

Draft Coast Defence Strategy for Saltdean to Newhaven (West Breakwater): Executive Summary

1. Introduction

Mouchel Consulting Limited were commissioned by Lewes District Council to develop a Coastal Defence Strategy Plan for their frontage extending from the eastern end of the defences at Saltdean to the Newhaven Western Breakwater. The primary purpose of the Strategy Plan is to provide a high level basis for decision making and action related to the provision and management of coastal defences. The Saltdean to Newhaven Western Breakwater Strategy Plan provides a strategic framework of preferred policies for the coastal defence of the study area over the next 50 years and up to the year 2050.

This Executive Summary provides an overview of the studies which contributed to the development of the plan and summarises the main conclusions. The reader should refer to the draft final report for more details.

Strategy plans fall within a hierarchy of plans comprising:

- i) Large Scale Plans (eg SMPs)
- ii) Strategy Plans
- iii) Scheme design/appraisal reports

Large scale plans include Shoreline Management Plans. The study frontage is encompassed by the South Downs Shoreline Management Plan which covers the frontage from Selsey Bill to Beachy Head.

Strategy Plans are normally prepared for coherent subsets of the large scale plan. The Strategy Plan frontage comprises of Management Units 13 and 14 defined by the South Downs SMP. Scheme design or appraisal is appropriate to projects that will be carried out over a limited time, generally as capital or maintenance works, to deliver part of the strategy plan.

This report follows the basic structure laid out in the guidance provided in MAFF's draft "Strategic Planning and Appraisal" Guidance Notes FCDPAG2 2000.

However this particular commission was also structured to provide the following outputs for Lewes District Council, namely:

- i) Review of existing information
- ii) Preparation of Initial Consultation letter and Scoping Document
- iii) Condition Survey of Defences
- iv) Topographical Survey
- v) Geological Survey and Assessment
- vi) Assessment of Nearshore Coastal Processes
- vii) Strategic Environmental Assessment
- viii) Strategic Option Analysis
- ix) Economic Appraisal
- x) General consultation
- xi) Preparation of Draft Report
- xii) Preparation and publishing Final Strategy Plan

2. General Description of the Study Area

2.1 Introduction

The study area extends from the eastern end of the existing sea defences at Saltdean to the root of the Newhaven Western Breakwater. The study frontage was defined as Management Units 13A, 13B and 14 by the South Downs Shoreline Management Plan (Gifford 1997). Management Units 13 and 14 are shown on the location plan figure 2.1.

2.2 Management Unit 13A

Management Unit 13A (see Drawing No. 48527/1) comprises a 1685m chalk cliff frontage comprising of three distinct frontages. The first frontage stretches from the eastern end of the defences at Saltdean to the western end of the existing Portobello Outfall works defences. This frontage is 750m in length and comprises of undefended chalk cliff backed by open grassland, some agricultural land and two houses.

The second section which is 160m long comprises of the existing Portobello Outfall Works Defences. As this frontage is managed by Southern Water Services it does not fall within the Strategy Study. Proposed new wastewater treatment works for the Portobello Outfall, including new sea defences, were rejected by the Secretary of State in March 2001 following a Public Inquiry.

The third frontage which is 775m long stretches from the eastern end of the existing Portobello Works Defences to the western end of the existing defences at Telscombe Cliffs. This frontage comprises of undefended chalk cliffs backed by a width of managed lawned public open space which fronts residential housing.

2.3 Management Unit 13B

This frontage (see Drawing No. 48527/2) which is 2540m long and extends the full extent of the existing Peacehaven sea defences from Telscombe Cliffs in the west to Peacehaven Heights in the east. The defences and regraded cliff line is backed by a narrow strip of managed lawned public open space backed by residential houses. The main recreational area is the Dell which is situated midway between the two vehicular accesses to the sea defences at Malines Avenue and Steyning Avenue.

2.4 Management Unit 14

This frontage (see Drawing No. 48527/3) is 2280m long and extends from the eastern end of the existing defences at Peacehaven Heights to the root of the Newhaven Western Breakwater. The frontage comprises undefended chalk cliffs, although the last 450m of cliff adjacent to the breakwater is protected by the large wedge of shingle which has accumulated to the west of the breakwater. The frontage comprises undefended chalk cliffs backed by open grassland and agricultural land. The major development behind the cliff line comprise a caravan park just east of Peacehaven Heights and mobile homes at Newhaven.

