

COASTAL DEFENCE ISSUES AND STRATEGY

1999 UPDATE

Executive Summary

This is an up-dated edition of the report presented to and agreed by Sefton MBC in January 1993. The original layout and, where appropriate, text have been retained, edited to take account of the latest information, legislation and best practice. This edition of the report takes full account of the findings and recommendations of the two Shoreline Management Plans recently developed for the Liverpool Bay and Ribble Estuary coastal sedimentary cells.

The purpose of the report is to present a comprehensive coastal defence strategy for the whole Sefton shoreline, based on a consideration of the effect of natural and artificial environmental influences.

The report also describes the legal and financial background to coastal defence policy taking account of the 1998 Enquiry by the House of Commons Agriculture Committee and the Government response to the findings.

The dominant environmental processes are described and the condition and performance of existing coastal defences is examined; including the natural dune coastline. The need for the further coastal research identified in the Shoreline Management Plans is described, costed and prioritised.

Particular attention is given to beach and dune management policies which will effectively complement and safeguard existing artificial defences and foster the “soft defences” that protect a large part of Sefton’s coastline.

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SEFTON COASTAL DEFENCE ISSUES AND STRATEGY

1.0 Introduction

- 1.1 The purpose of this report is to present an assessment of Sefton's Coastal Defence Strategy in the context of the findings of the Liverpool Bay and Ribble Estuary Shoreline Management Plans.
- 1.2 The report describes the dominant environmental processes and examines the condition and performance of existing coastal defences, including the natural dune coastline. The need for further coastal zone research to improve the understanding of the natural processes and the response of the coastline to changes is explained. Proposals for future works are described, costed and prioritised, together with a recommended timetable. Annexes to the report provide further background information to complement the main text.

2.0 Background

- 2.1 In 1993 Sefton adopted a coherent coastal defence strategy for the whole Borough based on the recommendations of the Coastal Defence Issues and Strategy Report presented to the Council in January 1993. The coastal defence provision developed by Sefton's former constituent authorities was enhanced by the following:- The establishment of a coastal engineering database in 1983, the Numerical Modelling Programme reported to the Council in June 1987, proposals for "Hightown Proposed Coastal Works" in November 1989, "Coastal Engineering Research - January 1991, Southport Seafront Strategy and the Unitary Development Plan adopted in 1995.
- 2.2 Recognising that the forces of nature are not constrained by administrative boundaries, the Council's officers actively participate in the forums that bring together practitioners from different agencies and authorities to share experience and develop a dialogue at both national and regional levels. The main groups are:- The Liverpool Bay Coastal Engineer's Group, the Mersey Estuary Management Forum, the Ribble Estuary Forum and the Irish Sea Study Group
- 2.3 Sefton has, over the years, carried out a great deal of investigation into coastal issues. The Sefton Coast Database was one such project, carried out between 1979 and 1982 in collaboration with Liverpool University. This Database collated the existing research, literature, plans and records, relevant to the coastal dynamics of Sefton, in an easily accessible form. It provided a basis for subsequent policies and research and led to a three-year programme of research that, in 1986, developed a numerical model of waves, tides and currents along the Sefton coastline.
- 2.4 Coastal defence is an aspect of coastal zone management. The Sefton Coast Management Scheme which ensures that all the council departments involved in management of the coastal zone, external agencies, and coastal landowners work together, whilst keeping the public informed and involved, is nationally recognised as an example of "Best Practice".

3.0 An Overview of Coastal Processes

- 3.1 The Sefton coast, which extends over 36 kilometres (21 miles), comprises soft and granular estuary deposits of sand, silt, clay and peat. There are no outcrops of rock on the shoreline. Hence, the forces of nature readily mould it, so the shoreline is constantly changing in response to the fluctuating influence of wind and water and as a result of human activity. Its overall shape derives from two major river estuaries, the Mersey and the Ribble. Two other much smaller rivers, the Alt and Crossens, each have important local zones of secondary influence.
- 3.2 In the distant past both human and wild life moved with, and adapted to, changes in the position of the coast. Between the last Ice Age, and medieval times the sea occasionally broke through the coastal dune barrier and flooded low-lying inland areas. Large tracts of sand were periodically stripped by gales from the dune coast and sand penetrated inland across fields and settlements. In more recent times the dunes have been partially stabilised by maintaining their natural vegetation, trees have been planted for shelter and artificial sea defences have been built to protect developed shorelines. The inland lakes and mosslands have been drained and claimed for agricultural production.
- 3.3 Before the beginning of the eighteenth century the form of the coast derived mainly from conditions offshore. Maps and charts demonstrate the effect of recent human influence. Dredging, river training, and coastline hardening have imposed a pattern of accretion and erosion on the shoreline, where previous conditions were much more variable.
- 3.4 At Crosby and Southport the shoreline has been partly fixed in place by coastal defence work. However, the natural forces remain at work and sand drift at Crosby is tending to bury parts of the sea wall, whilst sand dunes are developing in front of the sea wall north of Weld Road. From Hightown to Birkdale the coastline is in a more natural condition, with generally wide sandy beaches still backed by an extensive system of sand dunes.
- 3.5 Formby Point, midway between the Mersey and Ribble estuaries is the meeting zone of the two major estuarine regimes. Tidal streams converge offshore, with the result that a large inter-tidal sand spit (Taylor's Bank) has developed, aided by the construction in the first half of the 20th century of the River Mersey training walls.
- 3.6 The predominant source of the Sefton coast beach and dune sand is the bed of the Irish Sea. During the last Ice Age advancing ice sheets pushed glacial deposits into the Irish Sea basin and over 10,000 years these have been broken down, sorted and transported by tidal and wind-driven currents. The prevailing westerly weather and tidal streams both tend to move seabed deposits towards the coast and into the river estuaries, which are both zones of net sediment accumulation. The River Mersey contributes very little sediment to the Sefton coast; it is mostly intercepted in the Ship Canal. The River Ribble carries fine silt downstream, which settles out on the northern beaches whenever, or wherever, sheltered conditions prevail. A further source of estuarine accretion (infilling by sediment) is the sand eroded from Formby which is moved by tidal and wave-driven currents northwards into the Ribble Estuary and southwards into the Mersey Estuary.

- 3.7 Although the Altcar sand dunes and the dunes to the north of the Ainsdale National Nature Reserve are accreting, the sand dune system around Formby Point has experienced continuous erosion throughout the 20th century. The balance of evidence suggests that the present phase of erosion was primarily triggered at the end of the nineteenth century by a significant increase in the frequency of storm force westerly winds and destructive waves. The erosion was compounded by the combined effects of dredging, spoil dumping and training wall construction which significantly altered the bathymetry in Liverpool Bay, leading to increased wave focusing onto Formby Point. This focusing is greatest to the north of Wicks Lane and it particularly affects the National Trust frontage.
- 3.8 The erosion rate is greatest at the boundary between the Formby National Trust and the Ainsdale National Nature Reserve, with an average loss of approximately 3.5 metres per year over the past 20 years. Individual erosion events often result in a short-term loss of several metres. These events are generally transitory and conditions then settle back into the long-term trends identified.
- 3.9 The Sefton coastline also has to be considered in the light of the effect of possible climatic change:- global warming, sea level rise and increase in storminess. Numerous predictions have been made as to the magnitude of these effects, with widely differing answers, however, current predictions have tended to come together in a narrower range. Recent climate-modelling work suggests a possible rise in average sea level of 0.3 metres over the next 60 years. On top of this one has to consider the increase in maximum wave height and meteorological surge effects on any storm event.
- 3.10 Although the environmental influences and the directions of sediment movement are well understood, there is uncertainty over just how much sediment remains in the Irish Sea “reservoir”. More research is needed to gain a better understanding of how the Sefton Coast might respond to future climatic change.

4.0 Review Of Existing Shoreline

4.1 *Bootle to Seaforth (M.U. 8/1 – Seaforth Dock)* ***SMP recommended policy “Hold the Line”***

4.1.1 The coastline consists of rock armour river walls that provide immediate protection to the Brocklebank to Gladstone and Royal Seaforth Docks. The defences are owned and maintained by the Mersey Docks and Harbour Company. The river bed shoreline is only exposed at low water:- its condition is stable. The river walls are massive and the risk of breach or flooding is considered very low.

4.2 *Crosby Marine Park to Hall Road, Crosby (M.U. 8/2)* ***SMP recommended policy “Hold the Line”***

4.2.1 The main coast management problem at Crosby is the accumulation of sand in the bay centred on Mariners Road. This is a natural phenomenon, almost impossible to control, that leads to large amounts of sand being blown from the beaches onto the closely surrounding roads and residential area. Management work has been undertaken to reduce the sand blow by encouraging dune growth seaward of the Crosby Promenade and by stabilising the planted areas of the Marine Park. Constant future attention will be needed to maintain and improve on these preliminary management efforts.

4.2.2 The Crosby concrete sea walls were built in two phases:- from Seaforth Dock to Mariners Road in 1970-72 and from Mariners Road to Hall Road West in 1974-76. The first and earlier phase is at a higher level, is more massive, and has suffered less storm damage than the second phase. The section north of Mariners Road includes a 900 metre length of timber revetment near Hall Road, dating from the 1960's, incorporated within the 1975 concrete structure. The timber revetment has deteriorated to less than 5 years remaining life. As such it is categorised as “Class 4” in the MAFF Coast Protection Survey of England. It is proposed to reconstruct the timber revetment length in stone or concrete as part of the Hightown Coastal Works Programme (described later), preserving its concrete lower section. Emergency works costing £73,000 were undertaken in 1992 to strengthen the timber revetment and promenade.

4.2.3 In the vicinity of Hall Road, the level of the defence is insufficient to prevent wave over-wash during occasional severe storms. This causes periodic damage to the pedestrian and car park surfaces and the backing amenity grassland. Plans for any future reconstruction should consider the need to provide an increased level of protection.

4.3 ***Hall Road West to River Alt Pumping Station (M.U. 8/3)***
SMP recommended policy “Selective Hold the Line/Do-Nothing/(or retreat)”

- 4.3.1 From Crosby to Altcar, the coast is under the influence of the River Alt, which locally intercepts the natural southward drift of beach-building sediments. During the early part of the 20th century, the river changed its course; having previously discharged seaward from Altcar in a westerly direction, it moved to the south and began to erode the coast. Residential seafront properties at Crosby had to be abandoned as the coastline was slowly carried away despite attempts at artificial hardening. The River Alt was finally brought under control in 1936 by the construction of a training bank, 1 kilometre north of Hall Road, that directed the discharge seaward and away from the coastline. From 1936 to the mid-1970's the eroded coastline was reinstated and hardened by the tipping of demolition waste, builders' rubble and tin slag from local smelting factories. Coast protection works were undertaken in the 1970's to protect the developed land between Seaforth and Hall Road West, leaving the undeveloped coast north of Hall Road West still susceptible to erosion.
- 4.3.2 Hightown was mainly developed as a dormitory settlement during the late nineteenth and early 20th century. The settlement is built on land formerly covered with sand dunes, with typical ground levels at least 2 metres above the highest tides. In the immediate agricultural hinterland, ground levels are lower than the highest tides and land drainage is effected by ditches that discharge to the pump-assisted River Alt. During the 1960's, a private housing development was proposed extending along the coast towards Crosby, but it was opposed locally on the grounds of, inter alia, inadequate coast protection. The development was allowed at a Planning Appeal in 1969, that established the principle of a financial contribution towards the cost of future coast protection work. A sum of approximately £1 million has accrued from the developers' contributions for future coastal defence.
- 4.3.3 The coast between Hall Road West and Altcar is eroding at between 1 and 2 metres a year. The material eroded from the hardened coast at and near the Training Bank contains high levels of waste that is being slowly but continuously dispersed across the adjoining shore. This waste includes brick and concrete rubble, former fly-tipped waste and metal-smelting slag that has a measurable level of radioactivity.
- 4.3.4 The River Alt Training Bank has deteriorated and settled over the years. It was repaired and reinforced in 1949 and 1969 but has since deteriorated to a condition that in places is not much higher than the adjoining shore. It is categorised as Class 4 (less than 5 years remaining life) in the MAFF Coast Protection Survey.
- 4.3.5 Just north of the Training Bank, there is a narrow strip of tipped land that is now only 50 metres wide and is eroding at about 1 metre per year. The Environment Agency has had to protect its Far Moss drainage outfall with rubble, to prevent undermining. If coast protection work is not undertaken here, the sea could break through into the West Lancashire Golf Club by 2050 and would then threaten the Southport to Liverpool railway.

- 4.3.6 The clubhouse of the Blundellsands Sailing Club is located on the landward bank of the River Alt, which at this location is shifting its course landward. Club members have in the past (ca. 1980) placed large concrete blocks on the shore, forming a hardened promontory around the seaward flank of their premises. However the shore on both sides has continued to erode, undermining and threatening to topple these defences. Unless further intervention is undertaken the clubhouse will soon have to be moved inland or abandoned.
- 4.3.7 The sand dune coastline fronting the residential property at Hightown is also starved of sediment by the presence of the River Alt and it is eroding at 1 to 1.5 metres per year. If the present rates of erosion continue, the rear gardens of properties nearest to the sea could be threatened by 2050.
- 4.3.8 The construction in 1937 of the Alt Training Bank was a successful solution to the erosion of the Crosby shoreline. However, the Bank is now seriously eroded and in need of reconstruction. It has not prevented the erosion of the coastline to its north, where there is increasing public awareness of the need for action.
- 4.4 ***Altcar to Birkdale Dune Coastline CPUs 7 & 8 Ribble Estuary SMP SMP recommended policy:-
Short term “Natural Defence Management”
Long term “Natural Defence Management / Managed Retreat”***
- 4.4.1 The 16 kilometres of coast between the mouth of the River Alt at Hightown and Weld Road, Birkdale, is characterised by more than 30 square kilometres of sand dunes, with a maximum inland extent of 4 kilometres at Formby Point.
- 4.4.2 Large areas of the sand have in the past been levelled for agricultural and residential development but, near the coast, the dunes reach up to 20 metres in height and form a barrier against marine incursion.
- 4.4.3 The predominant source of the sand is the extensive sedimentary deposit in the eastern part of the Irish Sea. Tidal currents and prevailing weather patterns move the sand on to the beaches and into the river estuaries, from where, when dry, the sand is blown ashore to accumulate into dunes when conditions are favourable.
- 4.4.4 There is evidence (Neil, 1993) of sand dunes on the Sefton coast for the past 3,500 years. Until recent centuries there was little human interference, the coastline was very mobile and the dunes were sometimes breached by storms or during periods of high sea level. In the early 18th Century, a series of storms caused extensive flooding of the south Lancashire coast and also stripped large amounts of sand from the dunes. The sand was carried inland and overwhelmed much of the agricultural land within two miles of the coast. This experience led to the early attempts at stabilisation and reclamation. The manorial landowners fostered the planting of “starr”, or marram, grass and penalties were imposed for up-rooting the grass. These policies were successful during the 19th Century

when, under favourable climatic conditions, the coastline around the whole area of Formby Point accreted seawards by approximately 300 metres.

