

## **7 ACTION PLAN**

### **7.1 Introduction**

This section outlines further investigation, studies or works which need to be carried out or developed in order to implement policies for each area. The action plan also identifies the monitoring required; in part from the identification of investigations and studies mentioned above, but also with respect, more of the need to gain a better understanding of coastal processes, so as to perform coastal management in an effective manner and to feed back into the shoreline management process. The rationale for both undertaking further investigation and studies and that of monitoring is discussed in sections 7.2 and 7.3, respectively, below.

### **7.2 Investigations, studies and works.**

The need for further work is discussed in the main body of the SMP2 (Section 4). This need is drawn together in the Action Plan. In setting out this programme it is necessary to have regard to the priority and urgency of actions. Defra has recently published possible outcome measures (consultation December 2006) aimed at better aligning delivery of Flood and Coastal Erosion Risk Management with Defra policy. While these measures are still under discussion they can be used to help establish a priority for further work specifically from the flood and coastal erosion risk management standpoint. In addition, other important issues, not specifically covered by these outcome measures were identified during the development of the SMP2. In the following tables the further works are identified in summary. (Reference should also be made to Section 4 of this document, to the specific management area to which the action relates. In Section 4, together with the description as to what is to be undertaken, is a brief note providing an indication of those aspects which are relevant in assessing the priority of the action.)

An indicative cost is also shown in the table, together with an indicative timescale by when the action should be undertaken. While the degree of urgency may in one way be assessed from consideration of all issues (i.e. in terms of the significance of the issue being addressed), a more absolute urgency also arises from the possibility of being too late. This can arise from the timescale of potential loss (i.e. there is little point in investigating how loss may be avoided once loss has actually occurred). Equally, urgency may arise in terms of integrated decision making (i.e. the need for decisions on risk management needed to inform or be developed alongside land use planning).

It should be noted that, in the proposed outcome measures, the requirements of the Water Framework, Habitats and Birds Directives are statutory and are assumed to act as a defining framework for activities as other legal obligations. They are not, therefore, included in the proposed outcome measures. However, where relevant these issues are identified within the

SMP assessment of policy. In the Appropriate Assessment, preventative measures are identified aimed to avoid and demonstrate no negative impact on Natura 2000 sites. These are highlighted in the SMP2 and must be included in developing the implementation of SMP2 policy.

### 7.3 Monitoring

Monitoring is an essential element of good coastal management. However, it is equally important that the purpose of monitoring is clearly understood:

- providing justification for expenditure,
- to ensure that there is an overall coherence between different aspects of the monitoring process, ensuring maximum value is being obtained,
- from the above, scoping what actually needs to be done, and
- in being able to assess whether the overall programme or specific aspects of monitoring is providing the information required, and providing justification for further actions and expenditure.

In considering these, it may be seen that there are different scales of monitoring. It has been identified that there may be a general steepening of the nearshore area<sup>5</sup> over sections of the coast at Sunderland, and over the Scarborough frontage. Understanding this process, particularly in association with sea level rise, and assessing whether this process is more widespread, affecting the whole coast, may best be monitored at a regional scale. This would provide common information feeding into local management at the coast. Other processes, such as changes in wave climate or sea level rise may similarly be seen to be important at a regional scale, as might examination of the nearshore sediment processes.

In contrast, direct assessment of defence condition, local beach levels or, ecological impact may need to be considered at a local level, providing direct information in management of risk in specific areas (although also providing still a broader picture of change and need at the regional or even national scale).

In general, therefore, there is:

- Regional Level Monitoring,
  - providing an understanding of underlying processes acting at the regional scale,
  - identifying long term trends in relation to the whole coast
  - providing context within which local scale change may be assessed
  - assessing eco-system behaviour and integrity
  - cost effective management of data collection, storage and utilisation where appropriate over the region.

It is also envisaged that there will be a need for regional scale collation, storage and dissemination of data and information collected or derived

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<sup>5</sup> A landward movement of the nearshore contours, resulting in deeper water against the coast and increasing energy at the shoreline.

from monitoring at more a more local level. This function needs to be developed through the Coastal Group, acting as a group and drawing upon information provided by individual Group members.

- Strategy Level Monitoring
  - providing an understanding of underlying processes acting at the management area scale,
  - identifying trends in relation to the specific management areas,
  - identifying local scale impacts resulting from management,
  - assessing SMP2 policy, testing assumptions and addressing identified uncertainty.
  - developing general design data for use in developing solutions.
  - assessing general ongoing condition of defences and priorities for intervention.
  
- Defence Monitoring
  - identifying local variation and sensitivity of foreshore levels,establishing defence performance, condition, vulnerability, deterioration and maintenance.

The strategy level and defence monitoring relates directly to areas of flood and coastal erosion risk management and is sensibly maintained by individual operating authorities in relation to their specific functions and responsibilities. However, this clearly needs to be co-ordinated through the coastal group.

There will be overlap between levels of monitoring such that data collected at a strategic level may incorporate data required for monitoring of specific defences which may be aggregated to provide more general data required for strategic or national programming and assessment.



