Broad Character: Coastal Infrastructure
Character Type: Flood and erosion defence
National Perspective

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

The Character Type Sea Defences includes the following Sub-types:

- Sea Defence
- Flood Defence

This Character Type relates to provision of structures designed to remove, reduce or mitigate the risk of coastal and estuarine flooding from the sea, rivers or un-channelled rainfall run-off, or to counter losses to coastal land from marine erosive forces. In practice, along the coast the concepts of both flood and erosion defence are commonly incorporated in one and the same structure, though their character in terms of siting, design and build may be more heavily influenced by the one or the other at different locations.

Sea defence relates to an artificial structure designed to counter losses to coastal land from the erosive forces of the sea. Such structures may work directly to withstand those forces along a defined line, as for example with sea walls, or they may seek to dissipate them in the intertidal zone, as with lines of spaced revetments. This Sub-character Type is here termed 'Sea defence' in preference to 'Coastal Defence' to avoid potential confusion with pre-1956 British military 'Coastal Defence' policy.

Flood defence relates to man-made constructions used to prevent water flooding the surrounding area. Often taking the form of a bank or wall but sometimes much more sophisticated e.g. the Thames Barrier, and may include run-off drains and reservoirs (http://thesaurus.english-heritage.org.uk). Areas of flood and erosion defence are often slender and linear in form, and associated with other Character Types, for example 'Reclaimed Land' or 'Settlement'.

In England, this Character Type is administered under the Coast Protection Act 1949. The Department for the Environment, Food and Rural Affairs (DEFRA) generally gives maritime District Councils grant aid for undertaking works on the coastline provided it can be shown that the works are technically sound and are environmentally, socially and economically justified. The Environment Agency (EA) is an Executive Non-departmental Public Body responsible to the Secretary of State for Environment, Food and Rural Affairs and an Assembly Sponsored Public Body responsible to the National Assembly for Wales. The EA is the authority responsible for implementing and managing flood defence schemes in England and Wales. The EA also plays an important role in warning people about the risks of flooding, and establishing and maintaining flood-warning systems. Today, the Agency provides and maintains more than 34,000km of river and coastal defences in England and Wales (http://www.environment-agency.gov.uk/aboutus/default.aspx).

In England, Shoreline Management Plans (SMP) exist to promote the management of the coastline in a sustainable manner (see http://www.defra.gov.uk/Environ/Fcd/guidance/smp.htm). An SMP is a large-scale assessment of the risks associated with coastal processes, projecting those risks' effects forward to periodic future scenarios, informing planning to reduce these risks to people and the environment, and providing context for future flood and erosion defence needs in a given area (http://www.environment-agency.gov.uk/research/planning/104939.aspx; http://www.defra.gov.uk/Environ/Fcd/guidance/smp.htm).

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Typical components of this Type can include:

- breakwaters
- groynes
- sea walls
- dykes
- embankments

Coastal management is used throughout the world for many different purposes, but it is predominantly used to reduce coastal erosion and flooding. There are many techniques of coastal management including 'hard' and 'soft' construction and planning approaches. Hard construction is the more traditional response to erosion and involves the construction of structures which absorb and reflect or stop wave energy reaching the shore. These have often caused problems themselves, such as increasing erosion elsewhere. Soft construction techniques have become more popular because of this. Soft construction techniques involve promoting natural systems such as beaches and salt marshes which protect the coast, and are usually cheaper to construct and maintain than hard construction techniques.

Sea walls are one of the more traditional methods used in coastal management. Sea walls were constantly repaired and maintained throughout their active lifetimes, giving them historical depth. Often the position of sea defences has shifted due to coastal processes or changes in land management, including land reclamation, leaving them far inland. Programmes such as English Heritage's ongoing National Mapping Programme (NMP) are currently recording the position of some of these relict structures.

This Character Type has had an essential role in creating and maintaining vast areas of land reclamation around the English coasts from the Roman period onwards, especially, but not exclusively, in the Fens during the post medieval period. However in some cases, sea walls have been held responsible for losses of beach material *in situ,* exposing and undermining the base of the wall, or enhancing erosion elsewhere along the coast.

England, like other countries, has a long history of defending coastal flood plains and extensive areas of reclaimed land with hard construction techniques like dykes and embankments. Since the 1990s this has been brought into question. 'Softer' approaches to coastal defence, which work with nature rather than against it, have been introduced. The EA and SMP initiatives are examples, with the EA working hard to ensure that current coastal management objectives are widely accepted and embedded in local planning policy.

The first generation of SMPs resulted in the production of individual strategic plans monitoring programs and studies only at a local or regional level (Murphy 2006) whilst the second generation will provide a 'route map' for local authorities and other decision makers to move towards meeting our future needs (see Conditions and Forces for Change, below).

