

**Poole Bay & Harbour Coastal Group**  
**POOLE BAY & HARBOUR**  
**STRATEGY STUDY**  
**Assessment of Flood**  
**and Coast Defence Options**  
**SWANAGE BAY**

**Contents Amendment Record**

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The shoreline of Poole Bay has been divided into a number of management units, as shown in **Figure 1.2:**

- SWA1 - Peveril Point to Swanage Pier
- SWA2 - Swanage Pier to Outfall Jetty
- SWA3 - Outfall Jetty to Sheps Hollow
- SWA4 - Sheps Hollow to Ballard Point
- SWA5 - Ballard Point to Handfast Point



**Figure 1.2 Swanage Bay Management Units**

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In developing the Strategy for Poole Bay, a wide range of studies have been undertaken. The following provides a brief summary of those parts of the study that are of relevance to the SWA frontage.

- ***Technical Annex 1 – Coastal Conditions*** – the coastal conditions affecting the shoreline have been assessed through modelling and calculations of wave conditions, extreme water levels, tidal cycles and joint probability between waves and water levels.
- ***Technical Annex 2 – Beach Modelling*** – modelling of wave and water levels has been used to drive models of longshore and cross-shore sediment transport. In particular the degree of beach draw-down under storm conditions has been modelled to assess the degree of beach protection required along the frontage.
- ***Technical Annex 5 – Coastal Processes*** – the sources of supply, movement and output of sediment within Poole Bay were identified using the computer modelling described in Technical Annex 2 and in HR Wallingford (2003) (tidal and wave modelling carried out for this Strategy Study). Where possible, the volumes of sediment movement were evaluated (with the measurement in cubic metres per year - m<sup>3</sup>/year). This information is essential to the assessment of why a particular shoreline may be eroding or accreting and in judging what the affect of any intervention on the coast may have.
- ***Technical Annex 7 – Implications of Climate Change*** – the potential effects of the following factors associated with climate change have been evaluated and the potential implications for each management unit of the shoreline have been assessed:
  - (i) changes in sea level, incorporating global (eustatic) sea level rise and land-level (isostatic) change
  - (ii) changes in storm surge, due to changes in extremes of barometric pressure and wind stress caused by changing weather patterns
  - (iii) changes in wind climate affecting the height, periods and directions of wave conditions
  - (iv) changes in rainfall intensities, durations, and event frequencies, particularly affecting cliff slippage and run-off flooding
- ***Technical Annex 8 – Flood and Coast Defence Benefits and Costs*** – the benefits and costs of strategy options have been estimated and presented in this report. Further details are included in Technical Annex 8.

- ***Technical Annex 9 – Sources of Beach Recharge*** – potential sources of marine aggregates for beach recharge have been identified and alternative sources have been briefly described.
- ***Technical Annex 10 – Strategic Environmental Assessment (SEA)*** – This document contains the background data on which the Strategic Environmental Assessment is based (known as the baseline), which describes how the environmental objectives of the Strategy have been selected. Each of the options in the Strategy are then compared against these objectives to assess their environmental implications.



## 2 Strategic Overview

### 2.1 *The Need for Beach Recharge*

Work carried out to assess the inputs, transport and output of sediment within Swanage Bay (Halcrow, 2004) confirms that the potential for sediment loss from this frontage is considerably greater than the potential for sediment gain. This situation arises primarily from the cessation of erosion that resulted from the construction of seawalls along the frontage over the course of the last century. The alternative course of action to beach recharge would be demolition of the seawalls and of the properties that they protect. This was considered and rejected by the SMP, in selecting the Hold the Line policy.

### 2.2 *Availability of Beach Recharge*

The availability of sand for beach recharge is described in more depth in Technical Annex 9. It is limited at present to:

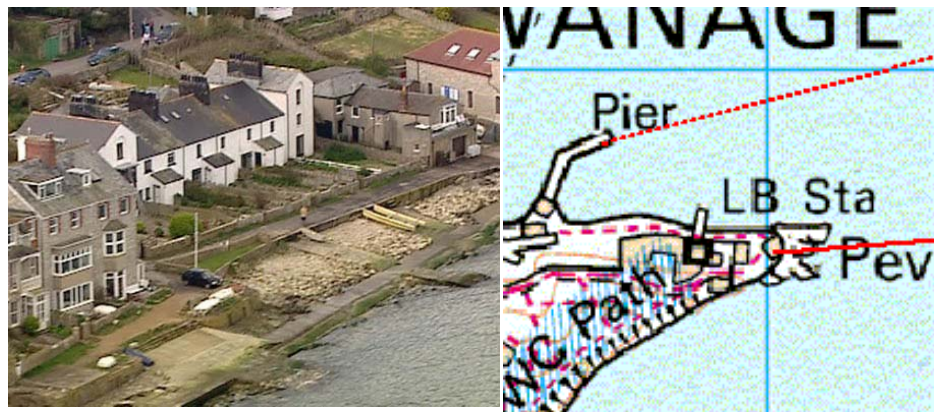
- Swash Channel and Middle Ship Channel (Entrance to Poole Harbour) – this could potentially supply up to 100,000m<sup>3</sup> of suitable materials every 2 years through maintenance dredging
- Swash Channel and Middle Ship Channel (Entrance to Poole Harbour) – this could potentially supply 1,000,000m<sup>3</sup> (as a “one-off” supply) of suitable materials if a deepening of the shipping channels were to proceed
- Licensed dredging sites located to the south-east and south-west of the Isle of Wight – these sites could provide suitable materials, but the costs would be higher than from the Swash Channel & Middle Shipping Channel since screening (large scale sieving) of the sediment would be required
- *For future recharges after 10 years*, it is possible that suitable materials might be available from a prospective licensed site at Dolphin Sand. A licence is being sought by a commercial aggregates company for the site. This is expected to hold suitable sediment which would not require screening and would be considerably closer than the alternative licensed sites.