## **7.4 Action Plan**

The action plan, combining studies, schemes and monitoring, is set out in this sub-section. In general it is the Operating Authorities who, even if not actually managing specific actions, will be promoting or ensuring actions are undertaken in a timely manner. These actions, summarising the information given for each management area (defined in Section 4) have, therefore, been grouped by Operating Authority. A brief overview of the need for these actions covering each Authority's area is given, further details being provided in Section 4. Where joint action is required between authorities or between authorities and other organisations, this is identified. Joint actions are repeated in sections covering the area of any other authority involved with that action for completeness. As part of this the SMP has attempted to provide a guide to both the timescale and priority for action, also identifying where actions need to be co-ordinated between organisations and with an indicative cost.



## 7.4.1 South Tyneside Council (STC)

### Overview

The South Tyneside frontage may be considered in two sections: the developed area immediately south of the Tyne and the more natural frontage from south from Trow Point.

The principal issues, associated with the first of these, are that of ensuring good integrated management of the frontage in relation to current activities and regeneration plans. Within this is the need to ensure enhancement of the natural ecological features.

Over the southern section of coast, the main issues are the management of pollution or potential pollution from quarries and the management of the retreating coastline. Associated with this latter issue is planned relocation of car parks and possibly the coastal road.

The following action plan is recommended.

By When	Action	Management Area	Responsibility	Cost £k
On going	Trow: design development. Establish specific design criteria and undertake design.	MA 03	STC	150
2007	Revise strategy for Littlehaven, with intention to realign defence.	MA 01	STC	30
2007	Establish plan for dune management at Herd Sands, including long term plan for recreation area.	MA 02	STC	10
2007	Risk assessment at harbour Quarry, initial surveys and report	MA 05	STC	5
2008	Marsden Bay, risk assessment of areas of concern, initial surveys and report	MA04	STC	5
2009	Investigation. Examine nature and extent of material in Harbour quarry.	MA 05	STC	50
2010	Assess potential impacts and confirm SMP policy.	MA 05	STC	10
2010	Scheme development. Review strategy and develop appraisal for maintenance and refurbishment plan.	MA 06	SCC/ <i>Co-ordinated with STC</i>	40
2012	Outline strategy for Herd Sands developed in conjunction with land use plan.	MA 02	STC	25
2012	Planning Strategy. Development of realignment strategy for road, car parking and access. Including examination of alternative route for road.	MA 04	STC	50
<b>Schemes</b>				
2008	Dune management	MA 02	STC	200
2008	Short term defence to Trow quarry	MA 03	STC	1600
2009	Develop new promenade on realignment	MA 01	STC	2100

2011	Initial scheme implementation to the south of Herd Sands	MA02	STC	200
2025	Retired defence at Harbour quarry (subject to investigations and plan)	MA 05	STC	240

Associated with these activities are the following monitoring recommendations for the two general areas defined above

**Monitoring recommendations for the northern section of coast.**

<b>ISSUES</b>			
Performance of the beach after realignment at Littlehaven and identifying the potential roll back and pressure on defences over Herd sand.			
Deterioration of coast protection structures and increasing pressure on defence line.			
Pedestrian damage to dunes			
Influence of Trow Point			
Possible change in nearshore area as identified elsewhere in SMP area.			
<b>OBJECTIVES</b>			
Topographic change over the two beach areas			
Establish erosion rate of Trow point			
Position of defences in relation to beach crest.			
Mapping human pressure on dunes and extent of dunes			
Establish and monitor condition of defences			
Establish reliable record of sea bed change			
<b>MONITORING</b>	<b>SCOPE</b>	<b>FREQUENCY</b>	<b>SCALE</b>
Air photography	Long term background monitoring of shape of beaches and pressures on natural frontages. Detailed examination of erosion of Trow point	Two yearly	Co-ordinated by group
Topographic survey	Survey covering both open beaches and dunes.	yearly	strategy
Crest profiles	Local variation of beaches and vulnerability of defences	quarterly	local
Defence inspection	Visual inspection and record photographs of defences.	After storms/ two yearly	Local, feeding to NFCDD
Bathymetric survey	Corridor survey out to 20m. CD contour, centred on Herd sands.	ten yearly	Regional

**Monitoring recommendations for the southern section of coast.**

<b>ISSUES</b>			
Influence of Trow Point and Target Rock, with the pressure and extent of erosion within Trow Quarry.			
Threat of loss of car parks and road, associated with loss of footpath.			
Condition of defence at harbour quarry			
<b>OBJECTIVES</b>			
Establish erosion rate of Trow point and target rock			
Erosion of quarry infill.			
Establish and monitor condition of defences at Harbour quarry			
<b>MONITORING</b>	<b>SCOPE</b>	<b>FREQUENCY</b>	<b>SCALE</b>
Air photography	Long term background monitoring of erosion of cliffs.	Two yearly	Co-ordinated by group
Topographic survey	Survey covering Trow Quarry.	yearly	local
Defence inspection	Visual inspection of defences. and record photographs	After storms/ two yearly	Local, feeding to NFCDD

## 7.4.2 Sunderland City Council (SCC)

### Overview

The frontage is covered by the Whitburn Bay to Ryhope Coast Protection Strategy (May 2001). In addressing the immediate issues the SMP confirms the overall approach set out in the strategy. The key elements of this are maintenance and major refurbishment of the linear defences and the actions recommended are summarised in the table below. Towards the end of the first epoch, and depending on monitoring, consideration needs to be given to development of the longer term intents set out in the SMP. Development of initial project appraisal should take account of this.

