontage. This would initially assist in realigning the accumulation of sand in the form of a spit at the northern bank and therefore ease pressure for the channel to migrating closer to the Cambois House shore. Over time it would also increase the accumulation of sediment at the mouth of the river in terms of increased ebb-tidal delta formations. These would offer improved natural protection to the shoreline either side of the estuary mouth and would have the additional advantage of enhancing the ecological value of the area. The approach would also, however, have adverse effects on present recreational use of the upstream Riverside Country Park and could alter the status of the Local Nature Reserve upstream at Castle Island.

- Diverting or training flows at the mouth. This will help in reducing the changes in alignment of the river mouth and would involve relatively small-scale and localised intervention.

All of these options are aimed at engineering a more suitable shoreline configuration at, and adjacent to the mouth of the River Wansbeck estuary, rather than through maintaining a fixed hard line of defence. Further detailed investigation and assessment of these options, including the effects on ecology, recreation and landscape, would be required before implementation. A further option would be to apply No Active Intervention at the estuary mouth and accept, or manage, the cliff recession along the adjacent frontages.

Moving south from the estuary mouth along Cambois Bay towards North Blyth, there is some scope for continued recession of the undefended frontages in the short term but in the medium and longer term some form of management will be required to maintain the assets that would be threatened by erosion or, in the south of the frontage, by potential breaching and resultant sea flooding through into Blyth Harbour. This management would be particularly relevant: (i) at either end of the existing revetment, which presently is highly effective and in a good condition; (ii) at Cambois House; (iii) at the access points to the beach from the car parks; (iv) and further south along the dunes where there is only a modest width of land between the eroding coast and the mineral railway and access road to North Blyth.

However, despite the above erosion risk, it presently would not be economically viable to provide fixed defences along the entire length of Cambois Bay to protect these assets. Instead, the preferred approach would be to use local control points to reconfigure the coast to ensure better continuity between presently defended and presently undefended areas and in doing so to safeguard the critical assets that will, in the longer term, become threatened. This will include prevention of a breach from the coast into the Blyth Estuary through the narrow strip of land. In addition to these works, and in light of the proposals and potential for redevelopment in this area, it is also recommended that a suitable planning buffer zone is allowed by developers to allow for potential recession rates into the future (beyond the time horizon of this SMP). The loss of sandy beach habitat designated under the Northumberland Shore SSSI in this area in the 2nd and 3rd Epochs will be mitigated by a policy of MR at Wansbeck Estuary in the 1st Epoch.

Blyth Harbour is such a critical feature along this frontage that the policy must be Hold the Line in the long-term along North Blyth, the East Pier, inside the harbour and along the West Pier to prevent sea flooding and changes in coastal alignment through loss of this critical control point. This policy naturally extends southwards to Beach Gardens in order to prevent a breach through to South Harbour. Rock outcrops are being lost through the natural processes of sea level rise. Blyth East Pier is not causing coastal squeeze in this area as it is not protecting any cliffs which would create new rock platform. Within the harbour, designated high tide roosts will not be altered and the area covered by the SMP is the deep water in the port to the limit of the tidal basin. As such, a policy of Hold the Line in this area will not affect designated salt marsh and estuarine habitat which occurs outside of the SMP policy area. When upgrading or replacing defences, measures to maintain enhance and create roosting habitat for SPA / SSSI species should be incorporated into these works. Any intervention in this area should aim to protect the Blyth Coal Staithes which is a Grade II listed structure.

Along Blyth Links, the existing promenade protects a Scheduled Ancient Monument and recent re-development areas and therefore the policy is Hold the Line over the next 50

years. In the longer-term, such a policy would be increasingly difficult to maintain since with sea level rise the southerly end of the promenade will come under increased wave attack and damage. It is likely, therefore, that some form of realignment of the promenade will be needed at its southern end in the longer term, but this can be implemented to coincide with the timing of a major refurbishment or upgrade and does not need to be a stand-alone initiative as the wider-scale impacts are minimal. Any realignment will need to be sensitive to land uses at the time. Management of the weak spot at Meggie's Burn should be considered as part of this realignment to provide a transition between the harder management to the north and the management of the dunes to the south. To assist this, it is recommended that further investigation of the local erosion and possible management responses around Meggie's Burn is undertaken.

Along South Beach a policy of Managed Realignment would involve local intervention works using 'soft' engineering techniques, such as sand recycling, dune replenishment, dune toe stabilisation, vegetation planting, etc., with the intent of maintaining a dynamic and functioning system between the dune and beach as it rolls landwards with sea level rise, rather than maintaining a fixed line of defence. This process may involve the dunes rolling back and vegetation taking over the existing scrub land but over the timescales of this SMP, this process will not be constrained by the presence of the backing coast road. It is imperative to manage the roll-back process through a policy of Managed Realignment, however, in order to minimise the risk of breaching through the dunes. In this way any sandy beach habitat designated under the Northumberland Shore SSSI in the north end of South Beach will be mitigated by MR at the south end.

At Seaton Burn the policy is to Hold the Line to maintain existing recreational use of the small harbour. This policy extends slightly around the headland at Seaton Sluice along the line of the existing wall. This policy will maintain a southern control point to the evolution of South Beach.

In summary, therefore, the zone is sub-divided into four management areas; these being:

- Newbiggin Moor and Newbiggin Bay (three policy units)
- Spital Point to Blyth East Pier (seven policy units).
- Blyth Harbour (one policy unit).
- Blyth West Pier to Seaton Sluice (three policy units).

The conclusions for each area are summarised in the Management Area statements which follow. First, however, an assessment of the strategic environmental objectives for the three epochs under the scenarios of No Active Intervention, With Present Management and Preferred Policy has been carried out below.

Assessment of Environmental Receptors in the First Epoch (up to 2025)

MA	Policy	Biodiversity	Population	Fauna and Flora	Soil	Water	Material Assets	Cultural Heritage	Landscape
MA20	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA21	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA22	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA23	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●

Major positive
significance



Minor positive significance



Major negative significance



Minor negative significance



The existence of the amenity weir on the Wansbeck estuary has the potential for a major significant impact on biodiversity, flora and fauna under all three scenarios in the first epoch. This is to be avoided through a policy of removal of the weir in the second and third epochs.

Assessment of Environmental Receptors in the Second Epoch (up to 2055)

MA	Policy	Biodiversity	Population	Fauna and Flora	Soil	Water	Material Assets	Cultural Heritage	Landscape
MA20	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA21	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA22	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA23	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●

 Major positive
significance


Minor positive significance



Major negative significance



Minor negative significance



The removal of the Wansbeck amenity weir in MA21 avoids the potential major negative impacts on biodiversity, flora and fauna. It also provides major positive impacts to both the aforementioned receptors through habitat creation as well as population and material assets due to increased soft coastal defence.

Assessment of Environmental Receptors in the Third Epoch (up to 2105)

MA	Policy	Biodiversity	Population	Fauna and Flora	Soil	Water	Material Assets	Cultural Heritage	Landscape
MA20	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA21	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA22	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA23	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●

 Major positive
significance


Minor positive significance



Major negative significance



Minor negative significance



As in the first and second epochs, potential major negative impacts to biodiversity, flora, fauna, and material assets under the NAI scenario can be avoided by the PP scenario. Under the NAI scenario there would be failure of defences within MA21-MA23 which would lead to potential major negative impacts on population, material assets and cultural heritage. These impacts are avoided under the PP scenario.

MANAGEMENT AREAS

4.5.2 Management Area Policy Statements (MA20- 23)

Location reference:	NEWBIGGIN (CH 113 TO 117)
Management Area reference:	20
Policy Development Zone:	PDZ 5

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: The intent of the plan is to maintain the defence to Newbiggin based on the concept of the recent scheme, incorporating beach management to enhance values to the area. To the north the aim is to allow natural development of much of the headland, in particular, allowing development of greater width in the natural defence of Newbiggin Moor, improving sustainability of defence, supporting ecological and landscape objectives and potentially adding amenity benefit. The one area of the headland where defence would be required would be in maintaining the defence to the graveyard.

PREFERRED POLICY TO IMPLEMENT PLAN	
From present day	Maintain defence with recharge to Newbiggin Bay, maintain defence between Newbiggin Point and Church Point and allow the northern coast to naturally develop.
Medium-term	Maintain defence with recharge to Newbiggin Bay, maintain defence between Newbiggin Point and Church Point and allow the northern coast to naturally develop.
Long-term	Maintain defence with recharge to Newbiggin Bay, maintain defence between Newbiggin Point and Church Point and allow the northern coast to naturally develop, with the potential need to create a retired defence to the flood area behind.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			
		2025	2055	2105	Comment
20.1	Newbiggin Moor	NAI	NAI	MR	Maintain competent flood defence set back from the projected coastline position.
20.2	Newbiggin Point	HTL	HTL	HTL	Limited intervention to protect graveyard.
20.3	Newbiggin Bay	HTL	HTL	HTL	Maintain beach through recharge.
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment					

CHANGES FROM PRESENT MANAGEMENT

In substance there would be no change to existing policy taking on board the recommendations for management of the recent scheme.

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	637	700	1334	2671
	Preferred Plan Damages £k PV	0	0	0	0
	Benefits £k PV	637	700	1334	2671
	Costs of Implementing plan £k PV	783	558	381	1715
Costs estimates are based on the recent strategy study. Subsequent damages taken from MDSF analysis. Damages identified by strategy of the order of £48M Description of damage and benefits under preferred plan.					
Heritage	Maintains heritage				
Amenity	Maintains amenity				

IMPLICATION WITH RESPECT OF NATURAL ENVIRONMENT

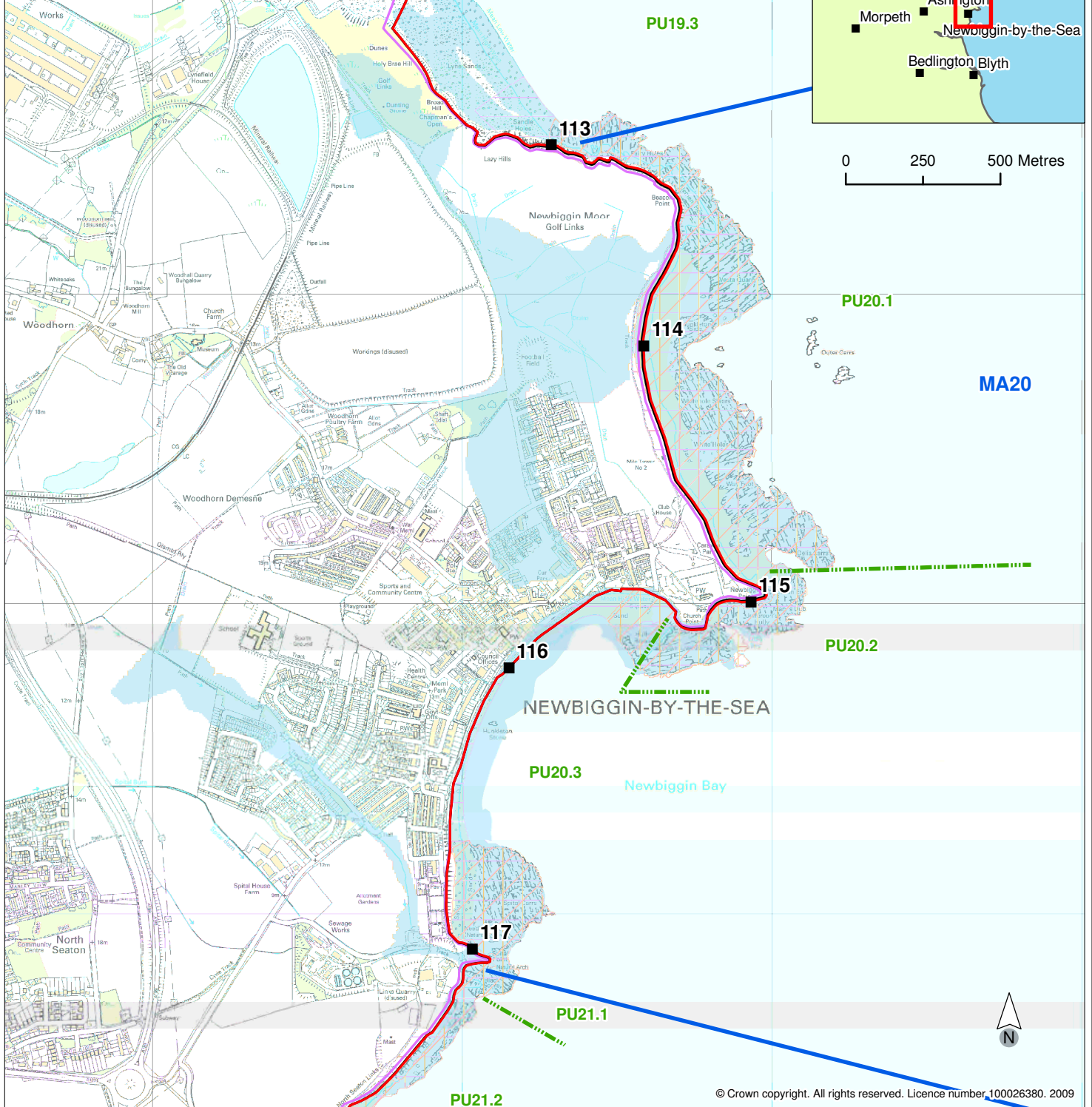
N.B. The table below is a summary of the potential impacts on sites designated for reasons of national or international nature conservation importance. This table should not be read in isolation, please refer to the narrative included in the Discussion and Detailed Policy Development section of this PDZ. Details of the boundaries of the policy unit can be seen in the Management Area map overleaf.

Designated Site	Designated / supporting habitat	Policy Unit	Impact			Mitigation / compensation
			by 2025	by 2055	by 2105	
Northumbria Coast SPA	Rocky shore	20.2	Habitat loss	Habitat loss	Habitat loss	No mitigation identified> Regional Habitat Compensation Plan needed.
		20.3	No impact	No impact	No impact	N/A
Northumberland Shore SSSI	Sandy beaches	20.2	No impact	No impact	No impact	N/A
		20.3	No impact	No impact	No impact	N/A
	Intertidal rock	20.2	Habitat loss	Habitat loss	Habitat loss	No mitigation identified> Regional Habitat Compensation Plan needed.
		20.3	No impact	No impact	No impact	N/A
Cresswell and Newbiggin Shores SSSI	Westphalian and Quaternary deposits	20.2	No impact	No impact	No impact	N/A
		20.3	No impact	No impact	No impact	N/A

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan reference should be made to the baseline data.

**Policy Development Zone 5 - Beadon Hill to Seaton Sluice
Management Area 20 - Newbiggin (Ch 113 to 117)**

Policy Unit		Policy Plan			
		2025	2055	2105	Comment
20.1	Newbiggin Moor	NAI	NAI	MR	Maintain competent flood defence set back from the projected coastline position.
20.2	Newbiggin Point	HTL	HTL	HTL	Limited intervention to protect graveyard.
20.3	Newbiggin Bay	HTL	HTL	HTL	Maintain beach through recharge.



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Predicted Shoreline Position under Preferred Policy

- 20 Years
- 50 Years
- 100 Years

- SPA
- RAMSAR
- SAC
- SSSI
- NNR

- Scheduled Ancient Monuments
- EA Flood Zone - Sept 07
- Management Areas
- - - Policy Units



ACTION PLAN MANAGEMENT AREA 20

Action	By when	Responsibility	Indicative Cost
<ul style="list-style-type: none"> Investigate flood risk to the town via Newbiggin Moor. 	2010	Environment Agency	£50k
<ul style="list-style-type: none"> Plan for longer-term realignment of sections of the Newbiggin golf course and Caravan Park. 	Ongoing	Golf Club / Caravan Park	Nominal
<ul style="list-style-type: none"> Coastal monitoring. 	Ongoing	Wansbeck DC	Ongoing
Schemes:			
<ul style="list-style-type: none"> Local intervention between Newbiggin Point and Church Point to safeguard St. Bartholomew's Church and graveyard. 	2010	Wansbeck DC	£100k
<ul style="list-style-type: none"> Newbiggin Bay Beach Recharge 	2008	Wansbeck DC	£100k
<ul style="list-style-type: none"> Newbiggin Bay Beach Management 	2009 onwards	Wansbeck DC	£50k annually
<ul style="list-style-type: none"> Maintenance of existing defence assets recommended. 	Ongoing	Wansbeck DC	Revenue

In addition to this detailed Action Plan for this specific Management Area, a high-level strategic Action Plan for the whole SMP area is provided in Section 7.

Coastal monitoring is also discussed in Section 7 and this is relevant to the whole SMP2 area as well as some specific frontages.

Location reference:	SPITAL POINT TO BLYTH EAST PIER
Management Area reference:	21
Policy Development Zone:	PDZ 5

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: The aim of the plan is to minimise intervention, allowing the coast respond naturally within existing hard points including potential realignment within the estuary to provide the coast with the ability to respond naturally at the estuary mouth without pressure for intervention on adjacent sections of the frontage. Any development of the coastal zone should aim to set back to allow a natural buffer zone or should include a detailed examination of how development and defences can be used to retaining sediment.

PREFERRED POLICY TO IMPLEMENT PLAN	
From present day	Maintain existing defences and East Pier along the Cambois frontage allowing natural adjustment between these control points.
Medium-term	Maintain existing defences and East Pier along the Cambois frontage allowing natural adjustment between these control points. Consider realignment within the Wansbeck Estuary.
Long-term	Maintain existing defences and East Pier along the Cambois frontage allowing natural adjustment between these control points.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			
		2025	2055	2105	Comment
21.1	Spital Point	NAI	NAI	NAI	
21.2	Hawks Cliff	NAI	NAI	NAI	
21.3	Sandy Bay	NAI	NAI	NAI	Relocation of mobile assets. There may be some incidental benefit derived from management approaches along 21.4.
21.4	Wansbeck Estuary	NAI	MR	MR	Further investigation of the possible medium and longer term approaches for MR involving weir removal and/or river training/control points to benefit 21.3 and 21.4.
21.5	Cambois Beach	MR	HTL	HTL	Selective local works (hard points) to assist realignment and safeguard properties and assets – including use of existing revetment to aid this process. Manage the recession process elsewhere to ensure no breaching through dunes. Set any new development back from shore (buffer zone).
21.6	Blyth East Pier	HTL	HTL	HTL	This is a key feature in controlling the plan shape of the PDZ.
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment					

CHANGES FROM PRESENT MANAGEMENT

The principal change is the potential for realignment within and at the mouth of the Wansbeck to create a more sustainable management of the shoreline.