- 4.4.5 During the 19th Century more sand was moved onshore during periods of favourable weather than was eroded by winter storms. In the 20th Century this trend has been reversed. Evidence (Neil, 1993) suggests an increase in westerly storms around the turn of the Century.
- 4.4.6 At about this time, the dredging and training works associated with the Ports of Liverpool and Preston were intensified, significantly changing the morphology of the offshore zone and increasing the degree to which wave energy is focused and reflected onto the coast north of Formby Point. During the 20th century almost all of the land gained at Formby in the 19th Century has been lost by erosion. At Altcar, to the south of Formby Point, the coastal bay formerly occupied by Formby Channel is accreting but around the whole area of Formby Point erosion proceeds at an average rate of up to 4.5 metres per year, depending on location. Accretion commences about a kilometre north of Ainsdale National Nature Reserve and remains the dominant trend at Southport and within the Ribble Estuary.
- 4.4.7 The past development of the coastline has been examined, using maps and charts from 1700 to 1950, assisted by aerial photographs and coastal surveys from 1950 to the present date. Examination of the measurements taken over the past 30 years reveals that, despite the attempts at control, the rates of change are sufficiently consistent to enable a realistic projection to be made for the next 30 to 50 years. The following projection assumes that no major engineering works are undertaken to control the erosion and that the climate does not vary more than it has over the past 50 years.
- 4.4.8 By the year 2050, the coastline between Sefton's Lifeboat Road car park and the National Trust Victoria Road car park is likely to erode by approximately 150 metres. North of Victoria Road, the coastline is likely to erode up to 270 metres along the Formby Golf Club frontage. The "hinges" between erosion and accretion, located approximately at the Formby/Ainsdale boundary (1200 metres north of Fishermans Path) and at Alexandra Road (600 metres south of south of Lifeboat Road), are unlikely to change significantly. This represents a total loss of 225 acres of land.
- 4.4.9 Land loss of this order does not entail any risk of inland flooding or any threat to developed land or property. Nor would there be any such risk if the present rates of erosion doubled or the same trends were to continue for a further 50 years. Over such longer time scales, however, the position is not predictable. Changing river channels and the effects of offshore sand drift will gradually change the shape of the seabed, significantly affecting the patterns of energy dissipation. Climatic variation over longer periods will further alter conditions at the shoreline.
- 4.4.10 Because of the mobile nature of this shoreline any attempt to "freeze" it in position would fail. A fixed sea wall would soon be undermined by the continued loss of sand from the shore. Any successful defences would have to

limit wave and current energies so as to allow sediment to drop out of its water-borne suspension and rebuild beach levels.

- 4.4.11 Under present national and European legislation, any proposals for new coastal defences must be subjected to tests of technical, economic and environmental viability. Any major civil engineering work would be very expensive so that its cost would far outweigh the benefits (in terms of land value) that would be gained. It could not therefore be economically justified and also the consequent changes to the natural environment would entail major loss of internationally recognised and protected habitat.
- 4.4.13 Operational members of the Sefton Coast Steering Group have considered the information presented above. All agencies accept that the natural dynamics of the beaches and dunes must be respected. Erosion and sand mobility are key processes that help to sustain the rare habitats for which the Sefton Coast is internationally recognised. Because there is no imminent threat of flooding, any intervention must not stifle these natural processes but should rather seek to preserve habitats and maintain appropriate levels of public access. The Coast Management Scheme's Beach Management Plan will be routinely up-dated, after full Public and Council consultation, to take account of the latest predicted rates of erosion and accretion.
- 4.4.14 Present beach and dune management measures recognise the likelihood of storm damage and have some resources for remedy built in. Where visitor pressures are high it is acceptable to confine public movement to boardwalks and paths and to fence vulnerable areas. The regular beach patrols and management visits tailor the work to suit particular sites and climatic conditions.

4.5 ***Birkdale to Southport Coastline CPU 6 Ribble Estuary SMP***
SMP recommended policy:- "Hold the Line"

- 4.5.1 Southport is located on the southern outer fringe of the Ribble Estuary, which in common with other west coast Irish Sea estuaries experiences a continuous influx of marine-originated sediments. This is augmented by sand eroded from the shore north of Formby Point and by the offshore deposit of dredging spoils from the Mersey navigation channels. In the past, humans have taken advantage of this natural tendency to accretion and have built successive coastal embankments to protect the land reclaimed from the sea.
- 4.5.2 The sixteenth century coastline ran from Crossens, past St Cuthbert's Church, along the present day Marlborough Road, Hawesside Street and Part Street. The Bold Estate map of 1736 demonstrates that the site of Lord Street was then known as the "New Marsh" a wet slack area at the seaward side of a range of sandhills. There was an estuary at Duke Street, the site of the original "Duke's Folly" Hotel, where the Nile stream discharged onto the shore. To the south lay a range of sandhills, bordering the sites of Palace Road and Rotten Row.
- 4.5.3 The first promenade and sea wall was built in 1835 to protect the developing seafront leisure zone of marine villas and hotels. The early sea wall had to be re-built or strengthened several times after destructive storms. A deep-water

channel known as the South Channel ran close to the Southport and Birkdale shore, connecting with the inner Ribble estuary. This channel was used by fishing craft, trading vessels and pleasure craft.

- 4.5.4 Nowadays, Southport is protected from inundation by the sea by two lines of defence; the outermost to the north of Weld Road, Birkdale consists of a series of coastal revetments dating from 1960 onwards. The most recent construction is Marine Drive Floodwall and its associated promenade which protects the previously undefended central kilometre of the Southport coastline, between Esplanade and Marine Parade. The inner line of defence consists of a line of nineteenth century embankments, following Promenade, Fleetwood Road, and from the Hesketh Road to Marshside Road Sea Bank to the Crossens Sea Bank.
- 4.5.7 The outer embankments, built between 1920 and 1974 were generally formed by the tipping of household refuse or builders rubble. These now form the underlying structure of the coastal Marine Drive highway. They are prone to continuous settlement, caused by the slow biological degradation of their core materials. This is likely to continue for many more years. The settlement has been partly relieved by a rolling programme of highway resurfacing. Frequent storm damage to the older sea walls is partly due to the settlement of their embankments and partly due to their age and “lightweight” construction.
- 4.5.8 Most of the ground between the old and new defences remains close to its original, i.e. beach, level. Where new development takes place, it is advisable that the land should be raised to a level higher than any potential flooding from the sea, i.e. to at least 6.5 metres above Ordnance Datum.

4.6 Salt Marsh Development on the Northern Southport Beach

- 4.6.1 Saltmarsh development at Southport has been surveyed and documented since the early 1970's because of concern about the potential loss of recreational amenity beaches. Evidence from other parts of Britain had demonstrated that *Spartina*, an invasive grass, with the ability to dominate other plant species, could readily colonise beaches bordering estuaries and harbours, causing a rapid build-up of saltmarsh.
- 4.6.2 Truscott, (1980) described the historic development of the Ribble marshes and the work that was undertaken at Southport between 1977 and 1980 to control the beach vegetation using herbicides. The shore, south of Marshside Road, was successfully cleared of *Spartina* and *Samphire* by 1980 and a “barrier zone” was established, within which herbicides were regularly applied during the period 1982-1992, to eradicate all the emerging vegetation.
- 4.6.3 By 1992 it was apparent that saltmarsh species, other than *spartina* and *samphire* were developing at Southport. The marsh grass, *Puccinellia*, was identified, in connection with a new area of “Green Beach” near Weld Road. During the early 1990's the statutory conservation status of the shoreline was strengthened considerably, through national and European legislation which recognised the

ecological importance of the Sefton Coast and, particularly for migratory birds, the Ribble Estuary.

- 4.6.4 After consultation with English Nature, the Council agreed in 1993 to allow the Weld Road “Green Beach” to develop naturally, whilst a modified control programme was established at Marshside. It was agreed that the control work and beach vegetation would be monitored over the next 5 years before any further English Nature statutory consents were issued.
- 4.6.5 By June 1996 the monitoring indicated that the threat from *Spartina* was receding. It also appeared that the more recent herbicide programme was not as effective as the earlier work, (Bennett, 1996). A report to the Council recommended a two-year pause in herbicide application and an enhanced monitoring programme. The Council agreed not to undertake herbicide control in 1996 and 1997. A survey of salt-marsh vegetation was commissioned in October 1996 from Greenspace Ecological Consultancy and again in October 1997. Site surveys were undertaken from November 1996 to March 1997 and from October 1997 to March 1998. Results were reported by the Consultants in April 1997 and April 1998, (Tomlinson, 1998). Reports to the Council in Summer 1997 advised that “the saltmarsh at Marshside had shown no appreciable change in extent” during the first survey period. Similar reports in Summer 1998 advised that “the northern saltmarsh showed no appreciable change in extent during the survey period”.
- 4.6.6 Monitoring since 1996 has shown that the cessation of herbicide treatments after 1995 has not had any discernible effect on saltmarsh development at Marshside. In order to test this result independently, aerial photographs taken between May 1989 and May 1997 have been examined. The photographs demonstrate a rapid advancement of the consolidated marsh between 1989 and 1993 (when herbicides were being used), an apparent slowdown from 1993 to 1995 (after which herbicide treatment was suspended), and a halt in saltmarsh development between June 1995 and May 1997. The photographs confirm the broad findings of the much more detailed ground-based surveys by Greenspace Consultancy. (Tomlinson, 1997-1999).
- 4.6.7 The ground-based surveys and aerial photographs demonstrate an increased diversity of beach vegetation since the original 1970’s surveys by Truscott and others. Tomlinson (1998) states that *Spartina* is no longer an essential (or even the usual) pioneer species on the shore south of Marshside Road. The rate of dense saltmarsh development immediately south of Marshside Road has slowed in recent years. Further towards the Pier, the density of vegetation has not changed significantly since 1996. So far, no measurable effects have resulted from the recent lack of herbicide treatment. Longer term monitoring is needed to decide whether the trend of saltmarsh development on the beaches north of Southport Pier has changed.

4.6.8 Summary of Events

| DATE | EVENT | COMMENT |
|--------------|---|---|
| 1977 -1980 | Truscott's initial work - 3-year programme | Successful eradication |
| 1982 | 121ha sprayed | The extent of the salt marsh did not change significantly between 1979 and 1989 |
| 1986 | 50ha sprayed | |
| 1987 | Manual Roundup to emergent growth | |
| 1988 | Manual Roundup to emergent growth | |
| 1989 | Manual Roundup to emergent growth | |
| June 1990 | 95ha sprayed with Dalapon (2 sources) | |
| 1991 | No treatment | |
| July 1992 | EN consent for 5 year spray programme | Consolidated area of growth protected |
| 27 July 1992 | Roundup (Glyphosate) | |
| January 1993 | Report to E&L re Green Beach | |
| 15 July 1993 | Roundup (Glyphosate) | No spray to consol. area |
| 2 July 1994 | Roundup (Glyphosate) | No spray to consol. area |
| 3 July 1995 | 26ha Roundup (Glyphosate) Chemservices | No spray to consol. area |
| June 1996 | Cttee reports recommended 2 year "pause" | Monitoring enhanced |
| April 1997 | 1st Report by Tomlinson | "No adverse effects" |
| April 1998 | 2nd Report by Tomlinson | "No adverse effects" |
| March 1999 | 3 rd Report by Tomlinson | "No adverse effects" |

4.6.9 Recommendations

It is important to maintain the detailed monitoring of the Southport beaches to give better and early indication of changing conditions.

Vegetation monitoring at Marshside and Birkdale should be continued to the specification established for the survey work undertaken by Greenspace Consultancy.

The annual beach level surveys from Birkdale to Marshside should be continued. Profiles and contours should be interpreted to monitor any effects of the new sea defences and prevailing climatic conditions. This work can be linked to the to the monitoring reports on sandwinning that include conditions in the outer estuary and climate data.

These recommendations are included within the monitoring programme described in Section 6.2.3 of this report.

4.7 *Sandwinning at Southport*

- 4.7.1 Sand has been extracted from the Horsebank area of the northern Southport coast under Licence and Planning Consent since 1979.
- 4.7.2 The documents supporting the renewal applications included an Environmental Statement, a “Sustainability” Report and the Company’s ongoing monitoring reports. These demonstrate that the Horsebank has been self-sustaining since sand extraction commenced in the mid 1970’s, despite the removal of up to 300,000 tonnes of sand per year. The Horsebank is slowly “rolling” landward, but not at a rate that gives cause for concern within the 15-year timeframe of the Planning application. This trend was evident well before extraction commenced. The major influences on shore conditions at Southport are the Ribble Estuary channels and sandbars, and climatic variations.
- 4.7.3 Mud deposition and saltmarsh development on the Southport shore are facts of history, which long predate the sandwinning operation. They arise from the very high fine sediment load of the River Ribble. The numerical modelling which was undertaken in the 1980’s predicted that the Ribble Estuary would return its historic and naturally variable condition following the cessation of the dredging and river training activity connected with the Port of Preston. One consequence of this renewed variability is an increased sediment load, derived from the river carving itself new channels within its estuary. There are no short-term (the next 50 years) adverse coastal defence implications arising from these estuary-wide changes.
- 4.7.4 There is no evidence of adverse coastal defence conditions arising from the sandwinning activity, but it is essential that the monitoring of the Ribble Estuary (by the Operator) and the Southport shoreline (by Sefton TSD) is maintained and enhanced to meet concerns identified during the 1998-1999 Planning and Licence renewal procedures. The monitoring should include vegetation surveys, air and ground-based photographs and beach profile comparisons. Sandwinning, coastal defences, the foreshore condition, climatic variability, beach vegetation and sediment feed from elsewhere, are all inter-related and interdependent.

5.0 Local Objectives for Coastal Defence

MAFF's High Level Targets (Annex D) require operating authorities to provide policy statements setting out how they will contribute to the delivery of national flood and coastal, defence aims and objectives. Cell-wide objectives for coastal defence are identified within the Shoreline Management Plans. The following local objectives have been used to develop the strategic approach to the Borough's coastal defence described in Sections 6 and 7 of this report.

- 5.1 To provide the regional level of Flood Defence to protect low lying areas of the Borough from flooding during high tides and storm events.
- 5.2 To provide the required level of Coast Protection to protect vulnerable areas of the Sefton Coastline from erosion.
- 5.3 To maintain and encourage the use of natural sea defences in appropriate locations.
- 5.4 To implement the recommendations of the Liverpool Bay and Ribble Estuary Shoreline Management Plans as soon as they have been adopted by the Council.
- 5.5 To continue to improve the understanding of natural processes and the response of the coastline to change.
- 5.6 To continue to actively participate in regional Coastal Groups to further develop the Groups to influence wider coastal zone management issues.

6.0 Monitoring Studies and Coastal Defence Projects

6.1 General

- 6.1.1 Having reviewed the condition and performance of the defences set against the background of natural environmental processes (and human influences) it is necessary to develop a strategy for securing the future integrity of the Borough's defences based on the objectives stated in Section 5.0 and the recommendations of the Shoreline Management Plans.
- 6.1.2 All of the studies and projects listed in the following section are considered as part of a coherent strategy. The relatively small costs of undertaking monitoring will be offset in the longer term, allowing better informed decisions on coastal defence to be made and enable more cost effective design of appropriate defence works. The use of Lead Authorities for data collection and storage is being examined in order to achieve economy of scale across the whole of Sediment Cell 11, and the best use of equipment and resources.

6.2 Coastal Monitoring

- 6.2.1 Monitoring of the coastline and the natural processes influencing it is fundamental to future understanding and hence planning the management of the shoreline. The need for a structured monitoring programme is recognised in the SMPs and the basis of such a programme is now in place in many areas. The information obtained from regular monitoring also provides for thresholds to be defined for actions.