Along the port area, the developments of the defence actions need to be integrated with the proposed regeneration plan. This will tend to determine the timescale for action.

Over the southern extent of the Council's area both major refurbishment work and reconstruction is to be undertaken. Further south, the investigation into the Halliwell Banks quarry is on-going. The outcome of this investigation together with the development of detailed appraisal of actions along the Hendon area need to take account of the longer term policies of the SMP2.

The following action plan is recommended.

By When	Action	Management Area	Responsibility	Cost £k
2007	Complete Investigation of Halliwell Banks. Management of potential contamination.	MA 08	SCC	80
2007	Longitudinal access study to Hendon Beach.	MA 08	SCC	5
2008	Review strategy priorities against outcome measures.	MA 06 -08	SCC	15
2008	Scheme development for Harbour East Bay. Review and develop defence requirements to port regeneration area.	MA 08	SCC	50
2010	Scheme development. Review strategy and develop appraisal for maintenance and refurbishment plan.	MA 06	SCC/ <i>Co-ordinated with STC</i>	40
2012	Review strategy along Hendon frontage/ Ryhope.	MA 08	SCC	25
2017	Review strategy for port area	MA 07	SCC	30
<b>Schemes</b>				
2009	Scheme under review for Harbour East Bay	MA 08	SCC	6000
2012	Refurbishment of defences to North Sunderland	MA 06	SCC	3000
2012	Potential schemes to South Sunderland	MA 08	SCC	4000
2012	Continued refurbishment of harbour piers	MA 07	SCC	1500

Associated with these activities are the following monitoring recommendations.

**Monitoring recommendations for the Sunderland frontage.**

<b>ISSUES</b>			
<ul style="list-style-type: none"> <li>Long term steepening of nearshore area.</li> <li>Stability of cliffs</li> <li>Risk at the Bents</li> <li>Erosion of area south of Sunderland and potential impact on transport infrastructure.</li> <li>Potential loss of beaches</li> <li>Defence condition and vulnerability to loss of material at the toe.</li> </ul>			
<b>OBJECTIVES</b>			
<ul style="list-style-type: none"> <li>Topographic change over the two main beach areas and at the Bents</li> <li>Establish erosion rate of Ryhope cliffs</li> <li>Position of defences in relation to beach crest.</li> <li>Mapping human pressure on dunes and extent of dunes</li> <li>Establish and monitor condition of defences</li> <li>Establish reliable record of sea bed change</li> </ul>			
<b>MONITORING</b>	<b>SCOPE</b>	<b>FREQUENCY</b>	<b>SCALE</b>
Air photography	Long term background monitoring of shape of beaches and cliff and foreshore position.	Two yearly	Co-ordinated by group
Topographic survey	Survey covering beaches to north and south of Sunderland with local survey at the Bents	yearly	strategy
Cliff crest profiles	Profiles along the Ryhope cliff	yearly	strategy
Crest profiles	Local variation of beaches and vulnerability of defences along the Seaburn walls	quarterly	local
Defence inspection	Visual inspection and record photographs of defences.	After storms/ two yearly	Local, feeding to NFCDD
Bathymetric survey	Corridor survey out to 10m CD contour at Sunderland North beach.	Five yearly	Strategy
	Corridor survey out to 20m. CD contour	10 yearly	Regional

### 7.4.3 Easington District Council (EDC)

#### Overview

The Seaham Strategy Study identified that defences are at present adequate but that deterioration is likely to increase over the next 20 years. There are concerns over potential contamination from erosion of the cliff line to the south of the harbour. This may have implications with respect to continued regeneration of the area. Critical to management of the coast is the change occurring on the shore as mining waste continues to erode. The behaviour of the beaches is, therefore likely to change over the next 20 years. The action plan has to be built from an understanding of this change. Monitoring is, therefore essential in developing the SMP2 policies.

The following action plan is recommended.

By When	Action	Management Area	Responsibility	Cost £k
On going	Local management	MA 10	Durham Heritage Coast	
2009	Management strategy for Crimdon Valley.	MA 11	Co-ordinated by HBC/ EBC /DHC	5
2010	Investigate potential contamination at Dawdon Beach.	MA 09	EDC	50
2014	Review overall coastal strategy	MA 09	EDC	
<b>Schemes</b>				
	No schemes at present.			

The following monitoring recommendations will provide information relevant to the above activities but as importantly providing information for Durham Heritage Coast management.