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	18	15	10	43
	Preferred Plan Damages £k PV	0	0	0	0
	Benefits £k PV	18	15	10	43
	Costs of Implementing plan £k PV	106	159	183	449
<p>Costs are estimated on the basis of managing existing revetments and the potential modification of the coast through control points. Actual costs, particularly with respect to management of the estuary would need to be considered in detail.</p> <p>Damages are also linked to MA22. Potential damages would increase substantially with higher erosion scenario indicating loss beyond end of SMP</p> <p>Description of damage and benefits under preferred plan.</p> <p>Maintains community and important transport links not identified by MDSF. Establishes longer term approach for management of the coast.</p>					
Heritage	Maintains heritage				
Amenity	Maintains amenity				

IMPLICATION WITH RESPECT OF NATURAL ENVIRONMENT

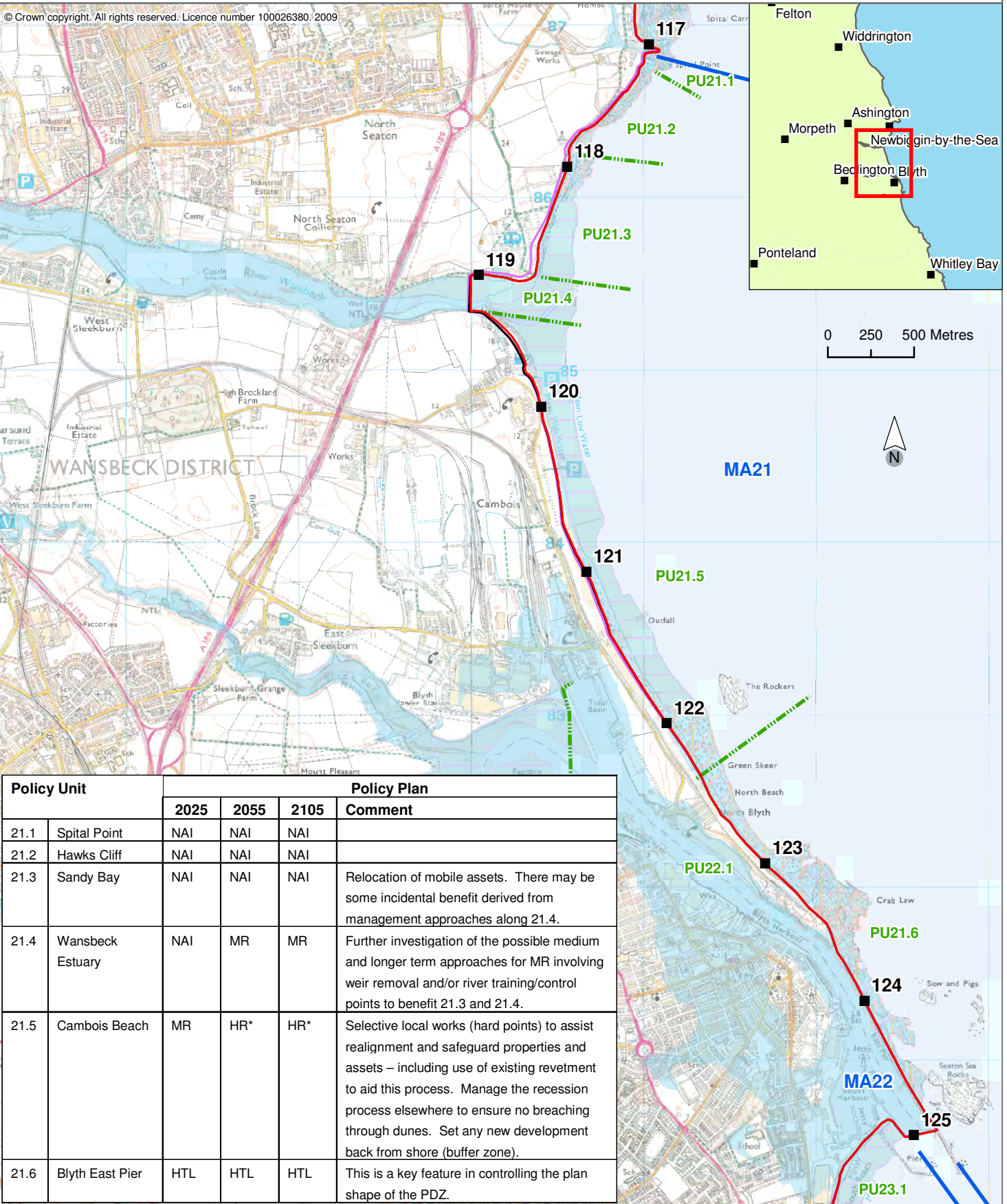
N.B. The table below is a summary of the potential impacts on sites designated for reasons of national or international nature conservation importance. This table should not be read in isolation, please refer to the narrative included in the Discussion and Detailed Policy Development section of this PDZ. Details of the boundaries of the policy unit can be seen in the Management Area map overleaf.

Designated Site	Designated / supporting habitat	Policy Unit	Impact			Mitigation / compensation
			by 2025	by 2055	by 2105	
Northumbria Coast SPA	Rocky shore	21.6	No impact	No impact	No impact	N/A
Northumberland Shore SSSI	Estuarine areas	21.4	No impact	Habitat creation	Habitat creation	N/A
	Salt marsh	21.4	No impact	Habitat creation	Habitat creation	N/A
	Sandy beaches	21.4 21.5	Habitat creation	Habitat creation	Habitat creation	N/A
	Intertidal rock	21.6	No impact	No impact	No impact	N/A
Cresswell and Newbiggin Shores SSSI	Westphalian and Quaternary deposits	21.1 21.2 21.3	No impact	No impact	No impact	N/A

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan reference should be made to the baseline data.

Policy Development Zone 5 - Beadon Hill to Seaton Sluice Management Area 21 - Spital Point to Blyth East Pier (Ch 117 to 125)

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Policy Unit		Policy Plan			
		2025	2055	2105	Comment
21.1	Spital Point	NAI	NAI	NAI	
21.2	Hawks Cliff	NAI	NAI	NAI	
21.3	Sandy Bay	NAI	NAI	NAI	Relocation of mobile assets. There may be some incidental benefit derived from management approaches along 21.4.
21.4	Wansbeck Estuary	NAI	MR	MR	Further investigation of the possible medium and longer term approaches for MR involving weir removal and/or river training/control points to benefit 21.3 and 21.4.
21.5	Cambois Beach	MR	HR*	HR*	Selective local works (hard points) to assist realignment and safeguard properties and assets – including use of existing revetment to aid this process. Manage the recession process elsewhere to ensure no breaching through dunes. Set any new development back from shore (buffer zone).
21.6	Blyth East Pier	HTL	HTL	HTL	This is a key feature in controlling the plan shape of the PDZ.

Predicted Shoreline Position under Preferred Policy	SPA	Scheduled Ancient Monuments
20 Years	RAMSAR	EA Flood Zone - Sept 07
50 Years	SAC	Management Areas
100 Years	SSSI	Policy Units
	NNR	



ACTION PLAN MANAGEMENT AREA 21

Action	By when	Responsibility	Indicative Cost
<ul style="list-style-type: none"> Plan for longer-term realignment of sections of the Sandy Bay Caravan Park. 	2055	Caravan Park	Nominal
<ul style="list-style-type: none"> Investigations into medium- to longer-term management of the mouth of the Wansbeck estuary, including potential benefits of weir removal and/or local training works. 	2010	Wansbeck DC	£80k
<ul style="list-style-type: none"> Inform land use plans to set development back from the eroding shore by a suitable buffer zone. 	Ongoing	Wansbeck DC Planners	Nominal
<ul style="list-style-type: none"> Cambois cliff top monitoring 	2009	Wansbeck DC	£5k annually
<ul style="list-style-type: none"> Coastal monitoring. 	Ongoing	Wansbeck DC	Ongoing
Schemes:			
<ul style="list-style-type: none"> Selective local works on a retreated alignment to safeguard properties and assets (e.g. Cambois House and Cottages) and help with wider-scale coastal reconfiguration. 	2055	Wansbeck DC	£200k
<ul style="list-style-type: none"> Improvement works at North Blyth 	2011	Private	£500k
<ul style="list-style-type: none"> Maintenance of existing defence assets recommended. 	Ongoing	Wansbeck DC	Revenue

In addition to this detailed Action Plan for this specific Management Area, a high-level strategic Action Plan for the whole SMP area is provided in Section 7.

Coastal monitoring is also discussed in Section 7 and this is relevant to the whole SMP2 area as well as some specific frontages.

Location reference:	BLYTH HARBOUR (CH 125)
Management Area reference:	22
Policy Development Zone:	PDZ5

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: Investigate flood risk within the harbour with the intent of securing the flood areas and allowing further development opportunities.

PREFERRED POLICY TO IMPLEMENT PLAN.	
From present day.	Maintain and improve flood defence.
Medium-term	Maintain and improve flood defence.
Long-term	Maintain and improve flood defence.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			
		2025	2055	2105	Comment
22.1	Blyth Harbour	HTL	HTL	HTL	Check compatibility with CFMP and Blyth Flood Risk review.
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment					

CHANGES FROM PRESENT MANAGEMENT

No change from previous policy.

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	8249	6746	4602	19,598
	Preferred Plan Damages £k PV	0	0	0	0
	Benefits £k PV	8249	6746	4602	19,598
	Costs of Implementing plan £k PV	-	-	-	-
Costs would be determined in relation to the flood risk study. Description of damage and benefits under preferred plan. Would maintain integrity of town and harbour.					
Heritage	Maintains heritage				
Amenity	Maintains amenity				

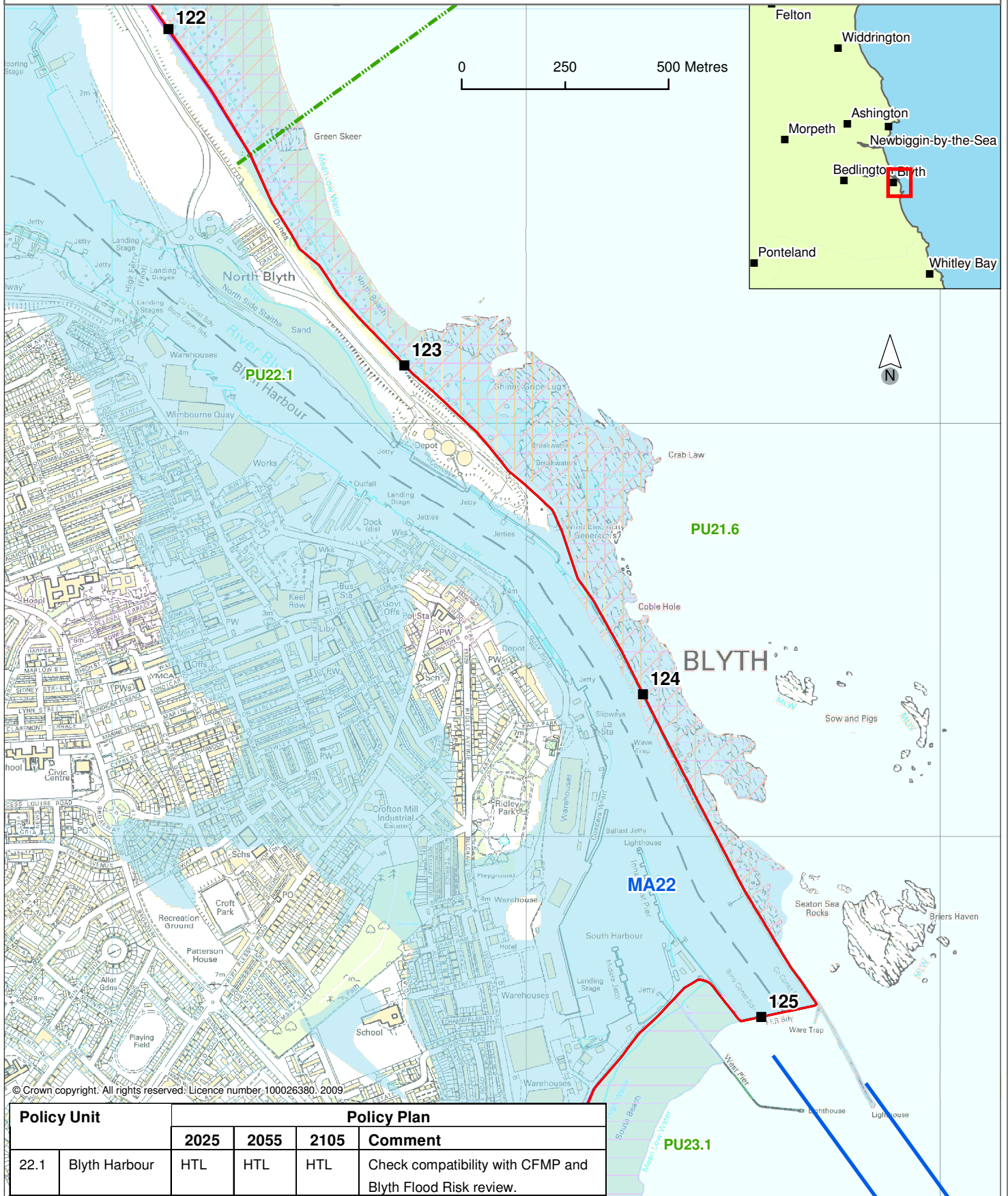
IMPLICATION WITH RESPECT OF NATURAL ENVIRONMENT

N.B. The table below is a summary of the potential impacts on sites designated for reasons of national or international nature conservation importance. This table should not be read in isolation, please refer to the narrative included in the Discussion and Detailed Policy Development section of this PDZ. Details of the boundaries of the policy unit can be seen in the Management Area map overleaf.

Designated Site	Designated / supporting habitat	Policy Unit	Impact			Mitigation / compensation
			by 2025	by 2055	by 2105	
Northumbria Coast SPA	High tide roosts	22.1	No impact	No impact	No impact	N/A
Northumberland Shore SSSI	Estuarine areas	22.1	No impact	No impact	No impact	N/A

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan reference should be made to the baseline data.

**Policy Development Zone 5 - Beadon Hill to Seaton Sluice
Management Area 22 - Blyth Harbour (Ch 125)**



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Policy Unit		Policy Plan			
		2025	2055	2105	Comment
22.1	Blyth Harbour	HTL	HTL	HTL	Check compatibility with CFMP and Blyth Flood Risk review.

Predicted Shoreline Position under Preferred Policy 20 Years 50 Years 100 Years	SPA	Scheduled Ancient Monuments
	RAMSAR	EA Flood Zone - Sept 07
	SAC	Management Areas
	SSSI	Policy Units
	NNR	



ACTION PLAN MANAGEMENT AREA 22

Action	By when	Responsibility	Indicative Cost
<ul style="list-style-type: none"> Review flood risk to Blyth from various sources. 	2009	Environment Agency	£50k
Schemes: <ul style="list-style-type: none"> No coast protection schemes proposed against erosion. Ongoing investigations may reveal need for flood defence improvements within the harbour against tidal and/or river flooding to the town. 	Ongoing	Port of Blyth / Environment Agency	

In addition to this detailed Action Plan for this specific Management Area, a high-level strategic Action Plan for the whole SMP area is provided in Section 7.

Coastal monitoring is also discussed in Section 7 and this is relevant to the whole SMP2 area as well as some specific frontages.

Location reference:	BLYTH WEST PIER TO SEATON SLUICE (CH 125 TO 130)
Management Area reference:	23
Policy Development Zone:	PDZ5

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: At the northern end of the bay the intent is to secure flood defence to the town of Blyth and to work towards supporting regeneration of the area. To the centre and southern end of the bay the aim is to support the natural development of the dunes as an important ecological and amenity value to the area; minimising intervention to that necessary in maintaining the natural defence. Between these two areas, management needs to allow a transition between the two approaches, this may require realignment of the coast. At Seaton Sluice the aim would be to support defence of this area as a locally important recreational and amenity area.

PREFERRED POLICY TO IMPLEMENT PLAN	
From present day	Maintain existing defences and manage dune realignment.
Medium-term	Maintain existing defences and manage dune realignment, considering potential further realignment between these areas.
Long-term	Maintain existing defences and manage dune realignment, considering potential further realignment between these areas.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			
		2025	2055	2105	Comment
23.1	Blyth West Pier to Beach Gardens	HTL	HTL	HTL	Prevent breaching into South Harbour.
23.2	Beach Gardens to Promenade	HTL	HTL	MR	Realignment at the end of the promenade will be needed in the longer term in response to rising sea levels.
23.3	South Beach	MR	MR	MR	Manage the recession process to ensure no breaching through dunes. Further investigation of local erosion at Meggie's Burn.
23.4	Seaton Burn	HTL	HTL	HTL	Policy extends along short section of existing wall at Seaton Sluice headland.

Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment

CHANGES FROM PRESENT MANAGEMENT

The policy changes are in detail with respect to local frontages rather than a change in attitude to defence management.

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

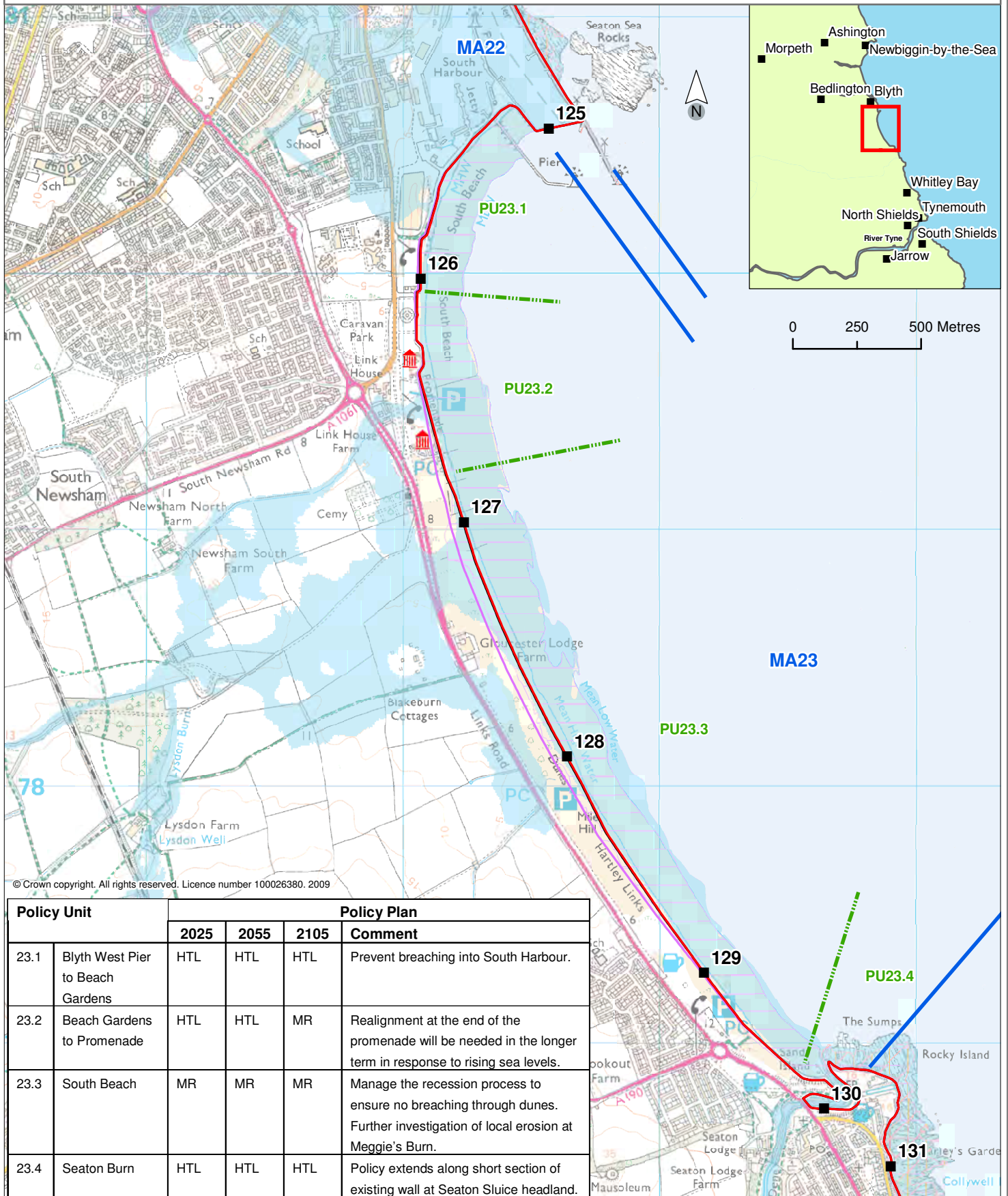
Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	0	0	0	0
	Preferred Plan Damages £k PV	0	0	0	0
	Benefits £k PV	0	0	0	0
	Costs of Implementing plan £k PV	177	30	19	225
Costs based on management of existing defences and on-going dune management. Costs also include for local works at Seaton Sluice Harbour which would be subject to a detailed study. Damages do not take account of potential realignment nor for disruption to road. Description of damage and benefits under preferred plan. Maintains natural dune defence					
Heritage	Maintains heritage				
Amenity	Maintains amenity				

IMPLICATION WITH RESPECT OF NATURAL ENVIRONMENT

Designated Site	Designated / supporting habitat	Policy Unit	Impact			Mitigation / compensation
			by 2025	by 2055	by 2105	
Northumbria Coast SPA	Rocky shore	23.4	No impact	No impact	No impact	N/A
Northumberland Shore SSSI	Sandy beaches	23.1 23.2	Habitat loss	Habitat loss	Habitat loss	Mitigated with MR at Blyth South Beach (23.3)
	Intertidal rock	23.4	No impact	No impact	No impact	N/A
Tynemouth to Seaton Sluice SSSI	Coal Measures exposures	23.4	No impact	No impact	No impact	N/A

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan reference should be made to the baseline data.

