



Poole and Christchurch Bays Shoreline Management Plan Review Sub-cell 5f

Section 4. Policy Development Zone 1

Bournemouth Borough Council

2011

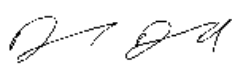
Report V4

9T2052

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Document title Poole and Christchurch Bays Shoreline
Management Plan Review Sub-cell 5f
Section 4. Policy Development Zone 1
Document short title PDZ 1
Status Report V4
Date 2011
Project name Poole and Christchurch Bays SMP2
Project number 9T2052
Client Bournemouth Borough Council
Reference 9T2052/R/301164/Exet

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Date/initials check
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Date/initials approval 

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4.2 PDZ 1 Central and Eastern Sections of Christchurch Bay



Hurst Spit to Friars Cliff
- Chainage 0km to 15km.



SMP 1 Management Units

UNIT	LOCATION	CHAINAGE	POLICY
	North Point to Hurst Point	0 -2km.	Not previously covered by SMP1
CBY7	Hurst Spit	2 – 5km	Hold the Line, short and long term
CBY6	Milford-on-Sea to Hordle Cliff	5 – 7km	Hold the Line, short term and long term
CBY5	Hordle Cliff to Barton Common	7 – 9.5km.	Do Nothing short term, Selective Retreat long term
CBY4	Barton Common to Cliff House Hotel	9.5 – 11.5km	Hold the Line, short term and long term.
CBY3	c) Marine Drive West, Barton	11.5 – 12km	Retreat short term, Hold the Line long term.
	b) Naish Holiday village.	12 – 12.6km	Retreat short term, Do Nothing long term
	a) Chewton Bunny	12.6 – 12.9km	Retreat short term, Hold the line long term.
CBY2	Chewton Bunny to Mudeford Sandbank	12.9 – 17.2km	Selectively Hold the Line, short and long term. Undefined sections possibly retreat long term.

Note: SMP1 policy was set over a 50 year period. Short term refers to immediate approach to management of defences with long term policy being set for the 50 years.



Figure 4.2.1

4.2.1 OVERVIEW

PRINCIPAL FEATURES (further details are provided in Appendix D)

Built Environment:

The main settlements are Milford-on-Sea, Barton-on-Sea and Highcliffe. Behind Hurst Spit is the village of Keyhaven. The main seafront centre of Milford is immediately behind the existing defence line with a car park, residential property and seafront services. The main coast road and car parks are situated at the crest of Rook Cliff and properties are situated on land behind the road. At Barton-on-Sea there are car parks and open ground with properties behind. At Highcliffe there is a large car park and Café at the eastern end of the cliff, overlooking Chewton Bunny, with various properties backing on to the cliff crest. A large holiday park is located to the rear of the crest of the large mobile clay Naish Cliff. It is recognised that the built environment and coastal communities are at risk from future coastal erosion. However key infrastructures, principally electricity sub-stations, are located only in the Highcliffe area and are set some distance back from the cliff crest.

Heritage and Amenity:

Hurst Spit Castle was built between 1541 and 1544 and is now designated as a scheduled monument. Highcliffe Castle is a Grade I Listed Building and one of the most important Listed Buildings in the area. Bramble Lane - situated in an area to the north of Chewton Common Road, is designated a Conservation Area by NFDC, as are two areas within Milford-on-Sea; one is centred around the green in the village centre and the other centred around the church. The previously derelict White House hospital on the seafront at Milford-on-Sea is an important Listed Building and prominent coastal landmark.

There have been important paleontological finds at Barton-on-Sea, with a number of isolated finds of worked flint tools in the Friars Cliff area, dating from Prehistoric, Neolithic and Bronze Age eras. Some pieces of Bronze Age metalwork have also been discovered in the area. There are also earthworks at Taddiford Gap that may have been associated with the medieval village of Hordle. There are a string of strategically located car parks at locations along the cliff top, at Milford, Barton and Highcliffe which provide important access to the coastline. At Milford and beneath Rook Cliff, behind existing defences, there are a large number of beach huts. Similarly at Barton-on-Sea, there are beach huts to the base of Barton Cliff. There is access to the shore at Chewton Bunny. The coast to the east is popular as open beach beneath the slumping cliffs, while the area to the west has more formal paths over the slope and to the base of Highcliffe. Hurst Spit is part of the Solent Way footpath and also extends along the clifftop through Milford-on-Sea.

The entire frontage is valued for its recreation value. There is one golf course between Milford-on-Sea and Barton-on-Sea.

Nature Conservation:

The marshes behind Hurst Spit are designated as SPA, SAC and Ramsar. The designated areas include Hurst Spit and Sturt Pond behind the Milford-on-Sea seafront. The cliffs from Milford-on-Sea through to Friars Cliff are a designated SSSI and there is a local nature reserve further up the Dane Stream, upstream of the Milford bridge. The cliffs along the frontage are significant for fossils as well as for their geological value. The overall landscape is considered very important.

KEY VALUES.

Despite the proximity of large areas of residential properties, the key value of the area is the semi natural coastline, its dynamic nature and the changing nature of the landscape. It is important both in terms of the geological and geomorphological understanding this provides, as well as the educational value in a more general sense. Within this context is the important community of Milford-on-Sea and

Barton-on-Sea, together with its seafront and cliff top amenity area, and the important general recreational access to the coast and its foreshore. Within the significant semi-natural environment are the internationally important areas of designated habitat behind and including the shingle ridge of Hurst Spit. The heritage aspect of the coast is vitally important with specific features of Highcliffe and Hurst Castle. The paleontological finds establish a long history of man's use of the area and the development and change of human use within the context of a changing coastline.

OBJECTIVES (the development of objectives is set out in Appendix D based on objectives listed in Appendix E)

- Manage risk to properties due to erosion where sustainable.
- Support adaptability of the local cliff-top communities.
- Maintain the community of Milford-on-Sea and Barton-on-Sea
- Manage Hurst Spit appropriately to deliver the objectives stated within North Solent SMP.
- Maintain geological exposures of the designated cliff line.
- Minimise loss of habitat or species if possible (identify compensatory habitat elsewhere within SMP area if any net loss occurs).
- Maintain the dynamic coastal zone and its capacity to change.
- Maintain the outstanding landscape and the views and appreciation of the varied coastal environment.
- Reduce and minimise reliance on defences.

DESCRIPTION

This zone extends from the eastern end of Hurst Spit through to the Friars Cliffs and extends approximately 15km.

The eastern end the frontage is formed by Hurst Spit. At its western end this barrier beach joins and aligns itself with the coastline at Milford-on-Sea. The beach line curves out to link with its most easterly point at Hurst Castle and Hurst Point, before returning back as a recurved spit (between Hurst Point and North Point) within the Solent.



The land behind the spit comprises saltmarsh. A main channel is formed at the end of the Spit and this cuts through the marsh, splitting into two smaller channels. One of these extends up as the Keyhaven Lake to form the Avon Water at Keyhaven. The second, Mount Lake, runs behind Hurst Spit, through a short intertidal drainage inlet linking with Sturt Pond and above that the Danes Stream through the town. Along the northern side of Sturt Pond (and along the intertidal drainage inlet), behind the coastal defences to the west of the saltmarsh, is a low earth flood embankment. This acts to protect agricultural land, the village of Keyhaven and the caravan park to the south east of Milford-on-Sea.

At the proximal end of Hurst Spit, the front face has been reinforced with major rock revetment. To the west of this rock revetment is the start of the Milford-on-Sea defences which is comprised of a number of old sections of concrete sea wall with timber groynes maintaining a beach. Where beach levels are reduced, there are also a number of sections of rock revetment which protect the wall. An example of this is at the White House which is protected by a sea wall and rock armour defences. These form a slight promontory, forming the headland of the shallow bay through to Hurst Spit. The defences protect the main seafront car park, open ground and seafront residential and commercial properties. There are also beach huts along the sea wall.



The sea wall combined with timber groynes, and then further lengths of rock revetment, continue west along the toe of Rook Cliff. At the crest of the cliff is open ground car parks and coastal footpath (forming part of the Solent Way). The main coast road is set back from the crest of the cliff by some 30m to 50m and there are properties to the rear of the road. Rook Cliff rises steeply from the defence along this section. The



cliff, comprising sands and gravels overlying clay continues to slump at its base with regular weathering at the crest.



Rook Cliff to Hordle Cliff

There are numerous beach huts located along the toe of the cliff, between Rook Cliff and Hordle Cliff. Hordle Cliff sets back slightly from the alignment of the defence along Rook Cliff and adopts a shallower gradient with a wider extent of shingle at the toe. This change in profile reflects the slight valley through this section of the coast and the composition of the cliff material. The main drainage is to the Danes Stream, running eastward down to Milford-on-Sea. At the crest of the cliff there is

generally open ground with the former school, now the residential development of Scholars Retreat, and Hordle Manor Farm, being the only development.

At the start of the higher Barton Cliffs, the backshore coastal slope pushes forward, with the high water mark close to the toe of the cliff. The higher cliffs comprise an upper sandy/shingle stratum overlying clays, forming a slight bevel to the toe of the slope. The crest of the cliff generally consists of open ground with agricultural land and, to the west, a golf course.

From this area to the west, the hinterland tends to increase in height with drainage channels cutting through the coast. This contrasts to the area further east, where the land tends to fall away to the hinterland. The first major stream, the Becton Bunny, cuts the coast as a deeply cut valley some 800m east of Barton-on-Sea.

To the west of Becton Bunny, the foreshore again narrows and there are extensive protection works to the toe of the cliff. These works are comprised of a number of major rock strongpoints, linked by rock revetment. In addition drainage works have been undertaken to help reduce groundwater levels, which is the main driver of slope instability and cliff recession at this location. The lower protected level has become well vegetated and access tracks lead to the lower part of the cliff, the beach and to a collection of beach huts. At the crest of the cliff is open ground with Marine Drive East set back some 50m. There is continuous development inland of the road. There are a limited number of properties between the road and the cliff and these include a small cluster of properties at Barton Court and the Cliff House Hotel towards the western end. It is at Barton Court or Fisherman's Walk, in the centre of the Barton-on-Sea frontage that the nature of the cliff starts to change. To the east are the steeper gravelly cliffs in front of Marine Drive East. To the west are the more predominantly clay cliffs running through to Naish Cliff, the clay stratum dipping to the east.



Barton-on-Sea East

All the cliffs along the Barton-on-Sea section have been re-graded which has improved the stability; however the angle of repose is still steeper than the naturally stable angle. The cliffs are therefore over-steep and subject to continued failure driven by the underlying groundwater / combined with the underlying geology.



The cliffs located below the western side of Barton-on-Sea (below Barton Court through Marine Drive into Marine Drive West) are currently unstable due to ground movement associated with an area of active landslides. This section is protected by rock revetment and strongpoints, however the drainage system had largely failed. Further along Marine Drive West and into the large Naish Holiday Village the coastline is undefended and the cliffs are erode due to toe erosion and shallow rotational landslides. The centre of the Holiday village is situated 200m from the crest of the coastal slope with holiday chalets populating the entire area.

To the western end of Naish Cliff, the Chewton Bunny cuts in a steep valley through to the coast. The entrance to the valley is defended on its western side by an arrangement of rock structures at the start of the defences to Highcliffe. This marks a distinct step in the coastal alignment, reflecting both the introduction of defences, but also the nature of the cliff material and drainage patterns.



The cliffs at Highcliffe have been significantly managed all the way through to the steeper, but lower, undefended section below Rothesay Park and Highcliffe Castle. Tracks have been developed down the coastal slope and along the lower defended platform at the shoreline. The defence comprises of large rock groynes or breakwaters, tending to be at shorter spacing than those at Barton. There is a rock revetment between the rock structures but this generally remains buried beneath the shingle. The coast in this area is aligned to the south rather than the more southwesterly facing orientation of the Barton frontage.



At the crest of the cliffs is open ground to the east, with residential property backing on to the cliff at the western end.

The cliff line reduces in height to the west, down to the frontages of Friars Cliff and beyond to Mudeford and Mudeford Quay.

PHYSICAL PROCESSES (The following information is provided as a brief summary, further details are provided in Appendix C).