The scheme that is proposed for Management Unit SWA3 takes into account the availability of beach recharge materials, in that the proposed volume of sediment is 50,000-90,000m<sup>3</sup>. The lower bound of this range is determined by the minimum quantity to raise the beach profile to the preferred standard of 1:300years. The

upper bound is the maximum that can be placed before the extension and modification of existing outfalls is recommended (beyond the requirement for a minor pumping system for the Outfall Jetty).. The actual volume of sediment placed can be between the two values and might depend on the volume of sediment available at the time from the Swash Channel.

## 3 Swanage Bay

### 3.1 *Peveril Point to Swanage Pier - SWA1*



#### 3.1.1 *Existing Shoreline & Defences*

The shoreline comprises seawalls, slipways and rocky beaches.

#### 3.1.2 *Flood and Coast Defence Problem*

Assessment of coastal flooding by Posford Haskoning for Environment Agency South West Region does not indicate that there is a coastal flooding problem in this frontage and no particular reports of historical flooding have been received.

The stability and integrity of individual structures along this frontage has not been assessed, but no evidence of long term erosion is evident. Individual structures will, however, be expected to deteriorate unless maintained.

#### 3.1.3 *Current SMP Policy (adopted 1999)*

The SMP policy in the Short Term and in the Long Term is Hold the Line.

#### 3.1.4 *Strategic Options*

The options in **Table 3.1** have been developed as ways of achieving the SMP Policy

| <b>Strategic Option</b> | <b>Description</b>   |
|-------------------------|--|
| No Active Intervention  | No action taken apart from fulfilling health and safety requirements |
| Minimum Maintenance     | Inspect and repair existing structures as required                   |

**Table 3.1**

3.1.5

*Strategic Environmental Assessment*

The specific objectives for this area have been established as part of the Strategic Environmental Assessment (see Technical Annex 10, Table 5.2). These have been summarised in **Table 3.2**.

Minimum Maintenance is the preferred environmental option and would meet the objectives of avoiding interference with the conservation and landscape value, protecting properties in Swanage and maintaining recreational resources through existing structures being renovated.

Provided it is implemented through maintaining existing sea walls and/or beach recharge then possible conflicts with the conservation and landscape value are likely to be avoided.

3.1.6

*Economic Appraisal*

No economic appraisal was necessary

3.1.7

*Preferred Strategy*

***It is recommended that the SMP policy be amended to Hold the Line, in line with the 2001 SMP Guidance.***

***The recommended way of achieving the SMP policy is therefore by Minimum Maintenance***

3.1.8

*Development of Preferred Strategy*

A programme of monitoring and maintenance for this frontage is recommended to be developed.

As a minimum this would include:

- Bi-annual inspection of the seawalls, recording and photographing of defects
- Recording of wave overtopping events, including photography, degree of damage etc

Where possible, it should also include:

- Bathymetric surveys of seabed levels (which could be included as part of the monitoring of the proposed scheme for SWA3)

|  | DESCRIPTION            |                     |
|--|------------------------|---------------------|
|  | No Active Intervention | Minimum Maintenance |
| SWA0.1 Avoid constructing any new coastal defences that would be detrimental to the landscape value of Dorset AONB   | Y                      | Y                   |
| SWA0.2 Maintain/enhance recreational resources in the coastal zone, where environmental sustainable, practical, economic and financially viable.   | N                      | Y                   |
| SWA1.1 Avoid constructing new coastal defences that would be detrimental to the setting of Swanage Conservation Area   | Y                      | Y                   |
| SWA1.2 Protect properties of architectural merit within Swanage Conservation Area and other properties within Swanage from coastal erosion, where technically feasible, environmentally sustainable and economic | N                      | Y                   |

***Table 3.2 - Peveril Point to Swanage Pier Strategy Options***

***Notes:***

1) Options have been assessed against the objectives with the following outcomes:

Y = this option meets the objective

N = this option does not meet objective

? = uncertain whether this option meets the objective or not

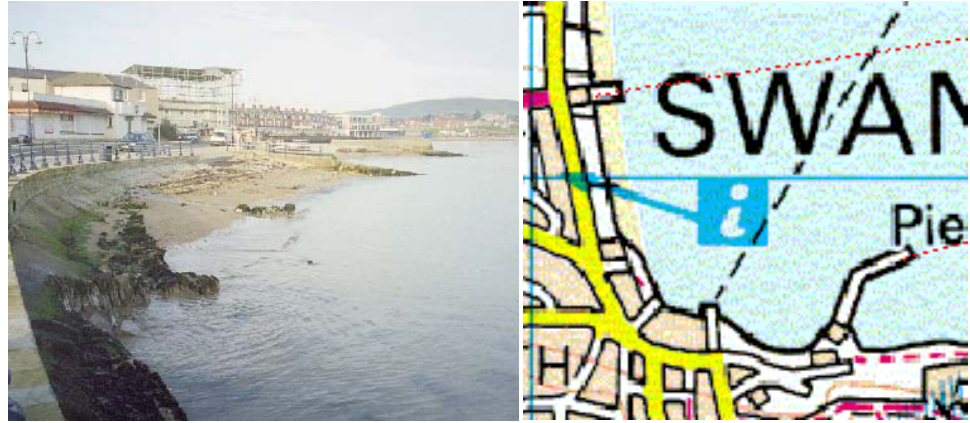
2) Objectives in bold italics arise from legal obligations, including the Habitats Regulations and Water Resources Act

3) Other objectives do not represent legal obligations

4) Objectives that are underlined identify where there is potential conflict with another objectives

### 3.2

#### *Swanage Pier to Outfall Jetty - SWA2*



#### 3.2.1

##### *Existing Shoreline & Defences*

The shoreline comprises seawalls, promenade and sand beach to the north end of the frontage..