Policy Development Zone 5 - Beadon Hill to Seaton Sluice
Management Area 23 - Blyth West Pier to Seaton Sluice (Ch 125 to 130)



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Policy Unit		Policy Plan			
		2025	2055	2105	Comment
23.1	Blyth West Pier to Beach Gardens	HTL	HTL	HTL	Prevent breaching into South Harbour.
23.2	Beach Gardens to Promenade	HTL	HTL	MR	Realignment at the end of the promenade will be needed in the longer term in response to rising sea levels.
23.3	South Beach	MR	MR	MR	Manage the recession process to ensure no breaching through dunes. Further investigation of local erosion at Meggie's Burn.
23.4	Seaton Burn	HTL	HTL	HTL	Policy extends along short section of existing wall at Seaton Sluice headland.

Predicted Shoreline Position under Preferred Policy

- 20 Years
- 50 Years
- 100 Years

- SPA
- RAMSAR
- SAC
- SSSI
- NNR

- Scheduled Ancient Monuments
- EA Flood Zone - Sept 07
- Management Areas
- - - Policy Units



ACTION PLAN MANAGEMENT AREA 23

Action	By when	Responsibility	Indicative Cost
<ul style="list-style-type: none"> Investigate local erosion around the outfall of Meggie's Burn. 	2009	Blyth Valley DC	£40k
<ul style="list-style-type: none"> Coastal monitoring. 	Ongoing	Blyth Valley DC	Ongoing
Schemes:			
<ul style="list-style-type: none"> Dune management along Blyth South Beach using 'soft' techniques to prevent breaching by the sea. 	Ongoing	Blyth Valley DC	£20k annually
<ul style="list-style-type: none"> Local realignment at the southern end of the existing Blyth promenade in the longer-term. 	2075	Blyth Valley DC	£100k
<ul style="list-style-type: none"> Improvement works to Seaton Sluice harbour structures. 	2009 – 2013	Blyth Valley DC	£135k
<ul style="list-style-type: none"> Maintenance of existing defence assets recommended. 	Ongoing	Blyth Valley DC	Revenue

In addition to this detailed Action Plan for this specific Management Area, a high-level strategic Action Plan for the whole SMP area is provided in Section 7.

Coastal monitoring is also discussed in Section 7 and this is relevant to the whole SMP2 area as well as some specific frontages.

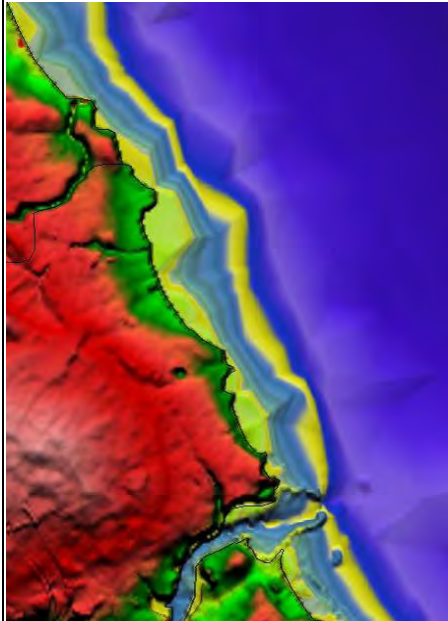
4.6 PDZ 6 Seaton Sluice to River Tyne (chainage 130 to 145.5)

4.6.1 Policy Development Analysis

DESCRIPTION

Physical

The zone covers a length of some 15.5km from Seaton Sluice to the Fish Quay on the north bank of the River Tyne estuary. The area generally comprises short sections of hard rock outcrops of sea cliff and shore platform in between which are (mostly) defended or managed beach frontages backed by cliffs or dunes. The physical coast may be described in four distinct sections: the sea cliffs extending from Seaton Sluice to Curry's Point; Whitley Bay; Brown's Point to Tynemouth North Pier; and Tynemouth North Pier to the Fish Quay.



Seaton Sluice to Curry's Point. This is a cliffed frontage with a rock shore platform. Coastal defences exist at Seaton Sluice and Collywell Bay, with a short length further south at Hartley Cove and on St Mary's Island. The rest of the frontage is undefended and eroding. The Seaton Burn drains into the North Sea at the north of the frontage and its harbour is used by small recreational craft. The town of Seaton Sluice lies throughout the northern half of the frontage. There is a coastal footpath that runs along the cliff edge and a causeway that provides access to St Mary's Island from the shore.

Whitley Bay. This frontage extends between Curry's Point and Brown's Point and is defended along almost all of its length, mainly by concrete or masonry seawalls but also with a short section of rip rap. There remains a short section of undefended cliff backed by a pitch-and-put golf course. There are two bays, namely Whitley Sands and Brown's Bay. The A193 road runs along the length of Whitley Bay, separated from the cliff by a recreational area in between, named Whitley Links. Considerable development extends landward of the road and, in the south, this comes close to the cliff edge.

Brown's Point to Tynemouth North Pier. Along this frontage there is a series of three bays, namely Cullercoats Bay, Tynemouth Longsands and King Edward's Bay (sometime known as Tynemouth Shortsands), extending between harder rock headlands. Considerable residential development backs the coastline. Cullercoats Bay is sheltered by two piers and is home to the Dove Marine Laboratory and the RNLI lifeboat station. It is mostly defended but has a short section of undefended sea cliff. The northern section of Longsands has defences protecting the cliff/slope, and the dunes further south, covering much of the bay, are managed. At the southern end of Longsands is a disused outdoor swimming pool and a recently-constructed beach café. King Edward's Bay and the cliffs upon which Tynemouth Priory is located are heavily defended. Tynemouth North Pier is a massive masonry structure that provides protection to areas of both North and South Tyneside and is the outer navigation structure to the River Tyne.

Tynemouth North Pier to the Fish Quay. The frontage is heavily defended by concrete and masonry walls below the slopes of Collingwood's Monument and Knotts Flats and there is a rip rap defence fronting Low Lights Car Park. A masonry groyne south of the car park provides a wave trap feature prior to the Fish Quay. There is a progression from a coastal environment at the sandy beach and backing sea cliffs of Prior's Haven to an estuarine environment characterised by quay walls and inter tidal flats at the Fish Quay. The area houses important fishing facilities and other industry and there is a RNLI lifeboat station near the Fish Quay.

Environment

The whole area provides a focus for recreation and tourism activities associated with the main urban areas of Tynemouth, Cullercoats and Whitley Bay. These activities include traditional beach use, water sports, walking and nightlife entertainments. These activities are supported by several shops, public houses, bars, cafés and areas of parkland and public open spaces, as well as car parking facilities. The beach at Longsands is heavily used for sporting activities by local clubs and is often used for local, national and international events. Brown's Bay is a popular spot for scuba diving

The frontage falls within the Northumbria Coast Ramsar Site and Special Protection Area (SPA), the Northumberland Shore Site of Special Scientific Interest (SSSI) and the Tynemouth to Seaton Sluice SSSI. These designations cover both nature conservation and earth science heritage values. Tynemouth Priory and Castle are important heritage features and St Mary's Lighthouse is a popular visitor attraction. In summer the SPA supports important numbers of breeding little tern, whilst in winter the mixture of rocky and sandy shore supports large numbers of turnstone and purple sandpiper. In addition, there are locally important numbers of knot, ringed plover and golden plover

Further detail regarding these sites can be found in Appendix D. Where proposed policies may have potential impacts on designated features these are discussed in the discussion and detailed policy development section and listed in the summary of preferred plan recommendations and justification section under implications with respect of the natural environment.

In the UK these Natura 2000 sites have legal requirements for protection (The Conservation (Natural Habitats, *et.c.*) Regulations 1994, and the Wildlife & Countryside Act 1981, as amended) to maintain their designated conservation value. Any activity that occurs within any of these designated sites, or is likely to impact upon them, must first have approval from the relevant statutory authority. As well as Natura 2000 sites, SSSIs and AONBs are protected under the Countryside and Rights of Way Act 2000 (CROW Act) as well as the proposed Marine Bill which contains provisions for Coastal Access.

Specific areas designated within the Northumbria Coast SPA within this PDZ include the coast from Seaton Sluice to St. Mary's Island, the rocky outcrops between Whitley Bay Beach and Cullercoats, Cullercoats Bay and Longsands, Longsands and King Edward's Bay, King Edward's Bay and Prior's Haven and from Prior's Haven to the Fish Quay.

The Tynemouth to Seaton Sluice SSSI provides one of the best exposures of Coal Measures strata in Great Britain (particularly at Hartley Cove), showing a continuous lower Westphalian B sequence from the Plessey to the High Main seams. Of particular importance are the unbroken sequence at Hartley Cove and the outcrops of sandstone bodies along the coastline, which have been interpreted as braided river deposits in marked contrast to the meandering river deposits which dominate the Pennines Coalfields to the south. This implies that the Northumberland Coalfield was formed in a more elevated area relative to the Pennines Coalfield, and was then probably further from the sea. The site is thus of considerable importance for interpreting the palaeogeographical structure of Britain during the Middle Carboniferous Period.

There are four conservation areas within the area: St Mary's Island, Whitley Bay; Cullercoats; Tynemouth; and North Shields Fish Quay. Grade II listed buildings within the area include: Spanish City, Whitley Bay; Cullercoats Watch Club House; Adamson memorial drinking fountain, Cullercoats; Clark / Anderson / Haswell / Wright Tombs, Tynemouth Priory; The Grand Hotel, Tynemouth; Clifford's Fort Almhouse, Fish Quay; North Pier and Lighthouse, Priors Haven, Tynemouth; Tynemouth Watch Clubhouse. There are many other Grade I and Local listed buildings in the area including: St. Mary's Lighthouse; the Dove Marine Laboratory, Cullercoats; RNLI Lifeboat House, Cullercoats and Collingwood's Monument, Tynemouth (Grade II*).

The Priory at Tynemouth is a Scheduled Ancient Monument. This monument includes the remains of an Iron Age and Romano-British settlement, a pre-Conquest and a post-Conquest monastery, a ninth century wayside cross, a possible Norman motte, an enclosure castle, an artillery castle and 19th and 20th Century coastal defences. They occupy a prominent headland with steep cliffs on three sides and form an important strategic position at the mouth of the River Tyne where, from the earliest times, it could command the mouth of the river.

There is a Registered Park at Seaton Delaval that runs 3 km from Seaton Sluice to Seaton Delaval and encompasses the village of New Hartley and Seaton Delaval Hall.

North Tyneside is one of five metropolitan boroughs within the County of Tyne and Wear and is situated at the mouth of the River Tyne. The main coastal settlements in North Tyneside are North Shields and Whitley Bay. The Tyne is a commercial river with shipbuilding, offshore fabrication, fishing and port related industries, supporting regular passenger services and exports to northern Europe.

Tourism provides a higher than average proportion of employment in the Borough with the coast, River Tyne and countryside providing the main attractions. In the coastal zone, tourism accounts for more than 20% of all employment. Improvements to the North Shields Fish Quay have greatly increased its attraction, whilst the increase in the growth of passenger services has improved the facilities at the Tyne Commission Quay.

Tourism is encouraged because of the economic and employment benefits it provides within the region, as long as environmental and conservation objectives are not compromised (Policy LE2). Areas detailed for attention in the local plan including the following coastal developments:

- Coastal parts of Whitley Bay, Cullercoats and Tynemouth.
- Further action in the area of North Shields Fish Quay and Riverside to enhance its attractiveness as a tourist destination.

River and port-related development provides major employment opportunities. Areas of opportunity include marine construction, marine repair, offshore fabrication and supply, the maritime goods trade, passenger services and the fishing industry. Adequate lengths of frontage are required for laying-up facilities, with some mineral and waste disposal also requiring access to water-borne transport.

North Tyneside has extensive areas of coast and river estuary with considerable existing and potential resources for land and water-based recreation. There is a need to ensure that development of these resources takes due account of likely impact on the natural environment and local amenity, and that a satisfactory relationship can be established with river-based commercial activity (Policy R2).

There are a number of relevant Biodiversity Action Plans (BAPs) that are relevant to this area including rocky shore and islands, maritime cliffs and slopes, saltmarsh and mudflat, sand dune and common seal. More information on the specifics of these BAPs can be found in **Appendix D**.

Appendix E details the issues and objectives that were brought up through public consultation. These issues and objectives have informed this review as well as the main decision making process. The SEA directive suggests out various receptors that should be included in any SEA. The themes within **Appendix D** and **Appendix E** address the various receptors as shown below. All the SEA receptors as shown below are assessed within this PDZ (note: some SEA receptors are covered by more than one theme):

Issues and Objectives	Thematic review	SEA Receptor
Environment	Natural Environment	Biodiversity Fauna and flora Water
	Contaminated land	Soil
	Landscape and character	Landscape Material assets Population
Heritage	Historic environment	Cultural heritage
Commercial	Current and future land use	Population Material assets
Recreational		Population
Hard assets		Material assets Population

It can be seen from the above table that Air, Human Health and Climactic Factors are not included. Air and Human Health were scoped out of the assessment as a receptor because the SMP is a high level planning document and as such these receptors are not applicable to this plan. Climatic Factors (especially sea level rise) are integral to the assessment of the SMP and have been considered within each PDZ (Physical Characteristics section).

Environmental issues identified within this area are:

- Loss of intertidal salt marsh and mud flat habitat at Seaton Sluice.
- Coastal processes affecting the geological features of the Tynemouth to Seaton Sluice SSSI through erosion, especially at Hartley Cove, north of St Mary's Island.
- Cliff erosion of boulder clay at the Links, Whitley Bay, through both drainage issues and wave action.
- Loss of roosting habitat along the whole area due to coastal squeeze.
- Dune erosion at Tynemouth Longsands.
- Dredging and disposal of spoil from the Port of Tyne.
- Sewage and sludge disposal.
- Loss of intertidal saltmarsh and mudflat habitat within the mouth of the River Tyne.

Issues concerning the whole area relating to the SPA include lack of management of wetland habitats, conflicts between wildfowl and farmers, recreational disturbance, pollution/water quality, commercial exploitation of marine animals, aggregate extraction, pressure for development of coastal habitats and cord grass invasion.

KEY PRINCIPLES

- To contribute to a sustainable and integrated approach to land use planning.
- To protect and enhance the natural environment.
- To support the cultural heritage.
- To protect people's homes from flooding and loss through erosion.
- To protect opportunities for employment.
- To support adaptation by the local communities.
- To maintain or enhance the high quality landscape.
- To minimise reliance on defence.
- To seek opportunity for habitat enhancement.

KEY OBJECTIVES (a full list of objectives for this zone is presented in Appendix E)

- To maintain or provide protection, where sustainable, against erosion and flooding to properties, businesses assets, utilities and transport infrastructure.
- To maintain navigation in the River Tyne estuary, including to the Port of Tyne.
- To maintain or enhance coastal biodiversity and geological features of interest, in particular those that are designated for features of international or national importance.
- To maintain heritage value in the Conservation Areas of St Mary's Island, Cullercoats, Tynemouth and North Shields Fish Quay, and also at Seaton Sluice and Rocky Island.
- To maintain boat berthing and navigation at Seaton Sluice.
- To maintain navigational access to Cullercoats Bay.
- To maintain a functioning service of the RNLI.
- To maintain existing recreational facilities and open areas, including beach access and the use of promenades.
- To maintain the function of the golf course.
- To maintain the function of the Low Lights car park.
- To maintain opportunities for environmental restoration or enhancement.
- To maintain opportunities for recreational enhancement.
- To maintain regeneration opportunities.
- To maintain or enhance access to the coast.
- To maintain access to the foreshore for Search and Rescue purposes.

PHYSICAL CHARACTERISTICS

Water levels (mODN)

MLWS	MHWS	HAT	1:10yr	1:25yr	1:50yr	1:100yr	1:200yr
-1.90	2.40	3.10	3.28	3.37	3.47	3.59	3.69

Levels are the Ordnance Datum Newlyn.

Source (tidal levels): Admiralty Tide Tables

Source (extreme water levels): Shoreline Management Plan (Posford Duvivier, 1998)

Note: The Hartley Cove to River Tyne Coastal Strategy Plan (Scott Wilson, 2007) confirms the suitability of the water level information presented in the 1998 SMP.

Wave climate

Return Period (1:X years)	Wave Height H_s (m)
1	5.44
10	7.56
100	9.63

Baseline Erosion Rates

Seaton Sluice	0.2 to 0.4m/yr	Over 100 years potential erosion of the order of 60m.
Crag Point to St Mary's Island	0.1m/yr	Over 100 years potential erosion of the order of 30m.
St Mary's Island to Whitley Bay	0.3 to 0.5m/yr	Over 100 years potential erosion between 40m and 70m.
Whitley Bay	0.3m/yr	Over 100 years potential erosion of the order of 50m.
Brown's Point to North Pier	0.1m/yr, locally 0.2m/yr	Over 100 years potential erosion between 10m and 15m.
Within the River Tyne estuary	0.1m/yr	Over 100 years potential erosion of the order of 16m, with associated coastal slope instability.

Sea Level Rise assumed rates: 0.05m to year 2025, 0.26m to year 2055, and 0.8m to year 2105. Coastal evolution has been examined based on lower rates and higher rates in addition to those assessed above.

Evolutionary Trend

Existing Processes:

The main shape of the coastline is defined and maintained by both the harder rock headlands and foreshore outcrops and the extensive lengths of coastal defences. There is only limited sediment transport throughout the frontage due to both limited supply and the presence of rock features that form a partial barrier to movement. This means that Whitley Bay, Cullercoats Bay, Tynemouth Longsands and King Edward's Bay are relatively independent of each other. Historic cliff top erosion rates are relatively low, even along undefended sections, reaching a maximum of around 0.3m/year along the cliffs to the north-west of St Mary's Island. Along the undefended section of Whitley Bay, backed by the golf course, rates from 1955-1999 ranged from 0.14 to 0.33m/year, depending on location, averaging around 0.21m/year for the frontage as a whole.

Ongoing monitoring of the beaches has revealed changes in beach response to wave climate, with draw-down of sand during storms and its return during calmer conditions. This was particularly noted during the storms of September 2007 when the lowest beach levels were recorded since monitoring began in April 2002.

Unconstrained:

If existing defences were not present, the coastline would likely be located further landward than its

present configuration, but the hard rock headlands would still exert control on plan shape evolution, with a general form of headlands and bays being observed. In the absence of the Tynemouth North Pier there would be greater wave penetration into the harbour and recession of the reclaimed areas in the vicinity of the quayside in the absence of the quay walls.

MANAGEMENT

Present Management

Policy

SMP1

The PDZ is covered by Coastal Process Units 24-27. These comprise Management Units 44-48.

Seaton Sluice to St Mary's Lighthouse MU 44	Do Nothing
St Mary's Lighthouse to Whitley Sands MU 45	Selectively Hold the Line
Whitley Sands to Whitley Bay MU 46	Hold the Line
Whitley Bay to Tynemouth North Pier MU 47	Selectively Hold the Line
Tynemouth North pier to Tynemouth North Bank MU 48	Selectively Hold the Line

Hartley Cove to River Tyne Coastal Strategy Plan

The PDZ is covered by Management Units 44-48

Hartley Cove to St Mary's Lighthouse MU 44*	Selectively Hold the Line
St Mary's Lighthouse to Whitley Sands MU 45	Selectively Hold the Line
Whitley Sands to Whitley Bay MU 46	Hold the Line
Cullercoats to Tynemouth North Pier MU 47	Selectively Hold the Line
Tynemouth North Pier to Fish Quay MU 48**	Selectively Hold the Line

* The northern boundary was moved from Seaton Sluice to North Tyneside Council's boundary at Hartley Cove and MU 44 was combined with MU 45 for purposes of policy selection.