TIDE AND WATER LEVELS (mODN)

Location	LAT	MLWS	MLWN	MHWN	MHWS	HAT	Neap range	Spring range	Correction CD/ODN
Hurst Point		-1.13	-0.43	0.47	0.87		0.9	2	-1.83
Christchurch Entrance		-0.31	-0.21	0.49	0.89		0.7	1.2	-0.9

Extremes(mODN)

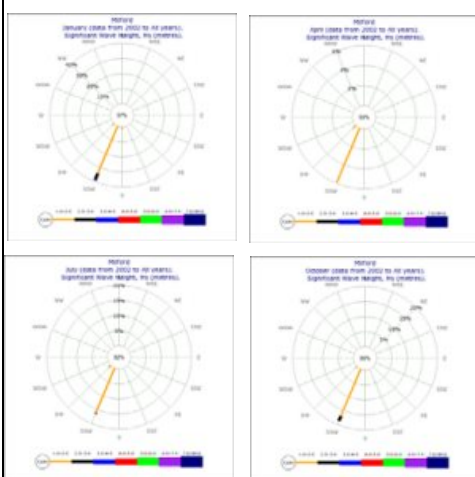
Location:	1:1	1:10	1:25	1:50	1:100	1:200	1:500	1:1000
Barton-on-Sea	1.43	1.70	1.80	1.88	1.96	2.04	2.15	2.23
Hengistbury Head	1.39	1.65	1.75	1.83	1.91	1.99	2.09	2.17

WAVE CLIMATE

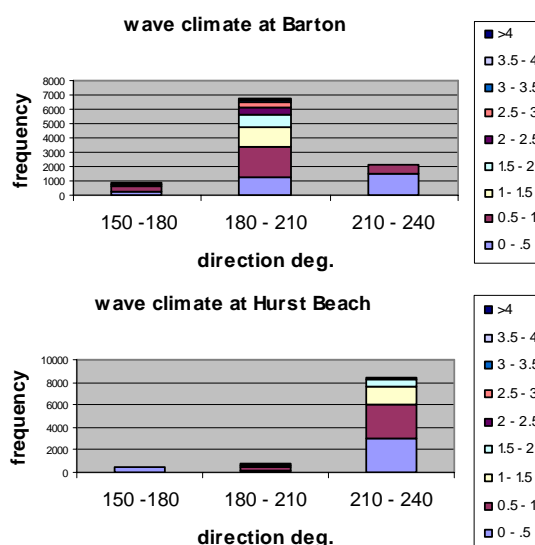
The dominant wave direction is from the south to south-west, which corresponds with the direction of longest fetch and longer period swell waves originating in the Atlantic Ocean. Shorter period wind waves from the east and south-east are less influential in terms of geomorphological development along the frontage, although significant storms do occur from these directions and can result in significant local impact.

The largest waves (and therefore greatest amount of wave energy) are received by Hurst Spit and the easterly part of Christchurch Bay. The presence of the Christchurch Ledge extending south-easterly from Hengistbury Head and the ebb-tide delta at the mouth of Christchurch Harbour creates shallower bathymetry and some attenuation of wave energy in the westerly part of Christchurch Bay.

The presence of the Isle of Wight and the Needles provides shelter to Hurst Spit from waves approaching from south to south-east.



Image/Data courtesy of the Channel Coastal Observatory.



The CCO have been monitoring the wave climate along this SMP frontage using Waverider directional wave buoys at Milford (OS 427297E 90361N) since 1996.

The nearshore wave roses show the very strong direction bias within this zone of the coast. Inshore wave climates are reported for Barton-on-Sea and Hurst Beach.

Although the strong directional bias is clearly maintained, the dominant direction at the shoreline changes; this is reflected in the change in orientation of the shoreline itself.

TIDAL FLOW

Currents across the main section of the frontage are relatively low; peak flows less than 0.5 m/sec. Flows increase to the eastern end between Hurst Spit and the Shingles Bank on the flood. Within the entrance to the Solent, in the area of Hurst Castle, peak flood and ebb flows are in the order of 1 m/sec.

PROCESSES

Control Features:

Overall the zone is controlled by the presence of Hengistbury Head and is also influenced by Christchurch Ledge and to the east by a combination of features including the headland of the Isle of Wight and the western approaches to the Solent. Associated with this is the influence, particularly on Hurst Spit, of the Shingles Bank. Within the zone, the development of the *shoreline* has been influenced by the robustness and height of the various sections of cliff and, associated more locally with this, both the projection of these cliff types influencing the erosion of the sea bed topography and their extent inland.

Existing defences at Highcliffe, Barton-on-Sea and at Rook Cliff are also seen as influencing and controlling the shore form, both locally (where defended) and with respect to adjacent frontages. The defence at Milford-on-Sea has created a slight headland, influencing and linking through to the defence at the start of Hurst Spit.

Local drainage has an influence upon the cross shore geomorphological profiles and, as a consequence, on the patterns and rates of erosion.

Existing Defences:

Individual defences are identified in Appendix C. Defence is provided to Hurst Castle, Milford-on-Sea, Barton-on-Sea and Highcliffe. The works at Milford are typically linear defences extending through to the root of Hurst Spit. The main defence to the town is suffering from lower beach levels and general deterioration. The works beneath Rook Cliff are in similarly poor condition. At Barton-on-Sea the defences, particularly at the western end, have suffered from heave of the underlying clays. More recent defences at Highcliffe are in good condition but are reliant on beach recharge and management. Hurst Spit acts as a defence to the low lying saltmarsh within the entrance to the Solent and there are low flood banks around the periphery of this area.

Processes:

The dominant aspects of the coastal processes within this zone are the supply and movement of sediment. The main external control features identified above provide constraints on the development of the natural system. Sediment has been historically supplied to the shoreline by erosion of the cliffs and has been transported along and away from the shore by wave energy. The interaction at the eastern end with the entrance to the Solent has tended to segregate sediment with:

- Wave action allowing generation of Hurst Spit as a shingle feature, re-curving within the estuary;
- Sand and shingle being moved, again by wave action but also within the entrance channel by

currents, to form the Shingles bank; and

- General water movement feeding finer sediment into the Solent sustaining and developing the saltmarshes.

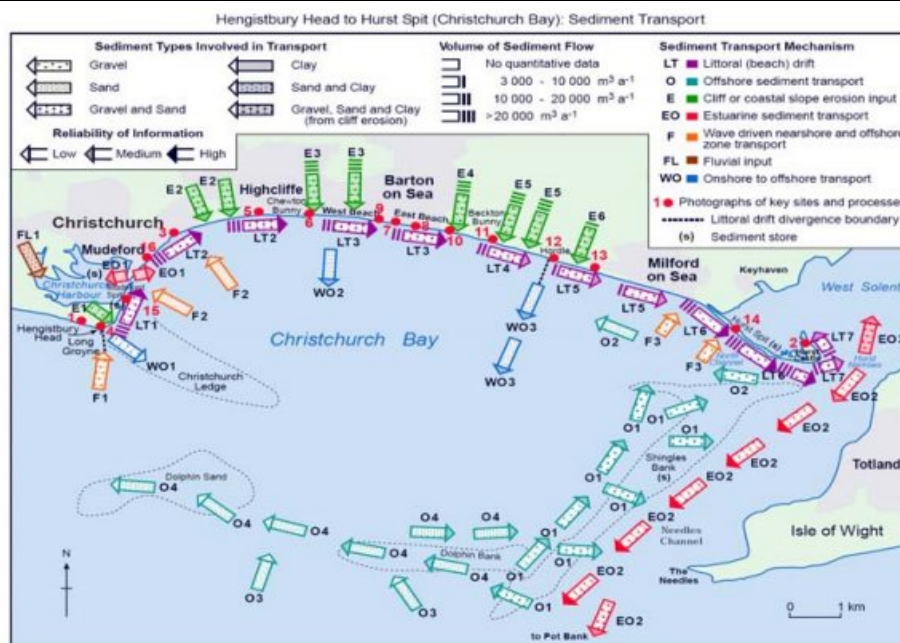
As the coast has evolved to a more stable alignment, the sediment supply has been reduced. The erosion of the coast continues, however the coast is not yet in net alignment with the wave energy. Of importance are the more local features of the coast, where sediment is retained by natural variation in the coastal alignment or where cross shore defences are in place retaining the beaches. This does support the concept developed from modelling, that the existing alignment is not excessively in advance of its stable position. Change does however continue and, in particular, that change is seen in the retreat of the crest of the cliffs, even in areas where the coastal toe has been stabilised. Increasing rates of sea level rise will continue to impose pressure from further retreat of the shoreline. This will have two effects:

- There will be increased wave action on the toe of the coastal slopes, increasing instability; and
- There will be increased potential for long shore drift as the coast is held (either naturally or by man made structures) out of line with its natural alignment.

As the cliffs have provided a degree of resistance to adopting a stable alignment, the natural process by which the cliff develops a stable slope is constrained. Given the complex interaction between the cliffs and the shoreline, an important distinction is made between shoreline erosion (moving towards a stable alignment of the beaches in relation to the plan shape of the coast) and cliff recession (the process whereby the crest and slope of the cliff adjusts to a more stable profile). In some areas this latter process is most strongly influenced by the underlying geology and the effects of groundwater. **The two processes are, however, fundamentally linked.** As material falls or slumps to the toe, so wave action removes this natural support. Unloading of the toe causes instability and shallow rotational sliding along predefined slip surfaces (block & graben system) leading to failure of the cliff. The cliffs are unable to develop a more stable slope. In other areas it is purely that removal of material from the shoreline exposes the cliffs to continuing erosion and over steepening.

In effect, along this section of the coast the erosion at the toe has kept pace with the recession of the crest of the slopes. The material of which the cliff is composed is critical to this process. The most obvious example of this is at Naish. Here, because of the high clay content of the cliff and the high ground water levels within the slope, the natural angle of repose is very shallow; ground water is the dominant influence. Even if toe erosion were stopped, the cliff would continue to fail and the cliff crest would retreat back a large distance. To a lesser degree the cliff at Barton-on-Sea would still retreat despite the current defences. In this latter case, tension cracks regularly develop with the cliff crest failing in sections. There is some sliding of the lower sections of this coastal slope. At Hordle, because the cliff is already set back in relation to the alignment of adjacent sections of the shoreline, a more stable slope has been achieved. At Highcliffe, the defences to the base of the cliff have also allowed the cliff to adopt a stable slope with little movement at the crest. The stability of the slope has also been improved by regarding of the cliff face.

Sediment released from the cliffs is moved to the east and in areas this slows erosion elsewhere. This is shown in the following figure.



Map courtesy of SCOPAC, 2004 (www.scopac.org.uk).

Figure 4.2.2

This analysis has been developed at a relatively broad scale. Further analysis, particularly developed from on-going monitoring, has shown some significant variation from the generalised patterns shown above. The monitoring has identified that there is likely to be discrepancies between the wave climate (determined by recent wave monitoring data) and the rate of sediment transport along the coastline which is presented in the model in figure 4.2.2. It is proposed that this model will be subject to a thorough review in future studies as identified in the Action Plan. Nevertheless as it currently stands the Sediment Transport model identifies the following specific points with respect to management:

- That although the drift along Highcliffe frontage is seen as being large, the potential sediment supply from the cliff is relatively low and the area is protected from the prevailing south-westerly winds. This deficit will be exacerbated by the probable long term reduction in supply from Poole Bay. Some of the deficit is made up by onshore supply of sediment from the area to the north of the Christchurch Ledge.
- The potential supply from the Naish Cliff and the Barton Cliffs is high, with the potential to feed the high drift rate along this frontage and to the east. Naish cliff tends to provide a much higher proportion of fine sediment rather than beach building material.
- Drift rates are shown to decrease towards the Milford frontage but then an increase along Hurst Spit. More detailed information for the area has shown that, while Hurst Beach is quite dynamic, the actual net drift rate over the frontage is relatively small. As an overall feature it remains quite stable. However, there is a clearly little sediment held in front of the Milford-on-Sea seafront.
- Although the assessed drift rates along the frontage are significant, they are a magnitude less than in many of the eroding coastal systems of the UK.

At Hurst Spit, the actual processes driving the development of the Spit are complex and less well understood. The Spit is under pressure to roll back with sea level rise. This pressure is modified by the presence of the Shingles Bank. There is believed to be some natural supply from the offshore area.

Protection to sections of the shoreline from headlands. This tends to reduce sediment supply immediately to the east of the headland and this then causes creation of sub-bays, set back further from the overall alignment of the coast. The depth to which these sub-bays form, or would form, is relative to their position within the overall bay. In this way, smaller bay shapes tend to be more pronounced within the central section of the bay than if formed further to the east.

Unconstrained Scenario:

Although unrealistic, because of the residual impact of defences, this scenario considers how the coast would respond, if all defences were removed. It is useful in examining the pressure along the frontage.

Both the shoreline and the back crest of the shore would tend to move back in unison over the Mudeford area. In the same way, the cliff crest and shoreline position along the Highcliffe section would tend to move back together, potentially some 100m. At the western end of Highcliffe, without the bastion at this point, recession of the cliff would be more severe as the softer Naish cliff line retreats more rapidly. The shoreline would erode at a rate more in line with adjacent frontages. Barton-on-Sea is already slightly in advance of the natural shoreline to the east and west and might be expected to erode, initially, at a faster rate. This would incur increasing recession of the cliff top as the toe support is removed and the over steepened cliff becomes unstable.

The cliff section to the east of Barton-on-Sea is slightly set back. Even so, because the high water mark is close to the toe of the cliff, there would be significant pressure on this frontage to erode. Hordle Cliff is provided some control by the cliff to the west and more significantly by the Rook Cliff frontage at Milford. The erosion at Hordle Cliff would be determined very much by the rate of erosion at Rook Cliff. This cliff, without its defences would retreat, initially, quite rapidly.