There are a number of elements to be considered in any monitoring programme, based upon what needs to be known and how it can be established. The basic needs are:

- the condition of defences;
- the behaviour and condition of foreshore in front of them;
- coastal process forcing parameters and changes resulting
- environmental data related to defence proposals and completed works.

6.2.2 Existing Monitoring

The following activities are currently carried out:

- Regular visual inspection of coastal defences and shoreline features;
- Regular beach profiles across the whole Sefton foreshore;
- Regular monitoring of the dune front position around Formby Point;
- Regular shore vegetation surveys from Birkdale to Southport;
- Monitoring of salt marshes in the Ribble Estuary (E.N.);
- Regular recording of tidal levels Seaforth, Alt and Crossens (E.A.);
- Vertical air photography typically at 2-year intervals;
- Regular weather monitoring at Crosby and Squires Gate (Met Office);
- Collection of physical / environmental data by Sandwinning licensee;
- Monitoring of bird populations, Ribble & Alt Estuaries SPA (E.N.).

6.2.3 Future Monitoring

Existing arrangements form the basis of a strategic monitoring system for the whole of Sediment Cell 11 (Great Orme's Head to Solway Firth). However, the SMPs recommend that the present arrangements require both extension and expansion, with the following items forming an integral part of the system. Their rationale is described in more detail in the SMP documents (1999, Volumes 4, Section 5):

| ID | Monitoring Description | Frequency | Estimated Annual Cost | Extent | Comments |
|-----|--|--------------------------------------|---|---------------------------------|---|
| M1 | Annual aerial intertidal inspection | 1 per year | £7,500 | Cell-Wide with local reports | Final price will be subject to change with number of report copies. |
| M2 | Annual ground shoreline and structure inspections | 1 per year | £4,750 | Per Authority | Two elements:- (1) overview of the physical condition of the shoreline, noting changes. (2) detailed regular inspections of structures' condition and performance |
| M3 | Sediment sampling at specific locations & contours | 1 per year | £2,500 | Per Authority | Co-ordinated with M4 topographic surveys. |
| M4 | Beach profile & topographic surveys (open coast) | 1 per year | £9,000 | Per Authority | Data output to KEYSHORE analysis programme and co-ordinated with adjoining local authorities. |
| M5 | Hydrographic beach profile extensions | Every 5 years | £3,000 | Per Authority | Establish need and programme after 2 years of foreshore results. |
| M6 | Marsh area surveys (estuaries & sheltered waters) | 1 per year | £2,500 | Ribble Estuary | Linked with aerial and ground-based vegetation surveys. |
| M7 | Vertical aerial photography | Every 2 years | £5,000 alternate years | Sub-cell-Wide | Sefton's share of cost of sub-cell-wide programme |
| M8 | Inshore wave monitoring at strategic sites | 1 campaign per 5 years per Authority | £8,000 every five years | One Authority | Anticipated that the work will move each year to a different Authority. |
| M9 | Littoral Drift measurements at strategic sites | 1 campaign per 5 years per Authority | £8,000 every five years | One Authority | Anticipated that the work will move each year to a different Authority. |
| M10 | Tide level recording at strategic sites | On-going, with annual report | £5,000 every five years | One Authority | Anticipated that the work will move each year to a different Authority. |
| M11 | Storm typicality and shoreline energy assessments | On-going, with annual report | £3,750 | Sub-Cell wide | Sefton's share of cost of sub-cell-wide programme |
| M12 | Hydrographic surveys of estuary & approaches | Every 5 years | Sefton contribution estimated at £1,000 | Dee, Ribble & Mersey estuaries | Contribution to estimated £18,000, shared between several agencies. |
| M13 | Monitoring of bird populations at strategic sites | As advised by EN / CCW | £3,000 | Specific sites | Maximise use of existing data collection by E.N., RSPB, etc. Detailed programme will arise from CHAMP requirements. |
| M14 | Biological monitoring of specific sites | | £3,000 | Specific sites | |
| M15 | Analyse data and compile annual report | 1 per year | £3,750 | Sub-cell wide and per authority | |

Monitoring frequencies will need regular review with a view to relaxation if the measured data show little change between successive surveys and the system elements will need to be phased in to smooth out cash-flow requirements.

Such a system requires a suitable software analysis system and, two such systems that are currently available:- Halcrow's SANDS system and Key Systems KEYSHORE system, provide the most suitable tools for data collection and analysis.

Wirral Metropolitan Borough Council has a licence for use of the KEYSHORE data collection system and Conwy operates SANDS. Lancaster City Council operate the IMAGINE software suite to permit geo-referencing of vertical aerial photographs and their subsequent overlay with earlier and later photographs of the same area.

6.3 *Future Studies*

General Comment

The collection, collation and analysis of presently available data carried out during preparation of the Shoreline Management Plan has identified specific areas where there are gaps in existing knowledge of the shoreline that require filling if on-going SMP update and review is to be progressed in the future.

Whilst much data will come from the proposed strategic monitoring system that is recommended to be set up (as detailed in Section 6.2), specific one-off studies will also be required to provide information that does not necessarily require regular updating. Such studies will either be strategic to the whole or parts of the sub-cell, in which case cell-wide funding by all members of the SMP Partnership will be required, or specific to certain locations or smaller sections of the shoreline in which case single Authority funding is more likely to be appropriate.

To assist in prioritising future studies and to provide a guide as to the anticipated levels of expenditure likely for each of the studies, cost estimates for each element have been identified within one of four bands as follows:

- <£10,000
- £10-50,000
- £50-100,000
- >£100,000

The above costs assume that relevant monitoring data recommended in Section 6.2 is available to assist carrying out of the studies. The following specific studies are proposed in the SMPs:

6.3.1 *Strategic Studies*

(S1) Geomorphology Study

Present geomorphological data has been gained from a variety of different studies that generally only deal with smaller sections of the shoreline and do not necessarily provide 100% coverage of the whole sub-cell shoreline. There is the need for a sub-cell wide desk study of geomorphological evolution of the shoreline to bring together the present information in a single volume that cascades from cell-wide considerations into the more local appreciation. Any significant gaps that require specific study could be identified for on-going Partnership consideration. For Sefton the correlation (if any) of Formby Bank morphology changes with deposition of dredging arisings at Jordans Spit needs assessment together with shoreline exposure changes to be expected with the ongoing retreat of Formby Point.

ESTIMATED STUDY COST: <£10,000

(S2) Extreme Water Level Predictions

Recent improved methods of analysis and determination highlighted in the three stage MAFF funded project carried out by Proudman Oceanographic Laboratory should, when completed, provide systems for definition of extreme levels at all coastal sites. The EA have recently commissioned a study to update all the predictions on a Cell 11 wide basis. It is appropriate as part of the recommendations for the SMP for all this information to be brought together to extend predictions particularly to the Hightown, Formby and Ribble Estuary frontages.

ESTIMATED STUDY COST: <£10,000

(S3) Wave and Water Level Joint Probability

Coastal flooding usually arises from a combination of severe storm waves coupled with high tide levels. The joint probability of wave and water levels occurring was analysed following the 1990 Towyn event and interpolated results have been provided in the SMPs for a number of locations across the Plan frontage. These results however require updating to take into account new water level data and extension into areas where there is at present no data available, e.g., Hightown, Ribble Estuary.

ESTIMATED STUDY COST: £10-50,000

(S4) Tidal Flows

Tidal current behaviour is not very well defined over the sub-cell and there is little specific data available inshore. The use of data collection and numerical modelling techniques should be applied over a spring/neap tide cycle in order to provide better definition of this parameter which is fundamental to obtaining better sediment movement definition within the sub-cell (see S5 below).

ESTIMATED COST: £10-50,000

(S5) Sediment Movement Definition

The present definition of sediment movement is largely qualitative, providing general data on sediment movement directions rather than quantities. Whilst it must be appreciated that defining sediment movement is not presently considered as an exact science, a qualitative assessment using a combination of theoretical numerical

modelling and practical data collection is required in order to provide a better understanding of littoral drift behaviour.

ESTIMATED STUDY COST: £50-100,000

(S6) Critical Nature Capital / Constant Natural Assets

In 1995 English Nature introduced the concept of Critical Natural Capital as a means of identifying those part of the nations environment and resource that must be conserved if future development within the coastal zone is to be sustainable and irreversible environmental loss was to be avoided. Whilst providing a definition of Critical Nature Capital the identification of actual physical on the ground species/habitat areas has proved more problematic. However if the identification of such resources are critical in achieving future sustainable development, including provision of coastal defence, then clearly detailed identification of areas within SMPs is required. Within the present SMP, the current approach has been to identify all designated conservation areas as being both CNC and CNA. This is clearly not helpful if it means that coastal defence actions, which might otherwise be economically and technically sustainable, cannot be carried out, with obvious knock-on human and social implications. It is important that if the concept of CNC/CNA is to be accepted that the criteria for evaluation are agreed and proposed areas within the sub-cell are identified for future plan considerations.

ESTIMATED COST: £10-50,000

(S7) Intangible Benefit Evaluation

The strategic policy appraisal has identified appropriate policies for management units, with the justification for coastal defence works and/or management requiring detailed economic analysis. Whilst in many cases valuation of tangible benefits (land, property, infrastructure) is sufficient to justify expenditure, in other areas benefits that are not readily quantifiable may be needed to support policy decisions. (e.g. at Hightown).

Within the coastal zone much may rest on evaluation of:

- Environmental Gains / Losses;
- Recreation Usage.

The collection of data/information will be of use for the Contingency Valuation of intangible benefits (the willingness of the public to pay to see particular conditions preserved). These methods may be essential if Government funding support for appropriate coastal defence management measures is to be obtained.

ESTIMATED COST: <£10,000 per Site

(S8) Coastal Survey Review

Existing coastal defence data has been from two sources:

- MAFF Coast Protection Survey of England 1994
- NRA Sea Defence Survey 1991

Although broadly similar, preparation of the SMP has identified differences and it would be appropriate to bring all the information together within a single survey to one format that provides for more effective dissemination of information.

ESTIMATED STUDY COST: £10-50,000

(S9) Feasibility of Managed Retreat / Removal of Life Expired Defence

A number of management units have been identified as having the potential for managed retreat as a long term policy for coastal defence, subject to detailed assessment and consideration. At present there is insufficient specific knowledge of the effects of releasing currently restrained sections of shoreline back to nature. Further desk study of historical shoreline behaviour and numerical or physical modelling is required to provide sufficient data on which to confirm policy decisions.

ESTIMATED STUDY COST: £10-50,000 per site.

(S10) Post Project Appraisal

A number of coastal defence works have been recently completed around the shoreline of sub-cells 11a and 11b, eg. Southport Marine Drive Floodwall. In order that appropriate data for policy confirmation can be collected Post Project Appraisal of these schemes should be carried out.

ESTIMATED STUDY COST: <£10,000 per project.

(S11) Appraisal of Coast Defence Revenue Expenditure against Whole Life Defence Costs

Revenue expenditure on coastal defences ranges considerably within Cell 11 dependent on both geographical position and coastal manager. With over 75% of management units advocating at least a potential hold the line policy and many of them on an effective Do-minimum basis, there is the need for a detailed examination of revenue expenditure costs against whole life costs for coastal defence.

ESTIMATED STUDY COST: £10-50,000

(S12) Beach Hazard management

Work not directly linked to coastal defence can create hazards on the foreshore that require mitigation on the foreshore in order to ensure both public safety and coastal defence integrity. Activities such as sandwinning or outfall construction can affect sediment behaviour and may cause disturbance, for instance to the flow of tidal water across the beach. Such activities require particular identification and study for appropriate response.

ESTIMATED STUDY COST: <£10,000 per site.

(S13) Improved Landscape Definition

Information made available by appropriate Agencies for preparation of the SMP with regard to landscape definition has been generally insufficient for specific landscape issues to be dealt with. It is proposed that a desk study to collate this information is carried out within the first plan review period to update the information presently made available such that informed judgements on local landscape implications can be made in the future.

ESTIMATED STUDY COST: <£10,000

6.3.2 Local Studies

Specific studies recommended in the Liverpool Bay and Ribble Estuary SMPs relevant to Sefton's coast are as follows.

Liverpool Bay SMP**(L1) River Mersey SMP Boundary Review**

The current SMP boundary is the Coast Protection Act Schedule IV boundary - a line running from the south side of Seaforth Dock to Seacombe Ferry. Preparation of the SMP has identified the need to consider the whole of the Estuary as a single coastal process and shoreline management entity. It is therefore appropriate to consider in more detail the need for relocation of one or both of these boundaries in the River Mersey.

ESTIMATED STUDY COST: <£10,000.

(L6) River Alt Training Wall – Integrity Assessment

The existing wall is in a dilapidated condition but continues to function effectively. The integrity of the structure is not known and needs evaluation to ensure appropriate management and maintenance of the area.

ESTIMATED STUDY COST: <£10,000.

(L13) Crosby to Hightown

The existing fill behind the sea wall and in some areas facing the present ad-hoc defences contains traces of pollutants. The consequences of allowing this pollution to enter the Mersey Estuary and the requirement to maintain an appropriate standard of defences, require detailed assessment.

ESTIMATED STUDY COST: <£10,000.

(L15) Crosby Wind Blown Sand / Beach Management

Southerly littoral drift along the south Sefton shoreline causes the accumulation of sediment along the Crosby frontage with associated wind-blown transport of sand. The area has always been subject to sand blow, but the problems are now exacerbated by the build up of the beach following the 1937 diversion of the River Alt, the 1970's construction of the sea wall and promenade and the prohibition of commercial sand extraction from Crosby beach. Present control methods include fostering the development of sand dunes seaward of the Promenade and recycling wind-blown sand to Hall Road West. Control and appropriate recycling of sand need to be considered in further detail as part of the overall shoreline management for the area.

ESTIMATED STUDY COST: <£10,000.

Ribble Estuary SMP**(L2) Ribble Estuary Study**

The Shoreline Management Plan has clearly identified that future coastal defence requirements within the Ribble Estuary are very much a function of how the regime behaves following nearly two centuries of intervention by man. In particular the cessation of training wall maintenance and channel dredging are likely to be fundamental criteria in this respect.

In order that appropriate management actions and preferred policies can be confirmed, prior to say training walls collapsing and/or present channel / bank arrangements changing, it is considered appropriate for a detailed study using up to date physical and/or numerical modelling of the estuary to be carried out to provide the best possible estimate of likely future estuary changes and to define the implications for future coastal defence provision.

ESTIMATED STUDY COSTS: £50-100,000

(L3) Effects of Sandwinning Operations

A privately funded study into the effect of these operations on the behaviour of coastal processes within the estuary has been carried out during the time of the SMP preparation as part of Rainford's planning application for continuation of their operation at Horse Bank, Southport.. In addition, a further independent study commissioned by Lancashire CC is considering both the Horse Bank and Salters Bank, Lytham operations. These studies will provide valuable inputs into the database and it is recommended that the results of all these studies are obtained and evaluated to provide further input into ongoing plan operation and review.