** The boundary was extended upstream in the River Tyne to the Fish Quay.

Baseline scenarios for the zone

No Active Intervention (Scenario 1):

If existing coastal defences were not to be maintained, they would be likely to continue to exert a degree of influence on coastal behaviour over the next twenty years. Over longer timescales, cliff recession would be likely to become reactivated. In areas of harder rock headlands, the recession rates would be relatively low and the headlands would continue to exert influence on platform alignment of the bays and on sediment transport rates. Elsewhere, where multiple defences front sea cliffs or coastal slopes of softer lithology, such as in Whitley Bay, failure could lead to more rapid recession or deeper seated failure mechanisms extending further inland.

These changes would lead to the loss of a number of coastal assets, such as roads, pathways, houses, recreational areas, a nature reserve and car parks.

Even without maintenance, the Tynemouth North Pier is likely to remain an influence on the coast and estuary mouth over the next fifty years, providing shelter to the frontage up to the Fish Quay. In the longer term, failure of the structure would result in greater wave penetration into the river and, when quay walls fail, recession of the reclaimed areas upon which the quays have been created.



<u>MDSF Evaluation</u> <u>(Appendix H)</u>	<i>Assets lost over the time period of the SMP</i>	<i>PValue Damages</i>
<i>Erosion</i>	<p>Collywell Bay: 24 No. residential £429k 7 No. Commercial £146k</p> <p>Whitley Bay 16 No. residential £333 15 No. commercial £264</p> <p>Tynemouth 8 No. residential £120k 1 No. commercial £23k</p> <p>River Tyne 2 No commercial £28k</p>	
<i>Flooding</i>	Principal flood risk associated with areas within the Tyne, with minor extreme level flooding at Whitley Bay	£6,463k
<u>Other Information</u>	Losses along the frontage would include the road and access to properties not considered within MDSF. Extensive loss of sea front properties may occur due to subsequent instability of coastal cliffs and slopes.	
<i>Assessment of Key Objectives</i>	Under this scenario there would be a high risk of future loss to infrastructure and property, failing to meet the socio-economic objectives for sustaining the towns and commercial development of the area and navigation. Natural ecological function would be restored but within a human environment of dilapidation and debris.	

With Present Management (Scenario 2):

As so much of the frontage is defended with structures and other beach/dune management activities, the shoreline would be maintained in its present position under this scenario. In undefended areas, such as the cliffs to the north-west of St. Mary's Lighthouse and the cliffs in front of the Whitley Links golf course; here, the coast would continue to erode.

The Tynemouth North Pier would also help to maintain the general shape of the coastline.

Beaches fronting defences will have a tendency to lower in the longer-term.

<u>MDSF Evaluation</u> <u>(Appendix H)</u>	<i>Assets lost over the time period of the SMP</i>	<i>PValue Damages</i>
<i>Erosion</i>	No erosion damages are identified throughout the area.	
<i>Flooding</i>	Potential flooding would still occur within the area of the Fish Quay.	
<u>Other Information</u>		
<u>Assessment of Key Objectives</u>	This scenario meets the overall socio-economic objectives but still maintains a high reliance on defence and limits enhancement of the ecological values. There would be continuing concern that hard management of the area would result in loss of beaches and potential reduction in recreational value.	

DISCUSSION AND DETAILED POLICY DEVELOPMENT

In terms of general management, key decisions for the zone are in relation to St Mary's Headland and the mouth of the River Tyne estuary.

Key Interactions in terms of Management Policy

Feature 1 St Mary's Headland	
Influence	The headland provides a strong control on shoreline evolution to the north-west and the south.
Management Options	The principal management options are to either hold the headland or to allow it to retreat to a new alignment (and perhaps then hold in this position).
<p>Discussion of High Level Policy Decision</p> <p>Maintaining the headland in its present position makes holding the existing form of Whitley Bay easier in most places, although the transition from defended to undefended and then back to defended sections needs careful management to prevent outflanking.</p> <p>To allow the headland to retreat would mean that large sections of Whitley Bay would, over time, realign landwards in response, putting increasing pressure on existing defences and/or causing loss of assets along Whitley Bay due to erosion; in particular further lowering of the important recreational beach. Headland retreat (either in a managed manner or through No Active Intervention) would also result in the longer-term in the loss of recreational amenities (the access road, Trinity Road car park and toilet facilities) and impinge on the nature reserve at the headland. This policy is likely to cause loss of designated rocky foreshore habitat.</p>	
High Level Policy: Hold the Line	

Feature 2 Tynemouth North Pier	
Influence	The North Pier at Tynemouth provides a large degree of shelter to the shoreline within the estuary mouth up to the Fish Quay, and also to the southern bank of the River Tyne (i.e. South Tyneside Council frontage). The Pier also acts as an essential navigation structure, maintaining use of the nationally important Port of Tyne
Management Options	Management options for the pier are either to Hold the Line or to do No Active Intervention. Managed Realignment, while possible, would be a costly exercise.
<p>Discussion of High Level Policy Decision</p> <p>A decision not to hold the pier would increase erosion and sea flooding risk to areas on both banks of the River Tyne upstream of the mouth. Furthermore, it would result in the loss of navigation use of the Tyne having major national, as well as regional, impacts on the economy and opportunity for economic sustainability for the region. This policy is likely to cause loss of designated rocky foreshore habitat. It is likely that any scheme for maintenance of these defences would require a decision from the Secretary of State stating interests of over-riding public opinion and compensation should be identified.</p>	
High Level Policy: Hold the Line.	

Sub-Division and Detailed Assessment

From Seaton Sluice to Collywell Bay it is necessary to Hold the Line in order to prevent loss of infrastructure and property through erosion. This will cause loss of designated habitat that will be partially mitigated for by the erosion of Crag Point. Further south-east along the coast towards Curry's Point, however, there would be few assets lost if erosion

continued and therefore it would be appropriate to apply No Active Intervention. There will be the need for some local works to maintain or, in the longer term, replace the access steps to Hartley Cove, however, and the public footpath will need relocating in the longer term. Any replacement steps should be wooden.

Having decided at a high level to Hold the Line at the key feature of St. Mary's headland, the management decisions along the rest of the Whitley Bay frontage can more readily be made. The undefended section between the car park and Briardene Burn should be subject to Managed Realignment, with the likely need for local works at the transition zone between defended and undefended sections or at beach access points. Drainage works within the cliff could help to deliver this policy without undue need for hard coastal defence structures. This overall approach should aim to maintain the natural development of this section of the coast, continuing to provide basic ecological function of the cliffs and foreshore, while also contributing to the sediment supply to the beaches to



Whitley Bay. As such, Managed Realignment is seen principally in terms of the transitional management between adjacent managed frontages and allowing the coast between to erode.

Managing this transition should avoid the need, therefore, to extend defence along the cliff, rather aiming to provide additional control within the hard defence areas that then influence the degree of erosion between. Specifically at the northern end, consideration should be given to the wave interaction with the wall at the St. Mary's headland, such that scour along this wall may be reduced while encouraging sediment accumulation at the interface with the eroding cliffs.

Elsewhere along Whitley Bay, the policy is to Hold the Line to prevent loss of important infrastructure, housing and amenity. The justification for defence initially relies upon the amenity benefit of open land on the promenade. This is seen as providing an essential support to the intent of maintaining the opportunities for economic regeneration. The beach is identified as being an essential component of this amenity benefit. In the long term there will be loss to the foreshore, and opportunity needs to be taken in considering means of retaining sediment when considering the detailed management of the defences. This may require use of cross shore structures rather than merely maintaining the linear defence as at present. Such an approach would be in line with the concept of managing the transition between this frontage and that to the north. There will be loss of designated rocky foreshore habitat from Briardene Burn to Brown's Point.

Between Brown's Point and Tynemouth North Pier, the coast comprises a series of hard rock headlands separating the bays of Cullercoats, Longsands and King Edward's Bay (Shortsands). Here the intent is to apply No Active Intervention to the headlands and Hold the Line to the bays, although at Longsands in the longer-term



it will be better to apply a Managed Realignment policy to the dunes. Under this policy, structures can be strategically placed to pull the line of the shore forward (i.e. engineering

a semi-natural configuration) rather than attempting to Hold the Line through hard reflective structures. This widening of Longsands will be favourable for nature conservation interest. Any future scheme would need careful assessment with regard to sediment budgets and nature conservation interests. This will result in the loss of designated rocky foreshore habitat at Cullercoats Bay, and a small area to the south side of Tynemouth North Point and at King Edward's Bay. Tynemouth Headland is a hard rock headland that has defences to prevent rock fall. There would be natural loss of rocky foreshore in this area due to sea level rise, there will not be any additional loss due to SMP2 policy. Similarly Tynemouth North Pier acts as harbour structure rather than a coastal defence structure and will not exacerbate any natural loss of rocky foreshore through sea level rise.

At Tynemouth North Pier the policy is to Hold the Line. The small bay of Prior's Haven is relatively well sheltered by the pier and can accommodate natural responses to sea level rise for which, therefore, No Active Intervention is appropriate while along the quayside up to the Fish Quay, Hold the Line is the preferred policy to protect the amenity, commercial and industrial assets. A detailed examination of the flood risk is required in this area and appropriate defence developed. The significant economic development opportunities of this area would suggest that develop and defence of the area is appropriate and that the risk, although considerable in economic terms, is manageable and sustainable.

In principal, the long term defence of the highly developed and economically important southern frontage is sustainable but with the potential consequences of loosing the beaches and with little opportunity for enhancing the natural environment. The general recommended approach is in management of the shoreline width rather than purely that of linear defence. This would encourage, in the longer-term, a more sustainable approach to both defence and in providing opportunity for amenity. Such an approach would also aim to redress the natural loss to nearshore rock outcrops.

As part of managing a balanced approach within what is a largely urban environment, planning policy should continue to resist development of the more natural coast to the north and over the natural headlands, such that existing natural environmental values may be retained.

In summary, therefore, the zone is sub-divided into four Management Areas, these being:

- Seaton Sluice to Curry's Point (two policy units).
- Whitley Bay (four policy units).
- Brown's Point to Tynemouth North Pier (eight policy units)
- Tynemouth North Pier to Fish Quay (two policy units).

The conclusions for each area are summarised in the Management Area statements which follow. First, however, an assessment of the strategic environmental objectives for the three epochs under the scenarios of No Active Intervention, With Present Management and Preferred Policy has been carried out below.

Assessment of Environmental Receptors in the First Epoch (up to 2025)

MA	Policy	Biodiversity	Population	Fauna and Flora	Soil	Water	Material Assets	Cultural Heritage	Landscape
MA24	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA25	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA26	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA27	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●

Major positive significance ● Minor positive significance ● Major negative significance ● Minor negative significance ●

Within this PDZ there are similar problems facing all MAs. Within the first epoch the scenario of NAI does not differ from WPM or PP as the life of the defences extends further than this epoch. It is thought that there will be minor negative impacts on biodiversity and flora and fauna within each MA due to coastal squeeze submerging intertidal rock platform. It has been proposed that this loss will be compensated through a Regional Habitat Creation Plan.

Assessment of Environmental Receptors in the Second Epoch (up to 2055)

MA	Policy	Biodiversity	Population	Fauna and Flora	Soil	Water	Material Assets	Cultural Heritage	Landscape
MA24	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA25	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA26	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA27	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●

Major positive significance ● Minor positive significance ● Major negative significance ● Minor negative significance ●

The second epoch has a similar outlook to the first. The major difference is that there will be minor negative impacts on population, material assets and cultural heritage under the NAI scenario as defences start to fail.

Assessment of Environmental Receptors in the Third Epoch (up to 2105)

MA	Policy	Biodiversity	Population	Fauna and Flora	Soil	Water	Material Assets	Cultural Heritage	Landscape
MA24	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA25	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA26	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●
MA27	NAI	●	●	●	●	●	●	●	●
	WPM	●	●	●	●	●	●	●	●
	PP	●	●	●	●	●	●	●	●

Major positive significance ● Minor positive significance ● Major negative significance ● Minor negative significance ●

The third epoch has a similar outlook to the first and second under WPM and PP. Under the NAI scenario there could be major negative impacts in all MAs on population and material assets due to failure of defences.

MANAGEMENT AREAS

4.6.2 Management Area Policy Statements (MA24- 27)

Location reference:	SEATON SLUICE TO CURRY'S POINT (CH 130 TO 133)
Management Area reference:	24
Policy Development Zone:	PDZ6

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: The intent of the plan is to maintain protection to property and access at Seaton Sluice but also to allow the natural development of the coast over the rest of the frontage. This aims to maintain the important ecological function and maintain sediment supply to the area.

PREFERRED POLICY TO IMPLEMENT PLAN	
From present day	Manage and maintain defences around Seaton Sluice and Collywell Bay but No Active Intervention elsewhere.
Medium-term	Manage and maintain defences around Seaton Sluice and Collywell Bay but No Active Intervention elsewhere.
Long-term	Manage and maintain defences around Seaton Sluice and Collywell Bay but No Active Intervention elsewhere.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			
		2025	2055	2105	Comment
24.1	Collywell Bay	HTL	HTL	HTL	
24.2	Crag Point to Curry's Point	NAI	NAI	NAI	Crag Point headland to remain undefended. Local intervention to maintain/relocate Harley Cove steps for use as an emergency access from the beach and allow access to view the unbroken coal measures.

Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment

CHANGES FROM PRESENT MANAGEMENT

No significant change from existing policy.

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	0	106	469	575
	Preferred Plan Damages £k PV	0	0	0	0
	Benefits £k PV	0	106	469	575
	Costs of Implementing plan £k PV	-	-	-	1000
Costs estimated taken from strategy. Damages do not include for loss of amenity and road. Description of damage and benefits under preferred plan: Maintains defence to Seton Sluice.					
Heritage	Maintains heritage				
Amenity	Maintains amenity				

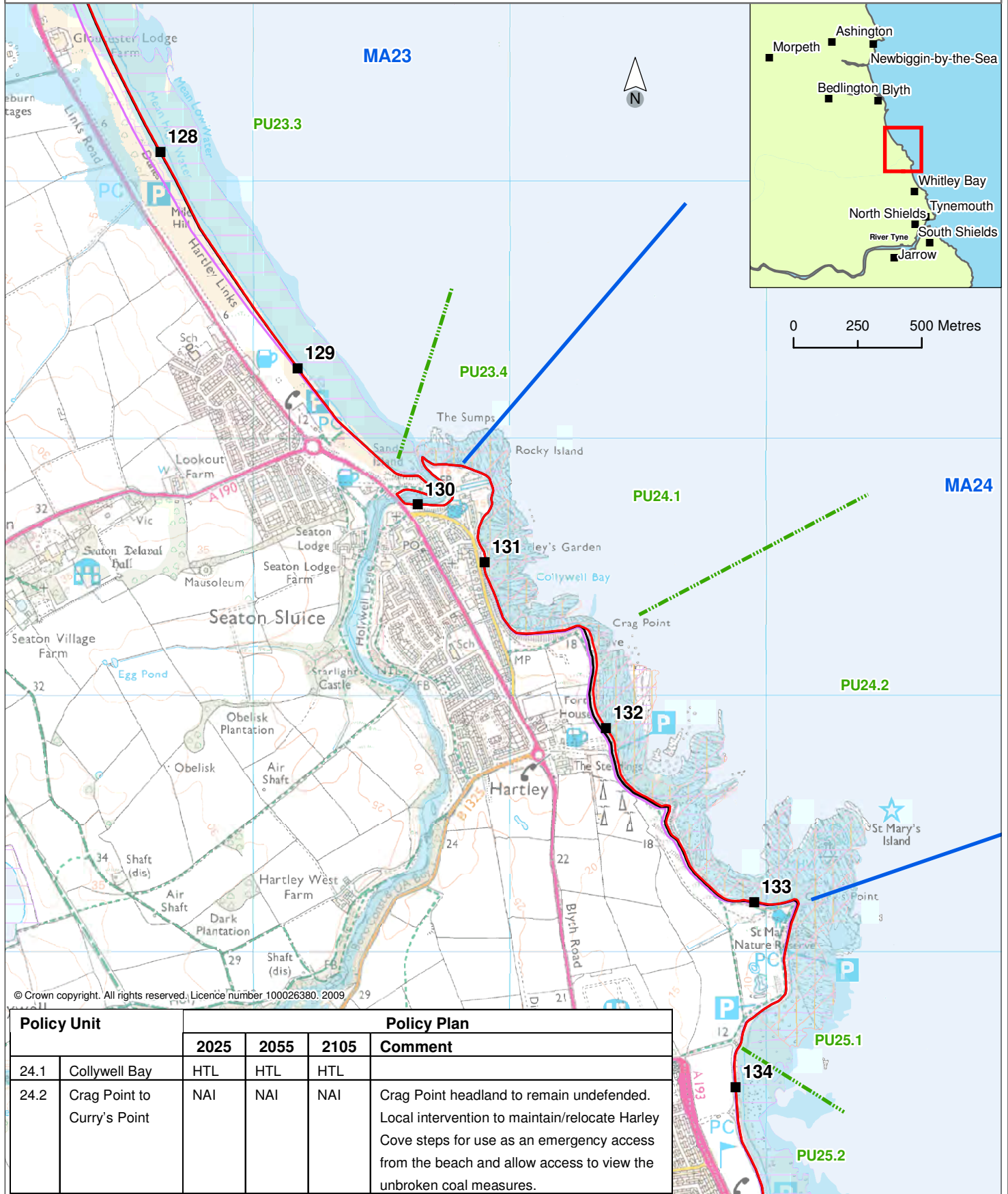
IMPLICATION WITH RESPECT OF NATURAL ENVIRONMENT

N.B. The table below is a summary of the potential impacts on sites designated for reasons of national or international nature conservation importance. This table should not be read in isolation, please refer to the narrative included in the Discussion and Detailed Policy Development section of this PDZ. Details of the boundaries of the policy unit can be seen in the Management Area map overleaf.

Designated Site	Designated / supporting habitat	Policy Unit	Impact			Mitigation / compensation
			by 2025	by 2055	by 2105	
Northumbria Coast SPA	Rocky shore	24.1	Habitat loss	Habitat loss	Habitat loss	Partially mitigated by erosion of Crag Point. Regional Habitat Compensation Plan needed.
Northumberland Shore SSSI	Intertidal rock	24.1	Habitat loss	Habitat loss	Habitat loss	Partially mitigated by erosion of Crag Point.
Tynemouth to Seaton Sluice SSSI	Coal Measures exposures	24.1	Habitat loss	Habitat loss	Habitat loss	Partially mitigated by erosion of Crag Point.

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan reference should be made to the baseline data.

Policy Development Zone 6 - Seaton Sluice to River Tyne
Management Area 24 - Seaton Sluice to Curry's Point (Ch 130 to 133)



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Policy Unit		Policy Plan			Comment
		2025	2055	2105	
24.1	Collywell Bay	HTL	HTL	HTL	
24.2	Crag Point to Curry's Point	NAI	NAI	NAI	Crag Point headland to remain undefended. Local intervention to maintain/relocate Harley Cove steps for use as an emergency access from the beach and allow access to view the unbroken coal measures.

Predicted Shoreline Position under Preferred Policy	SPA	Scheduled Ancient Monuments
20 Years	RAMSAR	EA Flood Zone - Sept 07
50 Years	SAC	Management Areas
100 Years	SSSI	Policy Units
	NNR	



ACTION PLAN MANAGEMENT AREA 24

Action	By when	Responsibility	Indicative Cost
<ul style="list-style-type: none"> Coastal monitoring. 	Ongoing	Blyth Valley DC / North Tyneside	Ongoing
Schemes:			
<ul style="list-style-type: none"> Local intervention to maintain/relocate access steps to Hartley Cove. 	2055	North Tyneside	£50k
<ul style="list-style-type: none"> St. Mary's Island Causeway improvements 	2015	North Tyneside	£160k
<ul style="list-style-type: none"> Maintenance of existing defence assets recommended. 	Ongoing	North Tyneside	Revenue

In addition to this detailed Action Plan for this specific Management Area, a high-level strategic Action Plan for the whole SMP area is provided in Section 7.