POTENTIAL BASELINE EROSION RATES

Base rates have been assessed from monitoring and historical data. The range of potential erosion is assessed in terms of variation from the base rate and sensitivity in potential sea level rise. Further detail on erosion rates is provided in Appendix C. The base rates provided below are taken as an average based on historical records. The rates are a composite value based on erosion of the toe and recession of the crest of the cliff and reflect the erosion rates following failure of defences.

(Sea Level Rise assumed rates: 0.06m to year 2025; 0.34m to year 2055; 1m to year 2105. Baseline date 1990.)

Location	Base Rate	Notes	100yr. Erosion / Recession (m)
Highcliffe	1.1m/yr	Erosion resisted by defences and slopes stabilised	120m
Naish Cliff	2.8m/yr	Shoreline position held forward by material slumping from the coastal slope.	280m to 410m
Barton-on-Sea	1.2m/yr	Erosion resisted by defences and cliff crest continues to retreat.	120m to 230m
Barton Cliffs	2.7m/yr		150m
Hordle Cliffs	0.8m/yr		120m
Rook Cliff	1m/yr	Erosion resisted by defences.	150m
Milford on Sea	1m/yr	Erosion resisted by defences.	150m

4.2.2 BASELINE MANAGEMENT SCENARIOS

PRESENT MANAGEMENT

Present Management is taken as that policy defined by SMP1, modified by subsequent strategies or studies. It should be noted that both in the case of SMP1 and that of many of the strategies undertaken before 2005, the period over which the assessment was carried out tended to be 50 years.

SMP1			MODIFIED POLICY		
MU	LOCATION	POLICY	REF	LOCATION	POLICY
Not identified	Area to rear of Hurst Spit				
CBY 7	Hurst Spit	HTL	S1	Hurst Spit	Beach recharge and management.
CBY 6	Milford on Sea	HTL	S1	Milford on Sea	Beach recharge and maintain defences.
CBY 5	Hordle and Barton Cliff	DN/ Retreat	S1	Hordle and Barton Cliff	Allow natural evolution.
CBY 4	Barton-on-Sea	HTL	S1	Marine Drive East to Sea Rd.	Stabilise cliff, maintain defences.
			S1	Sea Rd to Marine Drive West	Beach recharge and cliff drainage.
CBY 3	Naish	Retreat and selectively HTL	S1	Marine Drive West	Drainage, beach recharge and new rock headland (yr 20 – 30).
			S1	Naish Holiday Park	NAI
			S1	Chewton Bunny	Maintain Rock headland associated with defence to west.
CBY 2	Highcliffe	Selectively HTL	S1	Highcliffe	Reduce size of groynes and use to repair revetment, maintain headland to east end, beach management and recharge frontage to east (CBY3).
			S1	Highcliffe Castle	Maintain erosion but protect Castle in long term.
			S1	Friars Cliff	Replace timer Groynes with rock, beach management and recharge.

References:

S1

Christchurch Bay Strategy Study(DRAFT) - April 2007

BASELINE SCENARIOS FOR THE ZONE

Introduction

Two baseline scenarios are considered below, these being: No Active Intervention, assuming that no further action is taken to defend the coast, and With Present Management, developing the approach defined by SMP1 and subsequent strategies. In the latter case the approach defined for the next 50 years is extended over the next 100 years.

In examining these scenarios, the SMP2 has initially considered the whole frontage as one, considering how management and behaviour of different sections of the coast may influence one another (e.g. if one section of the coast is held by defence, how will this impact upon the development of other sections of the frontage). This establishes the various links between sections of the coast and provides a context for examining more specific sections of coast in greater detail.

As discussed earlier (Section 4.1.1 - Processes), this section of the coast works in two interrelated ways. On a frontage by frontage scale, the rates of erosion of the coast and the rate of recession of the crest of the cliffs is very largely determined by the geotechnical properties of the backshore. The ability of the coast to erode is determined by the ability of the cliffs and foreshore to resist wave action; the more able the foreshore is to dissipate or absorb wave energy, or the stronger the nature of the cliffs are, the less the shoreline will erode. Defences act to strengthen the coast in this respect. The nature of the cliff, together with its drainage and moisture content, also dictates the behaviour of cliff crest recession; so that even where the toe of the cliff is no longer eroding, the crest of the cliff may still retreat inland until it establishes a stable slope (or natural angle of repose). This retreat behaviour of the crest may be through continuing weathering and falls from the cliff face or may involve deeper seated failure, movement of large sections of the whole slope or surface slides. Where there is continuing erosion of the toe, the coastal slope can never reach a stable slope and the two processes work together, with a retreating coastal profile.

Along the shoreline, coastal behaviour is largely driven by the movement of sediments (drift), this being driven by the waves (or in some locations by tidal flow). If the wave approach is at an angle to the shoreline, sediment is moved. Sediment may be replaced by drift from adjacent frontages but, if not, the foreshore and toe of the coastal slope will erode. Cross shore structures may resist this movement. The rate of movement in any area is, therefore, largely determined by the orientation of the shoreline. Where there is a promontory (headland) in the coast; where a cliff is more resilient or there are defences, sediment is able to build up, realigning the shore more in tune with the direction of the wave angle. Down drift of such a point there tends to be increased erosion, until such a time as the headland actually starts to provide shelter to the coast down drift and a stable bay is formed (a log spiral bay). The basic process is shown in the following diagram.

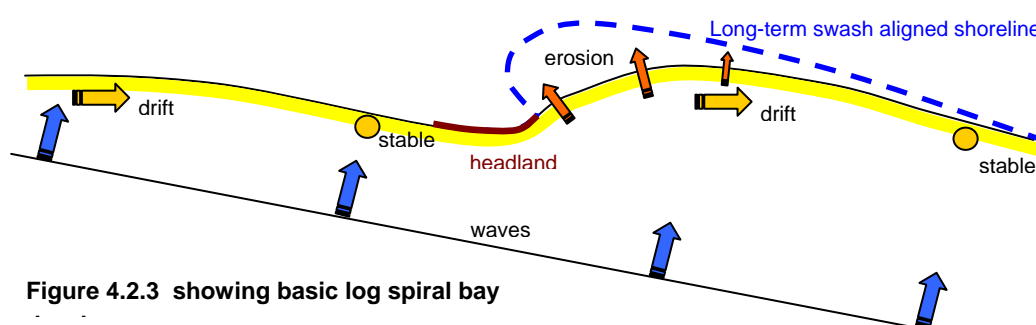


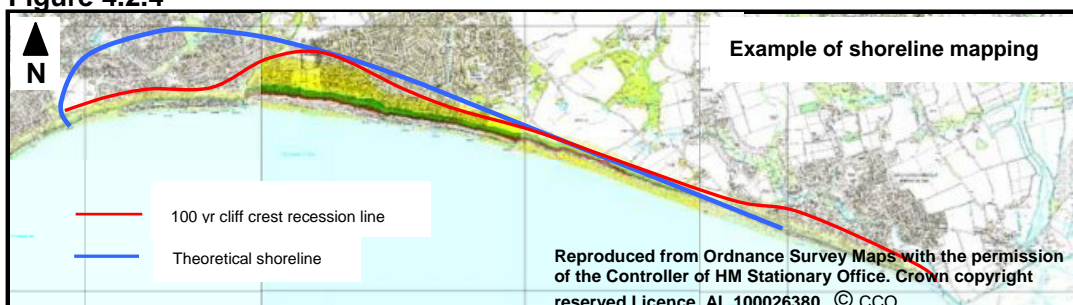
Figure 4.2.3 showing basic log spiral bay

The two processes, that of cross-shore behaviour and that of longshore interaction, work together to shape the coast and have to be considered both in the description of the baseline scenarios (below) and in discussion and development of policy (section 4.1.3).

The baseline erosion, mapped in Appendix C and discussed in the subsequent sections, has been determined from examination of historical records and monitoring data, in combination with information from geotechnical studies. As such, although generally shown as recession lines at the crest of the cliff, they reflect the past development patterns of the coast, incorporating both erosion and cliff recession. This provides a good analysis of where the crest of the cliff may be over the three epochs. However, they cannot, and do not attempt to, assess how, by holding sections of the shoreline or through the natural shaping of the coast through wave action, the frontages may continue to erode in the longer term or how management across different sections may influence the rate of erosion of the shoreline or toe of the coastal slope over the coast as a whole.

To help address this, a high level assessment has been made of the possible bay development arising from different scenarios. This assessment, based on average wave energy direction, consideration of potential hard points and the existing larger scale bay shape, provides rough estimates of how the shoreline (the toe of the coastal slope) might develop. This shape is described as a theoretical shoreline in the following sections; as shown in the example below. Where the theoretical shoreline lies well behind the mapped cliff recession line, the process of retreat would be one of combined erosion and cliff recession, if these processes are not constrained artificially. The development of the full bay shape could continue well beyond the hundred year period of SMP2.

Figure 4.2.4



Where the theoretical shoreline aligns closely with the existing shoreline, the pressure for erosion is likely to be less, although still occurring, and would tend to be more stable. This would depend on the degree of control imposed at the down drift end. In these areas the process of cliff recession is still likely to occur and the mapped recession lines under any scenario are still relevant in assessing potential loss of assets.

The theoretical shoreline is acknowledged to be indicative and does not fully take account of the variation in wave angle and exposure over the whole length of the coast, nor does it take account of the local influence of topography and bathymetry. Recognising this, it would be inappropriate to map this line in detail (the actual retreat lines are shown in greater detail in Appendix C). The various figures in subsequent sections aim only to aid discussion of different approaches to management. However, this approach is useful in highlighting over the larger scale where the coast would be under pressure to erode and how management in different sections of the coast might then influence this erosion, supply and drift of sediment affecting adjacent sections of the shoreline.

No Active Intervention (Scenario 1):

Overview

Under this scenario, no works would be taken to maintain existing defences along the frontage. With the exception of the rock revetment at the Milford-on-Sea end of Hurst Spit (with an estimated residual life of 50 years), it is reported that all defences would fail or would become ineffective within the first epoch of the SMP. The coast would resume an uninterrupted pattern of erosion. Erosion would occur to the toe of the cliffs as the alignment of the coast attempts to adjust to form a stable bay in line with typical wave energy on the frontage. Cliff recession zones for the three epochs (20yrs, 50yrs, 100yrs) have been assessed based on historic patterns of recession. This is shown in the following figure (Figure 4.2.5). Detailed maps of recession are provided in Appendix C.

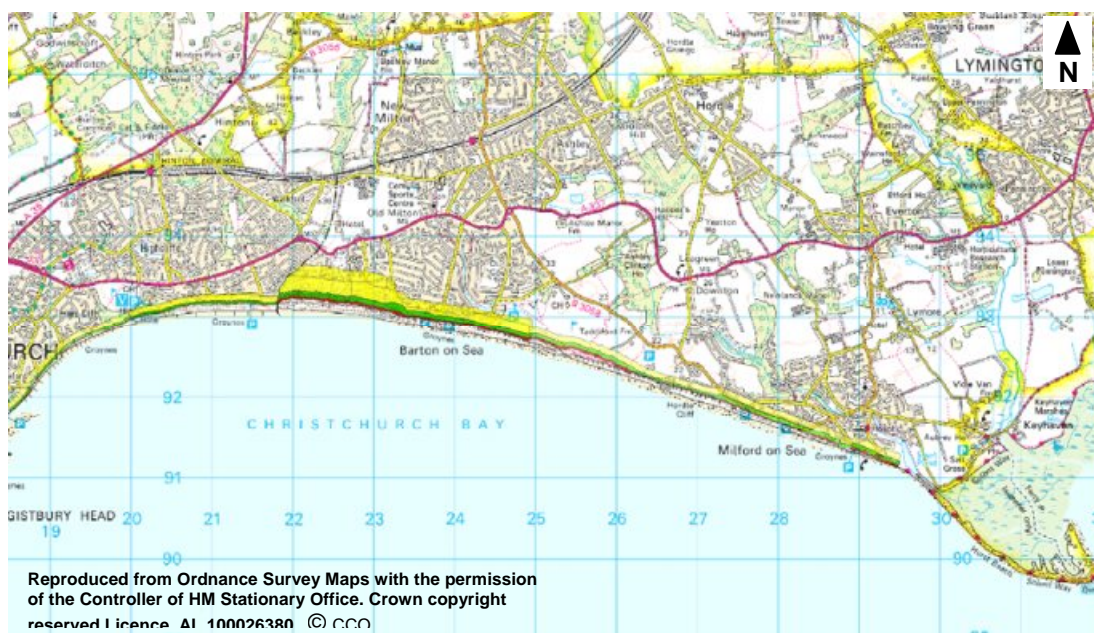


Figure 4.2.5

Figure 4.2.6 shows, superimposed on this recession plot, the estimated theoretical equilibrium shoreline, as discussed in the introduction to this section of the report.