ESTIMATED STUDY COSTS: <£10-50,000

(L8) Formby Point Study

Up until the end of the 19th century Formby point was advancing to seaward, however changes in natural process behaviour and associated effects of human interference e.g. disposal of River Mersey and Ribble dredging arisings, sewage sludge disposal, River Mersey training etc. have reversed this trend since 1900, such that the shoreline is now in the position that it was in 1850 and it is still receding. There is the need to examine relevant data applying and to define, if possible, the limits of recession that could be reached within the plan's timescale. Information from the present SMP database and from other studies proposed, e.g. S1 will be used as input to this study.

ESTIMATED STUDY COSTS: <£10-50,000

6.3.3 Coastal Strategy Plans

In addition to the specific strategic and local studies identified above, particular coastal process units or groups of management units lend themselves to a wider approach to management than on an individual basis.

MAFF have provided interim guidance on the development of coastal strategies and generally a strategy will be appropriate:

- Where there is advantage in considering problems and solutions in the longer term and over a wide geographic area. For example, enhancement of beaches by large scale intervention in coastal process systems or the initiation of long term changes in estuary or river morphology.
- Where implementation of a programme of works or management is to be carried out over long time scale, typically greater than five years, such as the ongoing long term management of beaches.
- Where there is a hydraulic or process connection between physically separate works. Such connections may not always be obvious or readily apparent and some may only become known as a result of further research, such as that into the processes, form and function of estuaries. Examples of obvious connections are the provision of a river flood relief channel which may well increase peak flows downstream or a beach control structure which will interrupt longshore sediment drift to adjacent beaches.
- Where there is a physical interconnection between benefit areas, for example, situations where flood risk areas are contiguous and a breach or overtopping in any one of several locations could lead to flooding of the whole area.

- Where several smaller problems can be addressed in an integrated way, for example where flood alleviation can be achieved by enhancement of the total storage in a catchment or by a major river diversion scheme.
- Where environmental or other implications extend outside the immediate area of a scheme. For example, the continuing erosion of a cliff or foreshore providing a source of recharge for down-drift beaches, mudflats or saltmarshes. Particular consideration will be required where works may effect the integrity of a site designated under the Habitats Directive or other protected area.

The primary criteria for identifying appropriate lengths of shoreline for development of strategy plans should be the Coastal Process Unit (CPU) division identified within the first stage of the SMP Process.

However because there can be a wide range of coastal defence measures i.e. from natural defence to hard vertical sea walls, applying across a CPU it will not always be appropriate for strategies to cover the whole of a unit and shorter lengths, consisting of one or more management units (MU) may form the basis of strategy development, dependent on coastal process implications.

The preferred policies and the future intervention timescale identified by the SMP has provided the initial basis for identification of whether a strategy would be appropriate.

For Sefton the length of shoreline recommended in the SMP as appropriate for a Strategy Plan is from Crosby Marine Park to Formby Point.

7.0 Coastal Defence Projects

SMP Recommendations

The proposals for the intervention works described below have been formulated in accordance with the recommendations of the Liverpool Bay and Ribble Estuary SMPs. The following table sets out the recommendations of these SMPs.

| Liverpool Bay SMP | | | | | | | |
|---------------------------|---|-------------|------------------|------------------------------------|---|----------------------------|----------------|
| No. | Management Unit | Length (km) | Coastal Managers | SMP Preferred Policy | | Future Intervention Timing | |
| | | | | Short Term | Anticipated Long Term | Capital | Maintenance |
| 8/1 | Seaforth Dock | 1.9 | MDHC | Hold the Line | Hold the Line | Beyond 10 years | Within 5 years |
| 8/2 | Crosby Marine Lake to Hall Road West (Blundellsands) | 3.4 | Sefton | Hold the Line | Hold the Line | Within 5 years | Within 5 years |
| 8/3 | Hall Road West (Blundellsands) to River Alt Pumping Station | 3.1 | Sefton/EA | Selective Hold the Line/Do Nothing | Selective Hold the Line/Managed Retreat | Within 5 years | Within 5 years |
| 8/4 | River Alt Pumping Station to Formby Point | 3.2 | Sefton/EA/MoD | Do Nothing | Do Nothing | No Intervention | Within 5 years |
| Ribble Estuary SMP | | | | | | | |
| 8/2 | Formby Point To Dale Slack Gutter | 1.9 | Sefton | Natural Defence Management | Natural Defence Management | Beyond 10 years | Within 5 years |
| 8/1 | Dale Slack Gutter to NNR North Boundary | 1.5 | Sefton | Natural Defence Management | Natural Defence Management/ Hold the Line | Beyond 10 years | Within 5 years |
| 7/3 | NNR North Boundary to Pontins | 3.8 | Sefton | Natural Defence Management | Natural Defence Management/ Hold the Line | Beyond 10 years | Within 5 years |
| 7/2 | Pontins | 1.0 | Sefton | Natural Defence Management | Natural Defence Management/ Hold the Line | Beyond 10 years | Within 5 years |
| 7/1 | Pontins to Selworthy Road | 3.2 | Sefton | Hold the Line | Hold the Line | Beyond 10 years | Within 5 years |
| 6/3 | Selworthy Road to Weld Road | 4.6 | Sefton | Hold the Line | Hold the Line | Beyond 10 years | Within 5 years |
| 6/2 | Weld Road to Fairway | 5.9 | Sefton | Hold the Line | Hold the Line | Within 5 years | Within 5 years |
| 6/1 | Fairway to River Crossens | 4.6 | Sefton /EA | Hold the Line | Hold the Line | Beyond 10 years | Within 5 years |
| 5/5 | River Crossens to Hundred End Gutter | 5.5 | Sefton/ W.Lancs | Hold the Line | Hold the Line | Within 5 years | Within 5 years |

7.1 Crosby to Hightown Coast Protection Works (MU 8/3 Liverpool Bay)

- 7.1.1 The behaviour of the Crosby to Hightown coastline is described in Section 4.3 of this report. The construction of a continuous sea wall would not be an appropriate form of defence for this length of the coastline because the river acts as an obstruction to natural beach nourishment on its landward side. A conventional sea wall would be continuously undermined by the loss of beach material at its toe.
- 7.1.2 The protection of this vulnerable coastline will probably be achieved by the management of the course of the river along the shoreline. The Alt training bank, constructed in 1937, was a first step in this direction. It provided a successful solution to the serious erosion at Burbo Bank Road caused by the meandering of the River along the Crosby shore.
- 7.1.3 Details of a proposed coastal defence scheme, based on the control of the River Alt, were submitted to the Ministry of Agriculture Fisheries and Food (MAFF)

in 1995 in support of an application for grant aid under the Coast Protection Act 1949. MAFF did not accept the urgency of the scheme and it was jointly agreed to await the recommendations of the Shoreline Management Plan (SMP) for this area. The research and monitoring work undertaken in support of the scheme have added to the understanding of local shoreline conditions and will be used in future studies.

- 7.1.4 The SMP is nearing completion and should be submitted to the Council by the end of 1999. The draft SMP recommends that the Council should commission a strategic study with the objective of discovering the most suitable and sustainable form of coastal defence for this area. It includes recommendations for monitoring the underlying physical processes and the corresponding behaviour of the shoreline. There is an urgent need to put in place a system of measurement that can be observed by local residents and reported on regularly, so as to establish a more scientific basis for intervention.

7.3 *Dune Management at Formby (MUs 8/2 & 8/1 Ribble Estuary SMP)*

- 7.3.1 In recent years the average rate of dune erosion at Formby shows a general relationship with the frequency of westerly storms. Significant dune erosion occurs when major storms coincide with high tides.
- 7.3.2 In the 1970s it was recognised that co-ordinated efforts were needed to protect the dunes and their wildlife from the severe degradation resulting from a combination of beach erosion and increasing recreational pressure. The Sefton Coast Management scheme was initiated as a partnership between the Local Authorities, national conservation and recreation agencies and landowners. The result is a comprehensive and developing management policy for the coastal zone.
- 7.3.3 The Coast Management Plan seeks to reconcile the sometimes conflicting viewpoints of coast protection, public access and wildlife conservation. From the coast protection viewpoint, the dunes comprise a reservoir of sand which is eroded during storms and taken offshore but which returns to the beaches during favourable weather. Artificial stabilisation of the frontal sand dunes by means of fencing, planting and fertilisation encourages the deposition of blown sand and also contributes to the build-up of beach levels on the adjoining shore. A high beach and an accreting sand dune system are effective absorbers of wave energy with an in-built ability to recover from storm damage.
- 7.3.4 Conservation agencies prefer minimum interference with natural systems and dislike “over-stabilisation” which tends to discourage the diversification of wildlife. Concern has been expressed that building up the dunes at Formby may reduce the supplies of drift-sand to the Freshfield/Ainsdale frontage, leading to a higher rate of local erosion.
- 7.3.5 Clearly, dune management policies need to be linked to a thorough understanding of the physical processes. The studies S1 to S7 and L8 proposed

in section 6.3 above, linked to continued monitoring of the beach/dune interface, will provide the information base needed to guide the future management of this important element in the Borough's coastal defences.

7.4 *Marine Drive Sea Defences (MU 6/2 Ribble Estuary SMP)*

- 7.4.1 Marine Drive was originally a beach causeway over which the highest tides could pass in order to fill the Marine Lake. The importance of the highway increased when the final links in the Coastal Road network were completed in 1975. Because the road remained at its original 1895 level it was regularly flooded and was closed to traffic on approximately 60 occasions every year. This caused costly delay and disruption to traffic and the Council incurred considerable expenditure in cleaning up after each flood event. The Council and commercial leisure operators also lost considerable income because of the road closures.
- 7.4.2 The need to alleviate this flooding was recognised as the Council's top coastal defence priority. A three phase scheme was approved in principle by the Ministry of Agriculture Fisheries and Food in 1995 and the first phase, 1.2km long, from Esplanade to the Marine Lake Sluice was undertaken between February 1997 and March 1998. The total cost of the first phase was £4.5 million, of which £1.1 million was European Community Objective 1 funding. It included a pedestrian promenade on the seaward side of Marine Drive, approximately one metre higher than the carriageway, with a 0.7 metre concrete wave wall on its seaward side. Pedestrian ramps to the beach were incorporated at the Pier, Pleasureland, and Esplanade. Vehicle access was maintained at Esplanade, for beach parking at peak times, and at the Pier for emergency and service vehicles. The Objective 1 contribution funded a high standard of amenity and decoration, befitting the prominent, central, seafront leisure zone status of the floodwall and promenade.
- 7.4.3 The two following phases are designed to achieve a consistent standard of flood defence on either side of the new Floodwall. Phase 2, from the Sluice to Fairway, involves reconstruction of the 1.3km existing sloping revetment, with a 0.5 metre wave wall at its crest. The estimated cost is approximately £3M. This sea defence embankment has reached the end of its useful life. It is of an unusual construction in that the tipping of household refuse formed part of its embankment. The implications of this construction were not too serious when the embankment served only to enclose the outer edge of the Marine Lake. However, the embankment now carries the coastal road and the land between the embankment and the Marine Lake is intended for leisure and residential development. A private proposal has been approved for housing on the land on the north Marine Lake Shore. The developer has agreed to fund, by means of a Planning Agreement, the cost of strengthening the sea wall abutting the site. The developer has also agreed to raise the site level to protect it against inundation from tidal flooding.
- 7.4.4 Phase 3, from Weld Road to Esplanade, will involve reconstruction of the 0.5km length of existing sloping revetment, with a 0.3 metre wave wall at its crest.

The embankment was formed from beach sand and demolition rubble and it is in a reasonable state of compaction. The beach fronting this section is at a higher level than the northern phases. Sand dunes are spreading progressively north from the Weld Road end. These will be maintained as beneficial to the integrity of the sea defence

ANNEX A SEFTON COASTAL DEFENCE STRUCTURES, LOCATION CONDITION AND PERFORMANCE

| COASTAL DEFENCE STRUCTURES - SEFTON COASTLINE | | | | | | | | | | | | | | | |
|---|-------------------------------------|-------------------------------------|--|----------------------|------------------------|---------------------------------|-----------------------|------------------------------|---|---|-----------------------|--|---------------------------|---|--|
| (Bootle to Formby Point) | | | | | | | | | | | | | | | |
| Structure Name | Owner | Purpose | Structure Type | MAFF reference 210/ | Length | Crest Level | Date Const' | Date of Last Recon' | Future Proposals | Beach Type | Beach Level | Beach Performance | Width of Defence | Land Level at Rear | Risk Assessment |
| Mersey Dock Wall - Brocklebank to Gladstone | Mersey Docks and Harbour Company | Dock Wall | Vertical River Wall | | 220 m | 9.00 m AOD | Pre 1900 | | | River Bed | -3.00 m AOD | Stable | 60.0 m | 7.00 m | Very low |
| Royal Seaforth Dock Wall | Mersey Docks and Harbour Company | Land Reclamation /Dock Wall | Rock Armoured Sloping Revetment | 8701 | 2200 m | 8.00 m AOD | 1970 | | | River Bed | -3.00 m AOD | Stable | 20.0 m | 8.00 m AOD | Very low |
| Crosby Seawall Seaforth to Mariners Road | Sefton MBC | Coast Protection - Land reclamation | Stepped Concrete Revetment with Wave Wall | 8702 8703 | 1600 m | 7.50 m Prom 8.1 m flood wall | 1972 | | None | Sand | 5.00 m AOD | Accreting | 30.0 m | 8.00 m AOD | Low |
| Coastal Seawall Mariners Road to Hall Road West | Sefton MBC | Coast Protection | Stepped concrete Revetment with Wave Wall | 8704 8705 8706 | 1950 m | 6.4m Prom 7.30 m flood wall | 1975 | 1984 £40K 1992 £70K | Strategic study proposed to establish priorities and proposals for strengthening and reconstruction | Sand | 5.00 m AOD | Accreting at Mariners Road- Eroding at Hall Road | 30.0 m | 8.00 m AOD | At risk if Alt revetment fails and will lead to erosion/loss of property |
| Hall Road to Alt Revetment Coastline | Sefton MBC | Coast Protection | Sloping Rubble-Reinforced Non-Armoured Revetment | 8707/1 | 1000 m | Appr 8.00 m AOD | 1945-1974 | None | | Sand/ Brick and Stone Rubble | 5.00 m AOD | Revetment eroding & feeding beach with rubble | 50.0 m | Variable sand dunes over 8.00 m AOD | Further erosion will lead to out flanking/ undermining of Crosby Sea Wall |
| River Alt Revetment | Sefton MBC (EA interest) | Coast Protection via River Training | Shore connected Rubble Breakwater | 8707/2 | 800 m @ Angle to Coast | + 3.00 m AOD to 0.00 m AOD | 1936 | 1945 and 1969 | | Sand and Silt | 2.00 m AOD (Nr Shore) | Eroding near shore | 15.0 m | Connected to land at approx 8.00m AOD | Eroding and subsiding failure will affect beaches, coastline and property to south |
| Alt Revetment to Fort Crosby Coastline | Sefton MBC | Coast Protection/ Sea Defence | Rubble, Stone and Brick Tipped Bank | 8708 | 800 m | Approx 8.00m AOD | 1936-1974 | | | Sand and Silt with Brick and Stone Rubble | 5.00 m AOD | Eroding | 60.0m minimum | Less than 6.00 m AOD | Risk of breach leading to local flooding |
| Fort Crosby to Hightown Coastline | Sefton MBC | Mainly natural | Dune Remnants | 8709 | 1200 m | | | | | Sand and Silt/Brick Rubble in South | 5.00m AOD | Eroding and exposing underlying Peat | Undef- ended | Variable Sand Dunes over 8.00 m AOD | Unchecked Erosion will eventually threaten property |
| Hightown to Cabin Hill Formby Coastline | Ministry of Defence | Natural | Sand Dunes | 8710 | 2000 m | | Re- claimed from 1790 | | | None | Sand | 5.00m AOD | Accreting | Dune Belt at Least 500 m | Less than AOD 5.0 m |
| Cabin Hill Dunes | English Nature | Natural | Natural Sand dune Coastline | 8711 | 900 m | | | | None | Sand | 5.00m AOD | Accreting | Dune belt at least 3000 m | Less than 5.0m AOD Protected by secondary EA flood-bank | None at present (continue to monitor) |
| Cabin Hill to Blundell Road | Private Beach managed by Sefton MBC | Natural | Sand Dune Coastline | 8711 | 2500 m | | | | None | Sand | 5.00 m AOD | Eroding at average 2m/year | Dune Belt 1500-200 m | Below 5.0m AOD (at 3km from coast line) | Amenity Land being lost. No imminent risk to habitation |