#### 3.2.2

##### *Flood and Coast Defence Problem*

Assessment of coastal flooding by Posford Haskoning for Environment Agency South West Region does not indicate that there is a coastal flooding problem in this frontage and no particular reports of historical flooding have been received.

The stability and integrity of individual structures along this frontage has not been assessed, but no evidence of long term erosion is evident. Indeed anecdotal reports from fishermen indicates that seabed levels are higher at present than has been the case in recent years.

#### 3.2.3

##### *Current SMP Policy (adopted 1999)*

The SMP policy in the Short Term and in the Long Term is Hold the Line.*Strategic Options*

The options in **Table 3.3** have been developed as ways of achieving the SMP Policy

| <b>Strategic Option</b> | <b>Description</b>   |
|-------------------------|--|
| No Active Intervention  | No action taken apart from fulfilling health and safety requirements |
| Minimum Maintenance     | Inspect and repair existing structures as required                   |

**Table 3.3**

3.2.5

*Strategic Environmental Assessment*

The specific objectives for this area have been established as part of the Strategic Environmental Assessment (see Technical Annex 10, Table 5.2). These have been summarised in **Table 3.4**, together with the implications of adopting the No Active Intervention and Minimum Maintenance options

Minimum Maintenance is the preferred environmental option and would meet all the objectives of avoiding interference with the conservation and landscape value, protecting properties in Swanage and maintaining recreational resources through existing structures being renovated.

Provided it is implemented through maintaining existing sea walls and/or beach recharge then possible conflicts with the conservation and landscape value are likely to be avoided.

3.2.6

*Economic Appraisal*

No economic appraisal was necessary

3.2.7

*Preferred Strategy*

***It is recommended that the SMP policy be amended to Hold the Line, in line with the 2001 SMP Guidance.***

***The recommended way of achieving the SMP policy is therefore by Minimum Maintenance***

3.2.8

*Development of Preferred Strategy*

A programme of monitoring and maintenance for this frontage is recommended to be developed.

As a minimum this would include:

- Bi-annual inspection of the seawalls, recording and photographing of defects
- Recording of wave overtopping events, including photography, degree of damage etc

Where possible, it should also include:

- Bathymetric surveys of seabed levels (which could be included as part of the monitoring of the proposed scheme for SWA3)

|  | DESCRIPTION            |                     |
|--|------------------------|---------------------|
|  | No Active Intervention | Minimum Maintenance |
| SWA0.1 Avoid constructing any new coastal defences that would be detrimental to the landscape value of Dorset AONB   | Y                      | Y                   |
| SWA0.2 Maintain/enhance recreational resources in the coastal zone, where environmental sustainable, practical, economic and financially viable.   | N                      | Y                   |
| SWA2.1 Avoid constructing new coastal defences that would be detrimental to the setting of Swanage Conservation Area   | Y                      | Y                   |
| SWA2.2 Protect properties of architectural merit within Swanage Conservation Area and other properties in Swanage from coastal erosion, where technically feasible, environmentally sustainable and economic | N                      | Y                   |

**Table 3.4 - Swanage Pier to Outfall Jetty Strategy Options**

|  |
|--|
| <p><b>Notes:</b></p> <p>1) Options have been assessed against the objectives with the following outcomes:</p> <p>    Y = this option meets the objective</p> <p>    N = this option does not meet the objective</p> <p>    ? = uncertain whether this option meets the objective or not</p> <p>2) Objectives in bold italics arise from legal obligations, including the Habitats Regulations and Water Resources Act</p> <p>3) Other objectives do not represent legal obligations</p> <p>4) Objectives that are <u>underlined</u> identify where there is potential conflict with another objectives</p> |
|--|

### 3.3

#### *Outfall Jetty to Sheps Hollow - SWA3*



The problems, options and preferred option for coast defence at Swanage are very well defined as a scheme has been developed in parallel with the Strategy.

#### 3.3.1

##### *Existing Shoreline & Defences*

The shoreline comprises a sandy beach with timber groynes, seawall and promenade.

#### 3.3.2

##### *Flood and Coast Defence Problem*

More than 84 residential properties and 15 hotels are at risk of erosion in the next 50 years. In addition, Shore Road is at risk, which provides the main route between (a) Swanage Town /Kingston /Harman's Cross / Langton Matravers and (b) New Swanage / Studland / Poole-Studland Ferry (which provides access to Poole, Bournemouth and beyond). For many of the residents and visitors to the town, the Shore Road is the main access route. Furthermore the main sewer that runs under Shore Road is at risk; this utility serves more than 300 properties in New Swanage that are not otherwise effected.