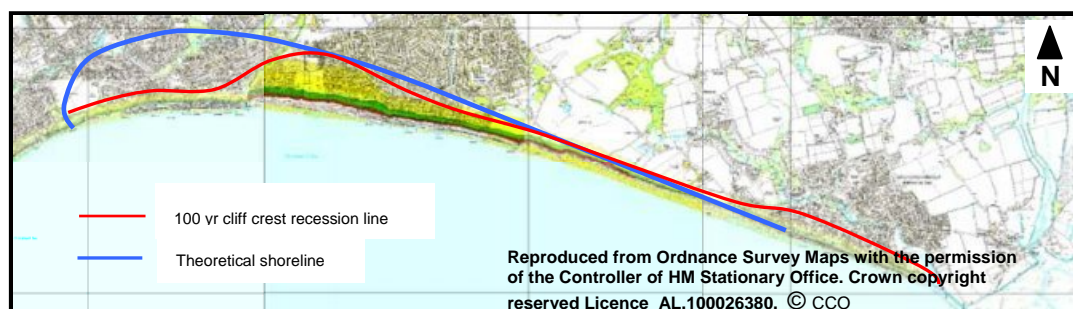


Figure 4.2.6

It may be seen that over the western end of the frontage, under a no active intervention scenario, the cliff recession rates would dictate the position of the coast over the period of the SMP2. There is unlikely to be any underlying geomorphological restraint slowing rates over this period and the full pattern of erosion and recession is likely to occur. Further erosion of the shoreline would continue beyond the 100 years, as suggested by the theoretical shoreline shape, and the cliff line would

continue to retreat. This erosion and cliff recession would vary along the frontage as different geology was encountered. At the eastern end, assuming the underlying control imposed by the entrance to the Solent does not significantly alter; the shoreline would erode to some degree at Rook Cliff, where it is held by defences, but would be tending to a more natural alignment. The cliff recession would still occur as the coastal slope adjusts to a more stable profile. This eastern section would gain some benefit from increased sediment transported from the eroding cliffs to the west. However, this would be a slow process of sediment release over time. The main beneficiary of this increased supply of beach material would be Hurst Spit, although a substantial volume of material would feed in to the nearshore area and beyond the spit, to the approaches of the Solent. It is not suggested that allowing the western half of the zone to retreat would substantially benefit the eastern half over the period of the SMP.

The key points highlighted by this overview of the frontage are:

- The long term erosion problem faced at the western end of the frontage;
- That at large scale the eastern end of the frontage is well aligned to wave energy;
- That at present, both the defended cliffs to the eastern end of Barton-on-Sea and the slight promontory formed by the defended section of Rook Cliff do act as headlands and are therefore quite strategic in management of the whole frontage. (In the case of Rook Cliff this is shown by the accumulation of sediment within the shallow bay to the west of Rook Cliff);
- That the position of these two areas, in relation to the theoretical equilibrium shape of the larger frontage does suggest that development of any down drift local embayment might be quite shallow.

The more specific consequences of this no active intervention scenario is discussed below, section by section, from east to west.

Hurst Spit.

Hurst Spit would benefit to a degree from the increased supply of sediment from the west. However, due to the slow release of material from the cliffs, while defences continue to have a residual impact this may not be sufficient to compensate for the loss of sediment around Hurst Point. Without the management and recycling of sediment, the shingle ridge of Hurst Beach may well breach. The overall feature is likely to sustain itself in some form but at a lower level. However, it seems unlikely that without maintenance of the defences to Hurst Castle, that the Castle would remain for the next 100 years. This would result in significant change, impacting on the sustainability of Hurst Beach and North Point and this in turn would impact on the marsh area behind.

There would also be significantly increased flood risk, due purely to water levels in the area behind Hurst Spit. Even at present, areas of Keyhaven are within the flood risk area and a substantial part of the village is at risk on higher return periods. With sea level rise, by mid-way through the third epoch virtually all the village would be at risk on a 1:10 year event, if defences were not in place. This area is covered by the adjacent Solent SMP2, but the point raised is in the increased exposure and increased level of risk as a result of more frequent overtopping and potential for breach along Hurst Beach.

Milford on Sea

Following failure of defences, the seafront at Milford would be lost, with the loss of property behind. Although the rock revetment at the root of the Spit would act as a hard point over the first two epochs (and probably into the third epoch) this would tend to allow formation of a more substantial beach to the west, this area would be a potential position for a breach through to Sturt Pond.

Despite the supply of sediment from the west slowing rates of erosion, the road above Rook Cliff would be cut by erosion and recession of the cliff. This could happen within the next 50 years. Property to the western side of Milford-on-Sea, between Rook Cliff and Hordle Cliff would be lost in the third epoch.

Hordle Cliff to Barton Cliff

Further west, the golf course would lose an estimated 150m width of its frontage, although, over this section of the coast, erosion of the toe to the cliff may start reducing and it is unlikely that the golf course club house would be lost in the foreseeable future. Similarly the main coastal road would be safe over this section of the coast.

Barton-on-Sea to Highcliffe

The group of properties seaward of Marine Drive in Barton-on-Sea would be lost during the first epoch, with the road and the property immediately behind Marine Drive probably lost within the next 50 years. Erosion of the Barton-on-Sea frontage would continue, taking out a further three to four rows of properties over the 100 years. With more severe erosion, the recession of the cliff might have taken out a further two rows of properties over this period. Under this scenario, future losses might be expected at a rate of two rows of properties every 50 years, beyond the 100 year period. Much of the Naish Holiday Village would be lost including the Holiday Village centre. Under this scenario there would be significant loss at Highcliffe, over the 100 years, including loss of the Castle and areas of property along Rothesay Drive and Wharnccliffe Road.

Overview of Impacts

The potential economic damages are identified in Table 1 at the end of this sub-section. Table 2 provides an assessment against the general objectives. Clearly significant properties would be lost under this scenario. Essential aspects such as the seafront would be lost at Milford-on-Sea, together with its main access road to the west. Access to the town would still be possible and the centre of the town would still exist, but the loss of its seafront would reduce one of its core values to the area. With continuing erosion in areas such as Barton-on-Sea, adaptation would be increasingly difficult.

Hurst Spit would provide a good degree of shelter to the marshes behind, although clearly the loss of the Castle would impact on tourism and character of the area.

One major benefit would be the fresh exposure of the geological features along the coastline and successfully maintaining the dynamic nature of the coast. Due to the dip of the geological beds, continued erosion of the exposure at Naish Cliff would lead to eventual loss of the resource. In addition, access to the coast would be severely constrained and, with the loss of car parks and open areas from which to appreciate the landscape, this value of the coast would be significantly affected. This would be exacerbated by the continuing abandonment and loss of property in areas such as Highcliffe and Barton-on-Sea. Overall, landscape values are assessed as having been diminished.

The character of the area would be substantially different and would not contribute in the same manner to the overall benefit of the communities or to the region. The persistent threat to properties over the Barton-on-Sea frontage, continuing beyond the 100 year period of the SMP2, would result in adverse impacts to the community and loss of value to property extending back into the town.

With Present Management (Scenario 2):

Overview

The present management scenario is based on that set by SMP1 and updated through the development of the recent draft Christchurch Bay Strategy. Although in draft, this strategy is taken as reflecting the intent of WPM within this baseline scenario. The intent defined within the strategy is to provide continued protection to all existing areas currently defended and to extend management to the west of Barton-on-Sea and, through recharge, to the slowing of erosion in front of Naish Cliff. The intent of the strategy is also to maintain defences at Milford-on-Sea and to continue to manage the future development of Hurst Spit. The strategic approach relies quite heavily on beach recharge to supplement the loss of sediment across the whole frontage.

Under this scenario, the coast is divided as a series of hard points, protecting or delaying loss of specific assets. This is shown in outline in Figure 4.2.7.

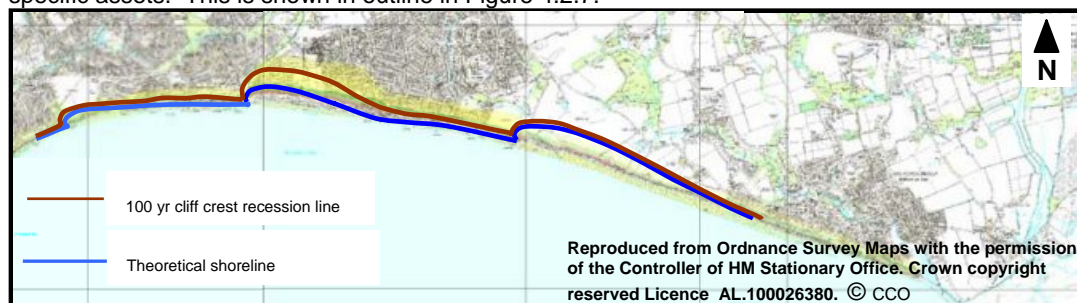


Figure 4.2.7

These hard points are:

- At the revetment to the root of Hurst Spit (specifically the breakwater at the eastern end of the revetment). Hurst Castle forms the down drift control feature to the spit; although the actual shape of the whole spit is strongly influenced by the nearshore banks and the entrance to the Solent;
- At Rook Cliff, with the defences at the White house and the seawall in front of Milford acting as local hard points;
- To the east of Barton-on-Sea, forming a bay between here and Rook Cliff;
- Along the whole length in front of Barton-on-Sea;
- At the eastern end of Highcliffe with a bay developing through to the extension of defence to the west of Barton-on-Sea; and
- At the eastern end of Friars Cliff with a small bay developing through to Highcliffe Castle, which would be defended in the longer term,

The intent of the strategy is to maintain sediment supply to the frontage largely through recharge. As sea level rise occurs, this will place a greater emphasis on the need for additional sediment. In particular, in reducing the potential to retain sediment in front of Highcliffe through reducing the length of groynes, this will place greater pressure on the linear approach to defence and on the need for greater effort in maintaining the revetment. Any sediment provided to this frontage will principally be held within the embayment at Naish Cliffs and by defences in front of Barton-on-Sea. Significant reliance would be placed on the defences extended to the west of Barton-on-Sea, in an area of the coast understood to be subject to underlying instability.

Drift to the east of Barton-on-Sea would be maintained to a degree by the increased erosion of the cliffs in this area. This would provide some additional material to support the defence of Milford-on-Sea and Hurst Spit.

The more specific consequences of this with present management scenario are discussed below section by section from east to west.

Hurst Spit.

The revetment to the root of Hurst Spit would be maintained and a programme of recharge and recycling of sediment would be undertaken to maintain Hurst Spit. The draft strategy makes no specific reference to the defence of the Castle but it is taken that defence of this feature would be part of the with present management scenario. The with present management approach emphasises the need to consider each element of the Spit (Hurst Beach, Hurst Castle and North Point) as part of one geomorphological feature.

In maintaining Hurst Spit, it is also taken that under this scenario the flood defences along the rising ground along Saltgrass Lane, to Keyhaven and to the centre of Milford-on-Sea, would be maintained. Even with the intent to maintain Hurst Spit, there would be a need to increase levels of flood defence to Milford and to Keyhaven. Retaining defences, particularly along Saltgrass road would result in squeeze of the marshes in this area, typically over the third epoch of the SMP. This would be considered in detail within the adjacent North Solent SMP2.

Milford on Sea

At Milford-on-Sea the existing defence line would be maintained with recharge in front. Holding the existing line in front of the low lying seafront of Milford-on-Sea, would be well in advance of the natural shoreline position and, despite the intent to maintain the Hurst Spit revetment, considerable effort would be required to maintain any significant beach to this area. The benefit of creating a hard point at the revetment is effectively lost because of the advanced position of the hard linear defence along the Milford seafront. The maintenance of this existing defence line would incur increasing loss of the beach and the need for substantially raised defence levels.

The linear approach to defence along the frontage between the seafront and Rook Cliff again provides little scope for naturally retaining a beach in this area and with present management, therefore relies upon increased effort put in to maintain the existing structures.

Hordle Cliff to Barton Cliff

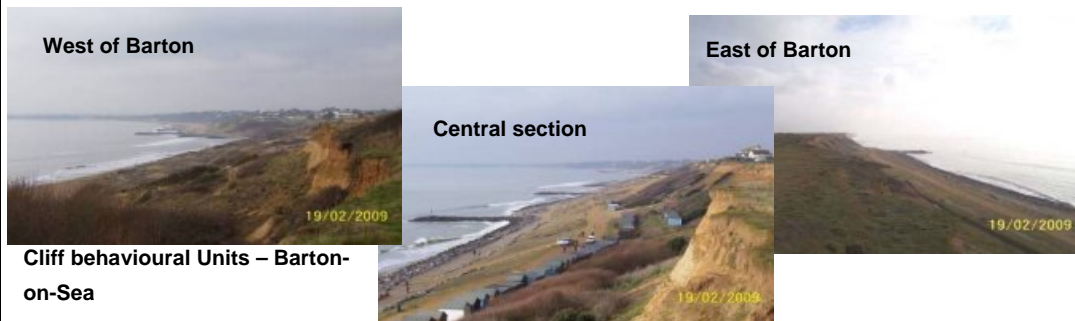
Between Milford and Barton-on Sea, erosion would be allowed to occur along Barton Cliff through to Hordle Cliff. Works would be undertaken to maintain defences at the eastern end of Hordle Cliff and along Rook Cliff to protect properties and the road. A bay would be developed between the defence at Rook Cliff and the defence to the eastern end of Barton-on-Sea, potentially creating increased erosion along Barton Cliff but being controlled, further east, by holding Rook Cliff. The development of this bay, with control at the eastern end, would tend to reduce erosion at the eastern end of Hordle Cliff.

