Boston Haven Strategy Study

Strategic Scoping Report

Prepared by

Babtie Brown & Root

Revision A02
July 2004

Environment Agency
Anglian Region
Agency Scheme Ref: NHB31150
BBR Document Ref: 0003293/CR/d4/17
## DOCUMENT HISTORY RECORD

<table>
<thead>
<tr>
<th>Revision</th>
<th>Date</th>
<th>Description/ Reason for issue</th>
<th>Orig.</th>
<th>Chk’d</th>
<th>App’d</th>
</tr>
</thead>
<tbody>
<tr>
<td>RO1</td>
<td>21 June 2004</td>
<td>Internal review</td>
<td>CP</td>
<td>AJ/SD</td>
<td>RB</td>
</tr>
<tr>
<td>A02</td>
<td>21 July 2004</td>
<td>Final Issue</td>
<td>AJ</td>
<td>CP</td>
<td>SD</td>
</tr>
</tbody>
</table>

Client Manager: Vicky Williams/Claire Redmond

Date:
Table of Contents

Summary

1 Introduction ........................................................................................................................................... 8
1.1 Purpose of this Document
1.2 Location and Site Description
1.3 Background to the Strategy Study

2 Strategy Study Objectives ................................................................................................................. 13
2.1 Objectives of the Strategy Study
2.2 SEA Objectives

3 Existing Environment ......................................................................................................................... 17
3.2 Legislation, Planning and Policy
3.3 Human Beings
3.4 Flora and Fauna
3.5 Fisheries
3.6 Air and Climate
3.7 Landscape and Visual Amenity
3.8 Water
3.9 Land Use
3.10 Cultural Heritage, Archaeology and Material Assets
3.11 Traffic and Transport
3.12 Soil, Geology, Hydro-geology and Geomorphology
3.13 Use of Natural Resources

4 Potential Strategic Policy Options .................................................................................................... 30
4.1 Introduction
4.2 Development of Options
4.3 Potential Impacts and Effects
4.4 Cumulative Effects

5 Consultation ........................................................................................................................................ 41
5.1 Introduction
5.2 Internal Consultation
5.3 External Consultation

6 Key Issues for the Strategy Study .................................................................................................... 44

7 Conclusion ........................................................................................................................................... 46

8 Next steps in the SEA ......................................................................................................................... 47

9 Further Information ............................................................................................................................. 48

10 References ......................................................................................................................................... 49
Glossary

Abbreviations

Tables
Table 2-1 Strategic Environmental Objectives for the Boston Haven Strategy Study, Strategic
Environmental Appraisal 14
Table 3-1 Sites of Local Nature Conservation Importance 21
Table 3-2 GQA Grades 25
Table 4-1 Policy Options 32
Table 6-1 Key SEA Stages and Consultation Opportunities 43

Figures
Figure 1.1 Environmental Constraints Map (Appendix 1)
Figure 1.2 Overview of SEA Process

Appendices
Appendix 1 Figure 1.1, Environmental Constraints and Study Area Map
Appendix 2 SEA Objectives methodology
Appendix 3 List of consultees and Internal and External consultation responses
Appendix 4 Consultation Pack

Photos
Photo 1: Hard defences in the town of Boston.
Photo 2: Flood embankments downstream of Boston town.
Photo 3: Boston Docks.
Photo 4: Riverside walk in Boston.
Photo 5: The Bar-tailed Godwit, one of the many birds of conservation interest supported by habitats in
The Wash.
Photo 6: Saltmarsh and mudflats in the Wash.
Photo 7: Tidally exposed mudbanks in Boston.
Photo 8: Boston Stump.
Summary

Introduction and Background
The purpose of this document is to scope environmental issues associated with the proposed strategic flood management options of the Boston Haven Flood Management Strategy Study. This report also serves as a consultation document and as such comments on the information presented are encouraged and welcomed from all interested parties.

Key environmental constraints and opportunities within the study area have been identified and a preliminary assessment undertaken of the environmental impacts associated with each strategic policy option. This is the preliminary stage of the Strategic Environmental Assessment (SEA), the aim of which is to integrate environmental issues into the development of proposals early in the strategic process. Key issues identified as part of this scoping study will be taken forward and considered in further detail under the subsequent assessment and evaluation stage of the SEA process, which is due to commence in Autumn 2004.

The study area is located within the Lincolnshire Fens, adjacent to The Wash on the east coast of England (refer to Figure 1.1, Appendix 1). In this strategy study the condition of defences is being considered from Grand Sluice to the Hobhole outfall. This section of river is commonly referred to as the Boston Haven.

Key drivers of the flood management strategy study include historical flood events that have affected Boston over the last 50 years and the current condition of flood defences in Boston, which are poor in places. Additionally, rising sea levels combined with more intense weather conditions have led to the need to reassess the current standard of protection (SoP) provided by existing defences.

Key Environmental Constraints
Key environmental constraints identified at this strategic scoping stage are as follows:

- Human beings - people and property in Boston, recreational use of the river and riverside open space and access, and river related industries and businesses including the Port of Boston and commercial fishing activities;
- Flora and Fauna - international conservation importance of The Wash with designations including Ramsar, cSAC, SPA and SSSI;
- Cultural heritage and archaeology - the town of Boston is a historical port with high archaeological potential and numerous buildings and features of heritage importance; and
- Water – there are numerous outfalls into the Haven including those associated with the sewerage network, waste water treatment and land drainage functions.
Strategic Options
Strategic flood management options considered as part of the strategic environmental assessment are:

**Option 1: Hold the Existing Line of Defence**
- 1a - Reactive maintenance (repair defences following a breach)
- 1b - Proactive maintenance (maintain defences to the present level)
- 1c – Wall raising: raise crest levels to maintain current standard of protection for the 100 year study duration
- 1d – Wall raising: raise crest level to improve the present standard of protection over the 100 year study duration

**Option 2: Advance the Existing Line of Defence**
- 2a - Barrier construction
- 2b - Relocation of Grand Sluice

**Option 3: Managed Realignment**
- 3a – Offline flood storage areas
- 3b – Rural realignment
- 3c – Urban Realignment

**Option 4: No Active Intervention**
- Do nothing/walk away

Consultation
Internal and external consultation has been undertaken as part of this scoping study and will continue throughout the SEA. A summary of consultation responses received to date is provided in Appendix 3. Option 4 is not considered a valid option by the majority of consultees contacted to date, who generally favour some increase in the standard of protection that is currently provided.
Key Issues for the Strategy Study

Key constraints and opportunities identified to date for each flood management option are summarised below. Further details regarding constraints and opportunities are provided in Chapter 4.

<table>
<thead>
<tr>
<th>Generic Option</th>
<th>Implementation option</th>
<th>Key issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 1</td>
<td>Options 1a and 1b</td>
<td>• Result in a reduced standard of flood protection over time.</td>
</tr>
<tr>
<td>Hold the existing line of defence</td>
<td></td>
<td>• The risk of flooding and damage to environmental assets would remain high.</td>
</tr>
<tr>
<td></td>
<td>Options 1c and 1d</td>
<td>• Would maintain and increase the standard of flood protection respectively.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Adverse effects on visual amenity and local landscape character,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>including obstruction of river views in places.</td>
</tr>
<tr>
<td>Option 2</td>
<td>Option 2a and 2b</td>
<td>• Provide increased flood protection upstream of structures.</td>
</tr>
<tr>
<td>Advance the line of existing</td>
<td></td>
<td>• Defences need to be raised downstream of the structures.</td>
</tr>
<tr>
<td>defence</td>
<td>Option 2a</td>
<td>• Localised changes in flow and sediment movement.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Localised changes in flow and sediment movement.</td>
</tr>
<tr>
<td></td>
<td>Option 2b</td>
<td>• Permanently raised water levels would result in:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ loss of intertidal habitat through the town;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ loss of tidally exposed mudflats through the town;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ potential adverse effects on preserved archaeology;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ may compromise outfalls into the Haven;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ loss of some mooring facilities; and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ potential operational problems for the docks.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Compatible with Fens Waterways Link Scheme.</td>
</tr>
<tr>
<td>Option 3</td>
<td>Option 3a</td>
<td>• Potentially provides increased flood protection upstream of flood storage area.</td>
</tr>
<tr>
<td>Managed Realignment</td>
<td></td>
<td>• Opportunity for habitat creation in flood storage areas and potential to meet BAP targets.</td>
</tr>
<tr>
<td></td>
<td>Option 3b</td>
<td>• Opportunity for habitat creation in areas of realignment.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Potential reduced conveyance of channel.</td>
</tr>
<tr>
<td></td>
<td>Option 3c</td>
<td>• Potential for land-use conflict.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Potential for land-use conflict.</td>
</tr>
<tr>
<td>Option 4</td>
<td>N/A</td>
<td>• Potential for land-use conflict.</td>
</tr>
<tr>
<td>No active intervention</td>
<td></td>
<td>• Loss of some riverside properties and other environmental assets.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Uncontrolled and unpredictable flood events resulting in damage and loss of environmental assets identified.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Baseline option.</td>
</tr>
</tbody>
</table>
Conclusion
This scoping report serves to scope out key environmental constraints and opportunities associated with each strategic flood management option. No preferred option has been identified at this stage. However, following this scoping exercise it is possible to conclude that the strategic option of No Active Intervention (Option 4) is not favoured from an environmental and social perspective due to the loss of and damage to environmental assets that would result. The option does not comply with objectives of local plans and policies and is rejected by the majority of consultees. However, this option will be retained throughout the Strategy Study as a baseline option.