#### Monitoring recommendations

<p><b>ISSUES</b></p> <ul style="list-style-type: none"> <li>Long term steepening of nearshore area.</li> <li>Performance of the beach in relation to maintenance of defences.</li> <li>Potential need to stabilise cliff to north of the port.</li> <li>Local management and long term evolution of the Durham Coast.</li> <li>Potential contamination from erosion south of the port.</li> <li>Long term risk to the railway line.</li> <li>Access management to the coast.</li> </ul>
<p><b>OBJECTIVES</b></p> <ul style="list-style-type: none"> <li>Establish erosion trends and vulnerability of defence to North Seaham</li> <li>Determine cliff erosion north of port</li> <li>Determine cliff erosion south of the port to inform contamination risk.</li> <li>Establish erosion trends of mining waste and stability of beaches over the Durham Coast.</li> <li>Establish and monitor condition of defences</li> <li>Establish reliable record of sea bed change</li> </ul>

<b>MONITORING</b>	<b>SCOPE</b>	<b>FREQUENCY</b>	<b>SCALE</b>
Air photography	Long term background monitoring of cliff erosion.	Two yearly	Co-ordinated by group
Beach profiles	Covering areas identified in strategy, establishing both trends and variation.	yearly	strategy
Crest profiles	Erosion of Cliff crest at Dawdon Beach	yearly	local
Defence inspection	Visual inspection and record photographs of defences.	After storms/ two yearly	Local, feeding to NFCDD
Bathymetric survey	Corridor survey out to 10m CD contour at Seaham.	Five yearly	Strategy
	Corridor survey out to 20m. CD contour, centred on bays along frontage.	10 yearly	Regional

#### 7.4.4 Hartlepool Borough Council (HBC)

##### Overview

The recent strategy study has set out detailed management to the north of Hartlepool and the Headland through to the marina. From this specific schemes are identified at the Headland, in front of the Town walls and the marina defences. In addition to this detailed proposals are being developed for North Sands. To the south of Hartlepool there is concern over condition of defences in front of Seaton Carew, management and maintenance needing to be taken forward with regard to development of the Seaton Carew sea front. There needs to be a management plan for Seaton Dunes to ensure the SMP2 policy for managed realignment is taken forward in an appropriate manner. The action plan and monitoring requirements are as set out covering the three general areas: North Hartlepool, Hartlepool Bay and Seaton Carew.

The following action plan is recommended.

By When	Action	Management Area	Responsibility	Cost £k
On going	Scheme Development for Headland. Detailed appraisal for improving defences.	MA 11	HBC	40
2007	Development strategy for area of North Sands. Develop an integrated approach to defence of the cemetery frontage. Identify potential erosion risk contribution.	MA 11	Co-ordinated by HBC	25
2008	Town walls. Detailed scheme appraisal report	MA 12	Private/ Co-ordinated by HBC	130
2009	Management strategy for Crimdon Valley.	MA 11	Co-ordinated by Hartlepool BC/ Easington DC/ Durham Heritage Coast	5
2009	Middleton Beach. Advise on defence.	MA 12	Co-ordinated by HBC	5
2009	Strategy for Seaton Carew, review of condition and develop management strategy.	MA 13	HBC	80
2010	Marina. Detailed project appraisal report.	MA12	Private/ Co-ordinated by HBC	80
2010	Management plan for Seaton Dunes. Co-ordinate land use and dune management	MA 13	Co-ordinated by HBC/(EA)	5
2012	Heugh Breakwater. Review strategy	MA 12	Private/ Co-ordinated by HBC	30
2012	Review flood defence strategy to Teesmouth	MA13	Environment Agency. (HBC/RCBC.)	50

Schemes				
	Schemes for North Hartlepool to be identified by strategies	MA 11	HBC	
2009	Town walls	MA 12	HBC	500
2010	Management for Seaton Carew defences determined from strategy.	MA 13	HBC	

Associated with these activities are the following monitoring recommendations.

#### Monitoring recommendations for North Hartlepool.

ISSUES			
<p>Developing pressures on golf course, access and car park and caravan park at Crimdon Valley as coast erodes. Position of beck.</p> <p>Determining behaviour of foreshore in relation to development and management and risk to LNR and cemetery.</p> <p>Transition from managed realignment to holding the line at the Headland</p> <p>Potential deterioration of exposed rock at Headland.</p> <p>Condition of defences.</p> <p>Possible change in nearshore area as identified elsewhere in SMP area.</p>			
OBJECTIVES			
<p>Overall evolution of foreshore and interaction with beck and dunes. Mapping pressure on dunes and extent of dunes and sand banks.</p> <p>Long terms trends of foreshore levels and interaction between sections of the coast.</p> <p>Determine erosion rates of rock headland.</p> <p>Establish and monitor condition of defences</p>			
MONITORING	SCOPE	FREQUENCY	SCALE
Air photography	Long term background monitoring of shape of beaches and pressures on natural frontages.	Two yearly	Co-ordinated by group
Topographic survey	Survey covering open beaches and back dunes.	Yearly	Strategy
	Survey covering rock headland	Five yearly	local
Defence inspection	Visual inspection and record photographs of defences.	After storms/ two yearly	Local, feeding to NFCDD