Coastal monitoring is also discussed in Section 7 and this is relevant to the whole SMP2 area as well as some specific frontages.

Location reference:	CURRY'S POINT TO BROWN'S POINT (WHITLEY BAY) (CH 133 TO 137.5)
Management Area reference:	25
Policy Development Zone:	PDZ6

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: Through maintaining defence to Curry's Point the aim of the plan is reduce pressure for erosion and beach loss over the rest of the area, thereby minimising intervention to the natural coastline immediately to the south and minimising pressure on the maintained defences to Whitley Bay. There is a need to manage the transition between the area of Managed Realignment and areas of defence, and the intent is to influence erosion over the natural section of coast rather than extend defences into these areas. In the longer-term, the approach to defence should look to retaining sediment at the shoreline, thus maintaining important amenity values.

PREFERRED POLICY TO IMPLEMENT PLAN

From present day	Maintain and reinforce defence at Curry's Point in such manner to reduce energy focus and outflanking. Maintain defence to Whitley Bay.
Medium-term	Maintain defence at Curry's. Point Maintain defence to Whitley Bay.
Long-term	Maintain defence at Curry's Point. Maintain defence to Whitley Bay with retention of beach area.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			
		2025	2055	2105	Comment
25.1	Curry's Point to Trinity Road Car Park	HTL	HTL	HTL	Maintaining this headland causes less pressure on frontages to south.
25.2	Trinity Road Car Park to Briardene Burn	MR	MR	MR	Local works may be needed at access points and at transition between defended and undefended frontages (at both ends) to prevent outflanking.
25.3	Briardene Burn to Brown's Point	HTL	HTL	HTL	
25.4	Table Rocks to Brown's Point	HTL	HTL	HTL	

Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment

CHANGES FROM PRESENT MANAGEMENT

In line with policy defined by strategy.

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	259	234	205	695
	Preferred Plan Damages £k PV	0	0	0	0
	Benefits £k PV	259	234	205	695
	Costs of Implementing plan £k PV				2900
Costs estimated taken from strategy. Damages do not include for loss of amenity and road. (additional damages identified in strategy of the order of £1.6M Description of damage and benefits under preferred plan: Maintains integrity of Whitley Bay					
Heritage	Maintains heritage				
Amenity	Maintains amenity				

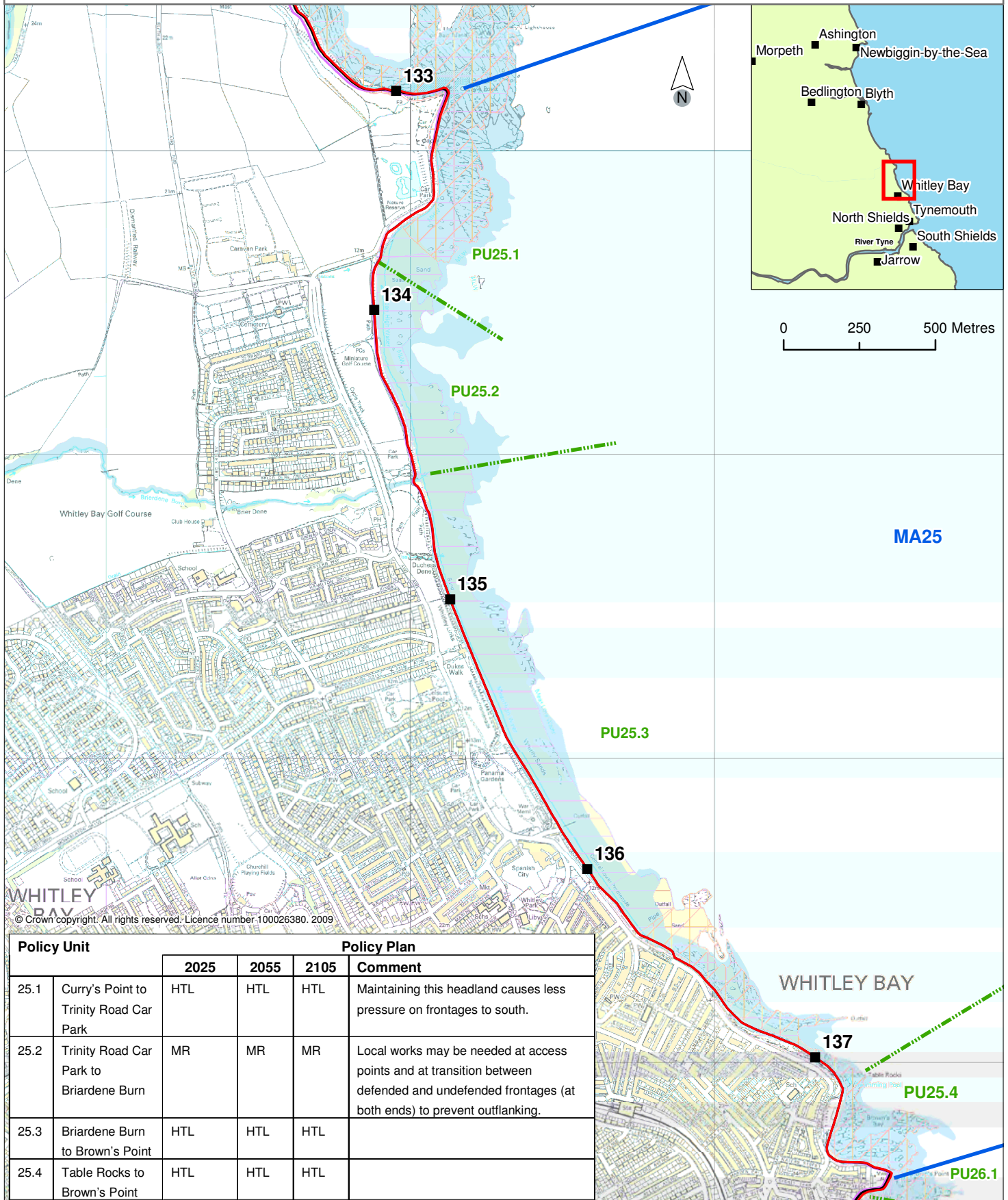
IMPLICATION WITH RESPECT OF NATURAL ENVIRONMENT

N.B. The table below is a summary of the potential impacts on sites designated for reasons of national or international nature conservation importance. This table should not be read in isolation, please refer to the narrative included in the Discussion and Detailed Policy Development section of this PDZ. Details of the boundaries of the policy unit can be seen in the Management Area map overleaf.

Designated Site	Designated / supporting habitat	Policy Unit	Impact			Mitigation / compensation
			by 2025	by 2055	by 2105	
Northumbria Coast SPA	Rocky shore	25.1	Habitat loss	Habitat loss	Habitat loss	No mitigation identified. Regional Habitat Compensation Plan needed.
		25.3				
		25.4				
Northumberland Shore SSSI	Sandy beaches	25.3	Habitat loss	Habitat loss	Habitat loss	Mitigated with MR in 25.2
		25.1	Habitat loss	Habitat loss	Habitat loss	No mitigation identified.
	25.3					
Tynemouth to Seaton Sluice SSSI	Coal Measures exposures	25.1	Habitat loss	Habitat loss	Habitat loss	No mitigation identified
		25.3				
		25.4				

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan reference should be made to the baseline data.

Policy Development Zone 6 - Seaton Sluice to River Tyne
Management Area 25 - Curry's Point to Brown's Point (Ch 133 to 137.5)



Policy Unit		Policy Plan			
		2025	2055	2105	Comment
25.1	Curry's Point to Trinity Road Car Park	HTL	HTL	HTL	Maintaining this headland causes less pressure on frontages to south.
25.2	Trinity Road Car Park to Briardene Burn	MR	MR	MR	Local works may be needed at access points and at transition between defended and undefended frontages (at both ends) to prevent outflanking.
25.3	Briardene Burn to Brown's Point	HTL	HTL	HTL	
25.4	Table Rocks to Brown's Point	HTL	HTL	HTL	

Predicted Shoreline Position under Preferred Policy

- 20 Years
- 50 Years
- 100 Years

- SPA
- RAMSAR
- SAC
- SSSI
- NNR

- Scheduled Ancient Monuments
- EA Flood Zone - Sept 07
- Management Areas
- - - Policy Units



ACTION PLAN MANAGEMENT AREA 25

Action	By when	Responsibility	Indicative Cost
<ul style="list-style-type: none"> Coastal monitoring. 	Ongoing	North Tyneside	Ongoing
Schemes:			
<ul style="list-style-type: none"> Local works to stop ongoing outflanking at end of revetment at Trinity Road Car Park. 	2009-2010	North Tyneside	£175k
<ul style="list-style-type: none"> Whitley Bay Central Promenade – improvements 	2011 - 2015	North Tyneside	£1,575k
<ul style="list-style-type: none"> Whitley Bay Southern Promenade – improvements 	2015	North Tyneside	£240k
<ul style="list-style-type: none"> Maintenance of existing defence assets recommended. 	Ongoing	North Tyneside	Revenue

In addition to this detailed Action Plan for this specific Management Area, a high-level strategic Action Plan for the whole SMP area is provided in Section 7.

Coastal monitoring is also discussed in Section 7 and this is relevant to the whole SMP2 area as well as some specific frontages.

Location reference:	BROWN'S POINT TO TYNEMOUTH NORTH PIER (CH 137.5 TO 143)
Management Area reference:	26
Policy Development Zone:	PDZ6

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: The aim of the plan is to maintain the defence to the important infrastructure and developed areas, maintaining also the North Pier as essential for navigation and sustaining use of the Tyne. Within this, the intent of the plan is to allow natural development of the main headlands and in the long-term to maintain, as far as possible, the retention of beaches for amenity use.

PREFERRED POLICY TO IMPLEMENT PLAN	
From present day	Maintain defences.
Medium-term	Maintain defences.
Long-term	Maintain defences and examine opportunity for realignment to retain sediment within bays.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			
		2025	2055	2105	Comment
26.1	Brown's Point	NAI	NAI	NAI	
26.2	Cullercoats Bay	HTL	HTL	HTL	
26.3	Tynemouth North Point	NAI	NAI	NAI	
26.4	Tynemouth Longsands	HTL	HTL	MR	Pulling the coast forward to maintain a beach and dunes (not a hard reflective structure at the toe)
26.5	Sharpness Point	NAI	NAI	NAI	
26.6	Tynemouth Shortsands (King Edward's Bay)	HTL	HTL	HTL	
26.7	Tynemouth Headland	HTL	HTL	HTL	Maintain existing retaining walls at the headland.
26.8	Tynemouth North Pier	HTL	HTL	HTL	

Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment

CHANGES FROM PRESENT MANAGEMENT

In line with policy defined by strategy.

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	0	0	143	143
	Preferred Plan Damages £k PV	0	0	0	0
	Benefits £k PV	0	0	143	143
	Costs of Implementing plan £k PV	-	-	-	3070
Costs estimated taken from strategy. Damages do not include for loss of amenity and road. (additional damages identified in strategy of the order of £8M Description of damage and benefits under preferred plan: Maintains town					
Heritage	Maintains heritage				
Amenity	Maintains amenity				

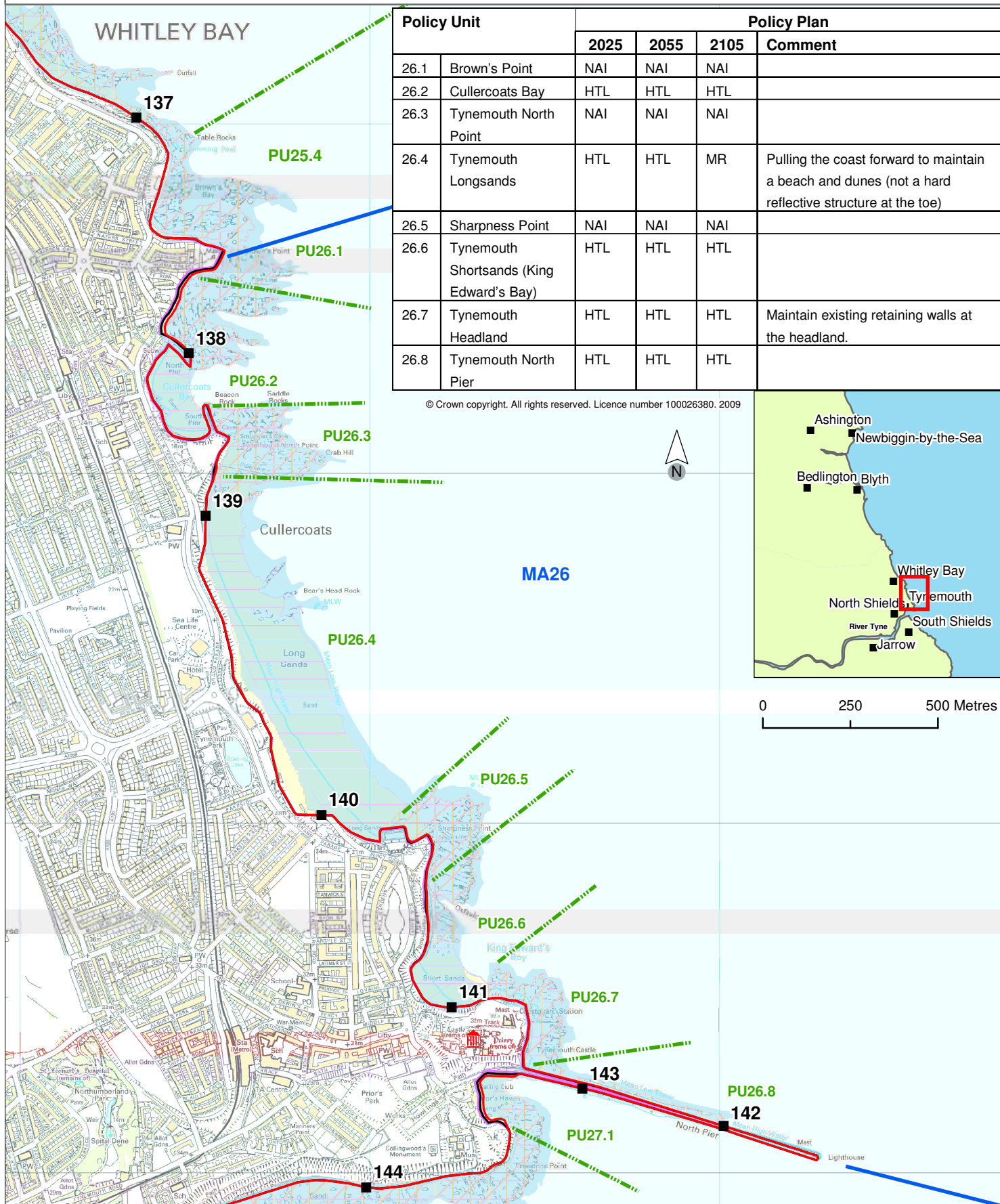
IMPLICATION WITH RESPECT OF NATURAL ENVIRONMENT

N.B. The table below is a summary of the potential impacts on sites designated for reasons of national or international nature conservation importance. This table should not be read in isolation, please refer to the narrative included in the Discussion and Detailed Policy Development section of this PDZ. Details of the boundaries of the policy unit can be seen in the Management Area map overleaf.

Designated Site	Designated / supporting habitat	Policy Unit	Impact			Mitigation / compensation
			by 2025	by 2055	by 2105	
Northumbria Coast SPA	Rocky shore	26.2 26.3 26.6	Habitat loss	Habitat loss	Habitat loss	No mitigation identified. Regional Habitat Compensation Plan needed.
Northumberland Shore SSSI	Sandy beaches	26.2 26.4 26.6	No impact	No impact	Habitat creation	N/A
	Intertidal rock	26.2 26.3 26.6	Habitat loss	Habitat loss	Habitat loss	No mitigation identified.
Tynemouth to Seaton Sluice SSSI	Coal Measures exposures	26.2 26.3 26.6	Habitat loss	Habitat loss	Habitat loss	No mitigation identified

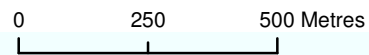
* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan reference should be made to the baseline data.

**Policy Development Zone 6 - Seaton Sluice to River Tyne
Management Area 26 - Brown's Point to Tynemouth North Pier (Ch 137.5 to 143)**



Policy Unit		Policy Plan			
		2025	2055	2105	Comment
26.1	Brown's Point	NAI	NAI	NAI	
26.2	Cullercoats Bay	HTL	HTL	HTL	
26.3	Tynemouth North Point	NAI	NAI	NAI	
26.4	Tynemouth Longsands	HTL	HTL	MR	Pulling the coast forward to maintain a beach and dunes (not a hard reflective structure at the toe)
26.5	Sharpness Point	NAI	NAI	NAI	
26.6	Tynemouth Shortsands (King Edward's Bay)	HTL	HTL	HTL	
26.7	Tynemouth Headland	HTL	HTL	HTL	Maintain existing retaining walls at the headland.
26.8	Tynemouth North Pier	HTL	HTL	HTL	

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Predicted Shoreline Position under Preferred Policy

- 20 Years
- 50 Years
- 100 Years

- SPA
- RAMSAR
- SAC
- SSSI
- NNR

- Scheduled Ancient Monuments
- EA Flood Zone - Sept 07
- Management Areas
- - - Policy Units



ACTION PLAN MANAGEMENT AREA 26

Action	By when	Responsibility	Indicative Cost
<ul style="list-style-type: none"> Develop solution to longer-term management of Tynemouth Longsands that avoids new lengths of linear defence. 	2055	North Tyneside	£50k
<ul style="list-style-type: none"> Coastal monitoring. 	Ongoing	North Tyneside	Ongoing
Schemes:			
<ul style="list-style-type: none"> Improvement works at Cullercoats Piers. 	2009 –11	North Tyneside	£875k
<ul style="list-style-type: none"> Tynemouth Longsands Bear's Back Seawall - improvements 	2010 –12	North Tyneside	£280k
<ul style="list-style-type: none"> Longer-term MR of shoreline in Tynemouth Longsands through local strategically placed structures to pull the coast forward and build up protective beaches. 	2055	North Tyneside	£250k
<ul style="list-style-type: none"> Outdoor Pool 	2015	North Tyneside	£450k
<ul style="list-style-type: none"> Sea Banks Seawall - improvements 	2015	North Tyneside	£300k
<ul style="list-style-type: none"> Port of Tyne – maintenance of harbour structures 	Ongoing	Port of Tyne	Revenue
<ul style="list-style-type: none"> Maintenance of existing defence assets recommended. 	Ongoing	North Tyneside	Revenue

In addition to this detailed Action Plan for this specific Management Area, a high-level strategic Action Plan for the whole SMP area is provided in Section 7.

Coastal monitoring is also discussed in Section 7 and this is relevant to the whole SMP2 area as well as some specific frontages.

Location reference:	TYNEMOUTH NORTH PIER TO FISH QUAY (CH 143 TO 145.3)
Management Area reference:	27
Policy Development Zone:	PDZ6

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: Continued protection provided by the North Pier maintains the sustainable defence of frontages within the mouth of the Tyne. The aim of the plan is to allow natural development of the area immediately behind the breakwater, adjusting the use of the area in line with sea level rise. The flood risk to the Fish Quay and associated areas need to be considered in detail but with the intent of maintaining development opportunity.

PREFERRED POLICY TO IMPLEMENT PLAN

From present day	Maintain defences and, subject to detailed risk assessment, incorporate long term flood defence to regeneration area within development plan.
Medium-term	Maintain defences.
Long-term	Maintain defences.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			
		2025	2055	2105	Comment
27.1	Prior's Haven	NAI	NAI	NAI	
27.2	Quayside	HTL	HTL	HTL	Defence standard needs to be examined in detail at Fish Quay with respect to tidal flooding.

Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment

CHANGES FROM PRESENT MANAGEMENT

In line with policy defined by strategy.