Barton-on-Sea to Highcliffe

The strategy over this whole section is based on defining intervention lines, at which time action (toe protection and drainage) would be taken to defend assets such as Highcliffe Castle, the Holiday Village and individual properties such the Cliff House Hotel. This staged approach is driven primarily by economic and funding constraints, works being justified by the imminent loss of hard assets, allowing loss of open recreational land in front of specific assets. Furthermore this approach is continued over the Barton-on-Sea frontage, extending the existing defence system further to the west, imposing greater control over the erosion of the Naish Cliffs.

Even with this additional protection to the west of Barton-on-Sea, the recession of the cliff crest would continue, potentially resulting in the loss of a significant area of the Holiday Village and, in the latter epochs, areas of west Barton-on-Sea. Over the central area of Barton-on-Sea, cliff crest recession is likely to affect assets at the cliff crest. This highlights the combined influence of coastal erosion and the underlying instability of the cliff profile.

The strategy identifies that the underlying geology (comprising interbedded sands and clays), which varies along the coastline, due to the dip of the underlying geological units, have resulted in subtle variances in the rate and mode of cliff failure along the coastline. A number of different cliff behavioural units have been identified between Chewton Bunny and Barton Common. It is recognised that to some degree the problem of high ground water and the associated pore water pressure and associated landslide potential affect all sections of the frontage.



To the west, in particular, the area is affected by deep seated failure in the underlying clays as well as more active slumping of the coastal slope. It is reported that existing defence structures in this area are already affected by heave of the underlying ground. The central section has a slightly more stable profile with a wider lower platform protected by groynes and revetment. Both the central and eastern section are still vulnerable to failure of the cliff structure, but both sections suffering significantly from failure of the overlying, over-steepened gravel exposures. Under the strategy, therefore, despite works to stabilise and protect the toe of the cliffs, there is an expected loss of cliff top assets and open ground at Barton-on-Sea, with continuing losses to the Naish Holiday Village and cliff recession over the whole of the Barton-on-Sea frontage.

Associated with the recommended policy of recycling of beach material from the western end of the zone back along the Mudeford section of the coast, is a need to recharge the frontage in front of Highcliffe to supplement drift to the east; this principally being for the benefit of Naish Cliff. As part of this plan, it is intended to allow the cliffs between Friars Cliff and Highcliffe to erode, although defending Highcliffe Castle at some time in the future. It is also suggested in the strategy that the length of the groynes along the Highcliffe frontage are reduced in length and rock used to increase the strength of the revetments. The eastern end of the Highcliffe frontage would be reinforced to provide an anchor to the coast at this position.

Overview of Impacts

The potential economic damages under this scenario are identified in Table 1 at the end of this sub-section. The damage assessment made for the SMP2 under WPM, based on the 100 year cliff recession, are considerably higher than predicted in the draft strategy. Critical to this is the potential delay assumed in loss made in the strategy study. Table 2 provides an assessment of this baseline scenario against the general objectives.

The intent of the scenario is to reduce the rate of erosion in all areas of the coast, with the exception of that along the Barton to Hordle Cliff section. Even so, unless in areas such as Naish Cliff and the Barton-on-Sea Frontage there were substantial works to stabilise the coastal slope, both through drainage and direct slope stability techniques, assets will still suffer loss in the future. Defence at the western end of Barton-on-Sea will become increasingly difficult to maintain in an advanced position and their long term sustainability would be questionable. Also long term defence of the Milford-on-Sea seafront will become increasingly difficult with sea level rise. As such, the objective of 'managing risk to properties where sustainable' is only considered to be partially addressed.

While the community of Milford-on-Sea is maintained, the use and appearance of the seafront would be significantly altered through loss of the beach and increasing levels of defence. In extending the defence to the west of Barton-on-Sea, a perception and expectation of longer term protection may be created. This may result in increased difficulty in adaption of the community in the long term.

The scenario would aim to increase the influence of defence over the designated cliff line. Although this would still allow exposure of the cliffs in front of Highcliffe Castle (until the Castle was protected) and would reduce erosion of the specific geological formation at Naish Cliff, overall there would be a reduction in cliff erosion. This would also further constrain the capacity for the coast to change.

There is a potential loss of saltmarsh area behind Hurst Spit as flood defences are maintained. Although this area strictly falls within the adjacent SMP area, under this scenario the assumed intent to maintain and increase flood defences would impose greater reliance on the need to maintain the level as well as the volume of Hurst Spit, imposing potentially greater need for management of the active spit area in the face of increasing sea levels. This may constrain an adaptive approach to management of this feature.

The intention of this scenario is to reinforce and extend defences as assets come under more immediate risk. This approach aims, therefore, to increase reliance on defences in the future, with more emphasis on linear defence of the frontage. In the longer term, actions such as reducing the length of the groynes at Highcliffe, extending defences at Barton-on-Sea and increasing defences at Milford-on-Sea would reduce the ability to maintain beaches and could therefore impact on the overall landscape and appearance of the frontage. The lack of economic value allowed against the important open spaces, associated with the enjoyment of the frontage, forces this approach to focus on a long term approach of being forced back to defence of specific hard assets.

Table 1. Economic Assessment

The following table provides a brief summary of damages determined by the SMP2 analysis for the whole PDZ. Further details are provided in Appendix H. Where further, more detailed information is provided by studies, this is highlighted. The table aims to provide an initial high level assessment of potential damages occurring under the two baseline scenarios. The damages for each epoch are current values. These are discounted to give present values in the final column. It is important for the reader to note that the loss figures quoted only refer to domestic dwellings and no account has been taken of commercial, industrial or infrastructure property values.

ASSESSMENT OF EROSION DAMAGES

Epoch		0 -20 year		20 – 50 years		50 – 100 years		
No Active Intervention	SMP1 MU	Number of properties	Value x £1000	Number of properties	Value x £1000	Number of properties	Value x £1000	Present Value Damages (£x1000)
Location								
Hurst Spit	CBY7	0	0	0	0	0	0	-
Milford on Sea	CBY6	0	0	40	10,407	484	125,920	17,420
Hordle Cliff	CBY5	0	0	0	0	1	260	28
Barton-on-Sea	CBY4	1	260	7	1,821	316	82,212	9,792
Naish Cliff	CBY3	0	0	1	260	261	67,903	7,494
Highcliffe	CBY2a	0	0	3	706	147	34,597	4,022
Total for PDZ1								38,756
With Present Management	SMP1 MU	No.	x £1000	No.	x £1000	No.	x £1000	Present Value Damages (£x1000)
Location								
Hurst Spit	CBY7	0	0	0	0	0	0	-
Milford on Sea	CBY6	0	0	0	0	164	42,667	4,651
Hordle Cliff	CBY5	0	0	0	0	1	260	28
Barton-on-Sea	CBY4	1	260	7	1,821	316	82,212	9,792
Naish Cliff	CBY3	0	0	1	260	261	67,903	7,494
Highcliffe	CBY2a	0	0	1	235	1	235	109
Total for PDZ1								22,074
Notes								
The economic assessment undertaken as part of the draft strategy (2006) recognises the significant uncertainty in determining damages due to prediction of cliff behaviour in the area of Barton-								

on-Sea and Naish Cliff. It is indicated that PV damages occurring under NAI would be £40M (Highcliffe to Mudeford), between £30M and £51M (Naish and Barton-on-Sea), £1M (Hordle Cliff) and £43M (Milford and Hurst Spit). This takes account also of loss of beach huts. The respective WPM damages are assessed as £1M (Highcliffe to Mudeford), between £1M and £2M (Naish and Barton-on-Sea), £1M (Hordle Cliff) and £1M (Milford and Hurst Spit).

ASSESSMENT OF POTENTIAL FLOOD RISK

		Flood risk total tidal and fluvial 2008		Flood risk total tidal and fluvial 2102		
No Active Intervention	SMP1 MU	Number of properties	Value x £1000	Number of properties	Value x £1000	Averaged PVD (£x1000)
Location						
Hurst Spit	CBY 7					
Milford on Sea	CBY 6	69	17,951	146	37,984	17,155
With Present Management	SMP1 MU	Number of properties	Value x £1000	Number of properties	Value x £1000	Averaged PVD (£x1000)
Location						
Hurst Spit	CBY 7					
Milford on Sea	CBY 6	0	0	0	0	0

OTHER INFORMATION:

No other assessment of flood damages has been made.

Table 2. General Assessment of Objectives

The following table provides an overall assessment of how the two baseline scenarios impact upon the overall objectives agreed by stakeholders. These objectives are set out in more detail within Appendix E. The table aims to provide an initial high level assessment of the two baseline scenarios, highlighting potential issues of conflict. These issues are discussed in the following section, examining alternative management scenarios from which SMP2 policy is then derived.

OBJECTIVE	NAI				WPM			
	Neutral	Fails	Partial	Positive	Neutral	Fails	Partial	Positive
Manage risk to properties due to erosion where sustainable.								
Support adaptability of the local cliff-top communities.								
Maintain the community of Milford on Sea								
Manage Hurst Spit appropriately to deliver the objectives stated within North Solent SMP.								
Maintain geological exposures of the designated cliff line.								
Minimise loss of habitat or species if possible (identify compensatory habitat elsewhere within SMP area if any net loss occurs).								
Maintain the dynamic coastal zone and its capacity to change.								
Maintain the outstanding landscape and the views and appreciation of the varied coastal environment.								
Reduce and minimise reliance on defences.								

4.2.3 DISCUSSION AND DETAILED POLICY DEVELOPMENT

In considering the two baseline scenarios, while the behaviour of the cliffs determines rates of erosion and cliff recession, a key aspect of the coast is its overall plan shape as much as the local cross-shore behaviour of the cliffs and foreshore. The draft strategy acknowledges this in terms of its attention to maintaining sediment drift over the frontage. As identified in the strategy, and in past examination of the frontages, one of the main constraints in the area is the way in which defence of the coast has developed in the past and, associated with this, the way in which the development has occurred behind defences. The strategy is further constrained by its necessary focus on strict economic justification for actions. As such, with present management is focused on an approach of considering the timing of when defences may be most effectively be put in place to limit loss of assets.

The brief within the procedural guidance for SMP2 allows greater latitude in considering the overall values of the area, with the intent to create a more balanced approach to overall sustainability of these values.

Under the no active intervention scenario, this balance is seen to be strongly in favour of natural evolution of the frontage. This is at the expense of both the built and historical environment and also the loss of opportunity to enjoy this naturally developing coastline. This loss would have considerable impacts at a regional level in terms of recreation and tourism, as well as a local impact on the value of the coast to communities through its ability to sustain their economic well being.

Even under the with present management approach, many of the values of the area are not met. There is still considerable loss of property as the cliff crest retreats, even where defences are held or new defences added. As such neither of the baseline scenarios identifies an ideal approach to the future management of the zone.

The approach taken in this discussion of policy initially considers the eastern end of the frontage. Although management of this section has a degree of dependence on the availability of sediment from the west, this is not seen as the critical factor in management. Increased sediment supply under no active intervention may be of assistance in managing the shoreline, but is not identified in the strategy as being fundamental. Indeed, the with present management approach which recommends maintaining and increasing the defence at Rook Cliff, would in any event, tend to reduce sediment supply to the Milford-on-Sea seafront and to Hurst Spit.

This eastern section of the coast is closely aligned to the net wave energy approaching from the south west. There is, however, still pressure on the coast to erode (and sea level rise and increasing wave energy inputs will sustain this pressure). While this section assists in holding the coast to the west to an extent, any impacts due to erosion of this control point on the coast to the west are only likely to be local. This eastern section of the frontage, therefore, can be considered to be essentially independent of the coast to the west, but management of this section provides a useful reference point before considering other sections in more detail.

Hurst Spit and Milford-on-Sea

This area is under pressure both from erosion of the front face and the hinterland is potentially at risk from flooding. The extent of erosion under the no active intervention scenario, together with the potential 100 year flood extents for present day and mid-way through the third epoch (with sea level rise) are shown on Figure 4.2.8 below.