3. Summary of Specific Investigations

3.1 Geological Survey

The geology of the study frontage between Saltdean and Newhaven comprise the Newhaven and Culver Members of the Upper Chalk overlain by a variable thickness of Tertiary and Quaternary Deposits. These drift deposits vary in thickness from less than 100mm on the higher ground between Saltdean and Peacehaven, to up to 6m to the east of the Portobello Pumping Station, where they form the remnant deposits of a glacial river channel that has denuded the top of the chalk to form a dry valley. The drift is characteristically a dark brown to reddish brown clay or sandy clay in which flint nodules are abundant.

Between Telscombe and Peacehaven a number of caves, in various stages of development, can be seen in the cliff face. The most significant cave is located just to the east of Portobello Pumping Station where the crown of the cave is just below the top of the cliff. The size of this cave would suggest that the process of cave development has been ongoing over a long period of time.

At present there is no evidence to suggest that the caves to the east of Portobello Pumping Station are in imminent danger of collapse.

The constant erosion and abrasion from the sea of the undefended frontage of the chalk cliffs between Saltdean and Newhaven will inevitably result in further loss of cliff edge of varying magnitudes over a period of time. Regression of the cliffs will be more likely to occur where the cliffs are significantly undercut.

3.2 Topographic Survey

A comprehensive set of survey data is available for Management Unit 13A (Mott MacDonald, 1999a and b, 2000) and consequently no further survey data was required for this frontage. To provide topographic data on the cliffs and wave cut platform for Management Units 13B and 14, a total of 28 cross-sections were surveyed along the frontage from Telscombe Cliffs to Newhaven Western Breakwater

From a comparison of the position of the top of the cliff from the sections along Unit 14 and the OS published cliff line it became evident that the OS cliff line was out of date.

Consequently the cliff line was re-surveyed as part of this study on 26 July 2000. The current cliff line and the OS published cliff line are both shown on Drawing no 48527/3. Along the eastern end of the frontage the current cliff line is about 10 to 15m landward of the position shown on the OS map.

3.3 Condition Survey of Defences

3.3.1 Introduction

A condition survey of the existing defences from Telscombe Cliffs to Peacehaven Heights was undertaken as part of the study. These defences fall under the jurisdiction of Lewes DC. The Lewes DC defences at Saltdean have been covered by the Brighton Marina to Saltdean Coastal Defence Strategy (Brighton & Hove Council/Posford Duvivier, 1999).

On 15th May 2000, a visual inspection of the existing defences from Telscombe Cliffs to Peacehaven Heights was carried out, a distance of 2.5km. The aim of the inspection was to assess the structural integrity of the defences, the extent of erosion or undermining of the toe of the structures and the condition of the foreshore. A total of 111 photographs of the frontage were taken, and a full annotated copy of these photographs have been submitted to Lewes DC separately.

The defences along the frontage were constructed in four phases. Phase 1, which comprised the defences from Groyne 14 to the Eastern Terminus, was constructed during 1977 and 1978. The defences from the Western Terminus to Groyne 13 were constructed in Phases 2 and 3 during the period 1977 to 1983. The defences between Groynes 13 and 14 were constructed in Phase 4 during the period 1996 to 1998.

3.3.2 Conclusions

Seawall

The seawall along the full 2.5km length is in a good condition apart from a few localised areas listed below:

i) Limited undermining of the toe of the seawall between Groyne 9 and the adjacent access step to the east.

- ii) Abrasion of the seawall face between Groyne 11 and Groyne 12 plus undercutting of the steps immediately to the west of Groyne 12.
- iii) The access steps immediately to the west of Groyne 14,15,16,17,18 and 19 have been undercut through abrasion.

Groynes

Most of the groynes are in good condition, however, the foundations of many of the groynes have been undermined. These structures require immediate attention to prevent the structures from toppling over. The groynes which require immediate attention to their foundations are Groynes 1, 2, 3, 4, 5, 6, 9, 10, 11, 12, 14, 15, 16, 17, 18 and 19. The groynes exhibiting the worst undercutting are Groynes 3, 4, 6, 9, 10, 14, 15, 16, 17, 18 and 19. In addition to the undermining of its foundation, Groyne 19 has lost a concrete slab from the top of the groyne.