There is presently a 10% probability of failure of the seawall in any year and collapse is anticipated between 2006 and 2012 due to ongoing long-term erosion. The cliff behind the defences is part of a Site of Special Scientific Interest and the frontage is an important feature of the town, which is reliant on tourism revenue. The Defra Land Use Band is considered to be Band A, being "*Typically intensively developed urban areas at risk from flooding and/or erosion*". The indicative standard of protection for coastal frontage is a return period of 100-300 years (MAFF, 1999).

### 3.3.3

#### *Current SMP Policy (adopted 1999)*

The SMP policy in the Short Term is Hold the Line (maintain existing defences) and in the Long Term is Hold the Line (through the use of beach recharge especially to the north of the Unit where geological conservation objectives may occur).

### 3.3.4

#### *Strategic Options*

The options in **Table 3.5 – 3.8** have been developed as ways of achieving the SMP Policy

| <b>Strategic Option</b>                    | <b>Description</b>  |
|--|---|
| No Active Intervention                     | No action taken apart from fulfilling health and safety requirements  |
| Hold the Line – Maintain Existing Defences | This option would include: <ul style="list-style-type: none"><li>• the removal of the sheet pile groyne ends for safety reasons</li><li>• the regular replacement of sections of the existing groynes to attempt to stop losses in total beach volume due to longshore transport, including the replacement of piles where necessary</li><li>• eventual complete replacement of the groynes</li></ul> |

**Table 3.5**

|  |   |
|--|---|
| <p>Hold the Line – Open Beach Recharge</p> | <p>This option would include:</p> <ul style="list-style-type: none"> <li>• the removal of the sheet pile groyne ends for safety reasons</li> <li>• the extraction of the existing groynes using land based plant such as piling rigs and dump trucks</li> <li>• the dredging of sand of a similar grading to the existing beach from either the Swash Channel entrance to Poole Harbour or a licensed dredging site</li> <li>• pumping ashore of the sand from the dredger through a pipeline (either floating or sunken, depending on the contractor’s preferred plant and methods)</li> <li>• transportation of the sand along the beach either through the pipeline or by dumper truck</li> <li>• initial placement of approximately 140,000m<sup>3</sup> (2004 commencement) of sand by bulldozer to a similar slope gradient as the existing beach</li> <li>• active monitoring and recycling of sediment levels on the beach</li> <li>• subsequent recharges of approximately 100,000m<sup>3</sup> anticipated to be required every 5 years.</li> <li>• extension of the Ulwell Stream pipe outfall to avoid blockage at the seaward end, due to the wider beach that would be required than for the other Improve options</li> <li>• installation of a flushing system to the Outfall Jetty</li> </ul> |
|--|---|

*Table 3.6*

|   |  |
|---|--|
| <p>Hold the Line –Timber Groynes and Beach Recharge</p>     | <p>This option would include:</p> <ul style="list-style-type: none"> <li>• the removal of the sheet pile groyne ends for safety reasons</li> <li>• extraction of the existing groynes using land based plant such a piling rigs and dump trucks</li> <li>• the construction of new groynes using hardwood timbers</li> <li>• recharge of the beach with 50,000m<sup>3</sup> - 90,000m<sup>3</sup> (2004 commencement) by similar means to that described in the Open Beach option.</li> <li>• active monitoring of sediment levels on the beach</li> <li>• active monitoring and maintenance of the groynes</li> <li>• subsequent recharges of around 40,000m<sup>3</sup> (Upper bound) anticipated to be required every 20 years</li> <li>• subsequent substantial reconstruction of the timber groynes every 25 years</li> <li>• installation of a flushing system to the Outfall Jetty</li> </ul> |
| <p>Hold the Line – Long Rock Groynes and Beach Recharge</p> | <p>This option would include:</p> <ul style="list-style-type: none"> <li>• the removal of the sheet pile groyne ends for safety reasons</li> <li>• extraction of the existing groynes using land based plant such a piling rigs and dump trucks</li> <li>• the construction of new groynes using rock, probably from local Purbeck or Portland Stone Quarries</li> <li>• recharge of the beach with 75,600m<sup>3</sup> (2004 commencement) by similar means to that described in the Open Beach option.</li> <li>• active monitoring of sediment levels on the beach</li> <li>• installation of a flushing system to the Outfall Jetty</li> </ul>   |

**Table 3.7**

|   |   |
|---|---|
| Hold the Line – Short Rock Groynes and Beach Recharge | <p>This option would include:</p> <ul style="list-style-type: none"> <li>• the removal of the sheet pile groyne ends for safety reasons</li> <li>• the extraction of the existing groynes using land based plant such as piling rigs and dump trucks</li> <li>• the construction of new groynes using rock, probably from local Purbeck or Portland Stone Quarries</li> <li>• recharge of the beach with 50,000 – 90,000m<sup>3</sup> by similar means to that described in the Open Beach option.</li> <li>• active monitoring of sediment levels on the beach</li> <li>• subsequent recharges of around 40,000m<sup>3</sup> (Upper Bound) anticipated to be required every 20 years</li> <li>• installation of a flushing system to the Outfall Jetty.</li> </ul> |
|---|---|

**Table 3.8**

3.3.5

*Strategic Environmental Assessment*

The specific objectives for this area have been established as part of the Strategic Environmental Assessment (see Technical Annex 10, Table 5.2). These have been summarised in **Table 3.13**.

Hold the Line options which include Maintain Existing Defences, and the various Beach Recharge options, would meet all the objectives of avoiding interference with the earth science, nature conservation, landscape value, protecting properties in Swanage and maintaining and/or enhancing recreational resources. Provided the option is implemented through maintaining existing sea walls and/or beach recharge then possible conflicts with the conservation and landscape value are likely to be avoided.