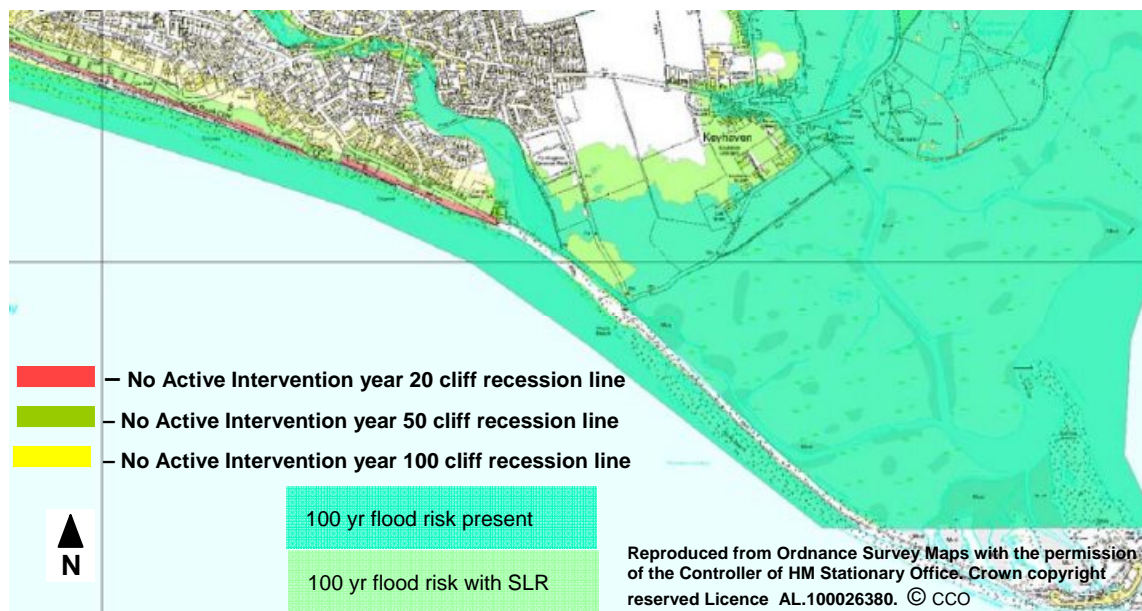


Figure 4.2.8

(Note: plots are indicative and further detail of flood risk should be obtained from Environment Agency flood risk mapping.)

Considering first Hurst Spit, this feature is considered important as a defence to the area behind as well as being an important feature in its own right. Despite the defence works at the root of the Spit and the hard defence at the Castle, the feature, as a whole, is important for its characteristic geomorphological form and the continuing evolution of the recurve behind the castle (North Point). There are also older recurves visible which demonstrate the historical evolution of the Spit.

Hurst Castle is an important aspect of the built heritage and the whole spit forms part of the Solent Way. Management, as at present, needs, therefore, to consider the whole geomorphological structure as one, with management of individual areas being undertaken in a manner sympathetic to the specific values of each section. In this way, the overall policy is to maintain the feature and position of the Spit.

To achieve this, the control imposed by the revetment and breakwater to the western end and the defence of Hurst Castle needs to be maintained. To maintain the beach section the bulk of the ridge will need to be sustained and reinforced by recharge and this is sensibly achieved in part through recycling sediment from North Point. However, removal of sediment from the North Point needs to be undertaken in a manner that does not destroy the overall natural value of this section. This would subject to continued monitoring and a local management plan as at present.

Within the overall intention to maintain Hurst Spit, there would be no intent to actively defend North Point. The Castle would come under increasing pressure of erosion and it would be important to maintain some further degree of control at the western end to

ensure that the castle defences did not become out of alignment with the central section of the Spit. This could tend to reduce sediment transported beyond the Castle. The secondary spit within the entrance to the Solent is therefore likely to roll back. This would sensibly be allowed to happen, maintaining the integrity of this feature and the protection it provides to the saltmarsh at the rear of the Castle.

In terms of policy, Hurst Spit is defined as one policy unit, with a policy of Hold the Line. The intent of this policy, as described above, is to maintain the semi-natural behaviour of the spit through maintaining existing controls and through recharge and recycling of sediment.

Management of the rest of this eastern end of the PDZ needs to consider the whole

**Beach huts to the west of
Rook Cliff**



frontage of Rook Cliff, the seafront of Milford-on-Sea and the interaction between the seafront and the defence at the root of Hurst Spit.

The existing sediment supply from the west is estimated as being of the order of 3000m^3 . This could be increased by allowing Rook Cliff to set back further, benefiting from sediment held beneath Hordle Cliff. Associated with such a retreat would be loss of the main coast road, potentially within the next 20 years

and substantial loss of cliff top property starting towards the end of the second epoch and continuing throughout the period of the SMP2. There would also be loss of the car parks along Rook Cliff and the beach huts at the toe of the cliff.

Retreat of Rook Cliff, while increasing sediment to the main seafront area, would also increase pressure for erosion along this section. In effect the control point would be moved to the east. Sediment would not be retained in front of the seafront and the wall in this area would come under increasing pressure. This pressure would increase with sea level rise. At present there are several local control points: at the apex of Rook Cliff where the road runs closest to the cliff crest, in front of the White House and at the curve in the stepped sea wall along the seafront.

**Seawall to the seafront at
Milford-on-Sea**



The rock revetment to the root of Hurst Spit acts as a final control feature. Particularly, with respect to the stepped sea wall and the most western end of the rock revetment, these positions appear to have been determined by practice rather than overall design, with the junction between the sea wall and the revetment constrained by the closeness of the channel linking Sturt Pond with the sea. The main section of the rock revetment to the root of Hurst Spit allows adjustment to a more consistent alignment through to the forward shape of the Spit and is supported by the design of the rock groyne at the eastern end.

The defended flood risk area to the far side of the Sturt Pond would require increased flood protection if the standard of defence was to be retained. This would result in squeeze of the saltmarsh. Therefore irrespective of the protection provided by Hurst Spit, there is an issue here with respect to future management.

No active intervention would be unacceptable in terms of delivering the core values for the area. With present management merely relies on reinforcing defences which are already under pressure over the whole frontage. The assessment of economic justification of with present management under the strategy appraisal highlights there may be difficulty in funding holding the existing line in the long term.

Two potential scenarios present themselves. In either, it may be seen that the coast is already formed as a series of very shallow indentations between more prominent defended locations. Rather than attempting to artificially control the whole frontage as a linear defence, an opportunity now exists to provide a more rational approach to defence; allowing increased width in areas to retain beaches between more established control points. This would aim to maintain open space in some areas while using existing open space to create a less linear approach to defence. The two scenarios are set out below.

Scenario (a)
<p>Description: Maintain control of strategic headlands while allowing the coast to readjust between these points. The main control points would be locally at Rook Cliff, at the White House and at the breakwater along the revetment to Hurst Beach.</p>
<p>Rationale: The apex of Rook Cliff (between the cliff access point and where Park Lane is closest to the cliff crest) already provides a reasonable control in the coast, protecting the road immediately behind and the length of coast to the west and providing control for the coast to the east. This is currently defended by a length of old wall and rock revetment.</p> <p>Despite the possibility of moving the road back or redirecting the coastal road to the rear via Kivernell Road, Whitby Road and Pless Road, this would remove access to the seafront properties along Cliff Road. Holding the line at this Rook Cliff location but allowing retreat of the shoreline to the west provides the opportunity of reducing recession to rates more akin to those recorded along Hordle Cliff. Towards the end of the second epoch, consideration would need to be given to creating a further control point at the junction of Whitby Road and Cliff Road, set back from the existing alignment. The overall intent would be to create a more stable cliff line able to be managed to protect both property and the coast road over the 100 year period. Beyond the period of the current SMP, there may be the need to allow further realignment of this western section and this would include loss of property and the road. This period of 100 years needs to be used, through planning, to allow width for further realignment. The intent, however, would be to continue maintaining defence at the apex of Rook Cliff as a key control to Milford-on-Sea.</p> <p>To the east of Rook Cliff, there is opportunity to allow the cliff to erode back. If this were uncontrolled further to the east, a substantial part of the Milford seafront would be lost, in addition to creating a significant step in the coast through to Hurst Spit. Typically, therefore, defence in front of the White House might be reinforced to limit erosion between here and Rook Cliff.</p> <p>The position of the western end of the rock revetment to the root of Hurst Spit and the eastern end of the existing sea wall is constrained by the channel to Sturt Pond. The position of this itself is</p>

constrained by the need to maintain the flood embankments to Saltgrass and New Lane. With increasing sea level it is seen as unlikely that these flood defences would be maintained. Despite the risk of this being more towards the end of the second epoch, consideration of long term management, whereby this area is opened up to tidal inundation would create opportunity for existing habitat development and replacement and may provide further opportunity for removing the constraint on the alignment of the root of the Spit. Consideration could also then be given to allowing Sturt Pond to discharge directly to the sea, potentially influencing the development of a small ebb tide delta. The net affect of such an overall approach would be to allow realignment of the seafront between the root of the spit and the control point at the White House. This may require readjustment of the existing rock revetment at its western end and removal and setting back of the existing sea wall. Given the anticipated residual life of the revetment (50 years), such realignment might be considered during the second epoch of the SMP2. However, this scenario would influence the management of the existing defences and would impose constraints in terms of planning development of the seafront area.

This approach to management would help support maintenance of Hurst Spit, allowing a more sustainable position to be taken for the rock revetment. The intent would be to maintain the revetment and rock breakwater. As discussed earlier the overall policy for the spit would be for continued management through recharge and recycling of material allowing the integrity of the Spit to be retained while allowing this feature to adjust with increase in sea level. This would maintain a degree of protection to the saltmarsh behind the ridge.

Implications: At the western end of Milford, above the Cliff, the implications would be that over the first two epochs, although allowing the coast to erode back, the control provided by defence of Rook Cliff would sustain the coastal road and property behind. In the third epoch this would need to be re-assessed and there may be loss of property and re-alignment of the road. Between Rook Cliff and the White House, the intent would be to provide a more sustainable defence line to the frontage, rather than necessarily relying on the existing linear form of defence. The aim would still be to provide protection to the properties along Shingle Bank Drive. This may involve realignment of the open ground in this area, providing a more natural defence to these properties.

The White House would be protected as a control point but further east, the approach would incur loss of areas of the existing sea front, principally areas of the car park and some property towards the eastern end of the frontage. It would however, allow development of a more natural and sustainable beach to Milford.

Behind coastal defences the implications would be to allow increased flooding of areas of agricultural land but to maintain flood defence to Keyhaven and the centre of Milford, subject to the findings of the adjacent SMP.

Impacts: Despite defences being improved, further natural erosion would occur to several areas of cliff. This would be in a controlled manner maintaining some balance between allowing natural development of the shoreline and the intent to maintain access and open landscape values. There is the potential loss of the coast road and properties to the western end of the town over the third epoch. Along the main sea front of Milford there would be loss of some of the existing facilities and some property but there would be gain in allowing development of a healthy beach in front of the set back defences. Hurst Spit and Hurst Castle would remain.

Scenario (b)

Description: Maintain control of strategic headlands, allowing the coast to adjust naturally to the west

but advancing the foreshore between Rook Cliff and the root of Hurst Spit.

Rationale: This scenario would be very similar to the approach in scenario (a) to the west of Rook Cliff and over the frontage of Hurst Spit and Hurst Castle. The emphasis in defence would still be to defend Rook Cliff, with the intent to control the natural development of the cliff line to the west. At Hurst Spit, the intent would be to continue management of the Spit and the Castle.

It is between Rook Cliff and the rock revetment to the root of the Spit that this scenario differs from that set out above. Here the intention would be to use the control imposed by the two existing hard points and the defence of the White House to pull the beach in between forward. Typically this might be by means of reefs or nearshore breakwaters to influence development of the shoreline. The rationale behind this would be largely to retain the existing facilities along the Milford Seafront, but also to provide a more continuous sediment path between Rook Cliff and Hurst Spit.

Implications: As with scenario (a), at the western end of Milford, above the Cliff, the implications would be that over the first two epochs, although allowing the coast to erode back, the control provided by defence of Rook Cliff would sustain the coastal road and property behind. In the third epoch this would need to be re-assessed and there may be loss of property and re-alignment of the road. Between Rook Cliff and the rock revetment at the root of Hurst Spit, the implications would be for the development of a wider beach defending Milford Seafront and providing additional amenity value.

Behind coastal defences the implications would still be to allow increased flooding of areas of agricultural land but to maintain flood defence to Keyhaven and the centre of Milford, subject to the findings of the adjacent SMP.

Impacts: Despite defences being improved, further natural erosion would occur to several areas of cliff. This would be in a controlled manner maintaining some balance between allowing natural development of the shoreline and the intent to maintain access and open landscape values. There is the potential loss of the coast road and properties to the western end of the town over the third epoch. Along the main sea front of Milford, there would be improved development of a healthy beach in front of the existing defence line. Hurst Spit and Hurst Castle would remain.

The principal difference in approach between scenarios is management of the Milford-on-Sea seafront area. Clearly scenario (b) offers less disruption to the frontage here, but potentially at an increased cost and a detailed study would need to be undertaken both to determine the feasibility of the scheme and to ensure that technically it was sustainable in detail. As such, this scenario can only be put forward in principle as a recommended way forward but one that offers potential benefit both to defence and to re-establishing a more direct management link between the main coast and management of Hurst Spit.

Overall, however, it is possible to define general policy within this section of the zone. In this, under either scenario, there would be a series of interconnected policy units aimed at delivering a coordinated approach to management. The policy, as previously discussed would be to maintain the overall integrity of Hurst Spit. This approach would include maintenance of the rock revetment and groyne at the root of the Spit, providing the necessary structure for management along the Milford-on-Sea frontage. Management of this section would remain essential to either approach to management of the coast to the west.