| COASTAL DEFENCE STRUCTURES - SEFTON COASTLINE (Formby Point to Southport) | | | | | | | | | | | | | | | PAGE 2 OF 3 |
|---|--|--|--|----------------------|--------|-------------|--|-------------------------|---|------------|-------------|-------------------------|-----------------------------------|-------------------------------------|--|
| Coastline Name | Owner | Purpose | Structure Type | MAFF Reference | Length | Crest Level | Date Const' | Date Of Last Recon' | Future Proposals | Beach Type | Beach Level | Beach Performance | Width of Defence | Land Level At Rear | Risk Assessment |
| Blundell Road to Massams Slack | National Trust | Natural | sand | 8712 | 2400 m | | | | None | Sand | 5.00m AOD | Eroding (ave 4m/year) | Dune Belt 2000-3000m | Below 5.0 m AOD (at 3km from coast) | As above |
| Massams Slack to EN Barrier Ainsdale | English Nature (National Nature Reserve) | Natural | Sand Dune Coastline | 8713 | 2000 m | | | | None | Sand | + 5.00m AOD | Eroding (Ave 4.5m year) | Dune Belt 2500 m | As above | As above |
| EN Ainsdale Beach Barrier to Weld Road Coastline | Sefton MBC | Natural | Dune Coastline | 8714 8715 8716 | 6500 m | | | | None | Sand | +5.00 m AOD | Accreting | Dune Belt Apx 500 m | As above | None at present continue to monitor |
| Weld Road to Esplanade Sea Wall | Sefton MBC | Sea Defence/ Highway embankment | Concrete Faced Revetment | 8718 | 850 m | 7.30 m AOD | 1975 | | Requires re-construction-Floodwall Phase 3. (2001) | Sand | 5.00 m AOD | Accreting at south end | 15.0 m | 5.5 m AOD | Low strength structure susceptible to storm damage no risk to habitation. |
| Marine Drive Floodwall | Sefton MBC | Sea Defence / Highway | Concrete faced revetment with Promenade. | 8719 | 1250 m | 7.8m AOD | Original 1890. Marine Parade to sluice 1960. | 1998 Flood-wall Phase 1 | New structure Monitor performance against project objectives. | Sand | 5.00m AOD | Stable | 18 metre berm, wavewall and prom. | Apx 5.00 m AOD | New structure has minimised risk. Phases 2 and 3 needed to complete defence. |
| Marine Lake Sluice to Fairway Seawall | Sefton MBC | Land reclamation/ Highway | Sett faced embankment | 8720 | 1150 m | 7.30 m AOD | 1960 | | Requires strengthening Floodwall Phase 2. (2000). | Sand | 5.0 m AOD | Stable | 50.0 m | Circa 5.00 m AOD | Deteriorating condition puts highway and leisure-related land at risk |
| Fairway to Hesketh Road Seawall | Sefton MBC | Land reclamation/ Flood defence/ Highway | Concrete faced embankment | 8721 | 600 m | 7.30 m AOD | 1927 | | Requires monitoring | Sand | 5.0 m AOD | Stable | 50.0 m | 4.50 m AOD | Low risk to habitation essential to maintain primary and secondary defences |
| Hesketh Rd to Marshside Rd Seawall South Section | Sefton MBC | Land reclamation/ Flood defence/ Highway | Open-Stone Asphalt faced embankment | 8722/1 | 300 m | 7.30 m AOD | 1968 (concrete slabbing) | | Requires monitoring | Silty sand | 4.50 m AOD | Stable | 50.0 m | 4.50 m AOD | As above |
| Hesketh Rd to Marshside Rd Seawall North Section | Sefton MBC | As above | Concrete faced embankment | 8722/2 | 1000 m | 7.30 m AOD | 1968 | 1968 | Requires monitoring | Silty sand | 4.50 m AOD | Stable | 50.0 m | 4.50 m AOD | As above |
| Marshside Rd to Millars Pace Seawall | Sefton MBC | Land reclamation/ Flood defence/ Highway | Concrete faced embankment | 8723 | 850 m | 7.30 m AOD | 1970 | | Requires monitoring | Salt Marsh | 4.50 m AOD | Stable | 50.0 m | 4.50 m AOD | Low risk to habitation essential to maintain primary and secondary defences |
| Millars Pace to Bank End Seawall | Sefton MBC | As above | Earth faced embankment | 8724 | 1500 m | 7.30 m AOD | 1970 | | Requires monitoring | Salt Marsh | 4.50 m AOD | Stable | 50.0 m | 4.50 m AOD | As above |

| COASTAL DEFENCE STRUCTURES - SEFTON COASTLINE | | | | | | | | | | | | | | | PAGE 3 OF 3 |
|---|--------------------|---|---|---------------|----------------------------|------------------|-------------|---------------------|--|-----------------|-------------------------|--------------------------------------|------------------|-----------------------------|---|
| Structure Name | Owner | Purpose | Structure Type | MAFF / EA Ref | Length | Crest Level | Date Const' | Date of Last Recon' | Future Proposals | Beach Type | Beach Level | Beach Performance | Width of Defence | Land Level At Rear | Risk Assessment |
| Harrogate Way Crossens Embankment | Environment Agency | Flood Protection | Earth embankment with sheet pile core and concrete capping beam | | 650 m | 7.30 m AOD | 1890 | 1978 | | Salt Marsh | 4.50 m AOD | Stable | 25.0 m | 4.50 m AOD | This is a primary defence protecting habitation. Continued maintenance is essential |
| Crossens Marsh Embankment | Environment Agency | Land reclamation/ Flood protection | Earth embankment | | 1500 m to Borough Boundary | Circa 6.80 m AOD | 1890 | | | Salt Marsh | 4.50 m AOD | Stable | 25.0 m | 4.50 m AOD | Low risk to habitation which is protected by secondary embankments |
| SECONDARY COASTAL DEFENCE STRUCTURES - SEFTON COASTLINE | | | | | | | | | | | | | | | |
| Ravenmeols Flood Bank | EA | Secondary Bank to seal a potential gap in the sand dunes defences | Earth bank | | 650 m | 7.9 m AOD | C 1970 | | EA to monitor condition of bank and its flanks | Inland Bank | Dune slacks 5.5 m AOD | The beach at Ravenmeols is accreting | 40 m | C 5 m AOD | Low risk under present conditions |
| Southport Esplanade | Sefton MBC | Originally a sea wall to protect Cheshire Lines Railway | Concrete wall | | 1400 m | 6.6 m OAD | C 1885 | | Monitor condition and avoid breaching | Inland Wall | Dune Slacks 5.0 m AOD | The Beach at Southport is accreting | 10 m | C 5.5 m AOD (Victoria Park) | Low risk as long as the 'Gaza Strip' remains at high level |
| Marine Lake Walls | Sefton MBC | Originally sea walls protecting Southport Promenade | Concrete walls | | 1750 m | 7.0 m OAD | C 1890 | | Monitor condition and maintain | Marine Lake Bed | Lake Bed 4.5 m AOD | As above | 15 m (Promenade) | C 5.5 m AOD | Very low risk under present conditions |
| Promenade/ Fleetwood Road Bank | Sefton MBC | Originally Sea Banks built to reclaim land | Earth Bank | | 1050 m | 7.0 m AOD | C 1882 | | Monitor local conditions | Inland Bank | Golf Course C 5.5 m AOD | As above | N/A | C 5.2 m AOD Fleet-wood Road | As above |
| Hesketh Road to Marshside Road Bank | Sefton MBC | Original Sea Bank built to reclaim land | As above | | 1350 m | 6.5 m | C 1890 | | Monitor conditions and maintain | Inner Marsh | ? C 5.0 m AOD | As above | 6 m | c 5.0 m AOD | Important secondary defence structure low risk if maintained |
| Marshside Road to Millars Pace Sea Bank | Sefton MBC | As above | As above | | 950 m | 6.5 m AOD | C 1890 | | As above | Inner Marsh | C 5.0 m AOD | Stable Salt Marsh | 6 m | C 5.0 m | As above |
| Millars Pace to Crossens Sea Bank | EA | As above | As above | | 900 m | 6.5 m AOD | C 1890 | | As above | Inner Marsh | C 5.0 m AOD | As above | 6 m | C 5.0 m AOD | EA monitor as above |

ANNEX B *THE ORGANISATIONAL FRAMEWORK***B.1 *Coast Protection and Sea Defence Authorities***

B.1.1 Maritime Local Authorities are the designated Coast Protection Authorities for the lengths of coastline within their area defined by the Coast Protection Act 1949. This Act enables Local Authorities and other owners or agencies, under the supervision of the Coast Protection Authority, to carry out work to prevent erosion of the land by the sea. For Sefton the coastline defined in this Act is from the southern corner of the Royal Seaforth Dock to the Borough boundary at Crossens.

B.1.2 The adjoining Coast Protection Authorities are the Metropolitan Borough of Wirral and West Lancashire District Council.

B.1.3 The Environment Agency (EA) has a duty to exercise a general supervision over all matters relating to flood and sea defence (See Annex D2). The Environment Agency and maritime local authorities work together on the flood protection of low lying ground and defending the coastline from erosion by the sea. Both the Agency and the maritime local authorities have powers to carry out sea defence works to protect low lying land against flooding by the sea. Private owners can also carry out work to protect their own land from flooding subject to the supervisory powers of the EA.

B.2 *The Regulation of Coast Protection and Sea Defence Works*

B.2.1 The Ministry of Agriculture Fisheries and Food (MAFF) regulates all aspects of Coastal Defence. Coast Protection and Sea Defence schemes must be submitted to the Ministry for authorisation and financial approval. Scheme sponsors are required to notify a list of consultees, which includes neighbouring Authorities, the Minister of Transport (in respect of the safety of navigation, the Acting Conservator of the River Mersey, Mersey Docks and Harbour Company, the Environment Agency, Trinity House, HM Coastguard, etc. Almost every part of the inter-tidal area of the Sefton Coast and a large part of the sand dunes are designated European Sites of Conservation Interest. This imposes a statutory duty to consult widely on proposals and to undertake environmental Assessment, in accordance with the Habitats Directive, for schemes of any significance.

B.3 *Coastal Groups and Shoreline Management Plans*

B.3.1 In order to improve co-ordination and the dissemination of technical information and research, coastal defence practitioners have established a number of Coastal Groups, which between them cover the whole of the English and Welsh coastlines. Sefton is a member of the Liverpool Bay Group which comprises the six coastal Authorities from Great

Orme's Head to the River Ribble, the Environment Agency, Railtrack (owners of several coast defence structures), English Nature, and the Countryside Council for Wales. Corresponding members include the Mersey Docks and Harbour Company, Merseyside Museums, the Ribble Estuary and Mersey Estuary Project Officers and Liverpool University (a centre of coastal engineering expertise). The Groups interface with MAFF and the Welsh Office, with each other, and with the other Planning and Conservation agencies concerned with the management of the coastal zone.

B.3.2 Shoreline Management Plans (SMPs) are a nationally adopted process to determine sustainable local coastal defence policies, and to set objectives for the future management of the shoreline. A sustainable policy is one that achieves harmony between the economy, society and the environment. It is a policy aimed at improving today's quality of life, without placing a burden on future generations or the natural world. The SMPs are based on the study of natural coastal processes and involve several stages of public consultation. The Ministry of Agriculture Fisheries and Food, the Welsh Office, the Environment Agency, local authorities and conservation bodies such as English Nature and the Countryside Council for Wales have developed the national guidance for preparing SMPs. This guidance and the SMPs themselves are reviewed and updated regularly to take account of new ideas and information.

B.3.3 The objectives of SMPs are to

- improve our understanding of coastal processes
- work in partnership with all interested organisations and the public
- prepare a setting for the long term planning of coastal defences.

B.3.4 A national study identified a series of coastal cells, within which sediment movements are mainly self contained. The coast from Great Orme's Head to the Solway Firth is one such cell. Five sub-cell based SMPs are being produced for this sediment cell. The Sefton Coast falls within two sub-cells, each with its own SMP. The Liverpool Bay SMP extends from Great Orme's Head to Formby Point. The Ribble Estuary SMP extends from Formby Point to the River Wyre.

B.4 *Land Ownership*

B.4.1 Sefton owns or manages a large part of the developed coastline. Other land owners include the Ministry of Defence at Altcar, the National Trust at Freshfield, English Nature at Formby, Ainsdale and Marshside, RSPB, the Duchy of Lancaster, and Formby Golf Club, (Figure 3).

B5 *Legal Framework*

B.5.1 There are two aspects to the responsibilities imposed by statute for coastal defence, namely:- Coast Protection, the protection of the coast against erosion

- by the sea and Sea Defence, the protection of land against flooding from the sea. The Ministry of Agriculture Fisheries and Food (MAFF) is responsible for flood and coastal defence policy in England and administers the legislation that enables flood and coastal defence functions to be carried out. MAFF contributes to the funding of capital defence measures, undertaken by the authorities, which meet established criteria. Coastal defence works cannot be undertaken, except in cases of emergency, without prior consent from MAFF.
- B.5.2 Under the Coast Protection Act, 1949, the Council for a maritime district is the Coast Protection Authority and has the power to carry out such coast protection work as may appear necessary or expedient for the protection of any land in their area. It should, however, be noted that this is a power and not a duty.
- B.5.3 The Environment Agency (EA) is a public body established by the Environment Act 1995. Under the Land Drainage Acts of 1991 and 1994, as amended by the Environment Act 1995, the EA has a duty to exercise a general supervision over all matters relating to flood defence. The EA has powers to maintain, improve, and construct works to protect land from flooding from the sea and from rivers. Again, it should be noted that these are powers and not duties. The EA is required to exercise most of its flood defence powers through statutory Flood Defence Committees. A Regional Flood Defence Committee has been appointed for the North West of England.
- B.5.4 Local authorities have permissive powers to undertake flood defence works on watercourses that are not designated as 'main rivers', and to reduce the risk of flooding by the sea. Sefton Council and its predecessors have, historically, taken a lead role in providing and maintaining sea defence works. Annex A includes the ownership of the sea defence and coast protection structures in Sefton.
- B.5.5 Although there is, apparently no legal requirement for the Local Authority to provide sea defences, the fact that Sefton has assumed responsibility for the maintenance of some flood defence banks within its area, could mean that, in the event that the Council was negligent in failing to properly maintain those banks, then there may be a possibility that property owners might seek to claim damages from the Council for any damage which may be done to property as a result of the failure of the flood defence banks. However, it would appear that the Council would not be liable if flooding arose in an area where no flood defences are provided.