Promenade, Access Ramp and Stairs

The promenade and the Malines Avenue vehicular access, the Steyning Avenue vehicular access, the Steyning Avenue steps and the Peacehaven Height Steps are all in good condition.

3.4 Assessment of Nearshore Coastal Processes and Cliff Erosion Rates

3.4.1 Nearshore Coastal Processes

Chalk cliffs and a wide intertidal wave cut chalk platform extend over the whole study frontage. A detailed description of the geology of the frontage is given in the Geological Survey of the frontage reported in Appendix B. The basic lithology of the area is Upper Chalk which contains significant quantities of flint nodules. Much of the shingle which occurs along the frontage is probably derived from the erosion of the exposed cliffs and the wave cut platform.

Beach deposits in the area are very variable in thickness and extremely patchy in distribution. Typically the most extensive deposits occur where the cliff toe is groyned or where the cliff line is indented. Changes in the alignment of the seawall also have an impact on the distribution of coarse sediments.

Most beach deposits are comprised of sand and shingle. The Condition Survey showed in most cases a significant accumulation of shingle against the western face of each concrete groyne indicating a west to east sediment transport. At a larger scale the nett loss of sediments east of the Brighton Marina and the accumulation at Newhaven West Breakwater indicate a predominant easterly transport of coarse beach material (ie sand and shingle).

H R Wallingford undertook an extensive sediment transport analysis both of the existing Saltdean to Telscombe Cliffs frontage and the same frontage with 5 different reclamation options for the proposed Portobello Outfall treatment works. The sediment transport analysis for the existing frontage confirmed that the net longshore drift is in an easterly direction.

3.4.2 Cliff Erosion Rates

A comprehensive analysis of the historical cliff erosion rates was carried out for the Management Unit 13A and 14 frontages as both these frontages and particularly the Unit 14 frontage are unlikely to be defended for some years to come. No analysis was undertaken for the Unit 13B frontage as this frontage is likely to be defended in the long term. Cliff erosion rates used for defence failure scenarios for Unit 13B were interpolated from the Unit 13A and 14 frontages.

The erosion rates for the above frontages were analysed using 57 A3 copies of historical maps. The maps reviewed dated from 1873 to 1998.

A summary of the erosion rates and protected total erosion over the next 50 years is given in Table 1 below.

Frontage	Erosion Rate [m/yr]		Projected Total Erosion (over 50 years [m])
West of the Portobello Outfall	Mean	0.3	15
	Upper Bound	0.5	25
East of the Portobello Outfall	Mean	0.3	15
	Upper Bound	0.5	25
Peacehaven Heights to Old Nore Point	Mean	0.4	20
	Upper Bound	0.6	30
Old Nore Point to Newhaven Western Breakwater	Mean	0.2	10
	Upper Bound	0.4	20

Table 1 - Summary of Erosion Rates and Projected Total Erosion over 50 years

No extra allowance for global warming has been included in the above erosion rates as the cliff erosion rate is dependent on the nearshore processes which could either slow or increase the erosion rate depending on how the sediment transport regime is affected. Furthermore, the erosion rates have decreased in the last 30 years possibly due to a widening wave cut platform. Consequently the mean historical erosion rates were thought to be the best available estimates.

3.5 Strategic Environmental Assessment

3.5.1 Introduction

Environmental issues have been integrated with engineering objectives in the development of this Strategy, through the production of a Strategic Environmental Assessment (SEA). The full SEA is given in Appendix F while the main conclusions are summarised below. The SEA followed a structured approach, including the gathering of baseline information, consultation, identification of environmental objectives, and appraisal of the coastal defence options. This process ensured that environmental considerations played a key role in the selection of preferred options for coastal management, as well as defining issues for further consideration at a later stage.

3.5.2 Baseline Environment

The physical environment of the study area can be divided into separate units, the cliff top, cliffs, intertidal, and marine environment. Baseline studies examined the environmental characteristics of each of these units, as well as socio-economic and recreational resources

Most of land on the cliff tops is taken up by urban development along the A259 South Coast Road, but open land is found between the urban centres, and along the cliff edge. The species rich grassland on the cliff top supports diverse insect and plant communities, and there are three designated Sites of Nature Conservation Importance. Archaeology on the cliff tops includes three Scheduled Ancient Monuments and three Archaeologically Sensitive Areas. The study area lies within the Sussex Downs Area of Outstanding Natural Beauty.