The outcomes of this scoping stage have been incorporated into the ongoing development of strategic flood management options.

Comments on this scoping report will be sought from all interested and affected individuals and organisations and these responses will be used to inform the ongoing SEA process. A list of consultees is provided in Appendix 3. The next stage of the SEA will include a detailed appraisal of options against the strategic environmental objectives and will be documented in the Strategic Environmental Report.
1 Introduction

1.1 Purpose of this Document

1.1.1 The Environment Agency is undertaking a strategic study of flood management options for the tidal section of the River Witham at Boston (commonly referred to as the Haven). The Strategy Study will be used to obtain agreement from the Agency National Review Group (NRG) and to obtain 'Strategy Agreement' from Defra.

1.1.2 Strategic Environmental Assessment (SEA) forms an integral element of the overall Strategy Study and is required in accordance with Agency procedures and the Environmental Assessment of Plans and Programmes Regulations (SI 2004/1633) and the European Community Directive on “the assessment of the effects of certain plans and programmes on the environment” (2001/42/EC). The aim of the SEA procedure is to ensure that environmental and sustainability issues are taken into consideration early in the strategic process of plan development.

1.1.3 The purpose of this document is to scope environmental issues associated with the proposed strategic flood management options for the Boston Haven Flood Management Strategy Study. Key environmental constraints and opportunities within the study area have been identified and a preliminary assessment undertaken of the environmental impacts associated with each strategic flood management option. Key issues identified as part of this scoping study will be taken forward and considered in further detail under the subsequent assessment and evaluation stage of the SEA process, which is due to commence in Autumn 2004.

1.1.4 An overview of the SEA process, its key outcomes and integration into the development of the flood management strategy study is provided in Figure 1.2 below.

1.1.5 This strategic scoping study has been prepared using the following information sources:

- Boston Haven Strategy Study: Strategic Screening and Scoping File Note. Version A02 (BBR, January, 2004);
- consultation with relevant environmental specialists within the Environment Agency and key external consultees (refer to Chapter 5);
- site visit (July 2003); and
- desktop study and literature review.

1.1.6 The latest available SEA guidance has been used in the preparation of this strategic scoping study. This has included the following:

Figure 1.2: Overview of the SEA process

1.2 Location and Site Description

1.2.1 The study area is located within the Lincolnshire Fens, adjacent to The Wash on the east coast of England (Figure 1.1). The River Witham runs through Boston (grid reference TF32 43) in a north-west to south-east direction to join the North Sea at The Wash. The section of river under consideration in this Strategy Study is the tidal Witham (Haven) from Grand Sluice to the Hobhole outfall (approximately 10km).

1.2.2 From Grand Sluice the tidal river passes through the urban conurbation of Boston, where the river banks are a mixture of old and new hard defences. As the tidal river leaves the town, the estuary follows the course dictated by maintained earth flood embankments and wide berms before flowing into The Wash at Tab’s Head.

Photo 1: Hard defences in the town of Boston.
1.3 Background to the Strategy Study

1.3.1 A number of flood events have affected Boston, such as the 1953 East Coast Flood, which has been documented as one of the worst natural disasters to strike Britain. Subsequent flood events have occurred in 1976, 1978, and 2001. The 1978 event caused the defences in front of the Stump to collapse resulting in significant flooding in the town.

1.3.2 The threat of climate change poses a new problem for managing the risk of flooding. Rising sea levels combined with more intense weather conditions have lead to the need to reassess the standard of protection being provided by existing defences within the study area.

1.3.3 The town of Boston and the surrounding land is currently protected from flooding by a variety of defences. Typical defences within the town comprise steel sheet piling, concrete and masonry walls. Out of the town, the estuarine defences generally comprise earth embankments set back from the main channel. The current condition of these defences is varied: in some cases the condition is poor and in need of attention.

1.3.4 The built up nature of the town along the tidal river means some lengths of the, flood defences are currently provided by existing properties of unknown construction.
1.3.5 Given the issues described above, it is recognised that a sustainable flood management strategy is required in order to manage the future risk of flooding to people, property, land and the environment. The Boston Haven Flood Management Strategy Study was therefore initiated.

1.3.6 The flood management strategy study is required to fit into a wider context of strategic planning within the study area as set out in national and local planning and policy documentation. Such documentation is listed in Section 3.2 and has been reviewed and considered in setting objectives and indicators for the SEA process. Opportunities to work in partnership with other bodies will be sought to help realise aims and objectives of the strategy study.
2 Strategy Study Objectives

2.1 Objectives of the Strategy Study

2.1.1 The overarching objective of the Strategy Study is to obtain agreement from the Agency National Review Group (NRG) and to obtain ‘Strategy Agreement’ from Defra for the preferred strategic policy option.

2.1.2 The overall aim of the strategy study is to ensure the sustainable management of the tidal section of the River Witham and consider implementation of tidal defence works which are technically sound, economically viable and environmentally and socially acceptable.

2.2 SEA Objectives

2.2.1 More specific Strategic Environmental Objectives have been set for the purpose of the SEA, in order to assist in appraisal of the strategic policy options. To aid this assessment process, indicators have been set against each objective. Objectives and indicators have been established for key environmental themes and are listed in Table 2.1.

2.2.2 A methodology for setting the objectives is provided in Appendix 2. It should be noted that SEA objectives are distinct from plan and external objectives, though they will often overlap with them.

2.2.3 Objectives have been developed in consultation with internal and external consultees. A summary of external consultee comments on the first draft of the objectives, and actions in dealing with these comments are provided in Appendix 2.
### Table 2-1 Strategic Environmental Objectives for the Boston Haven Strategy Study, Strategic Environmental Appraisal

<table>
<thead>
<tr>
<th>Theme</th>
<th>Objective</th>
<th>Indicators (measuring change – qualitative and/or quantitative)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Flood Management</strong></td>
<td>1. Manage the risk of flooding to people, property, land and the environment.</td>
<td>Number of properties in the study area defended to an agreed standard.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Area of land defended to an agreed standard.</td>
</tr>
<tr>
<td></td>
<td>2. Provide protection from flooding in a manner consistent with relevant plans, policies and objectives, related to sustainable development.</td>
<td>Agreement/conflict with relevant plans, policies and objectives.</td>
</tr>
<tr>
<td><strong>Climate Change</strong></td>
<td>3. Ensure the strategy is sustainable in terms of long term climate change.</td>
<td>Ability to adapt and upgrade flood defences in response to future predicted climate change.</td>
</tr>
<tr>
<td><strong>Flora and Fauna</strong></td>
<td>4. Protect and enhance biodiversity throughout Boston Haven.</td>
<td>Change in biodiversity value within the study area.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Loss or gain of barriers to fish migration.</td>
</tr>
<tr>
<td></td>
<td>5. Protect and enhance sites of nature conservation importance including designated sites of local, national and international importance.</td>
<td>Change in area or value of designated nature conservation sites of local and national importance.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>In accordance with the EU Habitats Directive, no adverse effect on site integrity, subject to natural change, of sites of European nature conservation importance.</td>
</tr>
<tr>
<td>Theme</td>
<td>Objective</td>
<td>Indicators (measuring change – qualitative and/or quantitative)</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>----------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Cultural Heritage and Archaeology</td>
<td>6. Protect and enhance features of archaeological importance and historic character throughout Boston Haven.</td>
<td>Change to fabric of archaeological features and listed buildings.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Change to character and appearance of Conservation Areas.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Change to setting of listed buildings, Scheduled Monuments or Conservation Areas.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Change in significance of archaeological /cultural heritage features.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Compatibility with cultural heritage designation throughout the study area.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Change to long-term preservation of the historic environment.</td>
</tr>
<tr>
<td>Landscape</td>
<td>7. Conserve and enhance the landscape character of the area, integrating all works into the local landscape character of Boston.</td>
<td>Change in landscape value based on allocation of an appropriate value.</td>
</tr>
<tr>
<td>Human beings and the built</td>
<td>8. Ensure the long-term sustainability of river-related industries, including fisheries and commercial activities within the Port of</td>
<td>Change in commercial navigation, moorings or access required to support Port of Boston industries, including fisheries.</td>
</tr>
<tr>
<td>Recreation and Amenity</td>
<td>10. Protect and enhance recreation and amenity facilities within the study area.</td>
<td>Change in area and quality of public open spaces.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Change in length and quality of public rights of way.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Change in recreational navigation or number of mooring sites.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Change in provision of access for angling.</td>
</tr>
<tr>
<td>Traffic, Transport and Navigation</td>
<td>11. Ensure compatibility with transport and navigation infrastructure within the study area.</td>
<td>Change in length of navigable river.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Change in number of navigational links.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Change in flood risk to transport infrastructure within the study area.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Compatibility with navigation improvement projects, e.g. the Fens Waterways Link.</td>
</tr>
<tr>
<td>Theme</td>
<td>Objective</td>
<td>Indicators (measuring change – qualitative and/or quantitative)</td>
</tr>
<tr>
<td>-----------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Land Use</td>
<td>12. Achieve a sustainable approach to land use within the Boston Haven catchment.</td>
<td>Change in area of best and most versatile agricultural land. Improved land management within the Boston Haven catchment, including uptake of Agri-environment schemes.</td>
</tr>
<tr>
<td>Geomorphology</td>
<td>16. Ensure a sustainable tidal system is maintained.</td>
<td>Change in sediment regime. Change in physical habitat quality. Promotion of natural floodplain conditions, for example increased connectivity with river floodplain.</td>
</tr>
<tr>
<td></td>
<td>17. Protect and enhance features of geomorphological importance within the Boston Haven and The Wash.</td>
<td>Change in value of features of geomorphological importance.</td>
</tr>
<tr>
<td></td>
<td>15. Ensure no detrimental impact of changes in water levels and flows within the study area.</td>
<td>Change in exposure of sensitive receptors to water table.</td>
</tr>
<tr>
<td>Air Quality</td>
<td>18. Minimise levels of dust and noise arising from construction.</td>
<td>Consideration of noise and dust suppression techniques.</td>
</tr>
<tr>
<td>Use of natural resources</td>
<td>19. Employ the principles of sustainable development.</td>
<td>Opportunities for waste minimisation. Consideration of noise and dust suppression techniques.</td>
</tr>
<tr>
<td></td>
<td>Consider sustainable wastewater collection and treatment (this can be mentioned in text but don’t think needs to be an objective).</td>
<td></td>
</tr>
</tbody>
</table>
3 **Existing Environment**