#### Monitoring recommendations for Hartlepool Bay.

ISSUES			
<p>Uncertainty associated with extreme water levels within Hartlepool Bay.</p> <p>Overall change and sediment transport within Hartlepool Bay.</p> <p>Impacts associated with Heugh Breakwater</p> <p>Condition of defences.</p>			
OBJECTIVES			
<p>Establish bathymetric change over the Bay</p> <p>Establish local variation in extreme water levels.</p> <p>Determine trends in local foreshore levels.</p> <p>Establish ornithological value of area in the lee of the Heugh Breakwater.</p> <p>Monitor shoreline use of area in lee of Heugh Breakwater.</p> <p>Monitor condition of defences</p>			
MONITORING	SCOPE	FREQUENCY	SCALE
Topographic survey	Survey covering foreshore levels.	yearly	strategy
Defence inspection	Visual inspection and record photographs of	After storms/ two	Local, feeding to

	defences.	yearly	NFCDD
Bird counts	Establish bird use of area in the lee of the Heugh Breakwater. (Co-ordinate with TBC)	As required	local
Bathymetric survey	Co-ordinate monitoring with Tees Port.	Determined by port operations	Strategy
Water levels	Collate local water level data.	Event driven	Strategy

### Monitoring recommendations for Seaton Carew and Teesmouth.

<b>ISSUES</b>			
<p>Uncertainty associated with extreme water levels within Hartlepool Bay.</p> <p>Overall change and sediment transport within Hartlepool Bay.</p> <p>Condition of defences at Seaton Carew associated with long term management of pressure.</p> <p>Management of integrity and retreat of dunes.</p> <p>Management of flood defence within the mouth of the Tees.</p>			
<b>OBJECTIVES</b>			
<p>Establish bathymetric change over the Bay</p> <p>Establish local variation in extreme water levels.</p> <p>Determine trends in foreshore levels.</p> <p>Establish variation in beach levels in front of defences at Seaton Carew.</p> <p>Establish ornithological value of area of Seaton Dunes.</p> <p>Monitor condition of defences</p>			
<b>MONITORING</b>	<b>SCOPE</b>	<b>FREQUENCY</b>	<b>SCALE</b>
Air photography	Long term background monitoring of the evolution of Tees Bay.	Two yearly	Co-ordinated by group
Topographic survey	Survey covering foreshore and dunes levels. Local survey in front of Seaton Carew	yearly After storms / six monthly	strategy local
Defence inspection	Visual inspection and record photographs of defences.	After storms/ two yearly	Local, feeding to NFCDD
Bird counts	Establish bird use of (Co-ordinate with TBC)	As required	local
Bathymetric survey	Co-ordinate monitoring with Tees Port.	Determined by port operations	Strategy
Water levels	Co-ordinate local water level data.	Event driven	Strategy



## 7.4.5 Redcar and Cleveland (RCBC)

### Overview

The frontage is taken in two sections: from the Tees through to Redcar and the frontages from Marske through to Staithes. In the first, a strategy is being developed for the Redcar frontage in association with the Environment Agency. There are potential flood risks associated with the policies for natural realignment of the dunes at Coatham and within the Tees. Along the Marske to Saltburn frontages there is still uncertainty associated with cliff erosion rates, coupled to foreshore evolution. These uncertainties will determine the timing for intervention at Marske and are critical to the management at Saltburn. There is a more immediate need to develop a strategy for Saltburn, this should include consideration of the longer term development management at Marske. The recently concluded strategy at Skinningrove sets out a plan for refurbishment of defences. Over the coast to the east the rates of erosion of the cliff remains uncertain and requires long term monitoring. This is most critical at Cowbar and links to the management of Staithes.

The following action plan is recommended.

By When	Action	Management Area	Responsibility	Cost £k
On going	Revised scheme and appraisal. Extend scheme to Redcar east and develop detailed works.	MA14	Environment Agency/ RCBC	300
2007	Management review. Review of defence measures associated with development at Coatham.	MA 14	Co-ordinated by RCBC	5
2008	Skinningrove Scheme Development. Define specific works based on strategy.	MA 17	RCBC	50
2009	Develop strategy for Marske and Saltburn	MA 15	RCBC	120
2009	Review Staithes strategy. Review flood risk and set out long term management of harbour and piers.	MA 19	SBC/ RCBC	50
2010	Review flood risk to rear of Coatham dunes. Examine need for retired flood defence	MA 13	Environment Agency. / RCBC	30
2012	Review flood defence strategy to Teesmouth	MA13	Environment Agency. (HBC/ RCBC.)	50
<b>Schemes</b>				
2009	Improved protection to Redcar frontage	MA 14	Environment Agency/ RCBC	12,000
2009	Refurbishment of defences at Skinningrove	MA 17	RCBC	1400
2016	Potential need to relocate Cowbar Lane (not coast protection)	MA 18	RCBC	

Associated with these activities are the following monitoring recommendations.