The chalk cliffs are an extremely important geological feature, particularly those areas that remain undefended, and are part of a geological Site of Special Scientific Interest which extends from Brighton to Newhaven. The main interest of the site is based on its geology, but it also supports important coastal plant, bird and invertebrate communities. The cliffs provide nest sites for some locally and nationally important seabirds including the Peregrine Falcon, a Schedule 1 Species.

The most important habitat in the inter-tidal zone is the chalk wave-cut platform, which is worn into a characteristic pattern of gullies and ridges perpendicular to the shore, and supports a typical variety of invertebrates and algae. The wave cut platform is likely to be put forward in the year 2001 as a marine Site of Nature Conservation Importance (mSNCI).

The area below the low water mark supports similar communities to the inter-tidal as well as a variety of fish further offshore. Fishing in the soft seabed material within the study area is very productive, comprising mainly whitefish. The offshore area contains two wrecks dating from 1800 and 1872, and a post-medieval cannon site.

Tourism in the area is a growing industry. The main attraction is the coastline, with spectacular cliffs and bathing beaches, a coast path and the undercliff walk, which is also an important recreational facility for local people.

3.5.3 Environmental Objectives

The study identified fourteen objectives for the conservation and enhancement of the existing environment in the study area. These included conservation of the visual appearance of the coastline and geological value of the cliff SSSI, protection of sea birds, fisheries, offshore marine environment and the ecology of the inter-tidal zone, and maintenance of water quality sediment supply to down-drift areas. Protection of the built, historic, natural and recreational value of the cliff tops, seafront access and the recreational value of beaches were also considered. These objectives are described in more detail in Section 5.

3.5.4 Appraisal of Options

A detailed appraisal of the Strategic Options from an environmental point of view was undertaken. The conclusions of this appraisal were included within the review of the options given in Section 7.

4. Consultation

Consultation with key consultees forms an important element of the development of the Strategy Plan. Not only does the consultation process allow important data on the frontage to be collated and consultees concerns and issues to be identified, it develops consensus regarding the general direction of future policy for the frontage.

The consultation for the Strategy Plan comprised two phases namely:

- (i) Scoping Document Consultation.
- (ii) Draft Final Report Consultation (in final report).

The consultees' responses were particularly useful in compiling the strategic objectives and in developing the strategic options and the selection of the recommended solutions. The consultees responses also greatly facilitated the compilation of the Strategic Environmental Assessment for the frontage.

5. Strategic Objectives

5.1 Primary Objectives

There is only one primary objective for the study frontage and that is the protection of people and their assets and property from coastal erosion through the development and implementation of a sustainable coastal defence strategy which is compatible with natural processes, environmentally acceptable, economically and technically viable and which is compatible with adjacent preferred options.

5.2 Secondary Objectives

The secondary objectives for the frontage were derived from an analysis of the consultees responses to the Scoping Document Consultation Phase. They are:

1. Protect historic environment on cliff top.
2. Protect natural environment on cliff top.
3. Preserve recreational value of cliff top.
4. Maintain/improve access to seafront.
5. Maintain/improve recreational value of beach.
6. Conserve visual appearance of coastline.
7. Conserve value of geological SSSI.

8. Prevent disturbance to sea birds.
9. Prevent damage to fisheries.
10. Protect ecology of inter-tidal zone.
11. Maintain sediment supply to down-drift areas.
12. Prevent damage to offshore marine environment.
13. Maintain water quality.

6. Review of SMP Generic Options

6.1 Introduction

The study frontage is encompassed by the South Downs Shoreline Management Plan which provides policy for the frontage from Selsey Bill to Beachy Head. The SMP divided the coastline from Selsey Bill to Beachy Head into 18 Management Units.

The South Downs, SMP defines a Management Unit as "A length of coast managed in accordance with a selected strategic defence option, which may change with time".

The "MAFF Guide for Shoreline Management Plans (1995)" recommends that the shoreline is subdivided into **Management Units** and that a preferred **Strategic Coastal Defence Option** is identified for each Unit. The Strategic Options to be considered are:

Do nothing: Carry out no coastal defence activity

Hold the line: By intervention hold the existing coastal defence line.