3.1.1 The following sections detail the existing baseline environment within the study area, which has been compiled through a desk top study, literature review and consultation.

3.2 **Legislation, Planning and Policy**

3.2.1 The selected strategy option for Boston Haven should consider relevant plans and policies. These include the following:

- Boston Borough Council Local Plan (1999);
- Boston Borough Local Plan, First Deposit Draft (March 2004);
- Lincolnshire County Council Structure Plan (Deposit Draft, 1998);
- PPG 7 – ‘The Countryside: Environmental Quality and Economic and Social Development’ (1997);
- PPG 9 – ‘Nature Conservation’ (1994);
- PPG 15 – ‘Planning and the Historic Environment’ (1994);
- PPG 16 – ‘Archaeology and Planning’ (1990);
- PPG 25 – ‘Development and Flood Risk’ (2001); and

3.2.2 Lincolnshire Structure Plan states in Para 56.6, Improvements to Flood Defences:

*Ways of improving flood defences are constantly under review. It is now accepted that it is generally better to work with natural physical processes rather than to continue trying rigidly to constrain them with expensive traditional sea walls and flood banks. The use of environmentally friendly methods such as beach recharge should be considered wherever practical and appropriate. Such approaches may not only be cheaper but could also help to maintain and create valuable ecological habitats.*

3.2.3 The plan also has requirements in relation to nature conservation sites. Paragraph 48.15 states:

*Where development is permitted which could affect any site of nature conservation importance, conditions should be imposed or agreements entered into to minimise disturbance, to conserve the ecological character, as far as possible, and/or to provide replacement habitat(s) where damage is unavoidable.*

3.2.4 The implications of relevant legislation in relation to this flood management strategy will be considered as part of the SEA. Legislation of relevance includes:

- The Environment Act 1995;
- The SEA Directive (2001/42/EC);
- The Water Framework Directive (2000/60/EC);
3.2.5 Other plans, policies and projects related to the Boston Haven Strategy Study include the following:

- Boston Borough Council’s Strategic Flood Risk Assessment (2002);
- Defra High Level Targets (Target 9: Biodiversity) (1999);
- Fens Waterway Link Implementation Plan (2003);
- The Black Sluice Strategy Study (date not given);
- The Boston Southern Economic Corridor (Current initiative at the time of writing);
- The Wash Banks: Gibraltar Point to Hobhole Sluice Strategy (1997);
- The Environment Agency’s Vision;
- The Lower Witham Catchment Management Plan (1996);
- The Lower Witham Flood Defence Strategy Study (1999);
- The Wash Estuary Management Plan (1996, and currently undergoing review);
- The Wash Local Biodiversity Action Plan (under preparation at the time of writing);
- The Wash Shoreline Management Plan (SMP) (1996); and
- Witham Catchment Abstraction Management Strategy (date not known at time of writing).

3.2.6 It should be noted that the boundary of the Wash SMP is Hobhole outfall, which is the downstream boundary of the Boston Haven Strategy Study. However, the Boston Haven Strategy Study should take into account the objectives of the Wash SMP and any downstream implications of the selected strategy option on The Wash.

3.3 Human Beings

3.3.1 The River Witham runs through the town of Boston, which has a population of approximately 27,000 people. This urban area comprises residential, commercial and industrial buildings and is also an important port with a number of docks and wharfs located along the banks of the river. The Port of Boston and commercial fishing are key river-related industries within the study area.
3.3.2 There are a number of footpaths that run along the banks of the River Witham in the study area; these include the Macmillan Way, which is a national trail that runs from the town centre to The Wash. There are several cycle routes along the river banks through the town of Boston. The selected strategy option should ensure that there is no adverse effect on use of footpaths and cycle routes.
3.3.3 There is no formal water based recreation on the River Witham downstream of Grand Sluice as fluctuations in the water levels are hazardous. However, there is some recreational boating on the tidal reach. Recreational angling occurs in low numbers by the local sea angling group.

3.3.4 Upstream of Grand Sluice the River Witham is a significant recreational resource and is used for boating, canoeing and angling.

3.3.5 Recreational areas are identified in the Boston Borough Council Local Plan (1999). Riverside recreational areas include the Witham Way Country Park, which is very popular with walkers, bird watchers and people who come to exercise their dogs. Also the Havenside Country Park is an important recreational facility. Refer also to Figure 1.1.

3.3.6 The town of Boston has been accorded Objective 2 status by the Government making it eligible for European Structure Funding. This may provide opportunities for regeneration within the town as part of the flood management strategy study. For example, there may be opportunities for enhancing the existing riverside walk. Currently there is a possibility for an off-line marina to be developed in Boston within the Black Sluice area.

3.3.7 The utilities infrastructure within the study area will be investigated at the next stage of the SEA.

3.4 Flora and Fauna

3.4.1 The Haven is an integral part of The Wash estuarine system, which is recognised as being of national and international importance for nature conservation.

3.4.2 The Haven discharges into The Wash, which is designated as a Site of Special Scientific Interest (SSSI), a Special Protection Area (SPA) and a Ramsar site. The main conservation interest of The Wash is the extensive mosaic of intertidal habitats which support an abundant and diverse bird community. The Wash and North Norfolk Coast is also designated as a candidate Special Area of Conservation (cSAC), the main conservation interest being mudflats, sandflats, lagoons and saltmarshes.

3.4.3 In addition to the wading birds and wildfowl sustained by The Wash, the area also supports a diverse range of invertebrates, a notable seal population and is also an important fish spawning and nursery ground.

3.4.4 The requirements of the Habitats Regulations (1994) and Wildlife and Countryside Act (1981) as amended by the Countryside and Rights of Way Act (2000), must be considered with respect to any proposals that could have downstream impacts on the above designated areas.
3.4.5 The tidal reach of the River Witham includes important intertidal habitat, in particular mudflats. Raising water levels would lead to the loss of such habitat, a phenomenon which is known as ‘coastal squeeze’. It is likely that compensatory habitat would need to be created to counteract such loss.

3.4.6 There are a number of Sites of Local Nature Conservation Interest (SLNCI’s) within the study area, including one site on the riverside boundary of Boston landfill site. SLNCIs within the study area are listed in Table 3.1 and are also shown on Figure 1.1.

<table>
<thead>
<tr>
<th>Site Name</th>
<th>Grid Reference:</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baptist Cemetry</td>
<td>TF 312 434</td>
<td>Abundant mature trees provide a potentially valuable habitat for roosting bats, breeding birds and invertebrates.</td>
</tr>
<tr>
<td>Boston Cemetry</td>
<td>TF 326 456</td>
<td>Conservation interest includes 121 plant species, 33 birds and, 10 mammals including pipistrelle bats, deer, and foxes.</td>
</tr>
<tr>
<td>Hobhole Bank</td>
<td>TF 368 416</td>
<td>Hobhole Bank is a grassland area of 5 hectares on the western bank of the Hobhole Drain. The area is lightly grazed and cut on a rotational basis to maintain the grassland and scrub mosaic.</td>
</tr>
<tr>
<td>North Forty Foot Drain Bank</td>
<td>TF 314 445</td>
<td>Not available at time of writing.</td>
</tr>
<tr>
<td>Slippery Gowt</td>
<td>TF 345 418 (two separate areas)</td>
<td>Branched Horsetail (<em>Equisetum ramosissimum</em>), a Red Data Book species, has been recorded here. This species is listed on Schedule 8 of the Wildlife and Countryside Act 1981 (as amended).</td>
</tr>
<tr>
<td>The Brick Pits</td>
<td>TF 315 419 (four separate areas)</td>
<td>Not available at time of writing.</td>
</tr>
<tr>
<td>Witham Way</td>
<td>TF 317 455</td>
<td>The Witham Way is a Country Park of 39 acres, which is owned by the Council and is being developed on former allotment land.</td>
</tr>
</tbody>
</table>
3.4.7 A strip of land along the banks of the Haven near Hobhole is currently being considered for designation as a site of proposed Local Nature Reserve (see Figure 1.1). The site is known as the Havenside Country Park and is approximately 50 acres in area, with part of the site currently managed under a countryside stewardship scheme agreement.