**Monitoring recommendations for the Coatham and Redcar frontages.**

<b>ISSUES</b>			
<p>Uncertainty associated with extreme water levels within Hartlepool Bay.</p> <p>Overall change and sediment transport within Hartlepool Bay.</p> <p>Condition of defences at Redcar associated with long term management of pressure and potential beach loss.</p> <p>Transition between defended sections and natural coast.</p> <p>Management of integrity and retreat of dunes.</p> <p>Management of flood defence within the mouth of the Tees.</p>			
<b>OBJECTIVES</b>			
<p>Establish bathymetric change over the Bay</p> <p>Establish local variation in extreme water levels.</p> <p>Determine trends in foreshore levels.</p> <p>Establish variation in beach levels in front of defences at Redcar.</p> <p>Monitor condition of defences</p>			
<b>MONITORING</b>	<b>SCOPE</b>	<b>FREQUENCY</b>	<b>SCALE</b>
Air photography	Long term background monitoring of the evolution of Tees Bay.	Two yearly	Co-ordinated by group
Topographic survey	Survey covering foreshore and dunes levels.	yearly	strategy
	Local survey in front of Coatham, Redcar and Redcar East	After storms / six monthly	local
Defence inspection	Visual inspection and record photographs of defences.	After storms/ two yearly	Local, feeding to NFCDD
Bathymetric survey	Co-ordinate monitoring with Tees Port.	Determined by port operations	Strategy
Water levels	Co-ordinate local water level data.	Event driven	Strategy

**Monitoring recommendations for Marske through to Staithe.**

<b>ISSUES</b>			
<p>Uncertainty of soft cliff erosion rates.</p> <p>Understanding of erosion of hard cliff frontages.</p> <p>Overall change and sediment transport over eastern section of Tees Bay.</p> <p>Sediment exchange in the offshore area.</p> <p>Erosion rates at Cowbar</p> <p>Condition of defences at Saltburn and Skinninggrove</p> <p>Condition and variation of beaches at Marske, Saltburn and Skinninggrove</p>			
<b>OBJECTIVES</b>			
<p>Determine trends in foreshore levels.</p> <p>Establish variation in beach levels in front of defences at Saltburn and Skinninggrove.</p> <p>Long term understanding of offshore sediment transport.</p> <p>Monitor condition of defences</p>			

MONITORING	SCOPE	FREQUENCY	SCALE
Air photography	Long term background monitoring of the evolution of cliffs.	Two yearly	Co-ordinated by group
Cliff face surveys	Support work by Durham University	Monthly	Local/ regional
Cliff crest profiles	Continue monitoring profiles at Cowbar lane	yearly	local
Topographic survey	Survey covering foreshore and dunes levels. Local survey in front of Saltburn, Cattersty Sands and Skinningrove.	yearly After storms / six monthly	strategy local
Defence inspection	Visual inspection and record photographs of defences.	After storms/ two yearly	Local, feeding to NFCDD
Bathymetric survey	Corridor survey out to 10m CD contour at Saltburn and Skinningrove. Corridor survey out to 20m. CD contour, centred on bays along frontage.	Five yearly 10 yearly	Strategy Regional
Sea bed sediments	Side scan sonar and initial seismic profiling	Ten yearly	Regional



## 7.4.6 Scarborough Borough Council (SBC)

### Overview

The North Yorkshire frontage naturally divides into three areas, covering: the town of Whitby and the villages over the northern section of the frontage, the areas around Scarborough and Cayton and Filey Bay. Common to each area is the need to better understand and monitor erosion and instability of the coastal cliffs. Following existing strategies, there is on-going concern over condition of defences at Staithes, Runswick Bay and Robin Hood's Bay. At Whitby the condition of the piers, the management of beach levels and the future management at Sandsend all require prompt action.

Strategies have been developed over the Scarborough frontages; these are being reviewed following protection works and building upon existing monitoring. Various actions derive from these and from the SMP2.

Further south the principle issues relate to cliff instability and erosion rates, particularly at Cayton Bay, Filey and the smaller communities in Filey Bay. There are specific concerns at Osgodby Point and Flat Cliffs where the policy is for managed realignment. In these areas there needs to be a co-ordinated plan to address loss of properties, supported by SBC. There is a general erosion of the cliff line which may have long term implications for land management.

The following action plan is recommended.