Retreat the line: By intervention retreat the coastal defences landward.

Advance the line: By intervention advance the coastal defences seaward.

The Saltdean to Newhaven Strategy Plan comprises of Management Units 13A, 13B and 14 defined by the South Downs SMP. For each of these units the SMP has selected one of the four generic strategic options described above. The generic options for each of the units are described below.

6.2 Management Unit 13A

The South Downs SMP recommended that the preferred Strategic Defence Option for this frontage should be **hold the line**.

6.3 Management Unit 13B

The South Downs SMP recommended that the Preferred Strategic Defence Option for this frontage should be **hold the line**.

6.4 Management Unit 14

The South Downs SMP recommended that the Preferred Strategic Defence Option for this frontage should be **do nothing**.

7. Consideration of Strategic Options

7.1 Management Unit 13A - Saltdean to Telscombe Cliffs

7.1.1 Options to be Considered

The "do nothing" option and a total of six "do something" options will be considered for the Unit 13A frontage, which extends from the eastern end of the existing defences at Saltdean to the western end of the existing defences at Telscombe Cliffs, and these are listed below. The existing Southern Water Services Defences protect a 160m length of frontage either side of the Portobello Outfall.

Do nothing Option

Do something Options

Option 1: Limited intervention at pinch points through to use of intermittent rock bunds

Option 2: Construction of intermittent shore parallel breakwaters

- Option 3: Shore normal rock groynes with beach recharge
- Option 4: Continuous rock bund along cliff toe
- Option 5: Traditional concrete seawall and groynes
- Option 6: Rock armour seawall

The "do something" options laid out above have been ordered from those that will cause the least direct impact to the existing cliff face to those that will cause the most direct impact to the existing cliff face. This approach is to accommodate the English Nature view which advocates no, or minimal, intervention along this frontage.

7.1.2 Comparison of Options

The indicative costs for Options 1 to 6 were determined. It is evident that Option 1 is the least expensive (and most environmentally friendly) solution but also only provides localised protection. Options 3 and 2 are the next cheapest solutions in ascending order and provide protection to a larger proportion of the frontage.

Options 4, 5 and 6 protect the full frontage. Of these options the traditional seawall appears the cheapest but this is without any beach recharge. With beach recharge it will probably have a similar price to Option 4.

7.2 Management Unit 13 B - Telscombe Cliffs to Peacehaven Heights

7.2.1 Options to be Considered

The frontage extends along the full 2.5km extent of the defences at Peacehaven from the western end of the defences at Telscombe Cliffs to the eastern end of the defences at Peacehaven Heights. These defences were constructed in four phases. Phase 1 which comprises the last 670m at the eastern end of the defences, was constructed during 1977 to 1978. Phase 2 and 3 comprises the first 1500m of defences from the western end. Phase 4 comprised filling in the 330m long gap between the Phase 1 and 2 & 3 defences and was constructed in 1996 to 1998.

A condition survey of these defences, (see Appendix D) was undertaken as part of this study and showed the defences to be in a good condition apart from localised abrasion damage to the seawalls and undercutting of the chalk foundations adjacent to the concrete groynes.

As required by MAFF's FCDPAG3 guidance the "Do Nothing" option and a range of "Do Something" options will be considered. The options to be considered are listed below:

Do Nothing Option

Do Something Options

Option 1 Capital maintenance to maintain existing standard of defence

Option 2 Rock armour revetment fronting seawall

Option 3 Rock armour revetment and rock armour groynes with shingle recharge

7.3 Management Unit 14. Peacehaven Heights to Newhaven Western Breakwater

As there are only few assets immediately at risk from erosion only the do nothing option has been considered for this frontage. This is also consistent with the recommended policy for this frontage given in the Selsey Bill to Beachy Head SMP.

8. Consideration of the Do Nothing Options and Economic Analysis

8.1 Introduction

Where no scheme is in place, the Do Nothing option is to allow the natural processes to continue uninterrupted. Where a scheme is already in place, the Do Nothing option is to abandon all maintenance and repair to the existing structures, allowing nature to take its course.