3.4.8 Japanese knotweed is present on the riverbank in some parts of Boston and giant hogweed is also present in the study area. Under the Wildlife and Countryside Act 1981 it is an offence "to plant or otherwise encourage" the growth of Japanese Knotweed. This could include cutting the plant or roots and disturbing surrounding soil if not correctly managed. If present in the vicinity of any proposed works, this species would require careful disposal measures: classed as 'controlled waste' and accompanied by appropriate Waste Transfer documentation.

3.4.9 There is a limited quantity of biological data for the tidal reach of the River Witham. There is some data on benthic invertebrates, but nothing more recent than 1998. Additionally, there are limited phytoplankton records although again, these are not recent (1996) and represent near drought conditions and are therefore not typical of the watercourse.

3.4.10 Little information on aquatic ecology was available at the time of writing this report. Further information will be sought for the next stage of assessment, including information on shellfish stocks in the lower reaches of the Haven and the Wash, plankton, benthos and fish populations.

3.4.11 Boston Cemetery contains a number of trees with Tree Preservation Orders (TPOs). Details of these and other TPOs will be determined at the next stage of the SEA.

3.4.12 The Wash Local Biodiversity Action Plan, which is currently being prepared by the Wash Estuary Strategy Group, is relevant to the study area. This plan will feed into the county BAPs for Lincolnshire and Norfolk. The aspirations of these plans will be investigated in more detail at the next stage of the SEA.

3.5 Fisheries

3.5.1 Downstream of the Grand Sluice the River Witham supports a typical estuarine fishery, which is expected to include flounder, mullet, goby, eel, sprat, bass and occasionally smelt (Halcrow, 1996). There is no current survey information on the fish populations present although Hobhole and Cowbridge drains are understood to support good fish populations. Limited eel netting occurs within the study area.

3.5.2 Movement of anadromous fish species (those that move between freshwater and the sea during their lifecycle) should be maintained under any flood management scheme.

3.5.3 The main lowland river and fen drains such as the Medlam and Hobhole, have stocks of roach, bream pike, tench, perch and carp. A number of popular stillwater sites also exist within the catchment, which will be investigated further at the next stage of assessment.
3.5.4 The requirements of the Salmon and Freshwater Fisheries Act (1975) should be taken on board as part of the Strategy Study. The Act provides legislative powers that require new obstructions, or those that are rebuilt to more than half their width, to include a fish pass.

3.6 **Air and Climate**

3.6.1 The main existing sources of air pollution within the study area are likely to be from road traffic and industry.

3.6.2 Since 1997 local authorities in the UK have been carrying out a review and assessment of air quality in their area. The aim of the review is to ensure that the national air quality objectives will be achieved. If a local authority finds any places where the objectives are not likely to be achieved, it must declare the relevant area as an Air Quality Management Area. The local authority is then required to put together a Local Air Quality Action Plan, which details how they will improve the air quality in this area. Boston Borough Council has been reviewing and assessing air quality within Boston in line with their legislative requirements, and have completed a Stage 2 and Stage 3 assessment. They are in the process of carrying out a Stage 4 assessment, (Babtie 2003, BDLR). Further details of any Air Quality Management Areas within the study area will be investigated at the next stage of the SEA.

3.6.3 It should be noted that predicted climate change is a key driver for the flood management strategy study. The selected strategy option should aim to provide a sustainable solution to managing the predicted impacts of climate change in particular, sea level rise.

3.7 **Landscape and Visual Amenity**

3.7.1 The study area lies within The Fens Natural Area, which is coincident with The Fens Countryside Character Area. Natural Areas are biogeographic zones identified by English Nature that reflect the geological foundation, the natural systems and processes and the wildlife in different parts of England. Countryside Character Areas are a Countryside Agency initiative that consider the whole of England's countryside rather than just specific designated areas.

3.7.2 The Fens have a large-scale, flat, open landscape with extensive vistas to level horizons.

3.7.3 The River Witham is an important landscape feature within the study area. In Boston the landscape is urbanised in character and the river provides a focal point for social and recreational activity. The tidal river and its mud banks are of historical landscape importance due to Boston's status as a historic port. Further downstream, out of the urban area, the river environment becomes more open and rural.
3.8 Water

3.8.1 The River Witham flows south eastwards into the Boston town centre. As it approaches the town centre it is crossed by Grand Sluice Bridge. The bridge is combined with a sluice structure to retain the fluvial flows and a barrier to contain the tidal waters. South of Grand Sluice the river becomes tidal and is commonly called the Haven. The Haven continues in south/south eastern direction and finally flows into The Wash approximately 10km downstream, (Babtie 2003, BDLR).

3.8.2 Environment Agency maps of groundwater vulnerability in England and Wales (Sheet 19) indicates that Boston is located on a non-aquifer of negligible permeability. Non-aquifers are defined as rock strata generally regarded as containing insignificant quantities of groundwater, although they can yield sufficient water for domestic use, (Babtie, 2003 (BDLR)).

3.8.3 The Environment Agency has delineated Source Protection Zones (SPZs) for the protection of groundwater used for public supply. The proposed strategic flood management options do not lie within a SPZ.

3.8.4 Nitrate vulnerable zones are designated in areas to the north, south and west of Boston.

3.8.5 There are tidal monitoring stations in the Haven which are used for flood warning.

Abstraction Licenses

3.8.6 Downstream of Grand Sluice water is saline and is generally not used for irrigation. However, there is one abstraction licence within the study area held by Boston Fisherman’s Cooperative Ltd. The source of supply is within the tidal reach at Witham Haven Cut End, Fishtoft (TF 3797 3909) and the license allows abstraction of 46369m$^3$ annually for use in mussel purification.

3.8.7 There are numerous abstraction licenses upstream of Grand Sluice including a major transfer scheme at Dogdyke for irrigation. The Lower Hobhole is part of the transfer scheme where there are many licences to abstract water. Water levels in the Lower Hobhole are set by the Internal Drainage Board outfall pumping station at Hobhole.

3.8.8 The Trent-Witham-Ancholme transfer scheme allows water to be abstracted from the River Trent and pumped into the River Witham and River Ancholme to supplement abstractions in Lincolnshire and north-east Nottinghamshire. Water resources in the lower Witham are fully committed in periods of low flows and high demand (Atkins, 2003).

Discharge Consents

3.8.9 There are numerous discharge consents licensed for discharge directly into The Haven and a number of tributaries, including Hobhole Drain, Maud Foster Drain, River Witham and the
surrounding groundwater (refer also to Figure 1.1). Discharges are consented for a range of uses including agriculture use, waste water treatment works and trade effluent.

3.8.10 Outfalls into the Haven and sustainable land drainage functions should not be compromised and must be taken into account as part of the appraisal of strategic flood management options.

**Water Quality**

3.8.11 The Environment Agency reports estuarine water quality in England and Wales every five years. This is based on an assessment and classification scheme prepared by the Classification of Estuaries Working Party (CEWP) in the 1970s. Estuaries are classified as Good (A), Fair (B), Poor (C) or Bad (D), based on biological, aesthetic and chemical quality. The saline stretch from Grand Sluice downstream to Clay Head (grid ref TF 401 395) has been assessed as Grade A (Good) between 1985 and 2002.

3.8.12 The Environment Agency’s method for classifying the water quality of freshwater systems (rivers and canals) is known as the General Quality Assessment scheme (GQA). It is designed to provide an accurate and consistent assessment of the state of water quality and changes in this state over time.

3.8.13 The 2002 GQA grades for tributaries of the tidal River Witham are provided in Table 3.2.

<table>
<thead>
<tr>
<th>Name of River</th>
<th>Chemical Grade</th>
<th>Biological Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hobhole Drain</td>
<td>D - Fair</td>
<td>C – Fairly Good</td>
</tr>
<tr>
<td>Maud Foster Drain</td>
<td>C – Fairly Good</td>
<td>B – Good</td>
</tr>
<tr>
<td>Frampton Town Drain</td>
<td>D - Fair</td>
<td>C – Fairly Good</td>
</tr>
</tbody>
</table>

3.8.14 In the past, Hobhole Drain has been affected by both eutrophication and saline intrusion (NRA, 1995).

**3.9 Land Use**

3.9.1 Land use in the study area is a mixture of urban, industrial (including docks) and agricultural use. Residential properties and gardens lie immediately adjacent to the riverbanks at a number of locations.

3.9.2 Inland of the existing flood defences, agriculture is the dominant land use of non-urban land. Seaward of the flood defences, land contains significant areas of saltmarsh and mudflats.