By When	Action	Management Area	Responsibility	Cost £k
On going	Scarborough - Review Holbeck to Scalby Mills Strategy,	MA 27	SBC	on going
On going pending funding	Whitby - Appraisal of Whitby Harbour Piers, examining condition of Piers and development of management approach.	MA 23	SBC	225
On going	Review of all SBC Coastal Strategies	All	SBC	
2007	Cayton Bay - Cliff stability investigations at Cayton Bay	MA 29	SBC	80
2007	Filey Bay - Management Plan for Flat Cliffs, to support management for realignment.	MA 32	Residents and private sector <i>Supported by SBC</i>	10
2008	Runswick Bay - Scheme appraisal for defence of Runswick Bay. Develop recommendations of strategy	MA 21	SBC	30
2008	Whitby - Strategy study examining flood risk within Whitby harbour.	MA 23	Environment Agency/ SBC	
2008	Cayton Bay - Management plan at Cayton Bay, to review implications of managed realignment.	MA 29	SBC/ NYCC/ National Trust	10

2008	Filey - Investigation to examine stability of coastal slopes at Filey taking account of long term management to main wall.	MA 31	SBC	50
2008	Filey - Scheme appraisal to develop strategy recommendations for outflanking defence.	MA 31	SBC	40
2008	Review strategy priorities against outcome measures.	All	SBC	
2009	Staithes - Review Staithes strategy. Review flood risk and set out long term management of harbour and piers.	MA 19	SBC/ RCBC	50
2009	Sandsend - Strategy Review. Highway investigation and review possible realignment of coastal strategic route.	MA 22	SBC/ NYCC	60
2010	Robin Hoods Bay - Develop Strategy for Robin Hood's Bay, further consideration of cliff stability.	MA 25	SBC	50
2010	Robin Hoods Bay North of Mount Pleasant Study	MA 25	SBC	30
2010	Port Mulgrave - Investigation to examine slope stability and dependency on harbour area at Port Mulgrave.	MA20	SBC	50
2012	Cayton Bay - Realignment strategy at Cayton Bay, develop managed realignment and access strategy plan.	MA 29	SBC	30
2025	Negotiate retreat of the Cleveland Way	MA 24	NYMNPA/ Heritage Coast	
<b>Schemes</b>				
2008	Scarborough South Bay: Spa Chalet Cliff - Rock revetment in front of existing seawall, seawall repairs and slope stabilisation	MA 28	SBC	7,030
2008	Scarborough South Bay: The Spa – Rock revetment in front of existing seawall, seawall repairs and slope stabilisation	MA28	SBC	11,700
2008	Scarborough North Bay: Sea Life Centre – Rock berm and seawall repairs	MA 28	SBC	8,777
2013	Scarborough North Bay: Peasholm Gap and Clarence Gardens - Rock revetment in front of existing seawall, seawall repairs and slope stabilisation	MA28	SBC	17000
2010	Robin Hoods Bay - Preventative maintenance at Robin Hood's Bay as recommended by strategy	MA 25	SBC	150
2010	Whitby - Whitby Harbour Pier improvements	MA 23	SBC	16,000
2010	Scarborough South Bay: South Cliff Gardens – Rock revetment in front of existing seawall, seawall repairs and slope stabilisation	MA 28	SBC	3,654
2010	Filey - Outflanking defence at Filey	MA 31	SBC	500
2010	Filey – Cliff Stabilisation	MA 31	SBC	500

2012	Scarborough South Bay: Foreshore Road and St Nicholas Cliff – Raise height of existing wall, drainage improvement Foreshore Road and slope stabilisation	MA 28	SBC	5,232
2012	Staithes - Potential scheme to improve flood risk to Staithes Harbour	MA 19	SBC	500
2013	Scarborough South Bay: South Bay Pool – Rock revetment in front of existing seawall, seawall repairs and slope stabilisation	MA 28	SBC	5,518
2015	North Bay Cliffs – Seawall repairs and slope stabilisation	MA 28	SBC	4000
2015	Scarborough South Bay: Rose Gardens - Rock revetment in front of existing seawall, seawall repairs and slope stabilisation	MA 28	SBC	6,679

Associated with these activities are the following monitoring recommendations.

**Monitoring recommendations for the northern section of the coast.**

<b>ISSUES</b>			
<p>Uncertainty of soft cliff erosion rates and stability.  Improved understanding of erosion of hard cliff frontages.  Potential nearshore steepening.  Sediment exchange in the offshore area.  Condition of defences at Staithes, Runswick, Robin Hood's Bay, Whitby and Sandsend.  Condition and variation of beaches at , Runswick, Robin Hood's Bay, Whitby and Sandsend.</p>			
<b>OBJECTIVES</b>			
<p>Establish mechanisms and cliff erosion rates.  Determine trends in foreshore levels.  Establish variation in beach levels in front of defences.  Long term understanding of offshore sediment transport.  Monitor condition of defences</p>			
<b>MONITORING</b>	<b>SCOPE</b>	<b>FREQUENCY</b>	<b>SCALE</b>
Air photography	Long term background monitoring of the evolution of cliffs.	Two yearly	Co-ordinated by Group
Cliff face surveys	Stability issues	Monthly	Local/ regional
Topographic survey	Survey covering foreshore and cliffs in Whitby Bay.  Local survey in front of Runswick and Robin Hood's Bay.	yearly  After storms / six monthly	strategy  local
Defence inspection	Visual inspection and record photographs of defences.	After storms/ annually	Local, feeding to NFCDD
Bathymetric survey	Corridor survey out to 10m CD contour at Whitby. Corridor survey out to 20m. CD contour, centred on bays along frontage.	Five yearly 10 yearly	Strategy Regional
Sea bed sediments	Side scan sonar and initial seismic profiling	Ten yearly	Regional