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	2680	2192	1523	6395
	Preferred Plan Damages £k PV	0	0	28	28
	Benefits £k PV	2680	2192	1495	6367
	Costs of Implementing plan £k PV	-	-	-	4050
Costs estimated taken from strategy. Description of damage and benefits under preferred plan: Maintains opportunity for regeneration.					
Heritage	Maintains heritage				
Amenity	Maintains amenity				

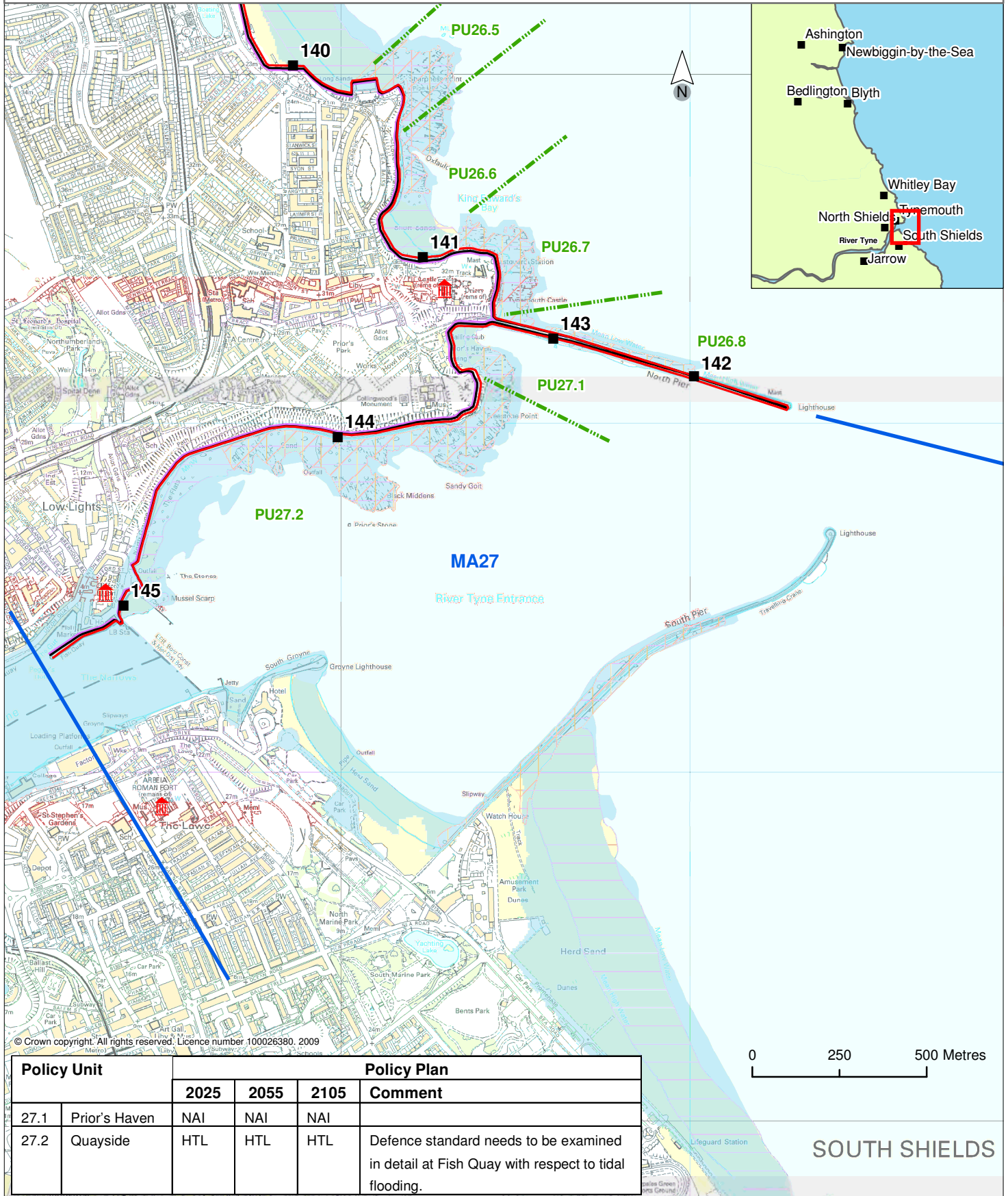
IMPLICATION WITH RESPECT OF NATURAL ENVIRONMENT

N.B. The table below is a summary of the potential impacts on sites designated for reasons of national or international nature conservation importance. This table should not be read in isolation, please refer to the narrative included in the Discussion and Detailed Policy Development section of this PDZ. Details of the boundaries of the policy unit can be seen in the Management Area map overleaf.

Designated Site	Designated / supporting habitat	Policy Unit	Impact			Mitigation / compensation
			by 2025	by 2055	by 2105	
Northumbria Coast SPA	Rocky shore	27.2	Habitat loss	Habitat loss	Habitat loss	No mitigation identified. Regional Habitat Compensation Plan needed.
Northumberland Shore SSSI	Sandy beaches	27.1	No impact	No impact	No impact	N/A
	Intertidal rock	27.2	Habitat loss	Habitat loss	Habitat loss	No mitigation identified

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan reference should be made to the baseline data.

Policy Development Zone 6 - Seaton Sluice to River Tyne
Management Area 27 - Tynemouth North Pier to Fish Quay (Ch 143 to 145.3)



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Policy Unit	Policy Plan				
	2025	2055	2105	Comment	
27.1	Prior's Haven	NAI	NAI	NAI	
27.2	Quayside	HTL	HTL	HTL	Defence standard needs to be examined in detail at Fish Quay with respect to tidal flooding.



SOUTH SHIELDS

Predicted Shoreline Position with No Active Intervention 20 Years 50 Years 100 Years	SPA RAMSAR SAC SSSI NNR	Scheduled Ancient Monuments EA Flood Zone - Sept 07 Management Areas Policy Units
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ACTION PLAN MANAGEMENT AREA 27

Action	By when	Responsibility	Indicative Cost
<ul style="list-style-type: none"> Examine defence standard against tidal flooding at Fish Quay. 	2009	North Tyneside	£50k
<ul style="list-style-type: none"> Coastal monitoring. 	Ongoing	North Tyneside	Ongoing
Schemes:			
<ul style="list-style-type: none"> Fish Quay – improvements 	2010 – 2013	North Tyneside	£1,165
<ul style="list-style-type: none"> Maintenance of existing defence assets recommended. 	Ongoing	North Tyneside	Revenue

In addition to this detailed Action Plan for this specific Management Area, a high-level strategic Action Plan for the whole SMP area is provided in Section 7.

Coastal monitoring is also discussed in Section 7 and this is relevant to the whole SMP2 area as well as some specific frontages.

5 SUMMARY OF PREFERRED PLAN AND IMPLICATIONS

5.1 Plan for Balanced Sustainability

As discussed in Section 3, the aim of the SMP is to deliver a balanced plan for the management of defences whilst still supporting the values of the coast in terms of its human need, natural environment and heritage value, and without committing to ever increasing expenditure on defence.

The objectives against which this is judged are set out in **Appendix E** and an assessment of how effective the plan has been in achieving the objectives is provided in **Appendix F**. The assessment is summarised in **Figures 5.1, 5.2 and 5.3**, which present the findings for the three epochs (2025, 2055 and 2105) respectively. Careful consideration is required when analysing these figures as the information presented, as percentages, does not fully reveal the actual detail associated with each theme (as described in Appendix F).

A brief discussion by Policy Development Zone (PDZ) and theme is given below. It is useful, however, to consider the overall information and to set this in the context of the coast as a whole.

Figure 5.1 Summary Objective Appraisal for the 2025 epoch.

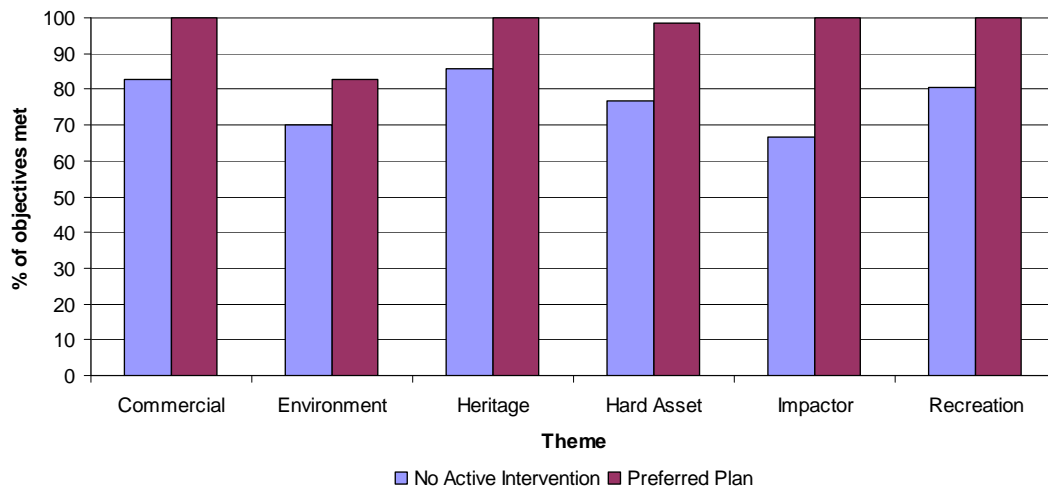


Figure 5.2 Summary Objective Appraisal for the 2055 epoch.

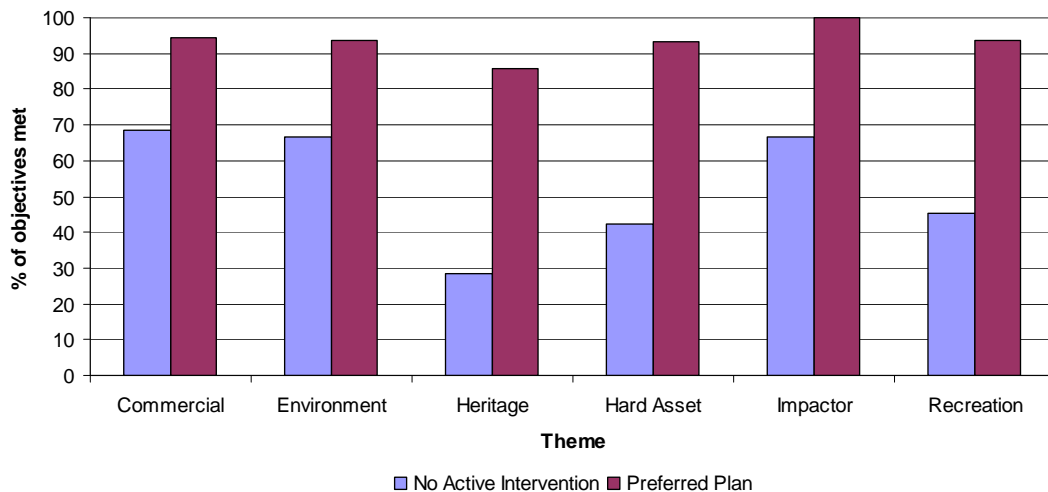
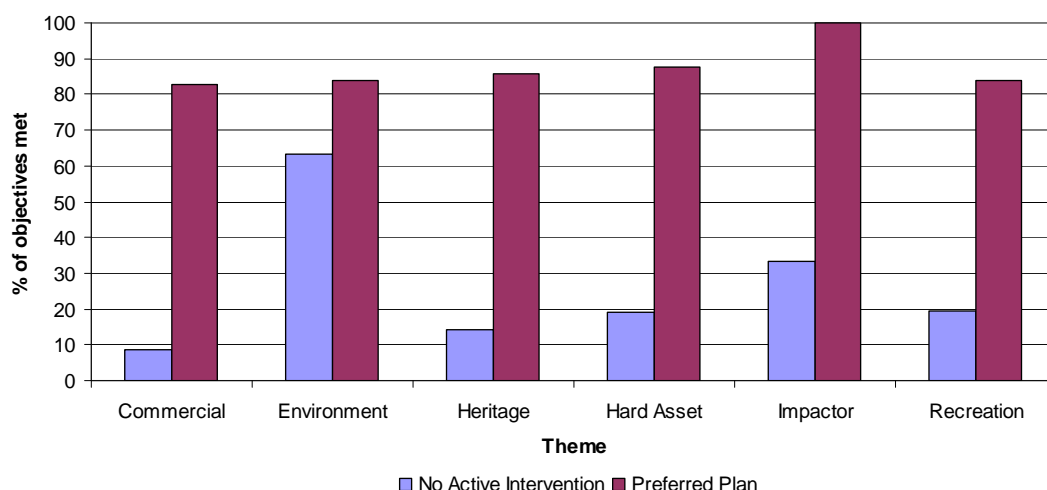


Figure 5.3 Summary Objective Appraisal for the 2105 epoch.



The above figures illustrate how the various themes will be affected over time based on the two scenarios, NAI and the Preferred Plan. Over the short term (2025 epoch, Figure 5.1) both scenarios exhibit similar results, with the significant majority of objectives being met, although implementation of the Preferred Plan results in near 100% achievement of objectives for all but one theme. The relatively good performance of the NAI scenario over this short timescale reflects the fact that on the whole defences are in reasonable condition and that the coast is functioning relatively well. Over the medium to long term (2055 and 2105 epochs, Figures 5.2 and 5.3 respectively) NAI results in a marked decrease in the percentage of objectives met for all themes. In comparison, the Preferred Plan, while clearly introducing certain changes, maintains a relatively high percentage success in balancing objectives over all of the epochs.

5.2 Considering the Preferred Plan by PDZ

5.2.1 PDZ 1 - Scottish Border to Holy Island

North of Berwick the intent of the plan is to maintain the naturalness of the coast. Loss of assets, such as the seaward limits of the Holiday Park and the general recreational use of the area are only significantly affected in the latter epoch of the SMP. Maintaining the natural development of the coast maintains its high ecological and landscape value, both important to the use of the coast.

Having determined a long term policy of holding the main breakwater, the area within the estuary may be further sub-divided by more local issues. Defence of the northern side of the estuary does not significantly constrain the development of the estuary, this being controlled more by the underlying geological structure behind the defences. While there may be a future long term need to increase defence levels and significant effort in bringing all defences up to a good standard, this is seen as being a sustainable form of defence, given the high values of the area in association with the character of the town.

The overall long term aim for Holy Island is to support natural development of the coastal system in such a manner as to enhance ecological function while attempting to derive more sustainable natural defence to communities and recreational aspects. While there remains considerable uncertainty as to coastal behaviour, which would require detailed examination, such an approach is likely to be best supported by Managed Realignment in the areas of the existing northern flood defence. The plan also

aims to maintain access to Holy Island and locally to maintain use and defence of the Holy Island harbour area.

5.2.2 PDZ 2 - Bamburgh to Boulmer

The main aim along this frontage is to allow natural development, thus maintaining the valuable ecological value and landscape; this will, however, also result in the loss of hard assets such as the coastal road north of Seahouses.

Beadnell Village and Beadnell Harbour are to be protected in association with the use and value of the semi-natural development of Beadnell Bay. The plan recommends allowing increased flooding of the hinterland to the centre of the bay, with the specific aim of creating a more resilient shoreline and potentially enhancing ecological value of the area. It is, however, recognised that this has to be considered in detail in association with land owners.

Locally maintaining the harbour structures at Craster is not seen as being in contradiction to the overall aim and this intervention aims to maintain the regionally important community. In maintaining defence to the main village it is likely to be possible to maintain local defence to either side. Further defence beyond these areas would be precluded.

5.2.3 PDZ 3 Seaton Point to Beacon Hill

Within the Aln Estuary, the plan supports the emerging policy for realignment of defences to low lying agricultural land in an attempt to redress the impact of sea level rise on designated habitat. This would require management of the estuary mouth so as to maintain the integrity of Alnmouth and allow management of issues in relation to the open coast. The town would continue to be defended. On the open coast to the south, natural processes would be sustained and to the north, actions would be developed to allow necessary realignment while reducing the impact on the land use and recreational value.

The intent for the Coquet Estuary and Amble is to maintain the long term viability of the harbour and town. While such a policy will not directly compromise the integrity of the important natural habitats, it is recognised that sea level rise will tend to reduce this overall integrity and Hold the Line within the estuary mouth will not act to address this. As such, the plan recommends consideration of realignment inland of the road within the inner estuary. This needs to consider the impact on flood risk and potential influence of flows at the mouth.

5.2.4 PDZ 4 Beacon Hill to Beacon Point

The main emphasis over the northern headland is in managing a sustainable transition between the natural coast and the defence to the village of Low Hauxley. To the north of the general headland, the aim is to work with the natural control provided by Beacon Hill, such that transitional management utilises the width of Hauxley Links in protecting access to the village rather ultimately relying on linear defence of the road. To the south, the limit of defences to the village needs to be formalised in effective management of the area to the south. Over the northern section of Druridge Bay the intent is to manage land use, operation of and access within the Country Park such that this relies less on defence of the outfall and access road. Particular emphasis needs to be placed on alternative access to the foreshore in association with creating a more natural outfall to the Ladyburn Lake. Over the main length of the bay, the intent is to

allow natural roll back of the dunes, considering potential creation and management of tidal incursion behind the dunes. The intent at Cresswell is to maintain the function of the village through continued defence.

Maintaining the defence to the power station is seen as important in the short to medium term in meeting socio-economic objectives. The value of the existing revetment would then be reviewed. The structure imposes significant, though not necessarily detrimental, control on the bay. Potentially a key factor in this is the managed dissipation of mining waste to the coastal zone. The nature and rate of material lost to the shoreline due to continued erosion would need to be examined to ensure that the adapting natural system is not overburdened with mining waste. The frontages to either side will continue to retreat. In the long term, regeneration of the area, access to and the achieving a sustainable balance within this heavily modified area, needs also to be considered in terms of land use planning. While the short term policy for the frontage, either side of the revetment would be for NAI, the long term policy would be for Managed Realignment to meet a balance of objectives in restoring this section of the coast to a more natural condition.

5.2.5 PDZ 5 Newbiggin Moor to Seaton Sluice

The intent of the plan is to maintain the defence to Newbiggin based on the concept of the recent scheme, incorporating beach management to enhance values to the area. To the north the aim is to allow natural development of much of the headland, in particular, allowing development of greater width in the natural defence of Newbiggin Moor, improving sustainability of defence, supporting ecological and landscape objectives and potentially adding amenity benefit. The one area of the headland where defence would be required would be in maintaining the defence to the graveyard.

Between Spital Point and Blyth East Pier, the aim is to minimise intervention, allowing the coast respond naturally within existing hard points including potential realignment within the estuary to provide the coast with the ability to respond naturally at the estuary mouth without pressure for intervention on adjacent sections of the frontage. Any development of the coastal zone should aim to set back to allow a natural buffer zone or should include a detailed examination of how development and defences can be used to retaining sediment.

At the northern end of the bay the intent is to secure flood defence to the town of Blyth and to work towards supporting regeneration of the area. To the centre and southern end of the bay the aim is to support the natural development of the dunes as an important ecological and amenity value to the area; minimising intervention to that necessary in maintaining the natural defence. Between these two areas, management needs to allow a transition between the two approaches; this may require realignment of the coast. At Seaton Sluice the aim would be to support defence of this area as a locally important recreational and amenity area.

5.2.6 PDZ 6 Seaton Sluice to River Tyne

Through maintaining defence to Curry's Point the aim of the plan is reduce pressure for erosion and beach loss over the rest of the area, thereby minimising intervention to the natural coastline immediately to the south and minimising pressure on the maintained defences to Whitley Bay. There is a need to manage the transition between the area of Managed Realignment and areas of defence, and the intent is to influence erosion over the natural section of coast rather than extend defences into these areas. In the longer-

term, the approach to defence should look to retaining sediment at the shoreline, thus maintaining important amenity values.

Continued protection provided by the North Pier maintains the sustainable defence of frontages within the mouth of the Tyne. The aim of the plan is to allow natural development of the area immediately behind the breakwater, adjusting the use of the area in line with sea level rise. The flood risk to the Fish Quay and associated areas need to be considered in detail but with the intent of maintaining development opportunity.