3.9.3 Within the study area, there are areas of land under countryside stewardship agreements and organic farming agreements. The long-term continuation of such agreements should be considered and, where possible, opportunities should be sought for more land to be entered into such schemes, for example, management of wetlands.
3.9.4 Boston landfill has been in place since the 1960’s and there is currently a proposal in place to extend the landfill which includes a scheme for flood defences. The selected strategy option should consider the proposals for Boston landfill site and ensure that any proposed flood defence is adequate and compatible with the strategy. Continuity of access along the riverside boundary of Boston landfill site should also be maintained. Implications of managing surface water runoff from this site should also be considered.

3.9.5 Boston Sewage Treatment Works is located adjacent to the river at grid reference TF: 354 411.

3.9.6 Redstone Industrial Estate and Boston Waste Transfer Station are both within 250 metres of the Black Sluice and Boston Waste Depot is within 250 metres of the Grand Sluice.

3.9.7 At the time of writing it is not known whether there are any planning applications for development within the study area that should be taken into account as part of the Strategy Study. This will be investigated further at the next stage of the SEA.

3.9.8 Further information regarding the presence and nature of contaminated land is provided in Section 3.12.

**Radioactive Substance Authorisations**

3.9.9 The following operators hold licenses for radioactive waste:

- Fogarty Ltd – Havenside Boston, TF 3470 4230; and
- Pilgrim Hospital Sibsey Road, TF 3368 4559.

**3.10 Cultural Heritage, Archaeology and Material Assets**

3.10.1 Boston and its surrounding area has significant archaeological importance, with the settlement of Boston itself dating back to the eleventh century (Harden, 1978). Boston’s main historic importance is as a port and a medieval town. Boston was one of the main ports of medieval England, exporting wool from monastic and other estates, lead from Derbyshire and salt from the Lincolnshire coast.

3.10.2 The historical character of the waterway is connected to the tidal influence, particularly the preservation of old timber vessel remains in the mud banks. Similarly, creek systems within the study area are likely to support dock remnants.
3.10.3 Significant aspects of cultural heritage importance within the study area include numerous listed buildings, Scheduled Ancient Monuments, Conservation Areas and an operative Townscape Heritage Initiative (THI) Scheme, (Babtie 2003, BDLR). The THI is the Heritage Lottery Fund’s grant giving programme for the repair and regeneration of the historic environment in towns and cities throughout the UK.

3.10.4 Listed buildings include St. Botolphs Parish Church, locally known as ‘Boston Stump’, which is the tallest parish church tower in England. The central area of Boston is also covered by an area of known archaeological interest. Further details and investigation of these features will be undertaken at the next stage of the SEA.

Photo 7: Tidally exposed mudbanks in Boston

Photo 8: Boston Stump
3.11 Traffic and Transport

3.11.1 Principal roads in the study area are the A52 and the A16 running through the town of Boston. Other transport infrastructure includes minor roads, bridges, carparks (some of which are adjacent to the River), and Boston Railway Station. There are currently proposals for a new bridge to be constructed upstream of Swing Bridge.

3.11.2 The River Witham is an important navigable route for commercial and recreational boats, particularly between Boston and The Wash. Commercial boating on the tidal reach includes fishing and cargo ships. There is private mooring of boats near to Hobhole outfall and also between Grand Sluice and Black Sluice.

3.11.3 British Waterways are the navigation authority on the freshwater side of the sluice and the Port of Boston is responsible for the navigation jurisdiction for the tidal reach of the River Witham. The preferred strategy option should not jeopardise future navigation projects and where possible navigation proposals should be integrated into the Strategy Study. Relevant waterways projects include:

- The Fens Waterways Link Scheme; and
- Lincolnshire Waterways Partnership project.

3.11.4 In order to create a navigable connection between the Witham and South Forty-Foot Drain, a barrier/sea lock close to where the two watercourses meet is one option currently being considered as part of the Fens Waterways Link Scheme. It is proposed to create the non-tidal connection by constructing a new cut (bypass channel) between the Haven and the South Forty-Foot Drain.

3.12 Soil, Geology, Hydro-geology and Geomorphology

3.12.1 The surface geology of Boston and the north-west of the study area consists of Barroway Drive Beds, which are Neolithic marine deposits and salty clay saltmarsh deposits. South-east of Boston are the Terrington Beds, which are younger marine deposits, saltmarsh tidal creek and river deposits, sandy silts and silty clays. The whole study area is underlain by the Ancholme Group, Jurassic in age, consisting predominantly of formations of Kimmeridge clay, Amphill Clay, West Walton, Oxford Clay and Lincolnshire Limestone. These form predominantly mudstones or stiff clays with minor thin limestones.

3.12.2 A high level geotechnical/geo-environmental study has been undertaken to support the condition assessment of the existing defences and to improve the existing understanding of the geological environment around the Haven. The completed study will comment on the geological ground conditions and potential geo-environmental hazards such as potential areas of contaminated land. This study will be reviewed at the next stage of the SEA process.

3.12.3 The geomorphological importance of the area in relation to The Wash and its international environmental designated status is noted. A high level geomorphological study has been
undertaken by BBR and is being completed at the time of writing. The results of this study will feed into the forthcoming assessment and evaluation stage of the SEA.

3.13 Use of Natural Resources

3.13.1 A sustainable approach should be taken to the use of materials, in particular, the source of materials for bank realignment and wall-raising must be appraised according to current best practice measures.
4 Potential Strategic Policy Options

4.1 Introduction

4.1.1 This chapter of the report presents a number of options for future flood risk management and scopes key environmental issues associated with each option. Comments and suggestions regarding options and the key issues are welcome from all interested parties.

4.2 Development of Options

4.2.1 Expenditure on flood risk management is constrained by government policy. The bulk of this expenditure is ultimately met by taxpayers. Comprehensive project appraisal is essential to ensure sound decision-making and best use of public money. Only those schemes that can be shown to be justifiable on economic, technical and environmental grounds will ultimately be considered for implementation. Viable schemes are then ranked on a national basis in terms of three criteria: economics, people and the environment. The highest scoring schemes are given priority as they provide the best value to the nation.

4.2.2 Because the strategy is a long-term planning exercise, it must be able to take account of changes in government policy. The strategy will include an action plan, which will be reviewed at intervals of approximately 5 years. These reviews will take account of any changes in policy that may have taken place which could affect the justification of a scheme.

4.2.3 It is possible that a combination of options for flood risk management will be implemented through the life of the strategy. It is also possible that a phased approach will be taken. However, the strategy must balance the immediate and long-term requirements to provide sustainable flood risk management.

4.3 Potential Impacts and Effects

4.3.1 The following table (Table 4.1) presents summaries of a range of generic options for flood risk management. For each option, an initial evaluation of the potential impacts and effects is provided. For each generic policy option there may be a number of methods of implementation; the implementation approaches are also identified and evaluated in the tables. This evaluation is based on the expertise of the project team plus comments received from Agency departments and key stakeholders (refer to Chapter 5 – Consultation).

4.3.2 It should be noted that the “No active intervention” option is included to provide a baseline against which other options can be measured.

4.3.3 Further description and analysis of key potential effects will be developed at the next stage of the SEA, which is due to commence in Autumn 2004 and will be reported within the SEA Environmental Report (refer to Figure 1.1). Further assessment of impacts and effects will incorporate comments received on this scoping report and the information it presents.
4.3.4 Downstream impacts on geomorphological processes within The Wash will be investigated in more detail at the next stage of the SEA. The latter will be informed by a geomorphological investigation of the study area, which at the time of writing is being completed by BBR.

4.3.5 Any potential schemes that are identified for implementation by the strategy will be subject to Environmental Impact Assessment (EIA) at a project level in order to establish the range and significance of impacts on the environment (positive and negative). The strategy will also establish procedures for ongoing monitoring of the effectiveness and impacts of any schemes that are implemented.

4.3.6 The definitions below apply to the terms used in the following scoping assessment:

- **Impact** = Change in the baseline environment attributable to the policy options (e.g. land take, change in flood risk, presence of new structure or change in sediment regime).
- **Effect** = The consequence of impacts on environmental resources or receptors.

4.3.7 It should also be noted that, in consideration of potential impacts and effects, mitigation measures have not been considered to date. Potential mitigation measures will be taken into account at the next stage of the SEA (evaluation and assessment).