**Monitoring recommendations for the Scarborough frontage**

<b>ISSUES</b> Cliff stability. Potential nearshore steepening. Sediment exchange in the offshore area. Long term trends in beach levels. Condition of defences Condition and variation of beaches			
<b>OBJECTIVES</b> Establish mechanisms cliff instability. Determine trends in foreshore levels. Establish variation in beach levels in front of defences. Long term understanding of offshore sediment transport. Monitor condition of defences			
<b>MONITORING</b>	<b>SCOPE</b>	<b>FREQUENCY</b>	<b>SCALE</b>
Air photography	Long term background monitoring of the beach shape and cliffs.	Two yearly	Co-ordinated by group
Cliff stability	Inclinometers and slope movement	Continuous	Local/ regional
Topographic survey	Survey covering foreshore areas. (monitoring linked to beach management) Local survey in front of defences	yearly After storms / six monthly	strategy local
Defence inspection	Visual inspection and record photographs of defences.	After storms/ annually	Local, feeding to NFCDD
Bathymetric survey	Corridor survey out to 10m CD contour. Corridor survey out to 20m. CD contour, centred on bays along frontage.	Five yearly 10 yearly	Strategy Regional
Sea bed sediments	Side scan sonar and initial seismic profiling	Ten yearly	Regional

**Monitoring recommendations for the southern section of coast.**

<b>ISSUES</b> Uncertainty of cliff stability. Potential nearshore steepening. Sediment exchange in the offshore area. Long term trends in beach levels. Condition of defences Condition and variation of beaches			
<b>OBJECTIVES</b> Establish mechanisms cliff instability. Determine trends in foreshore levels. Establish variation in beach levels in front of defences. Long term understanding of offshore sediment transport. Monitor condition of defences			

<b>MONITORING</b>	<b>SCOPE</b>	<b>FREQUENCY</b>	<b>SCALE</b>
Air photography	Long term background monitoring of the beach shape and cliffs.	Two yearly	Co-ordinated by group
Cliff stability	Inclinometers and slope movement	Continuous	Local/ regional
Topographic survey	Survey covering foreshore areas. Local survey in front of defences at Filey	yearly After storms / six monthly	strategy local
Defence inspection	Visual inspection and record photographs of defences.	After storms/ annually	Local, feeding to NFCDD
Bathymetric survey	Corridor survey out to 10m CD contour. Corridor survey out to 20m. CD contour, centred on bays along frontage.	Five yearly 10 yearly	Strategy Regional
Sea bed sediments	Side scan sonar and initial seismic profiling	Ten yearly	Regional



#### 7.4.7 East Riding of Yorkshire Council (ERYC) (Flamborough)

The main issues relate to long term erosion rates of Flamborough, in particular in the area of Flamborough Head. As such there are no specific studies or investigations. The following monitoring is recommended.

##### Monitoring recommendations

<b>ISSUES</b>			
Uncertainty of cliff erosion rates. Condition of defences			
<b>OBJECTIVES</b>			
Establish erosion in key areas. Monitor condition of defences			
<b>MONITORING</b>	<b>SCOPE</b>	<b>FREQUENCY</b>	<b>SCALE</b>
Air photography	Long term background monitoring of the beach shape and cliffs.	Two yearly	Co-ordinated by group
Defence inspection	Visual inspection and record photographs of defences.	After storms/ two annually	Local, feeding to NFCDD

## 7.5 General

The above action plan is developed covering each coast protection authority area. Actions associated with the Environment Agency are identified within this. These areas tend to be around the flood risk areas adjacent to the Tees and Esk and would be developed in co-operation with the relevant CPA.

The Action Plan sets out in outline the requirements for studies, investigations and works, together with an identification of overall issues which need to be addressed through monitoring. Based on this, specific strategy and local monitoring needs will be developed in detail. This, together with the regional monitoring programme should be developed further through collaboration at the Coastal Group level. In particular, consideration needs to be given as to how monitoring results may be presented in a consistent format to allow regional information to be collated, exchanged, analysed and interpreted

Erosion and stability of both soft and hard cliffs is an issue common to much of the frontage. As further information is drawn together, there is the potential for this to provide improved understanding of these issues relevant to management of the UK coast in general. It is recommended, through the SMP2, that this necessary effort for local management is brought together as a centre of coastal research into these issues. Consideration should be given to how this can be developed through the valuable work being undertaken by the regional academic institutions and in co-operation with other areas of the UK with similar issues (such as the Isle of Wight, Dorset and the West Coast of Wales).

The Coastal Group should also be aware of national data collection relevant to their frontages on tidal levels, extreme water levels and wave climate. This national data set should be used to provide baseline context for the regional monitoring. This national data may be most appropriately collated through the Environment Agency, feeding information on these underlying processes in to the collation of regional monitoring managed by the Coastal Group.