VALUES AND PERCEPTIONS

Sea and flood defences are generally perceived as essential for the preservation of many English coastal settlements as well as for the safety of the people who live in them. However, some people view the more visually intrusive recent sea defences as having a detrimental effect on the picturesque character of some of the smaller villages of England. There is also increasing recognition among local communities and heritage managers that patterns of historic sea defences and the areas of reclaimed land they maintained contribute strongly to local distinctiveness.

There are also conflicts between SMP coastal protection policy/resources and the perceived interests of some coastal communities: the high profile debates at Happisburgh (Norfolk) provide some examples. Elsewhere, the need for improved sea defences has been incorporated into regeneration schemes, such as the rebuilding of the Victorian promenade at Blackpool and the early twentieth century promenade at Cleveleys on the Fylde coast of North-West England.

Breakwaters are often highly visible features lending distinctiveness to coastal ports, large and small. They often feature in depictions of these places and become cultural reference points (e.g. 'The Cobb' at Lyme Regis, the breakwater at Bude).

RESEARCH, AMENITY AND EDUCATION

Sea and flood defences have been used in England for many centuries and as such some of the early coastal defence systems are now the focus of historical and archaeological interest in their own right (Fulford *et al* 1997: 190).

Sea and flood defences provide a stimulating and relevant focus for cross-curricular educational topics, including case studies looking at the environment, landscape, coastal change and sustainability. Case study resources related to flood defence schemes are freely available online, for example from Met Office Education and the Geographical Association.

CONDITION AND FORCES FOR CHANGE

Shorelines constantly change due to waves and tides. The extent of physical change depends on many factors, with changes over timescales ranging from seconds to centuries and millennia. Coastal processes have been hugely influenced by human activity over time, seeking to reduce erosion or flooding while maintaining and extending people's desired coastal management. In some cases this has taken place without a wider or coordinated appreciation of the effect these actions may have on other places along the coast (see http://www.environment-agency.gov.uk/research/planning/104939.aspx).

Coastal erosion has increasingly affected English coastal communities physically and perceptually and, more widely, aspects of both the natural and cultural dimensions of our environment. This in turn has affected future commercial development opportunities along the coast. In response, DEFRA have made significant progress in understanding and mapping coastal processes to inform the development of SMPs. In the first generation of SMPs, many operating authorities adopted SMP recommendations as a basis for production of individual strategic plans, monitoring programs and studies for all or part of their coastline (Murphy 2006). The second generation of SMPs (SMP2s), in covering the entire coastline in England and Wales, provide a 'route map' for local authorities and other decision makers to move towards identifying the most sustainable approaches to managing the risks to the coast in the short term (0-20 years), medium term (20-50 years) and long term (50-100 years) (http://www.environment-agency.gov.uk/research/planning/104939.aspx).

In addition, the current Environment Agency (EA) policy on sea defences involves strategic planning to make decisions about maintaining and building new flood defences, as well as raising public awareness of people living in vulnerable areas. They also advise local, regional and central government on the building of sea defences and their environmental impacts (http://www.environment-agency.gov.uk/research/planning/104939.aspx).

The threat of flooding along the English coast and rivers is also an issue of rapidly increasing importance. The population at risk is likely to increase as residential, service

and commercial development continues to take place on floodplains and low lying coastal regions while the effects associated with global warming, such as sea level rise and storm events, continue to intensify. Planning policies in place in England to manage flood risks are guided by PPS25, a key part of a holistic approach to managing risk as set out in the cross-Government programme developing strategy for flood and coastal erosion risk management in England, *Making Space for Water* (http://www.defra.gov.uk/environ/fcd/policy/strategy.htm) (Department for Communities and Local Government 2006, 2008). For specific lengths of the coastline, SMPs present a long term policy framework to reduce these risks in a sustainable manner. Their effectiveness requires adequate and properly interpreted information to be integrated into all stages of the SMP, ensuring proper consideration of the historic and cultural environment within the SMP process (see English Heritage 2003; Murphy 2006). HSC contributes to this, characterising the cultural context which has shaped the the typical and commonplace of the present everywhere (see Dellino-Musgrave and Oxley 2007; Hooley 2004 and in press; Fairclough 2003, 2006).

RARITY AND VULNERABILITY

In general, coastal defences are fairly common and their associated structures are usually not designated. The vulnerability of this Character Type could be intensified if erosion rates increase. Their frequent occurrence along and, in historic terms, behind the coast, makes them a major feature in land- and sea-scape distinctiveness along some parts of England's coastline.

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