4.3.8 With the aim of maintaining a strategic appraisal, the scoping evaluation concentrates on end-state effects. Construction impacts would be investigated in more detail at scheme level as part of a project specific Environmental Impact Assessment. However, it is recognised that the following issues may arise from construction works associated with the flood management options:

- disturbance to residents and/or over-wintering bird populations depending on timing and location;
- potential disturbance of preserved archaeology;
- potential disturbance of contaminated land, again depending on location;
- likely temporary decline in visual amenity; and
- potential for land-take.
### Table 4.1 Policy Options

<table>
<thead>
<tr>
<th>Policy Option</th>
<th>Implementation</th>
<th>Potential Impacts</th>
<th>Potential adverse effects</th>
<th>Potential beneficial effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Hold the Existing Line of Defence</td>
<td>1a Reactive Maintenance Undertake maintenance to repair or maintain the defences to the existing level following a breach or point of failure.</td>
<td>• Reduced standard of flood protection over time and therefore increased flood risk.</td>
<td>• Potential loss and/or damage of all environmental assets in the study area.</td>
<td>• A breach may offer the potential for habitat creation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Deteriorating flood defences</td>
<td>• High risk to public health and safety.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Widening of channel could occur (channel may adjust to natural width for tidal prism of the estuary).</td>
<td>• Potential adverse effects on navigation as bed level may increase.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If channel is fixed in current position, sea level rise, and consequent increased tidal prism, will lead to increased scour of bed and erosion of banks.</td>
<td>• Adverse effect on rivers capacity to remove fluvial and tidal water in an extreme flood event.</td>
<td>• More naturally functioning channel that could respond to predicted effect of climate change such as sea level rise.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If reactive repair left too long, tidal prism could increase over tidal cycles, increasing scour on ebb tide and erosion of banks downstream of breach.</td>
<td>• Difficulty maintaining position of flood banks.</td>
<td>• None</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Potential adverse effects on intertidal habitat including The Wash.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Potential adverse effects downstream of breach on intertidal habitat including The Wash.</td>
<td>• None</td>
</tr>
<tr>
<td>Policy Option</td>
<td>Implementation</td>
<td>Potential Impacts</td>
<td>Potential adverse effects</td>
<td>Potential beneficial effects</td>
</tr>
<tr>
<td>-------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------</td>
</tr>
</tbody>
</table>
| 1b Pro-active maintenance | Maintain the defences at the present level to ensure that a breach does not occur. Because of sea level rise due to climate change and long term ground settlement in the region it is assumed that there will be a gradual reduction in the SoP. | - Reduced standard of flood protection over time and therefore increased flood risk.  | - Potential loss and/or damage of all environmental assets in the study area.  
- Increased risk to public health and safety. | None                                                                        |
| 1c Wall Raising   | Raise the crest level of the defences in their current position to cater for the effect of climate change whilst maintaining the present SoP. Likely to need to provide new defences for some stretches where currently protection is provided by a building or river wall. This approach must take into account the functioning of sea doors at all the Sluice structures. | - Raised height of defence walls.                                                | - Adverse visual effects on groundfloor views of riverside properties and obstruction of views for recreational users of riverside walkways.  
- Adverse impacts on local landscape character.  
- Could cause operational problems for the docks.  
- Potential adverse effect on flora and fauna in locality of soft defences downstream of Boston. | Standard of protection for all environmental assets, including people and property, is maintained and provision is made for the predicted effects of climate change.  
- Possible increase in tidal prism in channel with sea level rise and therefore increased scour and erosion of banks (unless increased protection is provided).  
- May adversely affect intertidal habitats including The Wash.  
- Depth of navigation channel maintained. |
<table>
<thead>
<tr>
<th>Policy Option</th>
<th>Implementation</th>
<th>Potential Impacts</th>
<th>Potential adverse effects</th>
<th>Potential beneficial effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>1d Wall Raising plus improved SoP.</td>
<td>Raise the crest level to increase the SoP above the present level. The existing SoP is at approximately 1 in 100 years along the majority of the defences. However, there are a few locations where the level drops below this standard. Likely to need to provide new defences for some stretches where currently protection is provided by a building or river wall. This approach must take into account the functioning of sea doors at all the Sluice structures.</td>
<td>- Raised height of defence walls.</td>
<td>- Adverse visual effects on groundfloor views of riverside properties and obstruction of views for recreational users of riverside walkways. - Adverse effects on local landscape character. - Could cause operational problems for docks and Port of Boston. - Potential adverse effect on flora and fauna in locality of soft defences downstream of Boston.</td>
<td>- Improved SoP for all environmental assets, including people and property, and provision is made for the predicted effects of climate change.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Possible increase in tidal prism in channel with sea level rise and therefore increased scour and erosion of banks (unless increased protection is provided).</td>
<td>- May adversely affect intertidal habitats including The Wash.</td>
<td>- Depth of navigation channel maintained.</td>
</tr>
<tr>
<td>Policy Option</td>
<td>Implementation</td>
<td>Potential Impacts</td>
<td>Potential adverse effects</td>
<td>Potential beneficial effects</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>2: Advance the Existing Line</td>
<td>2a: Barrier</td>
<td>▪ Prevention of extreme high tide water flooding low lying land upstream.</td>
<td>▪ None</td>
<td>▪ Provides increased flood protection for all environmental assets, including people and property, upstream of the structure.</td>
</tr>
<tr>
<td>of Defence</td>
<td>Advance the line of the defences by positioning a barrier (rather like the Thames barrier) at a position to be determined within the Haven. It is important to note that the function of such a barrier would only be to prevent extreme high tide water levels flooding the low lying land upstream. It would not be used to retain water levels upstream.</td>
<td>▪ Raised defences downstream of the structure.</td>
<td>▪ Adverse visual effects (see 1c and 1d above).</td>
<td>▪ Greater flood protection for environmental assets landward of defences, including people and property.</td>
</tr>
<tr>
<td>This policy option considers</td>
<td></td>
<td>▪ Physical presence of barrier in the Haven.</td>
<td>▪ Potential adverse visual effects on local landscape character and setting of listed buildings and features of cultural heritage interest.</td>
<td>▪ Potential beneficial visual effects on local landscape character and setting of listed buildings and features of cultural heritage interest.</td>
</tr>
<tr>
<td>the opportunities to advance</td>
<td></td>
<td>▪ Changes in sedimentation regime including localised scour and deposition upstream and downstream of barrier abutments.</td>
<td>▪ Potential loss of intertidal habitat.</td>
<td>▪ Reduction in sedimentation upstream of barrier when extreme high tides are ‘shut out’.</td>
</tr>
<tr>
<td>Policy Option</td>
<td>Implementation</td>
<td>Potential Impacts</td>
<td>Potential adverse effects</td>
<td>Potential beneficial effects</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------</td>
<td>------------------</td>
<td>--------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td><strong>2b: Relocation of Grand Sluice</strong></td>
<td>Re-locating the function of Grand Sluice to a position just upstream of Black Sluice. The new structure would maintain a water level similar to that upstream of Grand Sluice and effectively move the tidal limit to this new position. The retained water level would be in the order of 0.2 to 1.5m AOD.</td>
<td>§ Physical presence of structure in the Haven.</td>
<td>§ Potential adverse visual effects on landscape character and setting of features of cultural heritage interest. &lt;br&gt;§ Obstruction to fish migration.</td>
<td>§ Potential beneficial visual effects on landscape character and setting of features of cultural heritage interest. &lt;br&gt;§ Provides increased flood protection to upstream environmental assets.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>§ Permanently raised water levels upstream of the structure.</td>
<td>§ Loss of intertidal habitat through the town (‘coastal squeeze’) - compensatory land would need to be provided. &lt;br&gt;§ Restriction of tidal navigation, loss of some mooring facilities and potential operational problems for the docks. &lt;br&gt;§ Likely to compromise outfalls into the Haven. &lt;br&gt;§ Loss of tidal exposure of historically significant mudbanks through the town.</td>
<td>§ Considered compatible with the objectives of the Fens Waterways Link Project. &lt;br&gt;§ Loss of tidal exposure of mudbanks may be perceived as a positive visual effect.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>§ Changes in groundwater levels upstream of structure.</td>
<td>§ May have adverse effects on preserved archaeology. &lt;br&gt;§ May adversely affect geo-hydrology.</td>
<td>§ None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>§ Raised defences downstream of the structure.</td>
<td>§ Adverse visual effects (see 1c and 1d above).</td>
<td>§ Increased flood protection for environmental assets landward of defences, including people and property.</td>
</tr>
<tr>
<td>Policy Option</td>
<td>Implementation</td>
<td>Potential Impacts</td>
<td>Potential adverse effects</td>
<td>Potential beneficial effects</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------</td>
<td>------------------</td>
<td>--------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td><strong>3:Managed Realignment</strong>&lt;br&gt;This policy option considers realigning the defences to a position back from the existing line of the defences. Again there are a number of approaches to implementing this policy.</td>
<td>Offline Storage&lt;br&gt;Setting back the line of the defences to allow for a managed breach to create a storage reservoir in a suitable location downstream of the town of Boston. Purchase of land is likely to be necessary for this implementation approach.</td>
<td>Changes in sediment regime including localised scour and deposition upstream and downstream of the structure.</td>
<td>Potential loss of intertidal habitat. Potential downstream impacts on The Wash although unlikely to be significant.</td>
<td>Reduction of marine sediment through Boston upstream of the structure.</td>
</tr>
<tr>
<td>3a: Offline Storage</td>
<td>Temporary storage of floodwaters on floodplain.</td>
<td>Potential adverse effects on existing land use, e.g. riverside Public Rights of Way (PROW), recreational areas, sites of nature conservation interest, Boston landfill site, agricultural land and development land. Reduced SoP in flood storage areas.</td>
<td>Possible adverse effects on existing land use, e.g. riverside Public Rights of Way (PROW), recreational areas, sites of nature conservation interest, Boston landfill site, agricultural land and development land. Reduced SoP in flood storage areas.</td>
<td>Opportunity for creation of wetlands in areas of flood storage. May contribute to meeting BAP targets. Potential opportunities to increase uptake of land managed under stewardship agreements. More natural functioning of the river through temporary storage of floodwaters on floodplain. Potentially provides increased flood protection to upstream environmental assets, including people and property.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Provide increased flood protection to environmental assets landward of flood banks.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Could increase soil fertility and be beneficial for agricultural use.</td>
</tr>
<tr>
<td></td>
<td>Presence of new flood banks.</td>
<td>Adverse visual effects and potential change in local landscape character.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Siltation in flood storage area.</td>
<td>May decrease available flood storage area in the long-term.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Policy Option</td>
<td>Implementation</td>
<td>Potential Impacts</td>
<td>Potential adverse effects</td>
<td>Potential beneficial effects</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------</td>
<td>------------------</td>
<td>--------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>3b: Rural Realignment</td>
<td>Setting back the defences from the existing position, allowing natural processes to breach the old line of the defences. Purchase of land is likely to be necessary.</td>
<td>Could potentially allow natural adjustment of channel.</td>
<td>Adverse effect on conveyance ability of Haven, i.e. reduction in the ability of Haven to discharge tidal and fluvial flows. May adversely affect navigation.</td>
<td>Possible reduction in water levels upstream and therefore increased flood protection.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Presence of new flood defences.</td>
<td>May have adverse visual and landscape effects.</td>
<td>Increased flood protection for environmental assets landward of new flood defences.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Land take for areas of set back/realignment.</td>
<td>Possible adverse effects on existing land use, e.g. riverside Public Rights of Way (PROW), recreational areas, nature conservation, agricultural land, development land and Boston landfill site.</td>
<td>Potential opportunities for creation of intertidal habitats and meeting BAP targets.</td>
</tr>
<tr>
<td>3c: Urban Realignment</td>
<td>Setting back the defences to a position where the natural level of the land acts as a line of defence and where it is evident that the benefit of protecting the adjacent unprotected land is not sustainable.</td>
<td>Would result in line of defence being positioned behind some riverside properties that are considered unsustainable to defend.</td>
<td>Likely to lead to loss of property and environmental assets in front of the new line of defences. Increased flood risk to people living and working in vulnerable properties.</td>
<td>Reduced risk of flooding landward of new line of defence.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Land take for areas of set back/realignment.</td>
<td>Possible adverse effects on existing land use, e.g. riverside PROW, recreational areas, nature conservation, agricultural land, development land and Boston landfill site.</td>
<td>None</td>
</tr>
<tr>
<td>Policy Option</td>
<td>Implementation</td>
<td>Potential Impacts</td>
<td>Potential adverse effects</td>
<td>Potential beneficial effects</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>---------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>4: No Active Intervention</td>
<td>Not applicable.</td>
<td>• Failure of banks.</td>
<td>• Loss and/or damage of all environmental assets in study area, including loss of productivity of surrounding agricultural land and high risk to public health and safety.</td>
<td>• A more naturally functioning river in the long term.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reduced Standard of Protection and increased flood risk.</td>
<td></td>
<td>• Potential for large area of intertidal habitat.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Uncontrolled and unpredictable flood events.</td>
<td></td>
<td>• Buried archaeology would be preserved in the floodplain.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Deterioration of existing flood defences.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Adverse effects on visual amenity and landscape character.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• High risk to public health and safety.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• None</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.4 Cumulative Effects