B.6 *Funding Arrangements*

B.6.1 Revenue Support Grant & Standard Spending Assessments

B.6.1.1 The general funds of local authorities come from Revenue Support Grant (RSG), a share of national non-domestic rates and council tax. These general funds can be spent on whatever are the authority's priorities, subject to fulfilling its statutory obligations. In addition to their own expenditure, local authorities pay flood defence and land drainage levies to the Environment Agency.

B.6.1.2 The distribution of RSG is based in part on a Standard Spending Assessment (SSA) calculated for each local authority. RSG is distributed to each receiving authority, so that if it were to spend at the level of its SSA then, subject to certain qualifications, all billing authorities could set broadly the same council tax for dwellings in the same valuation band in any area.

B.6.1.3 Two parts of the SSA are relevant to flood defence and coast protection. One relates to the maintenance, or day-to-day, costs associated with these services. The other relates to the cost of servicing borrowing undertaken on the strength of Supplementary Credit Approvals (SCAs). Capital Scheme approvals attract SCA and the power to borrow money on the amount outstanding after the deduction of all grant aid. The DETR has clarified that loans may be repaid over 40 years for schemes which have a design life of 50 years.

B.6.1.4 The element of the SSA for the day-to-day expenditure on flood defence and coast protection is calculated annually by DETR, determined by a formula. The formula for authorities' own expenditure is currently based on the average of expenditure 2 to 4 years earlier whereas the formula for EA levies is based on amounts from the previous year. The national totals reflect public expenditure decisions. They tend to be fairly close to the total of the EA levies, IDB special levies and authorities own spending.

B.6.1.5 The element of the SSAs relating to the cost of servicing borrowing is based on a notional debt for each authority, reflecting the SCAs that have been issued to the authority.

B.6.1.6 The overall effect of these arrangements is that the cost of flood defence and coast protection has little effect on council taxes. This is because changes in day-to-day costs of flood defence and coast protection, and much of the debt charges, are matched by quite similar changes in the distribution of RSG.

B.6.2 Grant Aid

B.6.2.1 *Sea Defence*

Grant aid for sea defence works is available from the Ministry of Agriculture, Fisheries and Food (MAFF) under the 1991 Land Drainage Act.

The basic grant is 25% with an additional tidal supplement of 20%, giving a possible total maximum grant of 45%.

To qualify for grant the scheme must prevent tides flooding land at or below sea level. It must be shown to be effective in this objective through technical soundness and it must be economically justifiable whilst demonstrating an environmental sensitivity.

B.6.2.2 *Coast Protection*

Grant aid for coastal protection works is available from MAFF under the 1949 Coast Protection Act.

The rate of grant varies from 35% to 75% based on the Capital Burden of the scheme to the Local Authority, the Community Charge Population and the Community Charge level. For small schemes (less than £100,000) the calculated burden may be insufficient to justify payment of any grant aid.

To qualify for grant the scheme must, as well as meeting the above criteria, show that it prevents erosion of the shore above sea level and again must demonstrate technical soundness, economic justification and environmental sensitivity.

B.6.2.3 *European Regional Development Funding*

ERDF grant is available under the Objective 1 Programme. It remains to be seen whether future coastal management projects will qualify for such funds.

B.6.2.3 *Belwin Formula - Storm Damage Costs*

This is normally payable as a percentage (75% in 1990) on eligible expenditure above a threshold over a specified period only. It does not constitute effective assistance. For instance no aid was given for Sefton's 1990 storm damage costs of circa £174,000, although supplementary credit approval was received.

B.6.3 *Future Arrangements*

B.6.3.1 In responding to the 1998 House of Commons Agriculture Select Committee, (see Annex C), the Government agreed to review the current funding mechanisms for flood and coastal defence with a view to ensuring that they facilitate decisions which are consistent with the national strategy.

B.6.3.2 This review commenced in May 1999, with a consultation paper issued to a wide range of public and private organisations, including the Local Government Association. The results are awaited.

ANNEX C**AGRICULTURE SELECT COMMITTEE ON FLOOD AND COASTAL DEFENCE**

C.1 In 1998 the House of Commons Select Committee on the Environment held an enquiry into Flood and Coastal Defence. The Easter 1998 floods, caused by exceptionally heavy and prolonged rainfall over central Britain, occurred whilst the Committee was in session. The experience arising from these floods influenced the Committee's recommendations (C.2 below) and the Government's response (C.3), particularly the formulation of MAFF's High Level Targets (Annex D).

C.2 The Committee's main findings are summarised below.

C.2.1 *Human Intervention in flooding and erosion processes*

Flood and coastal defence policy can not be sustained in the long term if it continues to be founded on the practice of substantial human intervention in the natural processes of flooding and erosion. The legacy of flooding and erosion problems arising from this practice - and the likely increase in future of climate and other environmental pressures on the UK's ageing flood and coastal defence infrastructure - might combine to present flood and coastal defence authorities with insuperable difficulties.

C.2.2 *Government's plans for flood and coastal defence expenditure*

The Committee was encouraged by the Government's plans to increase spending on flood defence and commended the introduction of three year budgets for flood and coastal defence expenditure, which would assist strategic planning.

C.2.3 *The changed policy context for flood and coastal defence*

Proposals for the defence of agricultural land should include managed realignment of the coastline, where appropriate. Suitable compensation arrangements would be required.

National policy must evolve, not only to mitigate effects of erosion and flooding, but also to embrace more holistic management of rivers and coastlines.

C.2.4 *Survey of flood defences*

Additional resources need to be devoted to the EA's national visual survey of river defences.

C.2.5.1 *Existing funding arrangements for flood and coastal defence*

Funds made available by MAFF and the DETR should not prejudice decisions by local authorities against the maintenance of existing infrastructure and in favour of the construction of new works. The Government should simplify the existing funding procedures for flood and coastal defence and should review the maintenance heading of the Standard Spending Assessment to assess whether it provides the most effective mechanism for delivering funds for flood and coastal defence maintenance.

C.2.5.2 There were strong arguments for the centralisation of all funding on flood and coastal defence in a single national agency, which would more effectively fulfil national objectives. This would, however entail a loss of political accountability, at local and regional level. There should be a greater decision-making responsibility for flood and coastal defence at regional level. One possibility could be to replace scheme-specific

grant-aid with block grants, allocated to Regional Flood Defence Committees or regional coastal groups.

C.2.6 *Project Appraisal Guidance Notes (PAGN)*

As a matter of priority, MAFF must develop criteria for including social and environmental values in PAGN. Operating authorities should also be required to identify the best practicable environmental option from among the range of choices submitted to MAFF, and such options should be given increased weighting in the approval process. PAGN should provide greater encouragement for projects with multiple functions - for example, defensive, social and environmental.

C.2.7.1 *Improving co-ordination between competent agencies in the coastal zone*

If SMPs are to play a strategic role in coastal defence and foreshore management, their guiding provisions should be given full statutory status in the local and regional planning process.

C.2.7.2 The Committee believed a more strategic approach could be taken to larger stretches of the UK coastline if coastal groups were given statutory status and granted formal powers to assume the responsibilities of their constituent authorities. Membership of existing groups should be vetted to ensure they represented the full spectrum of stakeholder interest.

C.2.8 *Integrating flood defence requirements within the planning system*

A clear presumption should be made against future development in flood plain land where the flooding risk attached to a particular development, as determined by the EA, is deemed to outweigh the benefits. In such cases, the Agency should intervene at all stages of the planning process in such a way as to deter inappropriate development. Local planning departments should have regard to costs to individuals and the community that the granting of planning permission for inappropriate development inevitably brings.

C.2.9 *Dissemination of information to the public & acceptance of flood & erosion risk*

Much greater emphasis must be placed on the dissemination to the public of locally-appropriate information on the degree of risk to persons and to property presented by flooding and coastal erosion. The EA and local authorities should ensure that persons at risk from flooding are made thoroughly aware of the warning procedures in place and the action to be taken in the event of emergency.

C.2.10 *Long term adaptive policies at the coast and inland*

MAFF should give fullest possible attention to long term adaptive policies, e.g, encouraging gradual abandonment of certain coastal areas, possibly over the course of many decades, and conferring residual life on defences currently protecting assets which are untenable in the long term.

C.2.11 *Habitat conservation and recreation*

The Committee urged MAFF to bring forward proposals to safeguard Special Areas of Conservation on rapidly eroding coasts, including provisions for recreating wetland habitats elsewhere, and the means of monitoring policy progress.

C.2.12 *MAFF flood disaster contingency fund*

A contingency fund should be established by MAFF with funds disbursed to local authorities to meet the longer term costs associated with the disruption to persons and property after catastrophic flooding events.

C.3 *Government Response*

The Government responded to the Committee in October 1998. Its response on the key themes of the Enquiry is summarised in the following paragraphs.

C.3.1.1 *Government approach to flood and coastal defence*

The Government would retain its current policy aim, which is to reduce the risks to people, the developed and natural environment from flooding and coastal erosion. It would continue to keep methods of achievement under review to reflect changing circumstances, risks and knowledge. It accepted that there could be a greater role for less interventionist measures such as beach recharge, managed realignment or washland creation.

C.3.1.2 MAFF would continue to hold policy responsibility for flood and coastal defence as hitherto, in liaison with DETR and other departments in areas of mutual interest. The Government believed that there was a very wide overlap between the measures needed to ensure the long-term sustainable management of coasts and floodplain and those necessary to conserve their wildlife and natural features. The Government would continue to work with English Nature, operating authorities and other interests to pursue these two goals in an integrated fashion.

C.3.2 *Institutional arrangements*

No fundamental change was proposed to the present institutional arrangements. The Government considered there was scope to enhance their effectiveness, to improve the co-ordination that takes place, and help ensure delivery of the national strategy. This would be achieved by developing the way in which the EA exercises its current general supervisory duty and seeking to establish national targets for all operating authorities. Specifically, the Government would:

C.3.2.1 Discuss with the EA, and other operating authorities, the arrangements and timing for completing surveys of all flood and coastal defences.

C.3.2.2 Discuss with the EA, and other operating authorities, how the Agency could assist in building on best practice in the approach to flood and coastal defence.

C.3.2.3 Discuss with the EA and other operating authorities the adoption of high level targets to measure their achievement of the Government's aims.

C.3.2.4 Discuss with all operating authorities what further monitoring of local authority and IDB plans was consonant with the Agency's general supervisory duty.

C.3.2.5 Discuss with the EA, and RFDCs, the continued need for LFDCs and the appropriate number and composition of RFDCs; this would need to take particular account of any changes flowing from the review of funding referred to below.

C.3.2.6 Discuss with the EA, and other operating authorities, whether greater standardisation of the arrangements for flood and coastal defence provision is needed.

C.3.2.7 Review and prepare guidance on a second generation of Shoreline Management Plans in consultation with English Nature and operating authorities.

C.3.3 *Funding arrangements*

The Government:

C.3.3.1 Accepted that the funding mechanisms should be reviewed. This would also address ring-fencing of EA expenditure to Committee areas.

C.3.3.2 Would consider whether further guidance to operating authorities was needed in relation to funding priorities and the balance between different types of expenditure such as capital and maintenance.

C.3.3.3 Would continue to work with the EA to define the arrangements that would allow block grant to be paid to the Agency to support the capital programme.

C.3.3.4 Would publish revised and new project appraisal guidance which would seek to address the range of issues of concern to the Committee.

C.3.3.5 Proposed no change in its present policy on compensation for those affected by flooding or erosion.

C.3.4 *Flood warnings, development control and information on flood risk*

The Government:

C.3.4.1 Reaffirmed that flood warning remained its highest priority, and would discuss with the EA and RFDCs how this would be translated into practice.

C.3.4.2 Would consider, in the light of the Committee's report, and the report of the Independent Review of the Easter Floods, whether the present guidance to local planning authorities on development in the flood plain should be strengthened. The Government would also be reviewing whether strengthened guidance was needed in relation to the contributions that developers, building in the flood plain, should be required to make towards flood defences.

C.3.4.3 Would pursue with relevant bodies use of flood risk maps for informing decisions on development control and in local searches undertaken by conveyancers. The Government would discuss with the EA and DCs appropriate targets for completion of these maps.

C.3.5 *Environmental issues*

C.3.5.1 MAFF and DETR would progress work with English Nature, the EA and other operating authorities to introduce arrangements for protecting habitat on internationally important wildlife sites from flooding and erosion.

C.3.5.2 The Government did not accept the criticisms made of Water Level Management Plans, which reflected in part a misunderstanding of their objective to provide a means by which water level requirements for a range of activities can be balanced and integrated.

ANNEX D *High Level Targets for Flood and Coastal Defence*

The October 1998 Government Response to the Agriculture Select Committee committed MAFF to prepare a series of high level targets, in order to ensure delivery of its flood and coastal defence aims and objectives. Interim targets were published in April 1999, after consultation with operating authorities and a more comprehensive set was published in November 1999. At the same time MAFF elaborated the Environment Agency's flood defence supervisory duty and Ministers set specific priorities for the Environment Agency in implementing the Independent Report on the Easter 1998 Floods. Both documents are reproduced below.

D.1.0 PART 1: INTRODUCTION

D.1.1 This paper contains high level targets for flood and coastal defence which will operate from 1 April 2000.

D.1.2 In August 1998 the Agriculture Select Committee published its report on flood and coastal defence. The Government response, published in October 1998, *inter alia* committed MAFF to prepare a series of high level targets which will be necessary in order to deliver its flood and coastal defence aims and objectives. A set of interim targets were published in May 1999 along with a first elaboration of the Environment Agency's general flood defence supervisory duty.

D.1.3 In publishing interim targets, MAFF undertook to produce more comprehensive targets to operate from 1 April 2000. The targets in this document fulfil that commitment and have been produced following wide consultation with relevant organisations.

D.1.4 The targets in this document supersede the interim targets published in May 1999. Where relevant they reflect the elaboration of the Environment Agency's supervisory duty and work flowing from the Agency's Action Plan for implementing the Independent Report on the Easter 1998 floods (the "Bye Report"). As the principal operating authority, and with its general flood defence supervisory responsibilities, the Environment Agency will have a key role in achievement of these targets, through advice to operating authorities, monitoring and reporting.

1.5 In considering the targets, the following definitions might be helpful:

"flood defences" are defences for the alleviation of flooding whether from rivers or the sea:

"coastal defence" is an overarching term that includes both defence from flooding from the sea, and coast protection;

"coast protection" are measures to protect land against erosion and encroachment by the sea;

"critical ordinary watercourses" are watercourses that are not classified as "main river" but which the Environment Agency and other operating authorities agree are critical because they have the potential to put at risk from flooding large numbers of people and property.

D.1.6 The targets include requirements to report to MAFF and others on a number of matters. The intention is that reports will be published, so providing greater openness and accountability in the provision of the flood and coastal defence service.

D.2.0 PART 2: MAFF AIMS AND OBJECTIVES

D.2.1 The adoption of a series of targets provides a framework for ensuring and demonstrating delivery of the Government's stated policy aims and objectives for flood and coastal defence, as set out in the 1993 Strategy for Flood and Coastal Defence in England and Wales. The stated policy aim of MAFF and the National Assembly for Wales (NAW) is:

To reduce the risk to people and the developed and natural environment from flooding and coastal erosion by encouraging the provision of technically, environmentally and economically sound and sustainable defence measures.