The do nothing option provides a baseline against which alternative options can be assessed. In comparing the options with the do nothing baseline, a benefit cost ratio can be calculated. The benefits are not losing the assets at risk. The costs are any negative effect the scheme may have plus the capital cost.

The importance of establishing a do nothing baseline is to enable different schemes in different areas at different levels of investment to be compared. Where national funds are scarce, the schemes will be ranked by their benefit cost ratio.

Damage to property is the significant component of the available benefit against which the cost for defence works can be compared for this frontage. This threat to property is due to landslides caused by erosion of the base of the cliff. The benefits in preventing or delaying these damages are readily quantifiable and are referred to as 'direct damage'.

Other direct damages include the loss of industrial production, disruption of communications and public utilities, disruption of traffic, and loss of land and agricultural production. 'Indirect damages' include damage costs to recreation and conservation

8.2 Management Unit 13A

To protect all the assets at risk from loss due to cliff erosion within the 50 year time frame, a 130m length of frontage would need to be protected. A likely preferred solution would be to construct a 130m long continuous rock bund protecting the toe of the cliff from erosion (Section 7.1.1, Option 1). The estimated cost of the proposed work is £445,105.23.

The total benefit for the frontage was calculated to be £208,416.60 comprising a direct benefit of £151,416.60 and an indirect (recreational and conservation) benefit of £57,000. To achieve a benefit cost ratio of 1 work can commence in year 13.

8.3 Management Unit 13B

Two failure scenarios were developed for the defences of this frontage, namely Scenario 1 (optimistic) and Scenario 2 (pessimistic). The total available benefit for Management Unit 13B for an optimistic failure scenario and a pessimistic failure scenario was calculated to be £440,977.55 and £1,482,449.53 respectively.

The economic analysis showed that for a pessimistic failure scenario for the sea defences there should be sufficient benefit to carry out a staged construction of Option 2 (rock revetment) fronting the existing defences: with Stage 1 being constructed in front of the existing Phase 1 defences in year 10, Stage 2 being constructed in front of the existing Phase 2 and 3 defence in year 15 and Stage 3 being constructed in front of the existing Phase 4 defences in year 28. There will also be sufficient benefit to construct the Option 1 defences in year 1.

8.4 Management Unit 14

The economic analysis gave a total available direct benefit of £114,240.88 which is not adequate for the construction of sea defences along this frontage.

9. Recommended Solutions and Implementation Strategy

9.1 Management Unit 13A

When the erosion rates given in Table 1 were applied to this frontage it became evident that an approximately 130m long frontage needed to be protected to prevent the loss of assets within the next 50 years. The frontage at risk lies approximately adjacent to and between Fairlight Ave and Telscombe Cliffs Way and is indicated on Drawing No 48527/1.

The recommended solution for this frontage comprises of a 130m long rock bund details of which are given in Section 7. If we assume a benefit cost ratio of 1 then the earliest that this bund could be constructed is in year 13.

Two major factors may effect this prediction. Firstly that the actual future erosion rate may differ markedly from the historical mean value and secondly, if the benefit of protecting the frontage were to increase, then the coastal defences could be developed sooner. Consequently in the short term, the primary recommendation for the frontage is regular monitoring of the cliff line erosion. This should take the form of an annual cliff line survey, and a walk over inspection by a trained engineering geologist.

This is considered the minimum annual survey requirements for the frontage. More detailed surveys such as those undertaken as part of the preliminary work for the proposed Portobello Scheme should be considered on a five yearly basis.

To aid in the determination of the available benefit for the 13A frontage and to support the coastal defence scheme studies which will be needed to develop the proposed defences for this frontage it is recommended that a study of the Recreational and Conservation Benefit of the 13A frontage be undertaken. This study should be undertaken in accordance with the Yellow Manual (Penning-Rowse et al 1992) and subsequent revisions of this manual.

9.2 Management Unit 13B

Two failure scenarios were developed for the defences of this frontage, namely Scenario 1 (optimistic) and Scenario 2 (pessimistic). The pessimistic scenario was adopted to provide an estimate of the earliest dates that new defences would need to be constructed along this frontage.

Firstly it is recommended that Option 1, the capital maintenance option described in Section 7, be constructed along the frontage in year 1. This option comprises the construction of concrete haunches adjacent to the existing sea walls and groynes where these structures have been undermined by the undercutting of the wave cut platform.