The section of coast between Rook Cliff and the White House would in principle be hold the line, although locally between these two points the approach should look to adapt defence from that of holding the existing linear defence to one of potentially allowing some further erosion and cliff recession to provide a more sustainable line of defence. This would also aim to restore some of the geological interest which is at present obscured. In holding the overall headland at Rook Cliff, the policy between here and the root of the Spit would initially be to maintain the existing line of defence but with the longer term intent to realign the seafront of Milford-on-Sea. The preferred approach to realignment would be to use nearshore structures to draw the shoreline forward, creating the opportunity to develop a more substantial beach and to maintain continuity of management of sediment between Rook Cliff and Hurst Spit. This may not attract full funding under flood and coastal erosion risk management and therefore, is likely to require a collaborative funding approach. It does, however, meet objectives to sustain the Milford seafront area in a sustainable manner and, therefore, has the potential for collaborative funding drawing upon the intent to maintain this important tourism and recreational aspect of the town.

As a default position, if such funding were not possible, the recommended approach would be for realignment back from the existing line of defence to encourage a more sustainable alignment of a new embayment. This would incur loss of open space and properties in the area.

Behind Hurst Spit It would be recommended that consideration is given within the adjacent SMP for managed realignment of the defences along Saltgrass and New Lane.

To the west of Rook Cliff, the intent would be to manage retreat of the cliff line such as to maintain the function of the coastal road and to avoid loss of properties over the next 100 years. This management would rely on defence more locally than at present beneath Rook Cliff, with the potential requirement for groynes as the cliff erodes back. The longer term intent, subject to monitoring of sea level rise and recession rates, would be to develop the road to the rear of the front line of properties as the main coastal road and to eventually abandon defence of the properties. This section of the coast would settle back to a more stable alignment held by the defence at Rook Cliff.

Overall this approach focuses effort for defence on critical locations of the coast. It accepts that in the longer term there is likely (even under a no active intervention approach along the coast to the west) to be a reduction of sediment supply as the coast to the west adjusts to a more stable alignment. The approach may therefore still require sediment recharge (as under with present management) but against a shoreline more adapted to help retain sediment. There would be loss of assets such as car parks probably starting over the second epoch. However, the approach maintains the main aspects of the community while also maintaining access, beaches and landscape. The approach would need to be considered further at detailed strategy level.

This sets the underlying approach to defence at the eastern end of the zone, fixing the underlying control at this end of the frontage. From this it is possible to consider different scenarios for the western frontages. These need to be considered over the full extent of the zone.

General discussion of the Western and Central Sections of the Zone.

The two baseline scenarios have been considered for the coast to the west of Milford-on-Sea. As discussed in the introduction to the previous section describing the baseline scenarios the general coastal shape arising from these two high level options may be examined in relation to an overall theoretical shoreline position. The indicative shape of the coast and cliff recession are shown in figures (4.2.9) -(no active intervention) and (4.2.10) - (with present management). These baseline scenarios are then developed further in relation to alternative approaches to management in specific areas.

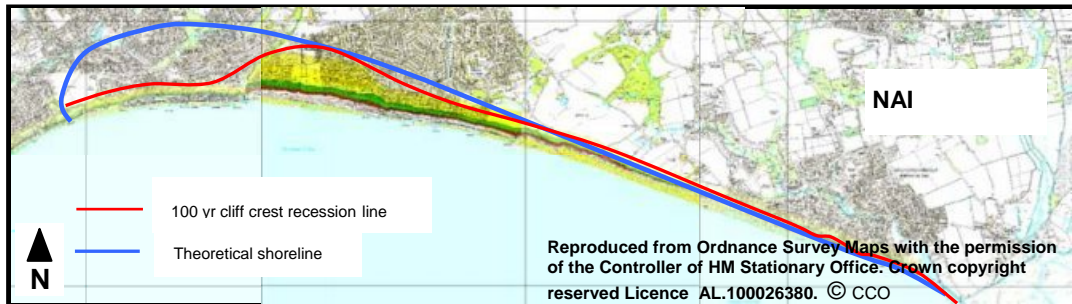


Figure 4.2.9

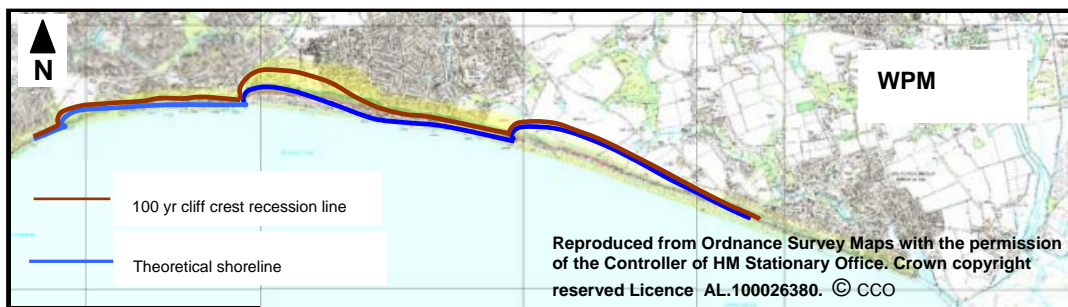


Figure 4.2.10

The essential differences are in the controls imposed at the western end under Highcliffe and in holding the line along the Barton-on-Sea frontage. The implications of this are the threat of longer term erosion beyond the period of the SMP in both these locations, with continued uncertainty at Highcliffe and especially, and more obviously, in the very substantial loss of property over the 100 year period at Barton-on-Sea.

Holding the line at Barton-on-Sea but allowing continued erosion at Highcliffe would not significantly reduce the rate of erosion to the community of Highcliffe. Although providing some additional sediment supply to the Barton-on-Sea frontage, there would be continued instability along this frontage and pressure for erosion. The Naish Cliff frontage would continue to be subject to substantial erosion of the shoreline and continuing set back of the crest of the Naish Cliff. Therefore there is no significant strategic benefit in abandoning the control of the coast to the west of Chewton Bunny.

Accepting this, an alternative scenario may be considered in holding the line at Chewton Bunny but allowing uncontrolled erosion at Barton-on-Sea. In outline the overall pattern of development of the coast under this scenario is shown in Figure 4.2.11.

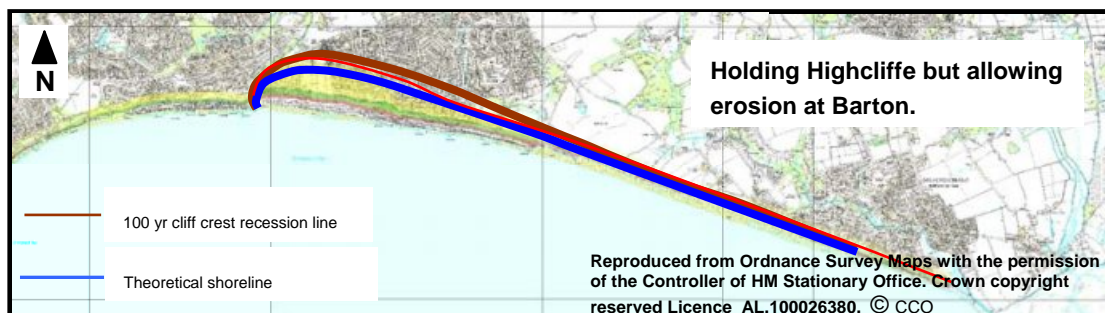


Figure 4.2.11

It may be seen that under this scenario the longer term recession of the cliff equates relatively well to the predicted 100 year recession line based on current recession rates and is, over this period, little different to the general no active intervention scenario. In effect over the period of SMP, holding the line at Chewton Bunny or abandoning defence at the existing headland has little relevance over the next 100 years in terms of management along much of the Naish or Barton Cliff section of the coast. In terms of SMP2 policy this section in front of Highcliffe may be considered independently.

In terms of the central section of the zone, between Hordle Cliff and Barton, there is some difference in behaviour in that defence at Barton-on-Sea would tend to create a slightly deeper embayment affecting the erosion of the golf course, as the frontage compensates for the retention of sediment further to the west.

Overall this transition zone between Barton-on-Sea and the undefended section of Barton Cliff is a local issue not impacting on essential features of the use of the area and, therefore, not material effecting the defined policy both under no active intervention and with present management for allowing this section of the coast to develop naturally.

In developing policy therefore for the SMP2 the coast may be examined further as three principal sections.

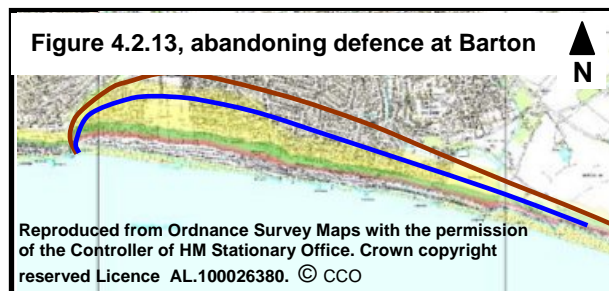
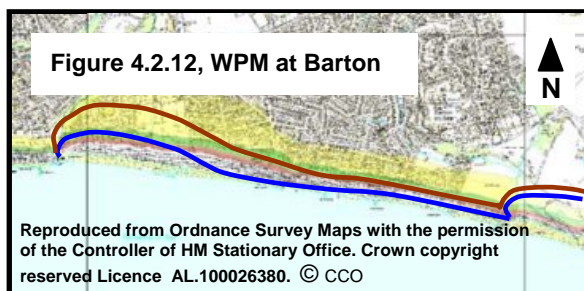
Hordle Cliff to Barton-on-Sea.

There is no justification for management of this frontage in terms of defence. There will be continued loss to the golf course but this would not justify any attempt to manage the process of erosion. The frontage provides important natural supply of sediment to the east and is an important part of the geological SSSI. The proposed management of the coast at Milford-on-Sea would tend to reduce erosion to the eastern end of Hordle Cliffs and as such it is unlikely that the new development at the former school or Hordle Manor would be lost over the next 100 years. The function of the coastal road would be maintained; the intention in later epochs would be to realign at such stage when the coastal road is under threat from erosion. This frontage is seen as being one policy unit with a policy of no active intervention.

Barton-on-Sea to Naish Cliffs.

The general scenarios set out above are shown in comparison in Figures (4.2.12) (with present management) and (4.2.13) (withdraw defence from the Barton-on-Sea seafront) below.

With present management, as indicated by the draft strategy, provides some additional control to erosion and recession over the Naish Cliff frontage but still with an accepted loss in the longer term of a substantial area of the Naish Holiday Village and properties to the west of Barton-on-Sea. There is significant discrepancy between the residual damages identified through the economic assessment within the draft strategy and those determined as part of the higher level assessment made for this SMP2. This highlights potentially the substantial uncertainty associated with predictions of cliff recession.



What may, however be seen is that defence aimed at protecting the western end of Barton-on-Sea (Marine Drive and Marine Drive West) lies well within the active slumping cliff zone of Naish Cliffs (as shown by the recession zones in Figure 4.2.14). Even with significant drainage works to the cliff in this area the property to this end of the town would remain at risk. The development of a more long term stable alignment of the coast between Chewton Bunny and the defence at Barton-on-Sea would depend on reinforcing a headland, beneath Marine Drive West, in an area potentially at risk from underlying instability. This is not considered to be sustainable.