5.3 Predicted Implications of the Preferred Plan

5.3.1 Implications to Land Use and Coastal Infrastructure

The Plan meets the majority of objectives over the SMP period, thus protecting the major industrial and residential developed areas. There are recommendations within the detail of the plan for not allowing further extension of defences. This will result in the loss of hard assets. In particular, this would include properties around Boulmer and Low Hauxley due to erosion, and around Newbiggin and within the area of the Fish Quay due to flooding. In addition, the vulnerability of Sandstell Point has also yet to be resolved, thus constraining regeneration of the area.

Transport infrastructure has also been protected in the whole. However, there is the potential long term loss of the B1340 and loss of the coastal road between Cresswell and Snab Point which could constrain future regeneration. Re-alignment of coastal roads has also been proposed in order to allow the natural evolution of the frontage, for example at Cresswell.

A significant area of loss is to some of the more mobile or softer commercial activities of the area, such as agriculture, the golf courses, and caravan parks. Agricultural loss is expected in the AIn Estuary. In addition, agricultural land to the north of the SMP could be lost in the longer term due to the abandoning of flood defences. The loss of caravan parks is expected to the north of Berwick in the longer term, as well as golf courses at Alnmouth and Newbiggin Moor. Recreation and amenity areas will also be lost along the Spittal Frontage, Foxton, and Whitley Bay. The difficulties with managing defence of these frontages to a large degree is in terms of economic justification but also in the very nature of where such activities are situated; on the open coast deriving benefit from the natural coastline. It is important, therefore, that monitoring is put in place, or continued, so as to work with the owners in providing best advice as to when change is occurring. Equally, where there is a policy for no active intervention the planning authorities should work with these organisations and individuals to examine how the impact on businesses of a retreating coast may be mitigated.

5.3.2 Environmental Implications

As discussed at the beginning of this section, the objectives against which the plan has been judged are set out in **Appendix E**. The impacts of the three scenarios, No Active Intervention, With Present Management and Preferred Policy, on the environmental objectives has been set out for each PDZ within **Section 4**. An assessment of how effective the plan has been in achieving the objectives is provided in **Appendix F**. The assessment is summarised in **Figures 5.1, 5.2 and 5.3**, which present the findings for the three epochs (2025, 2055 and 2105) respectively. As discussed in **Section 5.1**, the Preferred Plan, while clearly introducing certain changes, maintains a relatively high percentage success in balancing objectives over all of the epochs. The plan therefore

avoids or mitigates potential major negative impacts upon the receptors set out in the SEA Directive and provides opportunity for enhancement where possible.

It has been acknowledged that features of designated nature conservation interest within the SMP area are under threat from coastal squeeze in various areas. This is in part due to coastal defences, although there are occasions when natural hard points are causing coastal squeeze (e.g. the Bamburgh dune system being squeezed against higher ground). Several areas have been highlighted where policies of HTL to prevent loss of infrastructure, property and heritage assets will lead to the loss of rocky shore habitat, and it is not possible to mitigate for that loss within this SMP area.

As discussed in **Section 2**, at an SMP level a quantitative analysis of habitat loss and gain as a result of preferred policy is not appropriate. However, in order to get an understanding of impacts on designated sites from the SMP as a whole a record has been made of policies that will result in loss or gain of designated habitat or habitat supporting designated species. As the majority of impacts and gains come in the first epoch, the three separate epochs have not been separated out.

Table 5.1 shows a summary of losses and gains to all designated habitat within the SMP area as a result of preferred policy. Net losses are shown on pink lines and net gains or balances are shown on light blue lines.

As the habitat supporting designated species in the Ramsar Sites within the SMP area is the same as that supporting designated species in corresponding SPAs, the Ramsar sites have not been included. Similarly, impacts on the Berwickshire and North Northumberland European Marine Site (EMS) are included within the constituent designated sites (Northumbria Coast SPA and Ramsar Site, Lindisfarne SPA and Ramsar Site, Farne Islands SPA, Berwickshire and North Northumberland Coast SAC and North Northumberland Dunes SAC). It should also be noted that under the Countryside and Rights of way (CROW) Act 2000, the Northumberland Coast AONB is a statutory designation and any loss of habitat along the coastal strip would have an impact on the AONB.

Losses have only been counted where these have occurred as a result of a proposed coastal defence scheme. In situations where natural loss would occur, for example through sea level rise on a hard coast, this has not been counted. Similarly, gains have only been counted where active MR is taking place. Where the coast is being allowed to behave naturally with a policy of NAI, this cannot be counted as a habitat gain.

In order to ensure parity, where several small policy units will have individual impacts that are mitigated by MR in one large policy unit (e.g. the Aln or Coquet estuaries), the mitigation has been counted against each policy unit that causes habitat loss. For example, in the Aln estuary, there are three policy units that will each cause a small loss of habitat (13.3, 13.4, and 13.5) which are all mitigated by one policy unit by will cause a large gain (13.6). To have a count of three losses versus one gain in this instance would not be representative of the actual situation and has instead been recorded as three losses versus three gains (i.e. a degree of relativity judgement has been used in the assessments).

Table 5.1 Summary of losses and gains to designated habitat

Designation	Name	Habitat	Policies resulting in loss	Policies resulting in gain	Net balance	
SAC	Berwickshire and North Northumberland Coast	Intertidal reef	5		-5	
		Intertidal mudflat / sandflat	1	4	3	
		Inlet and bays		7	7	
		Estuaries	3	3	0	
	Tweed Estuary	Intertidal mudflat / sandflat	1	1	0	
	North Northumberland Dunes	Embryonic shifting dunes			6	6
White dunes				6	6	
Grey dunes				6	6	
SPA	Northumberland Coast	Rocky shore	15	6	-9	
	Lindisfarne	Intertidal mudflat / sandflat		1	1	
		Saltmarsh			1	1
SSSI	Northumberland Shore	Intertidal rock	14	4	-10	
		Sandy beaches	6	18	12	
		Saltmarsh	5	6	1	
		Estuaries	5	6	1	
	Lower Tweed and Whiteadder	Intertidal mudflat / sandflat	1	1	0	
		Intertidal mudflat / sandflat			1	1
		Saltmarsh			1	1
	Newton Links	Dunes		2	2	
	Castle Point to Cullernose Point	Whin Sill exposures	1	1	0	
	Howick to Seaton Point	Millstone Grit exposures	3	3	0	
	Alnmouth Saltmarsh and Dunes	Saltmarsh	3	3	0	
		Intertidal mudflat / sandflat	2	2	0	
	Warkworth Dunes and Saltmarsh	Saltmarsh	2	2	0	
		Dunes		3	3	
	Hadston Links	Dunes		2	2	
Cresswell and Newbiggin Shores	Westphalian deposits	2	4	2		
Tynemouth to Seaton Sluice	Coal Measures exposures	7		-7		
Total			76	100	24	

In total, there is more designated habitat being lost than gained. However, whilst it is apparent from **Table 5.2** that the SMP is creating significant amounts of intertidal mudflat / sandflat, sandy beach and dune habitat, it is also apparent that there will be a net loss of rocky shore and intertidal reef habitat. A large proportion of this loss occurs in the southern part of the SMP from Blyth to Tynemouth.

As discussed, a detailed, quantitative assessment of habitat loss and gain is outwith the scope of this SMP. However, in order to provide a means by which an estimate of significance can be made, a semi-quantitative approach has been adopted, involving

identification of the frontage lengths where rocky shore habitat will either be lost or gained (**Table 5.2**). It should be noted that this information is only an approximation and is not intended to give the same level of detail as a Regional Habitat Creation Plan. It is recognised that an approximation of the length of frontage affected does not give the same level as detail as an in-depth study quantifying hectares lost and gained, however at the SMP level it is considered that this approximation is adequate as a means for strategic assessment.

Table 5.2 Rocky shore frontage lost and gained through SMP policy

Policy Unit	Name	Loss (m)	Gain (m)	Net Balance (m)
6.2	North Seahouses	-600		-600
6.3	Seahouses	-800		-800
8.1	Beadnell North	-1150	400	-750
8.2	Beadnell South	-200	250	50
10.2	Craster	-750		-750
14.1	Birling Links		200	200
16.1	Island View Bay	-150		-150
16.2	Amble Links		500	500
18.1	Broad Sands Rock		1500	1500
19.1	Lynemouth North		750	750
19.3	Lynemouth Dunes		150	150
20.2	Newbiggin Point	-200		-200
24.1	Collywell Bay	-550		-550
25.1	Curry's Point to Trinity Road Car Park	-700		-700
25.3	Briardene Burn to Brown's Point	-750		-750
25.4	Table Rocks to Brown's Point	-350		-350
26.3	Tynemouth North Point	-200		-200
26.6	King Edwards Bay	-70		-70
27.2	Quayside	-500		-500
Total		-6970	3750	-3220

It can be seen from **Table 5.2** that there will be a loss along 6,970m of rocky shore frontage over the entire SMP area of around 145km due to Hold the Line policies. It should be noted, however, that Managed Realignment policies within the SMP will mitigate for over 50% of this length, totalling 3,750m. The net effect, therefore, is a net loss of 3,220m (noting that this does not include for gains coincidentally associated with No Active Intervention policies, which covers some 56.7km of the designated rocky shore habitat).

There is approximately 67.4km of rocky shore habitat along the SMP frontage that is either designated habitat or habitat supporting designated species. The policies (excluding No Active Intervention policies) in this SMP will result in a loss along approximately 5% of the length of this designated habitat (although this does not necessarily equate to a corresponding loss of habitat area). No Active Intervention policies will maintain or enhance the integrity of the designated rocky shore habitat along 85% of its length.

All of the rocky shore that will become lost lies within the Northumbria Coast SPA, where it is designated for its functionality in supporting designated bird species. This functionality is not based on a measure of total length or area of habitat alone but rather a measure of the potential of the habitat to support SPA species. Along the frontages

where a loss has been identified due to Hold the Line policies, this typically is in relatively short discrete lengths (on average less than 500m) at the margins of the designated areas where bird disturbance due to human activity is greatest. In only one Policy Unit is there loss along a frontage of greater than 1 km. There will remain continuity of physical, chemical and biological process either side of the frontages that will be subject to loss, as well as in the immediate seaward zone, which will maintain the functionality of the remaining designated habitat.

The loss of rocky shore habitat will not have a significant impact on the functionality of the designated sites. However, any loss must either be mitigated or compensated for.

As mentioned, the SMP has used every opportunity to mitigate for the loss of rocky shore habitat and has succeeded in providing over 50% of that which has been lost. However, it is beyond the remit of this SMP to detail opportunities for mitigation and compensation that do not lie within the SMP area. It is imperative, both to satisfy requirements under the Habitats Regulations and CROW Act 2000 as well as to ensure that other designated features are maintained, that the issue of mitigation and compensation for this habitat loss is taken forward by the appropriate authorities on a wider scale than that offered within this SMP.

5.3.3 Implications to Cultural Heritage

There is a broad range of historical and heritage features identified over the full length of the coast; however, few features were considered to be at threat during the consultation exercise. Even so there are several areas where features will suffer loss. The Plan attempts to identify where there are risks and as suggested by the objectives this will allow prioritisation of recording prior to loss of the feature. Coastal monitoring recommended by the plan will assist in this. There should be increased co-ordination of this information between coastal managers and those with responsibility for heritage features.

5.4 Managing the Change

5.4.1 Recommendations

The Plan sets out a development of policy over the three epochs from the present forward over 100 years. There are still essential decisions to be made in taking these changes in policy forward.

What has become very evident in developing the plan is the good involvement and co-ordination between different departments within authorities and between different authorities and organisations over the coastal zone. Such activities are required to continue into the future.

This is a coastline where, because of the underlying geology, overall change, even given sea level rise, will tend to be manageable. The impetus for management can, therefore, come from coastal management to deliver benefits. In specific areas, where there is a short term policy for hold the line with a longer term policy of retreat or no active intervention, this must be taken as an opportunity to allow adaptation, not a policy of delay.

It is recommended that the policies be adopted by all organisations represented on NCAG and that these policies, together with an understanding of their intent, are incorporated as guidance for the development of statutory planning within each area.

The following section of this document provides an overall summary of policies for the shoreline. This summary should be considered with reference to the detailed development of the plan provided in Section 4.

5.4.2 Funding

Each Management Area contains a number of Policy Units. For each management area an outline economic assessment has been provided based initially on the high level assessment of damages provided by MDSF. Where strategy studies have been undertaken and where appropriate further economic data has been incorporated within each policy statement.

Overall, given the level of detail available to the SMP, the policies are shown or are believed to be cost effective in terms of economics; taking into account the additional information from strategies not specifically evaluated in the SMP. However, it is equally recognised that in many areas direct funding under coast protection may not be available due to the need for prioritisation of this funding at a national level.

The development of policies set out in Section 4, highlights the consequences of alternative approaches. In this the SMP aims to identify the specific beneficiaries of the policy. In many cases this is driven by the specific objectives such as maintaining open coastal land as identified in planning documents or maintaining the commercial interests of an area. In line with the Government's strategy "*Making Space for Water*" co-funding of projects for the coast should be considered.

6 POLICY SUMMARY

6.1 Introduction

This section provides a summary table of the preferred policies for each Policy Unit. This states the policy up to 2025, from 2025 to 2055, and from 2055 to 2105.

Whilst brief comments are also attached to some policies in the table, it is strongly recommended that this policy summary is read in conjunction with the detail contained within Section 4 of this SMP2 since this describes the full intent of the management approach.

The abbreviations in the summary policy table are explained below.

SMP Policy	Abbreviation	Definition
Hold the Line	HTL	Maintain or upgrade the level of protection provided by defences or the natural coastline
Advance the Line	A	Build new defences seaward of the existing defence line
No Active Intervention	NAI	A decision not to invest in providing or maintaining defences or management of the coast
Managed Realignment	MR	Manage the coastal processes to realign the 'natural' coastline configuration, either seaward or landward of its present position

6.2 Summary of Policies

PDZ	Management Area		Policy Unit		Policy Plan				
					2025	2055	2105	Comment	
1	Scottish Border to Holy Island	MA01	North of Berwick	1.1	St John's Cliffs	NAI	NAI	NAI	
				1.2	Fisherman's Haven	HTL	MR	NAI	Significant change from present management policy, but this is phased over the three epochs. HTL in the first epoch involves maintenance of existing defences; no new defences are appropriate given future policies
				1.3	Pier Cliffs	NAI	NAI	NAI	
		MA02	Tweed Estuary	2.1	North Breakwater	HTL	HTL	HTL	Maintain and repair as coast protection
				2.2	Inner Estuary North	HTL	HTL	HTL	Improve defence and raise in 50 years
				2.3	Inner Estuary South	HTL	HTL	HTL	Improve defence and raise in 50 years
				2.4	Sandstell Point	MR	HTL	HTL	Significant change from present management policy to create a more sustainable shoreline alignment. Detailed study
				2.5	Spittal	HTL	HTL	HTL	Retain beach
		MA03	Scremerston Cliffs	3.1	Scremerston Cliffs	NAI	NAI	NAI	
		MA04	Holy Island Hinterland	4.1	North Low and South Low	MR	MR	MR	Significant change from present management policy in first epoch. Investigate need for hinterland defences set back from shore to counter flooding.
	4.2			Beal Point	NAI	NAI	NAI	No action required but intent to maintain access to Holy Island.	
	4.3			Fenham Flats	NAI	NAI	NAI	Encourage development of intertidal natural defence to rising hinterland.	
	4.4			Ross Low	HTL	HTL	MR	Maintain existing flood defences and allow natural dune accretion. In final epoch dunes may roll back due to higher sea level. MR of this process is required.	
	4.5			Waren Mill	HTL	HTL	HTL	Including new defence to road as required.	
	4.6			Shell Road (Holy Island)	MR	MR	MR	Subject to detailed examination raise road level.	
	4.7			Holy Island Clay Cliff	NAI	NAI	NAI		
	4.8			Holy Island Harbour	HTL	HTL	HTL	Maintain back defence to harbour area.	
	MA05	Holy Island North and East	5.1	North coast	NAI	NAI	NAI	Maintain natural dunes.	
			5.2	East coast	NAI	NAI	NAI		

PDZ	Management Area		Policy Unit		Policy Plan				
					2025	2055	2105	Comment	
2	Bamburgh to Seaton Point	MA06	Budle Bay to Seahouses	6.1	Bamburgh and St Aiden's dunes	NAI	NAI	NAI	Potential realignment of road in the long term.
				6.2	North Seahouses	HTL	HTL	MR	Significant change from present management policy in third epoch. Examine alternative access road with the aim to reroute access.
				6.3	Seahouses	HTL	HTL	HTL	Maintain harbour defences as front line, thereby maintaining defence to the back of the harbour.
				6.4	South Seahouses	NAI	NAI	NAI	
		MA07	Seahouses to Beadnell	7.1	Annstead Dunes	NAI	NAI	NAI	Potential increased flood plain.
				7.2	Beadnell Links	NAI	NAI	NAI	
		MA08	Beadnell and Beadnell Bay	8.1	Beadnell North	HTL	HTL	HTL	Control development seaward of the harbour road.
				8.2	Beadnell South	HTL	HTL	HTL	
				8.3	Beadnell Harbour	HTL	HTL	HTL	Maintaining harbour as a coastal management structure.
				8.4	Beadnell Bay north	MR	MR	MR	Relies on maintenance of buffer zone.
				8.5	Beadnell Bay south	NAI	NAI	NAI	Potential increase of flood plain.
		MA09	Embleton Bay	9.1	Football Hole and headlands	NAI	NAI	NAI	
				9.2	Low Newton	HTL	HTL	HTL	With the aim to retain dunes and sediment.
				9.3	Chuck Bank	MR	MR	NAI	
				9.4	Embleton	NAI	NAI	NAI	
		MA10	Castle Rock to Boulmer	10.1	Dunstanburgh	NAI	NAI	NAI	
				10.2	Craster	HTL	HTL	HTL	Areas adjacent to harbour require detailed examination.
				10.3	Howick	NAI	NAI	NAI	Potential realignment of road.
		MA11	Boulmer to Seaton Point	11.1	Boulmer Village	HTL	HTL	MR	
				11.2	Seaton Point	NAI	NAI	NAI	

PDZ	Management Area		Policy Unit		Policy Plan				
					2025	2055	2105	Comment	
3	Seaton Point to Beacon Hill	MA12	Foxton Bay	12.1	Foxton Bay	MR	NAI	NAI	Adjust access as bay erodes.
				12.2	Golf Club	HTL	MR	HTL	Adjust defences as bay develops.
				12.3	Marden Rocks	NAI	NAI	NAI	
		MA13	Alnmouth Bay	13.1	North Links	MR	MR	MR	Maintain and adjust bank with groynes.
				13.2	Golf Links	MR	MR	MR	Re-shape frontage to retain sediment.
				13.3	Alnmouth Corner	HTL	HTL	HTL	To maintain estuary shape.
				13.4	Estuary Outer North	HTL	HTL	HTL	Maintain flood defence.
				13.5	Bridge frontage	HTL	HTL	HTL	
				13.6	Estuary Inner	MR	MR	MR	Significant change from present management. Local flood defence.
				13.7	Estuary Outer South	NAI	NAI	NAI	
				13.8	Church Hill	HTL	HTL	HTL	To maintain shape of estuary.
		MA14	Birling Links	14.1	Birling Links	NAI	NAI	NAI	
				14.2	Breakwater Dunes	MR	MR	NAI	Encourage sediment build up in corner.
		MA15	Amble	15.1	North Breakwater	HTL	HTL	HTL	
				15.2	Inner Estuary	MR	MR	MR	Maintain and enhance habitat.
				15.3	Marina Area	HTL	HTL	HTL	
				15.4	Harbour	HTL	HTL	HTL	
				15.5	South Jetty	HTL	HTL	HTL	
		MA16	South Amble	16.1	Island View Bay	HTL	HTL	HTL	By maintaining defence at Pan Point and Island View but allow the coast between to adjust.
				16.2	Amble Links	MR	NAI	NAI	Retreat the area of the car park but review need for maintaining stability of the coastal slope to the graveyard.
				16.3	Coquet Bay	NAI	NAI	NAI	

PDZ		Management Area		Policy Unit		Policy Plan			
						2025	2055	2105	Comment
4	Beacon Hill to Beacon Point	MA17	Beacon Hill to Creswell	17.1	Beacon Hill Links	MR	MR	MR	Significant change from present management, with a view to create long-term sustainable solution. Develop a progressive transitional approach to defence in line with erosion pressure to sustain defence to the main village and its access.
				17.2	Low Hauxley	HTL	HTL	HTL	With the probable need to realign the southern end.
				17.3	Druridge Bay north	MR	MR	MR	Develop drainage plan and access management.
				17.4	Druridge Bay south	MR	MR	MR	Examine potential for tidal flooding inland.
				17.5	Creswell	HTL	HTL	HTL	
		MA18	Snab Point	18.1	Broad Sands Rock	MR	NAI	NAI	Significant change from present management policy. Realign road.
				18.2	Snab Point	NAI	NAI	NAI	
		MA19	Lynemouth Bay	19.1	Lynemouth north	NAI	MR	MR	Develop land use plan for the area so defining realignment.
				19.2	Power station	HTL	HTL	MR	Modify defences to assist realignment plan.
				19.3	Lynemouth dunes	NAI	NAI	MR	Maintain flood defence.