Secondly it appears that for a Scenario 2 failure of the sea defences there should be sufficient benefit to carry out a staged construction of Option 2 (rock revetment) fronting the existing defences: with Stage 1 being constructed in front of the existing Phase 1 defences in year 10 (from Groyne 14 to the eastern end of Unit 13B), Stage 2 being constructed in front of the existing Phase 2 and 3 defence in year 15 (from the western end of Unit 13B to Groyne 13) and Stage 3 being constructed in front of the existing Phase 4 defences in year 28 (between Groynes 13 and 14). There will also be sufficient benefit to construct the Option 1 defences in year 1.

The implementation of the capital maintenance option will prevent any further immediate deterioration of the defences and will also buy some time to undertake the detailed studies required to develop the future coastal defences for the frontage.

Detailed design of the Capital Maintenance Option will need to be undertaken building upon the work already undertaken for the Strategy Study. To undertake this scheme a more detailed visual condition survey of the frontage will need to be carried out, carefully identifying the different types of remedial work which needs to be done and mapping out the exact location and nature of the remedial work required.

In addition to the more detailed visual condition survey, geotechnical and structural surveys of the existing defences are required.

Failure Scenario 2 (Pessimistic Scenario) assumed that a significant loss of the chalk backfill material was underway with a consequent weakening of the overall integrity of the sea wall. It is

recommended that a geotechnical investigation of the integrity of the backfill material be undertaken. It suggested that an approach such as ground-penetrating radar be adopted to detect voids under the promenade, supplemented with selected bore holes in areas which require further investigation.

The remaining depth of the seawall toe along the seaward face of the seawall also needs to be determined. There are a number of locations identified in the Condition Survey where a considerable drawdown of the wave cut platform is evident and the toe key is exposed. The more detailed visual survey and the geotechnical study of the promenade fill and the seawall toe will identify areas of the seawall which may require a more detailed structural analysis to determine the residual life of the weaker portions of the existing seawall. The above additional studies will allow a much more detailed estimation of the residual life of the existing Phase 1 to Phase 4 defences which can be used in the Scheme Appraisal and Detailed Design Stages for development of the proposed phased coastal defence works for the frontage.

It is also recommended that a study of the Recreational and Conservation Benefit of the 13B frontage be undertaken along the same lines proposed for the 13A frontage for the Scheme Appraisal Studies needed to develop the proposed coastal defences.

9.3 Management Unit 14

The available benefit for this frontage is insufficient for the construction of any sustainable defences for the few assets which are likely to be at threat from coastal erosion over the next 50 years. Hence the policy for this frontage is to do-nothing apart from monitoring the erosion of the cliffs. It is assumed that the derelict buildings on the Ministry of Technology Test site will be lost. The bronze age bowl barrow adjacent to the Ministry of Technology site will also be lost possibly within the next 25 to 30 years and this site will need to be excavated and preserved through record.

The development of the Newhaven Heights caravan park has resulted in new mobile homes being sited within 20m of the cliff edge. The mobile homes may need to be relocated if monitoring indicates that they are at risk from cliff retreat or instability. This frontage is partly protected by shingle beach to the west of the New Haven Western Breakwater and at mean historical erosion rates is not under threat within 50 years.

Consequently, the only implementation strategy for the MU14 frontage is monitoring. It is recommended that an annual cliff line topographic survey be undertaken. It is also recommended that an annual walkway survey by an engineering geologist be undertaken in which particular attention is paid to new cliff falls.

References

Brighton & Hove Council/Posford Duvivier (1999) Brighton Marina to Saltdean Coastal Defence Strategy.

Gifford (1997) The South Downs Shoreline Management Plan, June.

Mott MacDonald (1999a) UWWTD: Portobello Scheme Cliff and Foreshore Survey - Baseline Survey - November 1998, 13 September 1999.

Mott MacDonald (1999b) UWWTD: Portobello Scheme Cliff and Foreshore Survey - Second Survey - April 1999, 20 September 1999.

Mott MacDonald (2000) UWWTD: Portobello Scheme Cliff and Foreshore Monitoring - Third Survey - October 1999, April 2000.

Penning-Rowse et al (1992) The Economics of Coastal Management: a Manual of Benefit Assessment Techniques (the Yellow Manual).