Beach Recharge could potentially be self sustaining, with the volume of sediment being lost from the scheme being balanced by the volume arriving at the south end. However, the rate of loss from beach recharge (rather than from an established beach) tends to be higher in initial years. The increased area of sandy beach would also be beneficial to the landscape and to recreational resources.

### 3.3.6

#### *Economic Appraisal*

A benefit cost analysis was carried out to establish the option that would provide the best value for money. The calculations were based on the economic damages resulting from:

- the loss due to erosion of residential properties
- the loss due to erosion of commercial properties (hotels)
- the road works required to upgrade junctions and road alignments to re-route traffic from Shore Road when it is lost due to erosion to Northbrook Road
- the works required to re-route the existing sewer out of the area of land at risk
- the loss of amenity of the beach frontage.

The costs of the options were calculated in the first instance on the expectation of obtaining beach recharge materials from licensed aggregate dredging sites for initial construction and making arrangements to obtain sediment from the Swash Channel (entrance to Poole Harbour) for subsequent recharges.

The present values of the benefits and costs of each of the options is summarised in **Table 3.9**. The Maintenance option and all of the Improve options have benefit-cost ratios robustly in excess of unity, confirming the cost effectiveness of carrying out a scheme. The option with the highest benefit-cost ratio is the Short Rock Groyne and Beach Recharge option to a 1:300 year standard of protection. Since this represents the upper limit of the indicative standards of protection given in the FCDPAG3 guidance, the use of incremental benefit-cost ratios to consider options of a higher standard is not relevant.

| Cost, Benefits and Scheme Prioritisation |            |                            |                     |            |            |                        |            |            |                           |            |            |                            |            |            |
|--|------------|----------------------------|---------------------|------------|------------|------------------------|------------|------------|---------------------------|------------|------------|----------------------------|------------|------------|
|  | Do Nothing | Maintain Existing Defences | Open Beach Recharge |            |            | Timber Groyne Recharge |            |            | Long Rock Groyne Recharge |            |            | Short Rock Groyne Recharge |            |            |
| Standard of Protection                   | -          | 1:10yr                     | 1:100 yr            | 1:200 yr   | 1:300 yr   | 1:100 yr               | 1:200 yr   | 1:300 yr   | 1:100 yr                  | 1:200 yr   | 1:300 yr   | 1:100 yr                   | 1:200 yr   | 1:300 yr   |
| PV costs PVc                             | 0          | 3,436,368                  | 5,751,485           | 5,847,965  | 5,880,125  | 4,827,937              | 4,924,417  | 4,956,577  | 6,054,777                 | 6,151,257  | 6,183,417  | 4,165,441                  | 4,261,921  | 4,294,081  |
| PV damage PVd                            | 23,733,968 | 19,002,944                 | 5,088,011           | 2,762,405  | 1,869,737  | 5,088,011              | 2,762,405  | 1,869,737  | 5,088,011                 | 2,762,405  | 1,869,737  | 5,088,011                  | 2,762,405  | 1,869,737  |
| PV damage avoided                        |            | 4,731,025                  | 18,645,957          | 20,971,563 | 21,864,231 | 18,645,957             | 20,971,563 | 21,864,231 | 18,645,957                | 20,971,563 | 21,864,231 | 18,645,957                 | 20,971,563 | 21,864,231 |
| Net Present Value NPV                    |            | 1,294,656                  | 12,894,472          | 15,123,598 | 15,984,106 | 13,818,021             | 16,047,146 | 16,907,654 | 12,591,181                | 14,820,306 | 15,680,814 | 14,480,517                 | 16,709,642 | 17,570,150 |
| Average benefit/cost ratio               |            | 1.4                        | 3.2                 | 3.6        | 3.7        | 3.9                    | 4.3        | 4.4        | 3.1                       | 3.4        | 3.5        | 4.5                        | 4.9        | 5.1        |
| Incremental benefit/cost ratio           |            |                            | 6                   | 24         | 28         | 10                     | 24         | 28         | 5                         | 24         | 28         | 19                         | 24         | 28         |
| Economic Score                           | -          | -                          | 5.5                 | 6.2        | 6.4        | 6.7                    | 7.5        | 7.8        | 5.2                       | 5.8        | 6.1        | 8.0                        | 8.8        | 9.2        |
| Residential Properties                   | -          | -                          | 99                  | 99         | 99         | 99                     | 99         | 99         | 99                        | 99         | 99         | 99                         | 99         | 99         |
| Social Score                             | -          | -                          | 1.3                 | 1.3        | 1.3        | 1.5                    | 1.5        | 1.5        | 1.2                       | 1.2        | 1.2        | 1.8                        | 1.7        | 1.7        |
| Environmental Score                      | -          | -                          | 0                   | 0          | 0          | 0                      | 0          | 0          | 0                         | 0          | 0          | 0                          | 0          | 0          |
| Total Prioritisation Score               | -          | -                          | 6.8                 | 7.4        | 7.7        | 8.3                    | 9.0        | 9.3        | 6.4                       | 7.0        | 7.3        | 9.7                        | 10.6       | 10.9       |

**Table 3.9 Economic Appraisal of Scheme Options and Standards of Protection**

Notes:

- (1) A discount rate of 3.5% and an Optimism Bias of 34% has been assumed
- (2) The Incremental Benefit-Cost Ratios stated have been calculated for each type of scheme, as follows:
  - for the 1:100 yr option, the I-bcr has been calculated with respect to the Maintain option
  - for the 1:200 yr option, the I-bcr has been calculated with respect to the 1:100 yr option
  - for the 1:300 yr option, the I-bcr has been calculated with respect to the 1:200 yr option