PDZ	Management Area		Policy Unit		Policy Plan				
					2025	2055	2105	Comment	
5	Newbiggin Moor to Seaton Sluice	MA20	Newbiggin	20.1	Newbiggin Moor	NAI	NAI	MR	Maintain competent flood defence potentially along a retired line.
				20.2	Newbiggin Point	HTL	HTL	HTL	Limited intervention to protect graveyard.
				20.3	Newbiggin Bay	HTL	HTL	HTL	Maintain beach through recharge.
		MA21	Spital Point to Blyth East Pier	21.1	Spital Point	NAI	NAI	NAI	
				21.2	Hawks Cliff	NAI	NAI	NAI	
				21.3	Sandy Bay	NAI	NAI	NAI	Relocation of mobile assets. There may be some incidental benefit derived from management approaches along 21.4.
				21.4	Wansbeck Estuary	NAI	MR	MR	Significant change from present management policy in second and third epochs. Further investigation of the possible medium and longer term approaches for MR involving weir removal and/or river training/control points to benefit elsewhere.
				21.5	Cambois Beach	MR	HTL	HTL	Significant change from present management policy in second and third epochs. Selective local works (hard points) to assist realignment and safeguard properties and assets – including use of existing revetment to aid this process. Manage the recession process elsewhere to ensure no breaching through dunes. Set any new development back from shore (buffer zone).
				21.6	Blyth East Pier	HTL	HTL	HTL	This is a key feature in controlling the plan shape of the PDZ.
		MA22	Blyth Harbour	22.1	Blyth Harbour	HTL	HTL	HTL	Check compatibility with CFMP and Blyth Flood Risk review.
		MA23	Blyth West Pier to Seaton Sluice	23.1	Blyth West Pier to Beach Gardens	HTL	HTL	HTL	Prevent breaching into South Harbour.
				23.2	Beach Gardens to Promenade	HTL	HTL	MR	Realignment at the end of the promenade will be needed in the longer term in response to rising sea levels.
				23.3	South Beach	MR	MR	MR	Manage the recession process to ensure no breaching through dunes. Further investigation of local erosion at Meggie's Burn.
				23.4	Seaton Burn	HTL	HTL	HTL	Policy extends along short section of existing wall at Seaton Sluice headland.

PDZ	Management Area		Policy Unit		Policy Plan				
					2025	2055	2105	Comment	
6	Seaton Sluice to River Tyne (North Shields Fish Quay)	MA24	Seaton Sluice to Curry's Point	24.1	Collywell Bay	HTL	HTL	HTL	
				24.2	Crag Point to Curry's Point	NAI	NAI	NAI	Crag Point headland to remain undefended. Local intervention to maintain/relocate Harley Cove steps for use as an emergency access from the beach and allow access to view the unbroken coal measures.
		MA25	Curry's Point to Brown's Point	25.1	Curry's Point to Trinity Road Car Park	HTL	HTL	HTL	Maintaining this headland causes less pressure on frontages to south.
				25.2	Trinity Road Car Park to Briardene Burn	MR	MR	MR	Local works may be needed at access points and at transition between defended and undefended frontages (at both ends) to prevent outflanking.
				25.3	Briardene Burn to Brown's Point	HTL	HTL	HTL	
				25.4	Table Rocks to Brown's Point	HTL	HTL	HTL	
		MA26	Brown's Point to Tynemouth North Pier	26.1	Brown's Point	NAI	NAI	NAI	
				26.2	Cullercoats Bay	HTL	HTL	HTL	
				26.3	Tynemouth North Point	NAI	NAI	NAI	
				26.4	Tynemouth Longsands	HTL	HTL	MR	Pulling the coast forward to maintain a beach and dunes (not a hard reflective structure at the toe)
				26.5	Sharpness Point	NAI	NAI	NAI	
				26.6	King Edward's Bay	HTL	HTL	HTL	
				26.7	Tynemouth Headland	HTL	HTL	HTL	Maintain existing retaining walls at the headland.
				26.8	Tynemouth North Pier	HTL	HTL	HTL	
MA27	Tynemouth North Pier to Fish Quay	27.1	Prior's Haven	NAI	NAI	NAI			
		27.2	Quayside	HTL	HTL	HTL	Defence standard needs to be examined in detail at Fish Quay with respect to tidal flooding.		

7 ACTION PLAN

7.1 Introduction

This section summarises the high-level and strategic actions that are required between now and the next review of the SMP in around 10 years time within an SMP2 Action Plan.

This SMP2 Action Plan is intended to:

- Establish processes for finalisation, dissemination and review of the SMP2;
- Enable linkages with relevant related flood and erosion risk management initiatives;
- Enable delivery of a prioritised programme of Strategy Plan development or reviews, studies and investigations;
- Enable delivery of prioritised programme of possible future schemes that are likely to be required given the preferred policies that have been identified;
- Identify actions that will be required to resolve uncertainties;
- Identify actions that are necessary to deal with the consequences of the SMP policies;
- Establish processes for informing stakeholders of progress with ongoing actions.

7.2 SMP2 Action Plan

7.2.1 Shoreline Management Plan

Following completion of this SMP2, the relevant local authorities will adopt the policies and recommendations. As the five authorities in Northumberland are to be amalgamated within the new unitary Northumberland Council with effect from 1st April 2009, it has been decided that each existing local authority will write a letter of recommendation for adoption of the SMP2 to the new Council, and it will then be the new Council that formally adopts it. This is intended to put coastal issues at the forefront of the new Council by achieving endorsement of the SMP2 from its outset. North Tyneside Council will remain unaffected by the local government restructuring and will also adopt the SMP2.

Following adoption, and subsequent to 'sign-off' by the National SMP2 Quality Review Group, the Environment Agency's Regional Director will be required to formally approve the document.

Once these activities have been undertaken, the final SMP2 should be disseminated. This can be achieved through the provision of copies in Council offices or town libraries and availability of the document on the website 'www.northumberland-smp2.org.uk'. A key part of the dissemination process will involve each authority linking the findings of the SMP process through to land use planning, including Regional Spatial Strategies (RSS) and the Local Development Framework (LDF). This is essential so that future land use plans can take due account of risks from erosion and sea flooding along the SMP frontage.

In the time period between reviews of the SMP, there will be emerging information that will need to be reviewed with respect to its consequences on SMP content, including policies. Such information foreseen over future years includes:

- United Kingdom Climate Projections 2009 (UKCP09) from the United Kingdom Climate Impacts Programme (UKCIP)
- National Coastal Erosion Risk Mapping from the Environment Agency;
- Flood Risk Mapping from the Environment Agency;
- Updated Project Appraisal Guidance and SMP guidance from the Environment Agency.

Review of such emerging information should be undertaken as a 'lite-touch' review in order to understand the consequences and implications on existing policies.

The SMP2 will need a detailed review in around 10 years time (i.e. around 2019). Suitably in advance of this date, the local authorities should start planning their requirements and procurement approaches in light of the guidance current at that time.

Action	Measure	Responsibility
Sign-off by National Quality Review Group	Sign-off achieved in May 2009	<ul style="list-style-type: none"> • Northumberland County Council¹ (as lead authority)
Letter of recommendation from each of the five existing Councils in Northumberland to the new unitary Authority.	Letter written and sent before the end of March 2009.	<ul style="list-style-type: none"> • Berwick-upon-Tweed Borough Council • Alnwick District Council • Castle Morpeth Borough Council • Wansbeck District Council • Blyth Valley Borough Council
Adoption of the SMP2	Adoption by Councils before end of May 2009	<ul style="list-style-type: none"> • Northumberland County Council • North Tyneside Council
Approval of SMP2	Approval from Environment Agency Regional Director before end of June 2009	<ul style="list-style-type: none"> • Northumberland County Council (as lead authority)
Dissemination of SMP2	Placement of SMP2 on website and copies available for inspection in Council offices or libraries. Letters sent to consultees before end of June 2009 informing them of SMP2.	<ul style="list-style-type: none"> • Northumberland County Council (as lead authority)
Links with Land Use Planning	All authorities to engage in discussions with planning departments about the findings and recommendations of the SMP upon its completion.	<ul style="list-style-type: none"> • Northumberland County Council • North Tyneside Council
'Lite-touch' review of emerging information	Maintain awareness of emerging national/strategic	<ul style="list-style-type: none"> • Northumberland Council

¹ The unitary Northumberland County Council came into effect on 1st April 2009.

Action	Measure	Responsibility
	information through regular attendance at North East Coastal Group. Review implications of information and report back to next Coastal Group meeting.	<ul style="list-style-type: none"> North Tyneside Council
Review of SMP2	Start planning in advance for review of SMP2 in around 2019	<ul style="list-style-type: none"> Northumberland Council North Tyneside Council

7.2.2 Related Flood and Erosion Risk Management Initiatives

The management of risks from flooding and erosion falls within a hierarchical approach that ranges from discouraging inappropriate development in 'at risk' areas through to providing sustainable defence measures. Within this hierarchy, it is also necessary to provide adequate and cost-effective warning systems and, in the event of a flooding or erosion incident, having appropriate contingency plans in place. Publication of the SMP2 presents an ideal opportunity to raise awareness of flood and erosion risk amongst the public and within the relevant departments of key organisations with operational responsibilities. In particular, the output from coastal monitoring (see **Section 7.3**) can provide invaluable data for the operation and verification of the North East Tidal Flood Forecasting and Warning System operated by the Environment Agency. Furthermore, information from the SMP2 relating to flood and erosion risk should be used to inform future updates of Contingency Plans so that relevant organisations are suitably prepared and trained to appropriately respond to such events.

Action	Measure	Responsibility
Establish links between the SMP2 coastal monitoring (Section 7) and the North East Tidal Flood Forecasting System	Dialogue between managers of each programme and delivery of data to cost-effectively benefit both programmes	<ul style="list-style-type: none"> Northumberland County Council Environment Agency
Use launch of SMP2 to raise awareness of flood and erosion risk and its management	Launch event with feedback questionnaire.	<ul style="list-style-type: none"> Northumberland County Council
Feed SMP2 information into future reviews of Contingency Plans	Contingency Plans make reference to SMP2 when assessing risks from flooding and erosion	<ul style="list-style-type: none"> Northumberland County Council North Tyneside Council

7.2.3 Strategy Plans, Studies and Investigations

At a location-specific level of detail, the need for any further Strategy Plans, studies or investigations has been identified within the Action Plans for each individual Management Area. The high-level Action Plan presented in this Section requires the local authorities to co-ordinate Medium Term Planning with respect to the proposed timescales for implementation of these further studies.

Action	Measure	Responsibility
Ensure that proposed Strategies, studies and investigations for each Management Area are included as appropriate within Medium Term Planning (MTP)	Annual MTP returns made to the Environment Agency in timely manner	<ul style="list-style-type: none"> Northumberland Council North Tyneside Council

7.2.4 Schemes

Similar to above, at a location-specific level of detail, the need for any further capital schemes has been identified within the Action Plans for each individual Management Area. The high-level Action Plan presented in this Section requires the local authorities to co-ordinate Medium Term Planning, and Project Appraisal Reporting (business case development) and associated funding applications with respect to the proposed timescales for implementation of these further schemes.

In addition, within each Management Area there is a recommendation for ongoing maintenance of existing defences through revenue budgets. This maintenance needs to be undertaken annually, based on results from ongoing monitoring and inspections (see Sections 7.2.4 and 7.3).

Action	Measure	Responsibility
Ensure that proposed schemes for each Management Area are included as appropriate within Medium Term Planning (MTP)	Annual MTP returns made to the Environment Agency in timely manner	<ul style="list-style-type: none"> Northumberland Council North Tyneside Council
Ensure that business cases and funding applications for proposed schemes for each Management Area are undertaken in line with sanctioned MTPs.	Project Appraisal Reports submitted to Environment Agency in line with agreements in annually sanctioned MTPs	<ul style="list-style-type: none"> Northumberland Council North Tyneside Council
Ensure that maintenance of existing defences is regularly undertaken	Annual maintenance undertaken from revenue budgets	<ul style="list-style-type: none"> Northumberland Council North Tyneside Council

7.2.5 Resolving Uncertainties

The principal uncertainties relating to the SMP2 concern: (i) projected rates and mechanisms of coastal change; and (ii) rates and mechanisms of deterioration in the condition of structures. This is because coastlines and structures will be subject to both specific events, such as storms, and to longer-term trends, such as rise in mean sea level. Consequently, it is necessary to continue monitoring of coastal change and of structural condition through the strategic coastal monitoring programme that has been in place along the SMP frontage since 2002.

Action	Measure	Responsibility
Continue beach surveys to understand rates and mechanisms of coastal change	Surveys in spring and autumn of each year	<ul style="list-style-type: none"> Northumberland Council North Tyneside Council
Continue structural condition inspections to understand rates and mechanisms of deterioration	Walk-over surveys once every 2 years (next due summer 2010)	<ul style="list-style-type: none"> Northumberland Council North Tyneside Council

7.2.6 Resolving Consequences of Policies

The Appropriate Assessment that accompanies the SMP2 has identified that there will be net loss of rocky foreshore habitat as a result of the policies of the SMP. Having examined this issue, including convening and hosting a SMP2 Biodiversity Workshop aimed at identifying habitat re-creation opportunities, it is concluded that it will not be possible to fully mitigate this loss within the SMP frontage. Consequently, there is a need for liaison with Natural England and the Environment Agency through involvement in the Environment Agency's wider-scale Flood and Coastal Erosion Risk Management Regional Habitat Creation Plan (RHCP; currently in preparation by the Environment Agency, and due for completion early in 2010) to identify, at a broad scale, any such opportunities across the wider north east of England. Timing of the production of the RHCP with respect to completion of the SMP2 is slightly later than ideal, but it does give the opportunity for the full consequences of the SMP2 to be known during development of the RHCP.

Other areas of the England and Wales coastline where hard rock geology is prominent (e.g. Cornwall, Wales) will also experience such issues when SMPs are developed for these frontages. There is, therefore, the need for a UK government approach to this issue that should be championed by local authorities via the North East Coastal Group.

Action	Measure	Responsibility
Active participation in the development of the Environment Agency's Flood and Coastal Erosion Risk Management North East Regional Habitat Creation Plan.	Liaison with Environment Agency and Natural England regarding losses of rocky shore habitat creation and opportunities for gain.	<ul style="list-style-type: none"> Northumberland Council North Tyneside Council
Escalate the issue of loss of	Discussion of the issue at	<ul style="list-style-type: none"> Northumberland

rocky foreshore habitat to UK government via Natural England and Environment Agency	North East Coastal Group Meetings and implementation of arising actions.	Council • North Tyneside Council
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7.2.7 Communication

The SMP has highlighted some areas where planning now for a longer-term change is required. These relate to areas of coast where a policy of Managed Realignment or No Active Intervention is selected in the longer term and assets that may become at risk, such as sections of road, caravan parks, golf courses, amenity areas, etc., will need to be relocated. Communication of the longer-term consequences to those individuals or organisations affected is essential to enable early planning for future change.

There are also areas of coast where opportunities for environmental enhancement exist, but where implementation of the approach will affect a number of different stakeholders. Again, this required early communication of the longer-term consequences to those individuals or organisations affected so that the opportunities can be optimised.

There is a requirement on local authorities under the Local Government Performance Framework, established by the Communities and Local Government (CLG) in 2007, to record progress in delivering agreed actions to implement long term flood and coastal erosion risk management plans, such as this Shoreline Management Plan. Measurement will be made by recording the percentage of agreed actions in this high-level SMP2 Action Plan that are being undertaken satisfactorily. The Environment Agency will record progress against all agreed actions and a report produced on an annual basis identifying the proportion of actions attributed to a particular local authority that are being undertaken satisfactorily.

Action	Measure	Responsibility
Communicate SMP outputs to those affected by policy changes	Communication Plan developed by June 2009 and implemented in accordance with its actions	<ul style="list-style-type: none"> • Northumberland Council • North Tyneside Council
NI189 reporting on implementation of the SMP2 Action Plan.	Percentage of actions implemented in accordance with the measurable targets.	<ul style="list-style-type: none"> • Northumberland Council • North Tyneside Council

7.3 Coastal Monitoring

As described in Section 7.2.4, a recommendation is made within each Management Area for ongoing defence inspection and coastal monitoring.

The development of the present SMP2 has significantly benefited from the data and information that has been available from the coastal monitoring programme since its inception in April 2002. The past 7 years of data relating to beach and cliff behaviour and coastal defence condition has been used to inform key elements of this Plan. Continued data collection will enable the SMP3 to be even better informed about these fundamental issues that could significantly affect decisions on sustainable policies.

The monitoring that is undertaken across the SMP2 area will become incorporated within the wider Cell 1 Regional Monitoring Programme from 2009 onwards. As part of this, the following monitoring will continue:

- Full measures beach profile surveys in September/October each year;
- Partial measures beach profile surveys in March/April each year;
- Topographic surveys of Holy Island causeway in September/October each year;
- Topographic surveys of Alnmouth Beach in September/October and March/April each year;
- Cliff top surveys at Newbiggin Bay Caravan Park and Sandy Bay Caravan Park in September/October and March/April each year;
- Walk-over inspections of the coastal defences and natural features (dunes, slopes, cliffs) every 2 years, with information being updated into the MS Access database and fed across to the Environment Agency for inclusion in its own National Flood and Coastal Defence Database.

Incorporation within the new Cell 1 Regional Monitoring Programme will add value through the inclusion of:

- One wave recording buoy off the Northumberland coast;
- Aerial photography of the coastline at low water once every 6 years;
- Development of a cell-wide website for data storage.

Future coastal monitoring should enable the operating authorities to more precisely establish the nature and magnitude of impacts on designated nature conservation sites, with particular regard to the potential loss of intertidal rocky reef habitat within the Northumbria Coast SPA. A range of UKCIP sea level rise scenarios should be considered in order to assess possible impacts, future habitat loss and associated timescales. Any such study should, as far as possible, link in with the Environment Agency's ongoing LIDAR programme, north east tidal gauges, and also with the Cell 1 Regional Monitoring Programme. As such a study would be investigating the loss of habitat due to submergence of a landform feature due to rising sea level rather than erosion, careful consideration should be given to appropriate approaches and any confidence limits put on such analyses.

In addition to the above, it is imperative that data management (quality control, processing and archiving) and data analysis and interpretation of the key changes are undertaken on an ongoing basis so that latest information is used to inform management decisions along the Northumberland and North Tyneside coastlines.

This will be achieved by regular reporting of the key findings from the coastal monitoring to each of the local authorities.

All of the authorities and organisations involved in the preparation of this SMP2 are entirely supportive of the coastal monitoring and are committed to its continuation.