4.4.1 Individual projects may have minimal impact on the environment, but when combined with other similar projects in the same area, may have a cumulative impact. The assessment of cumulative effects is a key aspect of the SEA process.

4.4.2 Potential cumulative effects of this strategy in association with other strategies and schemes within the area will be investigated at the next stage of SEA assessment. Furthermore, consideration will be given to cumulative effects associated with implementing a combination of options, for example, advance the line in one location and managed realignment in another.
5 Consultation

5.1 Introduction

5.1.1 A Communication Plan for the SEA process has been developed, detailing consultees and key requirements for consultation throughout the Strategy Study. The plan will be revised appropriately as the SEA and strategy study are progressed.

5.1.2 Key stages of the SEA process and associated consultation opportunities are summarised in Table 5.1 at the end of this Chapter.

5.1.3 To date consultation as part of this SEA has included internal and external consultation, as summarised below.

5.2 Internal Consultation

5.2.1 Consultation was carried out with internal specialists within the Environment Agency in order to inform the Screening and Scoping File Note (BBR, 2004). Table 1 in Appendix 3, lists Agency functions contacted, summarises responses received and identifies requirements for future consultation. No additional internal consultation has been undertaken for this scoping study.

5.3 External Consultation

5.3.1 As an initial awareness raising exercise, the ‘Boston Haven Flood Management Strategy’ Introductory Leaflet (April 2004), was distributed to stakeholders listed in Appendix 3.

5.3.2 In order to inform this scoping study, external consultation was carried out with key external stakeholders, as agreed with the Environment Agency. Consultees were sent a letter, a reply slip and a Scoping Study Consultation Document, which provided an outline of the background to the strategy study, the proposed flood management options and draft SEA objectives. A copy of the consultation pack is provided in Appendix 4. Consultees were asked to return comments, using the reply slip, within a 28 day period in April/May 2004. A summary of stakeholder responses is provided in Table 2, Appendix 3.

5.3.3 Additional scoping consultation exercises have been undertaken with English Nature (EN) and English Heritage (EH). A workshop, hosted by the Environment Agency and BBR, was held for both EN and EH, the purpose of which was to:

- inform EN and EH of the proposed options under the strategy study;
- establish communication links early in the SEA process; and
• obtain initial feedback on environmental constraints and opportunities with regard to nature conservation (EN) and archaeology and the built environment (EH).

5.3.4 Comments from these workshops have been incorporated into Table 2, Appendix 3.

5.3.5 No public consultation has been undertaken at this stage of the SEA. Consultation will be expanded to include the public at the next stage of the SEA process, which is due to commence in Autumn 2004.

5.3.6 Key issues and constraints arising from internal and external consultation are identified below:

• potential impacts on The Wash (SSSI, cSAC, SPA and Ramsar);
• movement of anadromous fish;
• opportunities for habitat creation and recreational enhancements.
• amenity value of the Haven;
• potential visual and landscape impact of raising walls;
• navigation needs of the Haven;
• opportunities for integration with the Fens Waterways Link Scheme;
• Boston landfill site;
• viability of discharges into the Haven and land drainage;
• maintain function of waste water treatment works, pumping stations and sewerage network;
• impacts on preserved archaeology from changes to the groundwater regime;
• the cultural heritage and historical significance of tidally exposed mudbanks;
• Listed buildings, Conservation Areas and their settings;
• fishing industry and mooring facilities;
• maintenance of Port of Boston operations; and
• a combination of options may be the most suitable approach.
# Table 5-1  Key SEA Stages and Consultation Opportunities

<table>
<thead>
<tr>
<th>SEA Stage</th>
<th>Description</th>
<th>Consultation Opportunity</th>
<th>Consultation Timescale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establish environmental baseline</td>
<td>Identify relevant aspects of the current state of the environment and any existing environmental problems. Also identify relationship with other relevant plans and programmes.</td>
<td>Contact relevant organisations to request data.</td>
<td>Completed</td>
</tr>
<tr>
<td>Identify Objectives</td>
<td>Identify relevant environmental protection objectives against which flood management strategy options will be appraised.</td>
<td>Consult relevant environmental authorities on appropriateness of objectives.</td>
<td>Completed</td>
</tr>
<tr>
<td>Scoping</td>
<td>Identify and describe existing environmental problems/issues and identify environmental characteristics likely to be significantly affected by Strategic flood management options. Compile Scoping Report to record the results of the scoping stage.</td>
<td>Undertake consultation with relevant environmental authorities to request views on the proposed scope of the assessment and ensure key sustainability issues are covered.</td>
<td>Completed</td>
</tr>
<tr>
<td>Assessment and Evaluation</td>
<td>Assess likely significant effects on the environment and propose mitigation measures. Undertake appraisal of Strategic options and select preferred environmental option.</td>
<td>Undertake consultation with all relevant stakeholders* on the outcome of the Scoping Stage and development of strategic policy options.</td>
<td>Autumn 2004</td>
</tr>
<tr>
<td>Environmental Report</td>
<td>Provides a detailed account of the SEA process. The environmental report and results of consultation should be taken into account during finalisation of the proposed Flood Management Strategy.</td>
<td>Provide all stakeholders, including the public, with an opportunity to express opinions on the Environmental Report and the draft proposed Flood Management Strategy.</td>
<td>Early 2005</td>
</tr>
<tr>
<td>Publish statement</td>
<td>Provides an account on how environment and consultation responses have been taken into account.</td>
<td>Make statement available to stakeholders.</td>
<td>Spring 2005</td>
</tr>
<tr>
<td>Implement Monitoring</td>
<td>Measure the environmental performance of the Flood Management Strategy.</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
6 Key Issues for the Strategy Study

6.1.1 Based on the review of the existing baseline environment in the study area (Chapter 3) and the initial assessment of potential impacts and effects (Chapter 4), this chapter summarises the key constraints and opportunities for the strategy study.

Main Constraints and Opportunities

6.1.2 Key constraints and opportunities within the study area are summarised below.

Constraints

6.1.3 Human beings present a key constraint to strategic flood management in the study area. The town of Boston supports a significant population for whom flood protection is crucial. There are many human interests within this area centred on recreational activities such as walking, cycling, boating, navigation and angling. The choice of flood management strategy needs to be sensitive to these uses.