*The recommended preferred option is therefore the Short Rock Groyne and Beach Recharge Scheme to a Standard of Protection of 1:300yr (allowing for 0.33% expectation of a storm event sufficient to cause seawall collapse in any year).*

The preferred option would include:

- the removal of the sheet pile groyne ends for safety reasons
- the extraction of the existing groynes using land based plant such as piling rigs and dump trucks
- the construction of new groynes using rock, probably from local Purbeck or Portland Stone Quarries
- recharge of the beach with 50,000 – 90,000m<sup>3</sup> by similar means to that described in the Open Beach option.
- active monitoring of sediment levels on the beach
- subsequent recharges of around 40,000m<sup>3</sup> (Upper Bound) anticipated to be required every 20 years
- installation of a flushing system to the Outfall Jetty.

From **Table 3.9**, it is clear that whilst the benefit cost ratios are robust, the Prioritisation Scores attributable to all the options considered are not sufficient to meet the threshold score for construction in year 2004/5, which has been set at 15 (indicative).

(a) Upper/Lower Bounds of Beach Recharge, Timing of Works and Source of Beach Recharge Materials

Whilst it is not possible to justify Grant Aid for a scheme carried out in 2004/5 using beach recharge materials obtained from licensed aggregate dredging sites, the justification for the scheme may be achieved by considering the following:

- Upper and lower bounds of recharge. In the initial assessment, an upper bound of recharge was assumed whereby an additional 40,000m<sup>3</sup> of material is placed over and above the required design beach profile to account for losses, with further maintenance recharges taking place every 20 years. Evidence from the period 1930 to 1980s shows that groyne schemes in Swanage have tended to trap sediment and result in accretion

rather than erosion. The assessment of coastal processes shows that there is a feed of sediment into Swanage Bay. Therefore the further economic analysis was undertaken to consider a lower bound of recharge, whereby it is assumed that the scheme is self sustaining, i.e. no sacrificial material is placed in year 0, and no maintenance recharge is required

- Use of beach recharge materials from the Swash Channel (entrance to Poole Harbour)
- Delay of the scheme until 2005/6 for which years, the current Prioritisation Score threshold is 10 (indicative).

The economic appraisal of the preferred scheme was repeated, taking into account the volume of the initial beach recharge will need to be increased to allow for the additional erosion of sediment that will take place between 2002 (the year when the last topographic survey was performed) and the time of carrying out the scheme

The revised economic appraisal and Prioritisation Scores are presented in **Table 3.10** and are summarised in **Table 3.11**.

| Cost, Benefits and Scheme Prioritisation |            |  |   |                                |   |  |   |                                |   |
|--|------------|--|---|--------------------------------|---|--|---|--------------------------------|---|
|  |            | Upper Bound<br>Short Rock Groynes and Recharge |   |                                |   | Lower Bound<br>Short Rock Groynes and Recharge |   |                                |   |
|  | Do Nothing | 2004/5 - from<br>Swash Channel                 | 2004/5 - from<br>Licensed Aggregate<br>Source | 2005/6 - from<br>Swash Channel | 2005/6 - from<br>Licensed Aggregate<br>Source | 2004/5 - from<br>Swash Channel                 | 2004/5 - from<br>Licensed Aggregate<br>Source | 2005/6 - from<br>Swash Channel | 2005/6 - from<br>Licensed Aggregate<br>Source |
| Standard of Protection                   | -          | 1:300  | 1:300   | 1:300                          | 1:300   | 1:300  | 1:300   | 1:300                          | 1:300   |
| PV costs PVc                             | 0          | 3,109,253                                      | 4,294,081                                     | 3,131,363                      | 4,367,781                                     | 2,646,889                                      | 3,456,517                                     | 2,668,999                      | 3,530,217                                     |
| PV damage PVd                            | 23,733,968 | 1,869,737                                      | 1,869,737                                     | 1,869,737                      | 1,869,737                                     | 1,869,737                                      | 1,869,737                                     | 1,869,737                      | 1,869,737                                     |
| PV damage avoided                        |            | 21,864,231                                     | 21,864,231                                    | 21,864,231                     | 21,864,231                                    | 21,864,231                                     | 21,864,231                                    | 21,864,231                     | 21,864,231                                    |
| Net Present Value<br>NPV                 |            | 18,754,978                                     | 17,570,150                                    | 18,732,868                     | 17,496,450                                    | 19,217,342                                     | 18,407,714                                    | 19,195,232                     | 18,334,014                                    |
| Average benefit/cost<br>ratio            |            | 7.03   | 5.09  | 6.98                           | 5.01  | 8.26   | 6.33  | 8.19                           | 6.19  |
| Economic Score                           |            | 13.06  | 9.18  | 12.96                          | 9.01  | 15.52  | 11.65   | 15.38                          | 11.39   |
| People Score                             |            | 2.39   | 1.73  | 2.37                           | 1.70  | 2.81   | 2.15  | 2.78                           | 2.10  |
| Environmental Score                      |            | 0.00   | 0.00  | 0.00                           | 0.00  | 0.00   | 0.00  | 0.00                           | 0.00  |
| Total Prioritisation<br>Score            |            | 15.5   | 10.9  | 15.3                           | 10.7  | 18.3   | 13.8  | 18.2                           | 13.5  |

**Table 3.10 – Economic Appraisal of Upper/Lower Bounds of Beach Recharge, Material Sources and Timing of Works**

Notes:

(1) A discount rate of 3.5% and an Optimism Bias of 34% has been assumed

3.3.7

*Preferred Strategy*

**Table 3.8** demonstrates that the preferred scheme would not receive Grant Aid in 2004/5 if beach recharge from an offshore source was required as the Prioritisation Score would be less than the value of 15 required. However, if beach recharge material were to be available from the Swash Channel then the costs would be reduced and the Prioritisation Score would increase to more than 15.