D.2.2 The key objectives to achieve the policy are:

To encourage the provision of adequate and cost effective flood warning systems.

To encourage the provision of adequate, economically, technically and environmentally sound and sustainable flood and coastal defence measures.

To discourage inappropriate development in areas at risk from flooding and coastal erosion.

D.2.3 MAFF's published policy aim and targets are carried forward to its Public Service Agreement (PSA), the target for which is:

By March 2000, publish targets for flood and coastal defence operating authorities which will ensure the effective delivery of sustainable flood defence and coast protection policies and prevent loss of life through flooding (including by timely and effective warning systems).

D.2.4 The linked Output and Performance Measures are:

The number of lives lost through flooding.

The aggregate benefit:cost ratio for grant aided flood and coastal defence schemes [the aim is to achieve 5:1 or better].

D.3.0 PART 3: APPROACH ADOPTED

D.3.1 The targets in this document are intended to facilitate a more certain delivery of national policies and objectives for flood and coastal defence. In particular, operating authorities are being asked to provide policy statements setting out how they will contribute to the delivery of these aims and objectives. The targets also put in place arrangements for a more systematic gathering of information about the nature and status of defences thus facilitating assessment of the integrity of defences and the taking of any necessary remedial action. Reports will be published.

D.3.2 The aim is to build on best practice, assisting operating authorities to undertake activities that can reasonably be required of them in safeguarding human life as well as economic and environmental assets. Some targets flow from agreed actions following the "Bye Report" for which additional specific funding has already been made available.

D.3.3 The targets in this paper apply primarily to flood and coastal defence operating authorities. However, some targets apply to local authorities in their capacity as local planning authorities and also as bodies responsible for emergency planning. There are also targets applicable to English Nature. The targets have been prepared in consultation with the Environment Agency, the Local Government Association and the Association of Drainage Authorities, as well as with the Home Office, Department of the Environment, Transport and the Regions, English Nature and other relevant statutory and non-statutory organisations.

D.3.4 These targets are dynamic; they will be kept under review and updated as necessary. In particular, MAFF is undertaking further research into the economic impacts of flooding and coastal erosion, which might lead to a revision of the Ministry targets and, in turn, revised targets for operating authorities. MAFF aims and objectives will also need to be reviewed in the forthcoming Government Spending Review, leading to a review of targets.

D.3.5 These targets need to be read alongside the legislation applicable to flood and coastal defence operating authorities, all other statutory requirements including those relating to the environment, and guidance issued by MAFF and other Government Departments.

D.4.0 PART 4: TARGETS

D.4.1 The primary aim of targets is to ensure a more certain delivery of MAFF's stated policy aims and objectives for flood and coastal defence and this is directly reflected in the following target. The statements will relate to the area covered by the operating authority and are expected to include general information about the nature of flood and erosion risks in the area including what is defended; where appropriate, the plans for mitigation of that risk, including management and inspection of existing works, and any new works. Statements should also cover issues such as how best practice will be adopted and shared; policies on developer contributions; and commitments to comply with sustainability policies and environmental obligations and targets.

D.4.2 Local authority statements will be expected additionally to cover their approach to flood and coastal defence aspects of emergency planning and development control, as well as flood warning and advice to local planning authorities.

D.4.3 The Environment Agency statement will be expected to cover the arrangements for ensuring that local authorities are informed about potential flood risks, so that these can be reflected in their emergency plans and in advice on development control.

D.4.4 MAFF will produce a template for completing these statements (to be available, after consultation, from Spring 2000).

| Target 1 - Policy Statements | By when | By whom |
|---|---|---------------------------|
| A Produce, and copy to the Environment Agency, MAFF and DETR, a publicly available policy statement setting out plans for delivering the Government's policy aims and objectives. | 31 March 2001 | All operating authorities |
| B Report to MAFF and DETR on: (i) completion of these policy statements; and (ii) information collated from them. | 30 September 2001 and subsequently by agreement with MAFF | Environment Agency |

Flood warning and emergency response

D.D.4.5 The first MAFF objective for flood and coastal defence is;
"to encourage the provision of adequate and cost effective flood warning systems".

D.4.6 An interim target was for the Environment Agency to produce, by March 2000, "an agreed target for provision of flood warning in terms of population and areas covered". This target is incorporated below. It will be for the Agency, working through flood defence committees, to develop and implement the programme of works to achieve this target. The provision of flood warning systems remains MAFF's highest priority for the provision of grant.

| Target 2 - Provision of flood warnings | By when | By whom |
|---|----------------------------|--------------------|
| In conjunction with local authorities, emergency services and other partners - | | |
| A. Develop a method for categorising the flood risk to an area for flood warning purposes. | 1 April 2000 | |
| B. Determine where a flood warning service can be provided and the appropriate dissemination arrangements using the method developed. | 1 September 2000 | Environment Agency |
| C. Determine and publish flood warning service standards for each area at risk of flooding. | 1 September 2000 | |
| D. Report to MAFF on achievement of service standards. | Annually from 1 April 2001 | |

D.4.7 The following targets relate to emergency exercises to test emergency plans, rolling forward and expanding the relevant interim targets. The targets are designed to be complementary to the "standards approach" that Home Office is promulgating with local authority emergency planning departments.

| Target 3 - Emergency exercises and emergency plans | By when | By whom |
|---|------------------------------|--------------------|
| A. Arrange in conjunction with local authorities, emergency services and other partners, a programme of flood emergency exercises at national, regional and local levels. A national exercise, and an exercise in each Agency region and local area should be conducted by 31 December 2001 (after the introduction of new flood warning codes) and at not more than three-yearly intervals thereafter. | Annually from 1 January 2001 | Environment Agency |
| B. Report to MAFF on: <ul style="list-style-type: none"> • the forward programme of emergency exercises; • the results of emergency exercises in the previous year, including lessons learned; and • those areas where the Agency and local authorities have, and have not, reviewed and agreed emergency plans within the previous two years. | Annually from 1 January 2001 | Environment Agency |

Provision of flood and coastal defence measures

D.4.8 The second MAFF objective is:

"To encourage the provision of adequate, economically, technically and environmentally sound and sustainable flood and coastal defence measures."

D.4.9 It is not appropriate to set specific targets for the provision of flood and coastal defences. Operating authorities work within a legislative framework that is essentially permissive. MAFF has already provided guidance to operating authorities on the factors which influence investment decisions though final responsibility rests with them, taking account of such guidance and other factors including the availability of resources.

D.4.10 Consideration will, however, be given later to the establishment of appropriate targets in the light of the results of research, currently being undertaken, on the economic benefits of flood and coastal defence.

D.4.11 The following targets 4-7 are linked. They build on the creation and maintenance of a new National Flood and Coastal Defence database managed by the Environment Agency from September 2000 (the subject of interim targets). They roll forward and develop various interim targets, particularly for ensuring that information on the database is updated, that defences on the database are inspected, that flooding or erosion risks are assessed, and that appropriate action is taken to ensure the defects are remedied, and that work programmes are provided. In setting these targets account has been taken of the further elaboration of the Environment Agency's general flood defence supervisory role, and the fact that the Agency, while maintaining information about coast protection works on its database, does not have statutory responsibility for coast protection.

D.4.12 The database is currently being developed by the Agency and details of the structure and the information that it will contain are still under consideration. Particular consideration will be given to structuring the data so that eventually all assets which protect a particular risk area can be readily identified and any changes to the risk profile of each area readily evaluated. The database should also include information on important assets (eg environmental or economic) that are within risk areas. Consideration should also be given to including the facility for monitoring losses or gains in habitats covered by Biodiversity Action Plans as a result of flood and coastal defence operations (Target 9B).

| Target 4 - National Flood and Coastal Defence Database | By when | By whom |
|---|---|--|
| A. Develop a National Flood and Coastal Defence Database and maintain it thereafter. The database should include information from other operating authorities (Target 4B) and on assets which provide a flood and coastal defence service that are in private or other ownership. | 1 September 2000 | Environment Agency (in partnership with other operating authorities) |
| B. Provide the Environment Agency with information on flood and coastal defence assets that are the responsibility of the operating authority. Such information should be in an agreed format and provided in the first instance by September 2000, and updated within one month of completion of any significant change, including creation, alteration, destruction or abandonment. | 1 September 2000 and ongoing thereafter | All operating authorities |
| C. Reach agreement with the other operating authorities on the means by which private defences will be identified and incorporated in the database. | 1 April 2000 | Environment Agency |
| D. Provide timely information from the database to other operating authorities to fulfil their obligations. The detail and frequency of such reports to be agreed, as necessary. | From 1 January 2001 | Environment Agency |

| Target 7 - Expenditure Programmes | By when | By whom |
|---|----------------------------|---------------------------|
| Provide to MAFF a prioritised forward programme of capital and maintenance work for the assets on the database. This should cover the current and following 3 year period. Where appropriate, programmes should include proposed expenditure on any assets in third party or other ownership. | Annually from 1 April 2000 | All operating authorities |

D.4.13 Shoreline Management Plans (SMPs) have been promoted by MAFF as a means for ensuring that coastal defences are planned in a strategic manner and in consultation with relevant interests. The interim target was for SMPs to be completed for the coastline of England by 31 December 1999. However, SMPs are intended to be "living" documents and subject to regular review and updating leading to the following target.

| Target 8 - Shoreline Management Plans. (SMPs) | By when | By whom |
|---|---------------|--------------------------------|
| Flowing from the policy statement in Target 1, have in place, and provide to MAFF, a programme for <ul style="list-style-type: none"> • completing strategy plans necessary to implement SMPs; and • updating SMPs in accordance with MAFF guidance planned to be issued in 2000. | December 2001 | Relevant operating authorities |

D.4.14 MAFF is committed to playing its part in wider Government policies for the protection of the environment and biodiversity¹ and acknowledges that flood and coastal defence measures can play a significant part in this. As a minimum, flood and coastal defence measures must be environmentally sound. However, operating authorities are positively encouraged to seek and consider opportunities for environmental enhancement when selecting flood and coastal defence options at a strategic level and in developing schemes. In addition, operating authorities are subject to specific statutory obligations and targets (including measures to protect SACs, SPAs, Ramsar sites and SSSIs). It is intended that, through the policy statements (Target 1), operating authorities will acknowledge these requirements, and also set out the arrangements that they have in place for compliance to protect and enhance the environment when carrying out works. The following, more specific targets, will also apply.

| Target 9 - Biodiversity | By when | By whom |
|--|----------------------------|---------------------------|
| A. In addition to statutory obligations, when carrying out flood and coastal defence works aim: <ul style="list-style-type: none"> to avoid damage to environmental interest; to ensure no net loss to habitats covered by Biodiversity Action Plans; and seek opportunities for environmental enhancement. | Ongoing | All operating authorities |
| B. Report to the Environment Agency on all losses and gains of habitats covered by Biodiversity Action Plans as a result of their flood and coastal defence operations. | Annually from 1 April 2001 | All operating authorities |
| C. Report to MAFF on the collated information from Target 9B. | Annually from 1 July 2001 | Environment Agency |

| Target 10 - Water Level Management Plans (WLMPs) | By when | By whom |
|---|------------------------------|------------------------------|
| A. In partnership with English Nature complete WLMPs <ul style="list-style-type: none"> in European sites in other SSSIs. | 30 March 2000 31 Dec 2000 | Relevant operating authority |
| B. Have in place a programme for implementing and reviewing WLMPs (flowing from the policy statement in Target 1). | 1 April 2001 | Relevant operating authority |
| C. Report to MAFF on operating authorities' progress in implementing and reviewing WLMPs against their published programme. | Annually from 1 April 2002 | Environment Agency |

| Target 11 - Coastal Habitat Management Plans | By when | By whom |
|---|----------------------------|--|
| A. Identify sites where a CHaMP is needed and produce a programme for their completion. (NB Consideration is currently being given to the arrangements for inland sites covered by the Habitats Directive. Appropriate targets will be set in due course.) | 31 December 2000 | English Nature (in partnership with the Environment Agency and other operating authorities). |
| B. Report to MAFF on progress in CHaMP completion. | Annually from 1 April 2002 | |

Development control

D.4.15 MAFF's third objective for flood and coastal defence is "To discourage inappropriate development in areas at risk from flooding and coastal erosion."

D.4.16 The Environment Agency is a statutory consultee in the preparation of development plans while guidance to local planning authorities (contained within DoE Circular 30/92 "Development and Flood Risk") encourages local authorities to use their planning powers to guide development away from areas that may be affected by flooding, or which would itself increase flood risks or interfere with flood control works or maintenance. Following recommendations from the Agriculture Select Committee in its report on flood and coastal defence, this guidance is being reviewed and updated by DETR. The revised guidance is also expected to emphasise the need to seek contributions from developers towards the cost of flood and coastal defence works necessary as a result of the development. The following targets are complementary to that guidance to LPAs on development in the flood plain and to the Agency's revised internal guidance on the advice to local authorities on development in the flood plain (an interim target). There are also targets relating to development in areas at risk of coastal erosion.

| Target 12 - Developments in areas at risk of flooding | By when | By whom |
|---|-------------------------|---|
| <p>Report to MAFF and DETR on:</p> <ul style="list-style-type: none"> • those local authority development plans upon which the Agency have commented, identifying plans which do, and do not, have flood risk statements or policies; and • the Agency's response to planning applications, identifying cases where: <ul style="list-style-type: none"> (i) the Agency sustained objections on flood risk grounds; and (ii) final decisions, either by the LPA or on appeal, were in line with, or contrary to, Agency advice. <p>(This target does not preclude the Agency from taking immediate and relevant action, eg to request Ministerial call-in of particularly significant cases).</p> | Annually from June 2000 | Environment Agency (in partnership with local planning authorities) |

| Target 13 - Development in areas at risk of coastal erosion | By when | By whom |
|--|----------------|---|
| <p>Report to MAFF and DETR on</p> <ul style="list-style-type: none"> • local authority development plans identifying the extent to which they contain coastal erosion statements and reflect the assessed risk of coastal erosion as set out in <i>inter alia</i> Shoreline Management Plans; • planning applications where coastal erosion was a material consideration and any conflicts between the final decision, either by the LPA or on appeal, with the assessed risks of coastal erosion. | From June 2000 | Coast protection authorities through Coastal Defence Groups |

Funding and administration

D.4.17 In its response to the Agriculture Select Committee report on flood and coastal defence, the Government did not accept that changes should be made to the present institutional arrangements for flood and coastal defence. It did, however, agree that a joint MAFF/DETR review should be conducted on the funding mechanisms and this is currently under way. It has

been decided that another commitment in relation to the ASC report, consideration of the future need for local flood defence committees (LFDCs), should follow the funding review.

D.4.18 The following targets are intended to bring about improvements in the present arrangements for IDB administration and membership.

| Target 14 - Administration and Membership | | By when | By whom |
|---|--|---------------------------|--|
| A. | Produce and distribute to IDBs guidance on: | 1 June 2000 | Association of Drainage Authorities in conjunction with MAFF, Environment Agency and LGA |
| • | the means by which efficiency can be improved through amalgamations and consortia; and | | |
| • | ensuring that relevant interests are reflected in membership of Boards. | | |
| B. | Report to MAFF on progress in implementing this guidance. | Annually from 1 June 2001 | Association of Drainage Authorities |

D.5 The following paper is the Environment Agency's elaboration of its flood defence supervisory duty. It addresses issues that are complementary to the foregoing high level targets.