6.1.4 River related industries, in particular the Port of Boston and commercial fishing activities, are a key constraint to options for flood management. The long-term viability of these industries must be considered as part of the assessment of strategic flood management options.

6.1.5 Land required for potential flood storage areas may present some conflicts with other land uses, such as agriculture. If flooded, contaminated land could cause a significant water quality problem.

6.1.6 Sustainable land drainage operations and outfalls into the Haven must be taken into account along with the effective operation of sewerage infrastructure and waste water treatment works within the study area.

6.1.7 Key ecological constraints are concerned with The Wash, which is designated as a SSSI, Ramsar, SPA and cSAC. Any downstream impacts on this site must be given due consideration in accordance with the legal requirements afforded by the sites designations.

6.1.8 Boston has significant historical interest as a historic port, and is designated as an area of known archaeological interest. Additionally, there are numerous SAMs, listed buildings and Conservation Areas in Boston. Any proposals should prevent damage to these assets and be in keeping with the character of Conservation Areas.

6.1.9 Visual amenity and local landscape character within the study area present potential conflicts with respect to construction of new structures and possible obstruction of views. New structures may however, benefit landscape character and visual amenity if designed in a sensitive way.
Opportunities

6.1.10 General opportunities associated with the flood management options are related to increasing flood protection for the existing assets and receptors in the Boston region, as described in Chapter 4.

6.1.11 Specific environmental enhancement opportunities which should be investigated further under future stages of assessment include the following:

- increased access to the riverside and provision of recreation and amenity enhancements could be developed in partnership with appropriate bodies/organisations, e.g. enhancing existing riverside walks, possibly in association with European Structure Funding.
- habitat creation opportunities eg. creation of intertidal habitat or softening of hard edges of watercourse with marginal vegetation;
- there may be navigation and recreational enhancement opportunities in association with the Fens Waterways Link Project;
- fish passes where alterations to or construction of sluice structures are proposed. These should be designed in consultation with the Environment Agency’s National Fish Pass Officer and Regional representatives and the National Fish Passage Panel (NFPP); and
- opportunities for integrating public art into the flood defence works could be developed in partnership with appropriate bodies/organisations and the local community.
7 Conclusion

7.1.1 This report serves to scope out the key environmental constraints and opportunities for enhancement associated with each strategic flood management option. No preferred option has been identified at this stage. However, following this scoping exercise it is possible to conclude that a strategic option of No Active Intervention (Option 4) is not favoured from an environmental and social perspective due to the loss of and damage to environmental assets that would result. The option is not sustainable, does not comply with objectives of local plans and policies and is rejected by the majority of consultees. However, Option 4 will be retained throughout the strategy study as a baseline option against which the costs and benefits of implementing other options can be determined.

7.1.2 Environmental constraints and opportunities identified as part of this strategic scoping study will feed into the ongoing development of flood management options (refer to Figure 1.2).

7.1.3 A more detailed appraisal of options against the strategic environmental objectives identified will be undertaken at the next stage of the SEA (see Chapter 8).
8 **Next steps in the SEA**

8.1.1 This document will be distributed and/or made available to consultees for comment at the next round of consultation, which is due to commence in Autumn 2004. Statutory and key non-statutory consultees will receive a copy of this report for comment and all other stakeholders, including the public, will be made aware of the scoping report via a second consultation document and/or a public exhibition. (See Appendix 3 for list of statutory, key non-statutory and other stakeholders).

8.1.2 Comments on this scoping report will feed into the assessment and evaluation stage of the SEA. The latter will involve a more detailed appraisal of flood management options against the SEA objectives and selection of a preferred environmental option.

8.1.3 The assessment and evaluation stage of the SEA will be documented as the SEA Environmental Report (refer to Figure 1.2). The Environmental Report will feed into the final development of the overall preferred flood management strategy, which will also incorporate technical and economic factors.

8.1.4 The Strategy will present the Agency’s plans for implementing flood management solutions for Boston Haven for a 100 year period. It will also identify and prioritise a 5 year plan for capital investment, recommending flood management works to be undertaken in that period.

8.1.5 The SEA consultation process will continue as detailed in the SEA Communication Plan, with subsequent stages of consultation including a wider range of organisations and the public.

8.1.6 The SEA process is due for completion in early 2005.
9 Further Information

9.1.1 This Strategic Scoping Report has been prepared on behalf of the Project Manager. Further information can be obtained from either the Agency Project Manager or BBR's environmental coordinator at the respective addresses below:

Boston Haven Strategy Study Project Manager
Environment Agency
Kingfisher House
Goldhay Way
Orton Goldhay
Peterborough
PE2 5ZR

Telephone: 01733 371 811

Angela Jones
Environmental Scientist
Babtie Brown and Root
Simpson House
6 Cherry Orchard Road
Croydon
Surrey
CR9 6BE

Telephone: 0208 256 0493
10 References

- Environment Agency, (not dated). *The Fens Waterways Link, Phase 2: Connecting the Cathedral Cities (Booklet).*
- Halcrow, (1996). *Boston River Walls, Feasibility Study (CDP 9130970).*
## Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstraction</td>
<td>Removal of water from ground or surface water, usually by pumping.</td>
</tr>
<tr>
<td>Aquifer</td>
<td>Underground porous rock that contains water and allows water to flow through it.</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>The variability among living organisms from all sources, including land based and aquatic ecosystems, and the ecosystems of which they are part. These include diversity within species, between species, and of ecosystems.</td>
</tr>
<tr>
<td>BAP</td>
<td>Biodiversity Action Plan. Produced in the United Kingdom following the 1992 Earth Summit. The purpose of BAPs is to identify local habitats and species of conservation importance, taking into account national priorities, for which conservation focus should be given.</td>
</tr>
<tr>
<td>Catchment</td>
<td>Area of land, which contributes surface water to a specified watercourse or water body.</td>
</tr>
<tr>
<td>Coastal squeeze</td>
<td>The process by which coastal habitats are progressively reduced in area, and lose functionality, when caught between rising sea level and fixed sea defences or high ground.</td>
</tr>
<tr>
<td>cSAC candidate</td>
<td>Special Area of Conservation: an internationally important native conservation site, designated in accordance with the Habitat Directive.</td>
</tr>
<tr>
<td>Deposition</td>
<td>Accumulation of sediment.</td>
</tr>
<tr>
<td>Discharge consent</td>
<td>A statutory consent issued by the Environment Agency under Schedule 10 of the Water Resources Act 1991 which places conditions and limits on the discharge of an effluent.</td>
</tr>
<tr>
<td>Ebb tide</td>
<td>Outgoing tide.</td>
</tr>
<tr>
<td>Embankment</td>
<td>Earth bank raised above low-lying land area to prevent flooding.</td>
</tr>
<tr>
<td>Floodplain</td>
<td>All land adjacent to a watercourse over which water flows or would flow if no flood defences were in place, in time of flood.</td>
</tr>
<tr>
<td>Flood tide</td>
<td>Incoming tide.</td>
</tr>
<tr>
<td>Intertidal</td>
<td>Zone of seashore between high and low water mark (May also be referred to as the littoral zone).</td>
</tr>
<tr>
<td>Ramsar site</td>
<td>Internationally important wetland habitat adopted following the Ramsar Convention on Wetlands of International Importance.</td>
</tr>
<tr>
<td>Scour</td>
<td>Erosion of sea or river bed and removal of sediment.</td>
</tr>
<tr>
<td>SEA</td>
<td>Strategic Environmental Assessment. The assessment of</td>
</tr>
</tbody>
</table>
environmental impacts for plans and programmes with the aim to integrate environmental considerations and promote sustainable development at the strategic level. This process is similar to Environmental Impact Assessment (EIA) which is undertaken at the project level.

**SPA**

Special Protection Area (SPA): internationally important nature conservation site especially for birds; designated under the EEC Wild Birds Directive.

**SSSI**

Sites of Special Scientific interest (SSSI): land notified under the Wildlife and Countryside Act 1981 (as amended, especially by the countryside and Rights of Way Act) as being of special nature conservation interest. SACs, SPAs and Ramsar sites are also classified as SSSI.

**Sea level rise**

The long term upward trend in mean sea level resulting from a combination of local or regional geological movements and global climate change.

**Tidal prism**

The total volume of water transferred over a tidal cycle (between low and high tides).

**Tide**

The periodic rise and fall in the level of the water of seas and oceans as a result of gravitational attraction of the sun and moon.
Abbreviations

AOD  Above Ordnance Datum
BAP  Biodiversity Action Plan
cSAC  candidate Special Area of Conservation
CSS  Countryside Stewardship Scheme
Defra  Department for Environment, Food and Rural Affairs
EA  Environment Agency
EH  English Heritage
EN  English Nature
IDB  Internal Drainage Board
PPG  Planning Policy Guidance
PROW  Public Right of Way
SAM  Scheduled Ancient Monument
SEA  Strategic Environmental Assessment
SMP  Shoreline Management Plan
SLNCI  Site of Local Nature Conservation Interest
SoP  Standard of Protection
SPA  Special Protection Area
SPZ  Source Protection Zone
SSSI  Site of Special Scientific Interest
STW  Sewage Treatment Works
THI  Townscape Heritage Initiative
TPO  Tree Preservation Order