In 2005/6, the scheme would receive Grant Aid regardless of the source of sediment as both options have Prioritisation Scores in excess of 10.

|  |                        | Year  |   |
|--|------------------------|---|---|
|  |                        | 2004/5<br>(score = 15)                                | 2005/6<br>(score = 10)                              |
|  | offshore licensed site | 10.3 – 13.8<br>(x does not meet prioritisation score) | 10.7 – 13.5<br>(✓ meets prioritisation score)       |
|  | Swash Channel          | 15.5 – 18.3<br>(✓ meets prioritisation score)         | 15.3 – 18.2<br>(✓ 15.3 – 18.2 prioritisation score) |

**Table 3.11**

*It is recommended, therefore, that the scheme be progressed to be carried out in 2004/5 assuming that material would be available from the Swash Channel in the knowledge that, if it is not available, the scheme could be carried out in 2005/6 using either source.*

**Cost Plan**

The estimated costs in the first five years of the scheme, including contingencies, is indicated in **Table 3.12**.

| Year                        | Item   | Cost (£) | Contin. (£) | Total (£)        | Contin. (£)    |
|-----------------------------|--|----------|-------------|------------------|----------------|
| 2004/5<br>and/or<br>2005/06 | Detailed Design,<br>Tender and Contract<br>Award | 55,000   | 10,000      |                  |                |
|                             | Site Supervision &<br>Contract Support           | 250,000  | 38,000      |                  |                |
|                             | Site Investigations                              | 25,000   |             |                  |                |
|                             | Planning Supervisor                              | 15,000   | -           |                  |                |
|                             | Remove Existing<br>Timber Groynes                | 275,000  | -           |                  |                |
|                             | Outfall Jetty Flushing<br>System                 | 20,000   |             |                  |                |
|                             | Install New Rock<br>Groynes                      | 965,000  | 200,000     |                  |                |
|                             | Recharge Beach                                   | 168,300  | 95,500      | 1,773,300        | 343,500        |
| 2006/07                     | Topo/bathy surveys,<br>analysis & reporting      | 15,000   | -           | 15,000           | -              |
| 2007/08                     | Topo/bathy surveys,<br>analysis & reporting      | 15,000   | -           | 15,000           | -              |
| 2008/09                     | Topo/bathy surveys,<br>analysis & reporting      | 15,000   | -           | 15,000           | -              |
| 2009/10                     | Topo/bathy surveys,<br>analysis & reporting      | 15,000   | -           | 15,000           | -              |
|                             | <b>total</b>                                     |          |             | <b>1,833,300</b> | <b>343,500</b> |

**Table 3.12 Cost Plan for First 5 Years**

3.3.8

*Development of Preferred Strategy*

The implementation of the scheme at SWA3 is depended on:

- (i) resolving issues relating to the ownership of the beach
- (ii) obtaining Planning Permission and other licences/consents, which is dependent on (i)
- (iii) gaining Scheme Approval and associated Grant Aid

|  | DESCRIPTION            |  |                                     |   |  |   |
|--|------------------------|--|-------------------------------------|---|--|---|
|  | No Active Intervention | Hold the Line – Maintain Existing Defences | Hold the Line – Open Beach Recharge | Hold the Line – Timber Groynes and Beach Recharge | Hold the Line – Long Rock Groynes and Beach Recharge | Hold the Line – Short Rock Groynes and Beach Recharge |
| SWA0.1 Avoid constructing any new coastal defences that would be detrimental to the landscape value of Dorset AONB   | Y                      | Y  | Y                                   | Y   | N  | Y   |
| SWA0.2 Maintain/enhance recreational resources in the coastal zone, where environmental sustainable, practical, economic and financially viable.                   | N                      | Y  | Y                                   | Y   | Y  | Y   |
| <i>SWA3.1 Avoid constructing any new coastal defences that would be detrimental to the earth science or nature conservation value of Purbeck Ridge (East) SSSI</i> | Y                      | Y  | Y                                   | Y   | N  | Y   |

|  |   |   |   |   |   |   |
|--|---|---|---|---|---|---|
| SWA3.2 Protect properties in Swanage from coastal erosion and flooding where technically feasible, environmentally sustainable and economically viable | N | Y | Y | Y | Y | Y |
|--|---|---|---|---|---|---|