D.5.0 ELABORATION OF THE ENVIRONMENT AGENCY'S FLOOD DEFENCE SUPERVISORY DUTY

Definitions

In considering flood and coastal defence issues some definitions might be helpful.

- **Main rivers** are watercourses designated as such on main river maps and are generally the larger arterial watercourses.
- **Ordinary watercourses** are all those watercourses that are not designated as main river.
- **Sea defences** are measures to help prevent flooding from the sea.
- **Coast protection** are measures to protect the land against erosion and encroachment by the sea.
- Coastal defence is an overarching term that includes both sea defence and coast protection.
- **Critical ordinary watercourses** are ordinary watercourses which the Environment Agency and other operating authorities agree are critical because they have the potential to put at risk from flooding large numbers of people and property.

Background

The public sector organisations that are responsible for providing defence from flooding are known as operating authorities. There are four types of operating authority, with differing powers and responsibilities.

- The first operating authority is the **Environment Agency**, which is responsible for sea defences and works on main rivers.
- The second group of operating authorities are the **Internal Drainage Boards** who look after ordinary watercourses in areas known as Internal Drainage Districts.
- The third group of operating authorities is made up of the **Local Authorities** who look after those ordinary watercourses that are not in an Internal Drainage District (it must be noted that the different tiers of Local Authorities; Counties, Metropolitan, Unitary and Districts have differing flood defence responsibilities).
- The final group of operating authorities are the **Maritime Local Authorities** who look after coast protection (prevention of coastal erosion) and may also undertake sea defence works.

The powers given to the operating authorities to carry out works are all permissive, which means they can choose either to carry out works or not at their discretion. No operating authority can be compelled to use their permissive powers.

The Environment Agency is funded, for flood defence purposes, by a levy on Local Authorities and by grant towards capital works from the Ministry of Agriculture, Fisheries and Food (MAFF) in England, and from the National Assembly for Wales.

Local Authorities fund their flood defence activities through the Council Tax and from central government through the Standard Spending Assessment mechanism.

Internal Drainage Boards fund their activities through a direct charge on agricultural land occupiers within their Internal Drainage District and from special levies on Local Authorities. MAFF in England and the National Assembly for Wales have policy responsibility for flood and coastal defence, setting policy aims, objectives and targets for the operating authorities, providing guidance, funding a Research and Development programme and grant aiding eligible works.

D.5.1 Introduction

Section 6(4) of the Environment Act 1995 states:

The Environment Agency shall in relation to England and Wales exercise a general supervision over all matters relating to flood defence.

In a statement to Parliament on 20 October 1998 the MAFF Minister, Elliot Morley, highlighted a commitment by Government, following its response to an Agriculture Select Committee Inquiry, for the Agency to develop its current supervisory responsibilities for all flood defence matters including the adequacy of defences owned by others.

In May 1999 the Government announced interim high level targets for flood and coastal defence to secure the delivery of its flood and coastal defence aims and objectives; a more comprehensive set of targets was announced in November 1999. The supervisory duty is included within the framework of the high level targets.

As the principal operating authority, and with its general flood defence supervisory responsibilities the Environment Agency has a key role in monitoring and reporting achievement by all operating authorities.

A consultation exercise has been carried out which addressed how the Environment Agency's supervisory duty in England and Wales should be undertaken.

The high level targets set by government deal with the three key objectives to achieve the policy aims:-

- 1. To encourage the use of adequate and cost effective flood warning systems.**
- 2. To encourage the provision of adequate, economically, technically environmentally sound and sustainable flood and coastal defence measures.
and**
- 3. To discourage inappropriate development in areas at risk from flooding and coastal erosion.**

The high level targets set by Government are intended to secure the delivery of these objectives. The Agency's elaboration of its supervisory duty addresses the actions required to fulfil those targets and spells out clear ownership by each operating authority for its part of each action.

D.5.2 The Agency's Supervisory Duty

The elaboration of the Supervisory Duty is intended to be consistent with the legislative framework that currently exists. The Environment Act 1995 sets the scope of the supervisory duty as very wide ranging, namely "all matters relating to flood defence". For simplicity in detailing the Agency's supervisory duty, the flood defence service has been divided up into eight sections:

| | |
|-----------|--|
| Section 1 | Condition of flood and coastal defences and critical ordinary watercourses |
| 1 a | Flood Defences |
| 1 b | Critical Ordinary Watercourses |
| 1 c | Coastal Defences |
| 1 d | National Flood and Coastal Defence Asset Database |
| Section 2 | Assessment of flood risk |
| Section 3 | Achievement of high level targets |
| Section 4 | Emergency response to flooding incidents |
| Section 5 | Awareness of flood risk in the community |
| Section 6 | Future development proposals that have potential impact on flood risk |
| Section 7 | Regulation of others |
| Section 8 | Application of conservation duty and environmental impact |

Taking each Section in turn the Agency's supervisory duty will be:-

D.5.2.1 SECTION 1 Condition of flood and coastal defence service and critical ordinary watercourses

SECTION 1.a - Flood Defences

The overall standard of flood defence provided in a river catchment depends on the condition of all its parts. In order to be able to understand how a flood defence system is working it is important to look at the whole picture not just parts of it.

The Agency will be responsible for inspecting defences on main River whilst Local Authorities and Internal Drainage Boards will be responsible for inspecting their own defences on ordinary watercourses. The information on the condition of all defences will then be passed to the Agency who will keep it on a national database (see section 1d). The Agency and local authority/IDB will agree arrangements for identifying and inspecting third party defences.

SECTION 1.b - Critical Ordinary Watercourses

Section 1a deals with flood defences on Main Rivers and Ordinary Watercourses. This section is intended to provide a means for identifying "critical" ordinary watercourses and for assessing their condition, including flow capacities.

The Agency, in partnership with the Local Authorities and Internal Drainage Boards will agree methods of identifying those ordinary watercourses that are critical to the area through which they pass. The Local Authorities and Internal Drainage Boards using that definition will then identify and inspect the condition of those critical ordinary watercourses. The frequency of inspection should be risk based taking account of factors such as the status and nature of the critical ordinary watercourse.

SECTION 1.c - Coastal Defences

This section focuses on the coast and deals with coastal defences and their condition in a similar way to the defences on inland watercourses.

The Agency will inspect the condition of sea and coastal defences that protect low lying land from flooding from the sea. The Maritime Local Authorities will be responsible for inspecting the condition of:

- Coast protection works that solely protect the land from erosion or encroachment; and
- Coastal defences that are in their ownership and that as well as protecting the land from erosion, provide a degree of protection from flooding.

The Agency will receive information on the condition of all coastal defences (both sea defences and coast protection works) and maintain this information on the National Flood and Coastal Defence Asset Database (see Section 1d).

SECTION 1.d - National Flood and Coastal Defence Asset Database

In order to store and make easily available information collected on the condition of defences and watercourses the Agency will develop and maintain a national database. Amongst its other uses the Agency will use the database to provide reports as required, including to Ministers and for publication in the public arena.

D.5.2.2 SECTION 2 - Assessment of Flood Risk

As well as being aware of the condition of defences it is important to know the risk associated with them, so the Agency will assess the flood risk associated with all sea and main river defences. In partnership with Local Authorities and Internal Drainage Boards the Agency will agree methods of assessing the standards of defence for ordinary watercourses and other coastal defences. These methods will then be used, with the assistance of the Local Authorities and Internal Drainage Boards, to assess the flood risk associated with all defences on critical ordinary watercourses and other coastal defences.

Where the assessed risk gives cause for concern the Agency, with assistance from Local Authorities and Internal Drainage Boards, will bring the concern to the owners notice and seek to agree remedial actions.

In addition the Agency will investigate the causes of serious or repeated flood events on ordinary watercourses and identify potential solutions

D.5.2.3 SECTION 3 - Achievement of MAFF High Level Targets

The Agency will receive information from Agency Regions, Internal Drainage Boards and Local Authorities on achievement of high level targets and provide Ministers with an annual report.

D.5.2.4 SECTION 4 - Emergency Response to flooding incidents

The Agency in partnership with Local Authorities and Internal Drainage Boards will endeavour to provide flood warnings to those that need them efficiently and effectively and to ensure that efficient and effective emergency planning, operational and emergency response, incident management and aftercare is undertaken.

The Agency will lead in partnership with Local Authorities, Internal Drainage Boards, emergency services and others in producing and running a programme of flood emergency exercises at national, regional and local levels.

D.5.2.5 SECTION 5 - Awareness of flood risk in the community

The Agency in partnership with Local Authorities and Internal Drainage Boards will agree and implement methods for raising and maintaining appropriate levels of public awareness within the community of flood risk.

D.5.2.6 SECTION 6 - Future development proposals that have potential impact on flood risk

It is important that future housing or other building developments are not put in areas at risk of flooding or in such a place that they make an existing problem worse. For that reason the Agency will keep its guidance to local planning authorities under review and update as needed. Additionally the Agency in partnership with Local Authorities will report to MAFF, the National Assembly for Wales and the Department of the Environment, Transport and the Regions on the success of the Agency's responses to development plans and planning applications, inter alia reporting where decisions have been against the Agency's advice and on the inclusion or not of adequate flood risk statements in Local Authority Development Plans.

D.5.2.7 SECTION 7 - Regulation of others

The Agency will produce annual statistics on applications for consent to carry out works on main rivers and ordinary watercourses and receive annual reports from Local Authorities and Internal Drainage Boards on the use of their statutory powers on ordinary watercourses.

D.5.2.8 SECTION 8 - Application of conservation and environmental impact

The Agency will prepare Water Level Management Plans for those main rivers where one is needed, except where another operating authority has accepted responsibility, and give advice to help Local Authorities and Internal Drainage Boards prepare Water Level Management Plans for other sites where one is required.

The Agency will also report to MAFF and the National Assembly for Wales on the preparation and implementation of Water Level Management Plans. The Agency will also report to MAFF and the National Assembly for Wales on the impact of flood and coastal defence operations on habitats covered by national Biodiversity Action Plans.

D.5.3 Implementation

In considering its supervisory duty it has been the Agency's intention to achieve supervision by consent and then to exercise its supervisory duty in partnership with the other operating authorities. In view of that, the Agency will set up a forum with the Association of Drainage Authorities to discuss the high level targets and the manner of implementation in partnership of the Agency's supervisory duty. The Agency will also discuss the need for a similar forum with the Local Government Association.

It is intended that agreed guidance for IDBs and local authorities will be produced by April 2000, to complement the MAFF targets.

ANNEX E - CLIMATE CHANGE**E.1 *Climate Change, Global Warming and the Greenhouse Effect***

- E.1.1 When solar radiation passes through the atmosphere, most of it is absorbed by the earth's surface. However, some of this radiation is reflected from the earth and trapped by a number of "greenhouse gases" in the atmosphere. The heat from this trapped radiation warms the surface and the lower atmosphere of the earth. This is known as the "greenhouse effect".
- E.1.2 Without this effect, life as we know it could not exist, as naturally occurring greenhouse gases keep the earth about 33°C warmer than it would otherwise be. Human activities are now increasing the concentration of some natural greenhouse gases, and adding new ones, such as CFC's. Much of the public debate focuses on warming, an admittedly likely reaction of the climate system. Disturbing Earth's radiation balance may, however, change the climate in a host of other potentially serious ways. Warming need not even be the practically most relevant part of the response. This is why many climatologists prefer the term 'climate change' to 'global warming'.
- E.1.3 Over the past 100 years global temperature has risen by 0.3°C to 0.6°C but because of the great natural variability of climate it is not possible to say with absolute certainty that this temperature rise is due to global warming. Nevertheless, recent data shows that the ten hottest years since world temperature records began were recorded in the last 15 years, with 1998 being the hottest. Best predictions of temperature rise based on climatological modelling show a rate of increase of 0.3° per decade; this gives a rise of 1°C by 2025 and 3°C by 2100. This represents a global mean and regional climate changes will differ.

E.2 *Sea Level Rise*

- E.2.1 Sea level rise comprises two elements, the first due to geological changes and the second due to global warming. The geological changes are occurring due to the removal of the weight of glacial ice following the past Ice Age, and result in an isoclinactic tilt of Great Britain around an axis running approximately south-west to north-east. Scotland is rising geologically, and the south east of England is sinking. Sefton is close to the neutral axis.
- E.2.2 The sea level rise resulting from global warming is due to thermal expansion of the world's oceans and the partial melting of glacial and polar ice sheets. There is a in-built lag in oceanic response to climate warming. Unfortunately, the prediction of future climate change relies, to a considerable degree, on a number of simplifying assumptions and the input of accurate data on a large scale. This process reduces the resolution of any model and predictions can only be given for various scenarios as "informed" or "best estimates". Even harder is the translation of global model results down to a regional level which can produce local effect estimates.
- E.2.3 At the moment sea level rise is very small (approximately 1 mm/year), and no acceleration has yet been detected. However, if the climate model predictions are correct, an acceleration in sea level rise is to be expected in the near future. There is investment by central government in enhancing the network of tidal gauges around the country, to improve the accuracy of storm tide warnings and to measure sea level changes.

- E.2.4 Sea level rise will also affect the other components of overall water level such as wave height; storm surge; tide height. For example in Liverpool Bay, a sea level rise of 1 metre would increase the maximum tide by 0.15 m and storm surge by 0.05 m, giving a still water level increase of 1.2 m. Or, put another way, what is now a 1 in 200 year event may become a 1 in 20 year event.

E.3 *Central Government Guidance*

- E.3.1 In July 1989 the Ministry of Agriculture, Fisheries and Food published a strategy to respond to the impact of the greenhouse effect. This strategy used current predictions of sea level rise to review existing standards and best practice for coastal defences, with consideration given to incorporating future modifications when better predictions become available.
- E.3.2 The Intergovernmental Panel on Climatic Change (IPCC) has produced reports that offer predicted global sea level rises for various scenarios. The “IPCC best estimate trend” of a 50 cm rise (20 inches) by the year 2100, is accepted as the most appropriate at the moment.
- E.3.3 A combination of these predictions has been accepted as forming the best basis of allowances for the design of coastal defences. The governmental guidance for the North West region is 4 mm/year. Consideration needs to be given in the designs to adapting defences to allow for any future change in predictions where defences have an effective life beyond 2030. In designing schemes to this response strategy it should be ensured that proposals are cost effective.

E.4 *Effect on Sefton’s Coast*

- E.4.1 The predicted changes in climate, sea level and storm activity will have far reaching consequences for the Sefton Coast. Detailed research has shown that Sefton’s coastline is governed to a great extent by changes in sea level and sediment process patterns.
- E.4.2 There are many questions which need to be answered before the effect of sea level rise and climatic change can be quantified. How will the supply of sediment to the coast change as we enter the 21st century? Will the dynamic dune system along the coast be able to keep pace with the rising sea? Or will there be large scale destruction of the dunes as more frequent storms create weaknesses which gradual sea level rise will be able to exploit?
- E.4.3 Further research is required to understand better the sediment transport regime along the Sefton Coast to enable any predicted changes to be assessed. Continued monitoring of local climate, coastal profiles, movement of the coastline and its wildlife and vegetation, is necessary to adapt to any changes efficiently; resources will always be scarce and only by efficient coastal management can they be targeted effectively.