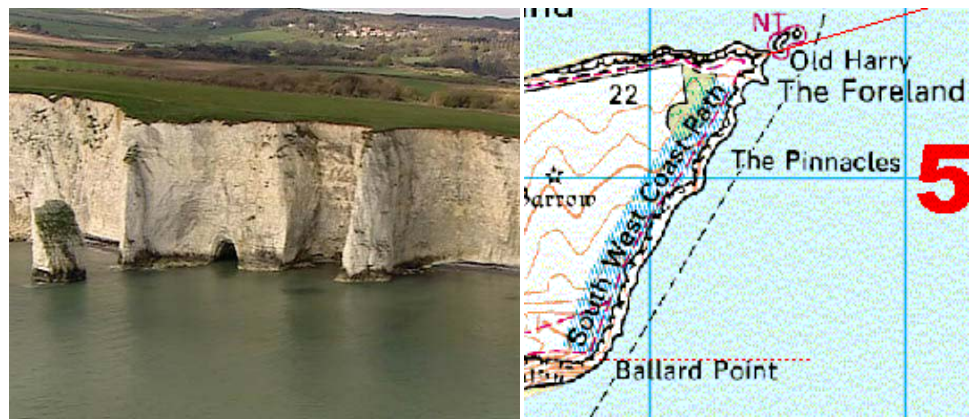
***Table 3.13 - Outfall Jetty to Sheps Hollow Strategy Options***

**Notes:**

- 1) Options have been assessed against the objectives with the following outcomes:
  - Y = this option meets the objective
  - N = this option does not meet the objective
  - ? = uncertain whether this option meets the objective or not
- 2) Objectives in bold italics arise from legal obligations, including the Habitats Regulations and Water Resources Act
- 3) Other objectives do not represent legal obligations
- 4) Objectives that are underlined identify where there is potential conflict with another objectives

3.4

***Sheps Hollow to Ballard Point - SWA4  
& Ballard Point to Handfast Point - SWA5***



3.4.1

***Existing Shoreline & Defences***

The shoreline comprises exposed chalk cliffs.

3.4.2

***Flood and Coast Defence Problem***

There are no properties or utility services on the cliffs, which are foreseen to be at risk in the next 50 years. The headland is important in providing protection from wave attack and in stabilising the shoreline alignments of Studland Bay, Poole Bay and therefore, much of Poole Harbour as well. The degree of shoreline recession is likely to be small in the coming 50 years, although it may be punctuated with isolated cliff collapses. As a result, it is not expected, however, that there will be a detrimental impact on flood or coast defences in other management units.

Increased cliff falls in the future may be expected due to increased rainfall, particularly in winter, and increased wave attack at the base of the cliff. The change in the shoreline recession due to climate change (including sea level rise) cannot be estimated. However, even if it were to result in a doubling of the rate of erosion, it remains unlikely that a detrimental impact in other management units would occur

3.4.3 *Current SMP Policy (adopted 1999)*  
Do Nothing in the Short Term and Do Nothing in the Long Term

3.4.4 *Strategic Options*  
Since the existing SMP policy is Do Nothing, there is only one strategic option, given in **Table 3.14**.

| Strategic Option       | Description  |
|------------------------|--|
| No Active Intervention | No action taken apart from fulfilling health and safety requirements |

**Table 3.14**

3.4.5 *Strategic Environmental Assessment*  
The specific objectives for this area have been established as part of the Strategic Environmental Assessment (see Technical Annex 10, Table 5.2). These have been summarised in **Table 3.15**, together with the implications of adopting the No Active Intervention option.

Adopted policy of no intervention is the preferred environmental option and would meet the objectives of avoiding interference with earth science, nature conservation and landscape. It is possible that this option would lead to the erosion of the coastal footpath in the long term. Some measures would be appropriate to facilitate the re-creation of the lost footpath within this coastal section.

3.4.6 *Economic Appraisal*  
No economic appraisal was required.

3.4.7

*Preferred Strategy*

***It is recommended that the SMP policy be amended to No Active Intervention, in line with the 2001 SMP Guidance.***

***The preferred strategy to achieve this policy is to take no action apart from fulfilling health and safety requirements.***

3.4.8

*Risks and Implications*

There will be potential erosion risks to Jurassic Coast World Heritage Site, Isle of Portland to Studland Cliffs cSAC and Purbeck Ridge (East) SSSI with the option No Active Intervention. As these are natural processes, they are considered appropriate to and acceptable for these sites.

The existing coastal footpath would need to be set back, and it is recommended that each time this is done, the area of land between the footpath and the new cliff edge could be used for creating cliff top grassland, to provide an area of habitat and landscape feature. This should be done by agreement with the landowner, as there is no legal basis at present for re-routing a footpath lost to erosion.

|   | DESCRIPTION            |
|---|------------------------|
|   | No Active Intervention |
| SWA0.1 Avoid constructing any new coastal defences that would be detrimental to the landscape value of Dorset AONB  | Y                      |
| SWA0.2 Maintain/enhance recreational resources in the coastal zone, where environmental sustainable, practical, economic and financially viable.  | Y                      |
| <p><b><i>SWA4.1 Avoid constructing any new coastal defences that would be detrimental to the earth science or nature conservation value of:</i></b></p> <ul style="list-style-type: none"> <li>• <b><i>Jurassic Coast World Heritage Site</i></b></li> <li>• <b><i>Isle of Portland to Studland Cliffs cSAC</i></b></li> <li>• <b><i>Purbeck Ridge (East) SSSI</i></b></li> </ul> | Y                      |
| SWA4.2 Avoid constructing any new coastal defences that would be detrimental to the landscape value of Purbeck Heritage Coast   | Y                      |

***Table 3.15 - Sheps Hollow to Ballard Point & Ballard Point to Handfast Point Strategy Options***

***Notes:***

1) Options have been assessed against the objectives with the following outcomes:

Y = this option meets the objective

N = this option does not meet the objective

? = uncertain whether this option meets the objective or not

2) Objectives in bold italics arise from legal obligations, including the Habitats Regulations and Water Resources Act

3) Other objectives do not represent legal obligations

4) Objectives that are underlined identify where there is potential conflict with another objectives