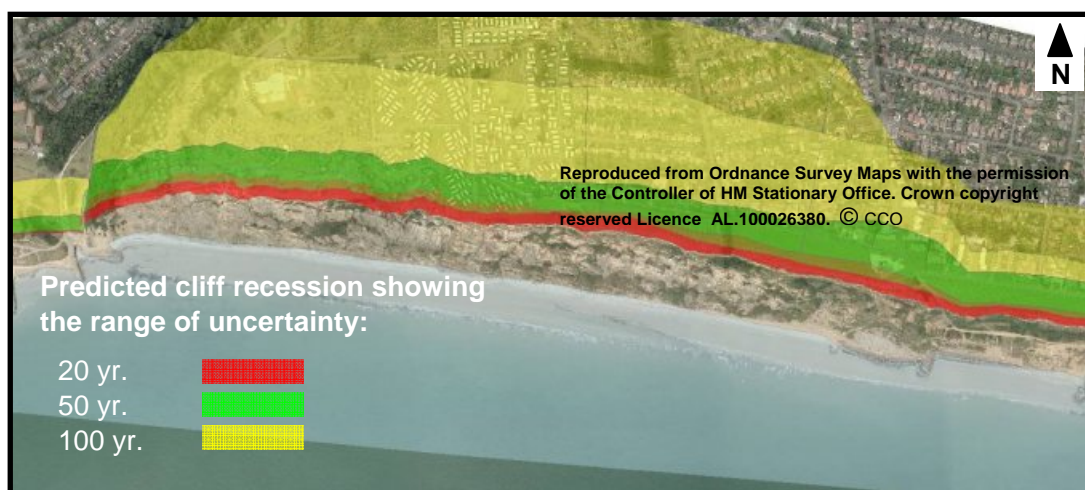
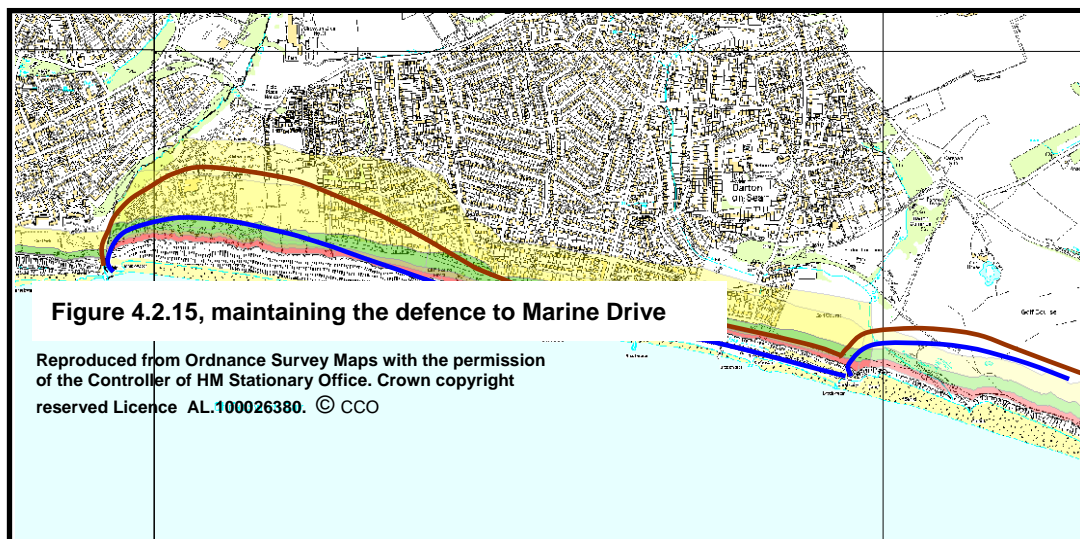


Figure 4.2.14

The alternative of withdrawing defences along the whole Barton-on-Sea frontage would, however, result in loss of not just the sea front but potential recession of the cliff back close to the inland centre of the town, potentially affecting the sustainability of Barton-on-Sea as a community (as shown in figure 4.2.13).

In attempting to mitigate this, one further scenario is considered, that of moving defences back to the centre of the seafront area, in the area of Fisherman's Walk. This is shown in outline in Figure 4.2.15.



This provides a more secure location for controlling the shape of the coast, with the intent of maintaining through the current practice of drainage and toe protection the areas of Marine Drive East and, at least over the first two epochs, the properties forward of the road. Even under this approach, there would be continued recession of the cliff crest due to continued failure of the upper gravels. However the intent would be to restrict recession within the open space seaward of the road over the next 50 years. This is identified as possible within the draft strategy. Works would be required to significantly reinforce the toe defence and to provide dynamic toe weight through recharge.

This achieves a more sustainable approach, notwithstanding that from Barton Court to the west there would be substantial loss of property over the period of the SMP2.

To attempt to alleviate this to some extent, there would be a need for progressive change in management over the three epochs. The existing defences, in terms of the most westerly rock groynes and revetment could be managed initially but with the intent of retaining these more as a shoreline cell as they begin to fail over the first epoch. This would act to provide a degree of transitional defence, delaying erosion and continue to provide a degree of protection to the retained defence to the east (to the east of the Fisherman's Walk). The toe of Naish Cliff would continue to erode back, although there is the potential, subject to more detailed study, to slow this erosion with beach recharge. This would need to recognise the intent to maintain integrity of the SSSI. The potential supply from a defended section of the coast to the west is not considered to be that relevant to management of the Naish Cliffs. The intent would, however, be to provide a limited degree of protection to the frontage, slowing general recession of the cliff line particular to the area of west Barton-on-Sea (Marine Drive and Marine Drive West), allowing potentially a 50 year period of adaption to loss of properties at the crest of the cliff. It is probable, however, that the Cliff House Hotel would be lost significantly earlier.

A detailed assessment of the geotechnical risk would be required, as recommended by the draft strategy, to define with more confidence how this transitional approach would be developed.

This intermediate scenario offers a high degree of protection to core areas of Barton-on-Sea without substantially reducing the existing value of the eroding cliffs. The approach, in comparison with that of with present management, provides significantly less reliance on defence and greater opportunity for maintaining natural coastal change. The approach also aims to maintain much of the recreational use of the coastal slope in front of the town. In time it would establish better access to the Naish Cliff as erosion creates greater width in the shoreline zone for establishing a beach to the frontage.

This section of the coast is therefore defined as three policy units, managed to achieve the overall shoreline management plan. The defence along the eastern frontage of Barton-on-Sea (beneath Marine Drive East) would be maintained. Despite this, recognising the crest of the cliff will continue to set back, there will be risk to property in the longer term; this will need to be managed. As such the policy is for managed realignment, while holding the defence at the toe. The eastern boundary of this policy unit would need to be treated as a transition between this unit and that of the no active intervention along the rest of Barton Cliff. To the west of the defended frontage there would be a unit where defence, is adapted and toe erosion allowed in a controlled manner. Over this section the policy is also managed realignment but with the distinction that the toe defence would not be fully maintained. This would be from Barton Court through to Marine Drive West. The main section of Naish Cliffs would have a similar policy of managed realignment, recognising the significant issues arising from the retreat of the cliff line, but here there would be no hard defence. In application, there may be some justification for beach recharge, but with the intent of merely slowing erosion to allow adaptation of use of land to the rear.

Highcliffe and Friars Cliff

In defining the approach to the Naish and Barton-on-Sea frontages, there is, as suggested in the draft strategy, benefit in maintaining the control point at Chewton Bunny; in part to maintain a degree of control on the coast to the east, but primarily as a means of stopping outflanking of defences to the important recreational area and properties to the eastern end of Wharncliffe Road. However, given that Naish Cliff benefits little from sediment derived from the frontage to the west and that the SMP policy for Naish Cliff would be for managing the retreat of the cliff, there seems little value in reducing the ability to maintain a defence along Highcliffe. The strategy does, however, suggest some benefit to the actual frontage in reducing the length of the rock groynes in this area.

There is significant benefit in terms of property at risk along the crest of High Cliff (to the village of Highcliffe). This coupled to the fact that the cliff line is relatively stable would indicate that maintaining a good beach width through recharge and beach management is preferable to concentrating efforts directly on maintenance of the revetment behind the beach. Taking this approach it may be more appropriate to reinforce the breakwater to the western end with the intent of retaining a better level of natural defence beneath Friars Cliff and the Highcliffe Castle. This would still maintain a degree of exposure of the as yet unmanaged cliff line in this location but would reduce the need in the future for more substantial management of the frontage. Future requirement for defence in this local area beneath Friars cliff is uncertain in detail during the period of the SMP2. The

with present management policy is for maintaining this as an undefended section of cliff until such a time as defence might be required to the castle.

In principle therefore the overall policy is for management and the local future decision as to defence of the castle would be considered in more detail in the future. At the level of the SMP the intent would be to hold the line over this section of the coast, but with the intent to minimise future extension of defences.

PDZ1

Management Area Statements

Hurst Spit and Milford on Sea (CH. 0 TO –CH 7.5 KM.)
Covering previous SMP1 management units CBY7 and CBY6

Hordle Cliff to Chewton Bunny (CH. 7.5- TO –CH 13 KM.)
Covering previous SMP1 management units CBY5 to CBY3

Highcliffe to Friars Cliff (CH.13 - TO – CH 15 KM.)
Covering part of previous SMP1 management unit CBY2





Location reference:	Hurst Spit and Milford-on-Sea
Management Area reference:	CBY A
Policy Development Zone:	PDZ1

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change, these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan, reference should be made to the baseline data.




The following descriptions are provided to assist interpretation of the map shown overleaf.

100 year shoreline position:

The following maps aim to summarise the anticipated position of the shoreline in 100 years under the two scenarios of "With Present Management" and under the "Preferred Policy" being put forward through the Shoreline Management Plan.

-  In some areas the preferred policy does not change from that under the existing management approach. In some areas where there are hard defences this can be accurately identified. In other areas there is greater uncertainty. Even so, where the shoreline is likely to be quite clearly defined by a change such as the crest of a cliff the estimated position is shown as a single line.
- Where there is a difference between With Present Management and the Preferred Policy this distinction is made in showing two different lines:
 -  With Present Management.
 -  Preferred Policy.
-  In some areas, the Preferred Policy either promotes a more adaptive approach to management or recognises that the shoreline is better considered as a width rather than a narrow line. This is represented on the map by a broader zone of management:

Flood Risk Zones

-  General Flood Risk Zones. The explanation of these zones is provided on the Environment Agency's web site www.environment-agency.gov.uk. The maps within this SMP document show where SMP policy might influence the management of flood risk.
-  Indicate areas where the intent of the SMP policy is to continue to manage this risk.
-  Indicate where over the 100 years the policy would allow increased risk of flooding.

The maps should be read in conjunction with the text within the SMP document.



SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN:

The underlying intent of the plan for this area is to maintain the core values of Milford-on-Sea but in such a way as to provide continuity with the management of Hurst Spit and allowing some increased exposure of the designated geology, while maintaining control of the development of the shoreline. Management of the Spit would be controlled by holding the line at Hurst Castle and through maintaining the eastern end of the rock revetment and the groyne. Although the spit beyond the Castle would be allowed to develop naturally, the intent would be to recycle material from that section back on to the central section of the spit. As such this Hurst Spit section is defined as one policy unit.

At present there is increasing pressure on the main sea frontage to the town. The intent here would be to manage the frontage through control of erosion in front of the White House and through retaining a beach in front of the old sea wall. This would require drawing the natural alignment forward, potentially through the use of offshore structures. It is recognised that this approach may not meet funding requirements and that such an approach would, therefore, need to identify collaborative funding streams. As a default, should collaborative funding not be put in place, it may be necessary to consider realigning the defence line backwards to create the space to maintain a sustainable defence and area of beach.

The intent is to maintain defence through to Rook Cliff, but focussing defence at key locations. This creates an opportunity for a more sustainable defence and allows some further erosion of the cliff face. This would be in a controlled manner. To the west of Rook Cliff, through holding the line at the apex of the cliff and thereby protecting the closest point of the road, the intent would be to allow controlled erosion of the cliff line. The intent would be to maintain the coastal road at least over the next 50 years. Through monitoring erosion rates and sea level rise, decisions would be deferred as to the degree of further control that might be required and sustainable in managing this western frontage. At present it is considered that during the final epoch, there may be a need to realign the road and that over the final epoch there may be some loss of properties along this section of the frontage. The intent behind this is to allow development of a more substantial beach area, providing protection to the realigned road and properties further back from the cliff line.

PREFERRED POLICY TO IMPLEMENT PLAN:	
From present day	Maintain existing defence practice to Hurst Spit. To undertake detailed study of management in front of Milford seafront with the intent to develop more localised hard points and beach control structures rather than reliance on the existing linear defence approach. Continue recharge and recycling.
Medium term	Maintain existing defence as above. Construct a new offshore control in front of Milford sea front, subject to funding. To adapt use of open space to the west of Rook Cliff. Continue recharge and recycling
Long term	Maintain existing and new defence as above. Re-assess potential control along the frontage west of Rook Cliff with the

	intent for further managed realignment, subject to monitoring. Continue recharge and recycling.
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SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			Comment
		2025	2055	2105	
CBY.A.1	Hurst Spit	HTL	HTL	HTL	Maintain the overall integrity of the geomorphological feature through beach management and maintenance of rock revetment to west and in front of Hurst Castle. North Point would be allowed to develop naturally while continuing to provide a source of sediment for recycling under an agreed coastal management plan.
CBY.A.2	Milford Seafront	HTL	MR	MR	Investigate options for developing a continuous beach between Rook Cliff and Hurst Spit, subject to funding.
CBY.A.3	Rook Cliff	HTL	HTL	HTL	Local realignment controlled by hard points.
CBY.A.4	Cliff Road	MR	MR	MR	Intent to maintain road and property but with possible future need for further realignment beyond the period of the SMP.
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention MR – Managed Realignment					

CHANGES FROM PRESENT MANAGEMENT

The change is primarily in the approach to defence of the area, moving from a linear defence line to one of working in cooperation with natural processes. This aims to establish a more long term sustainable approach to defence of the town and continued management of Hurst Spit.

IMPLICATION WITH RESPECT TO BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	12718	6237	15619	34575
	Preferred Plan Damages £k PV	12718	2543	6545	21806
	Benefits £k PV	0	3694	13725	17419
	Costs of Implementing plan £k PV	2481	688	595	3764





Location reference:	Hordle Cliff to Chewton Bunny
Management Area reference:	CBY B
Policy Development Zone:	PDZ1

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change, these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan, reference should be made to the baseline data.




The following descriptions are provided to assist interpretation of the map shown overleaf.

100 year shoreline position:

The following maps aim to summarise the anticipated position of the shoreline in 100 years under the two scenarios of "With Present Management" and under the "Preferred Policy" being put forward through the Shoreline Management Plan.

-  In some areas the preferred policy does not change from that under the existing management approach. In some areas where there are hard defences this can be accurately identified. In other areas there is greater uncertainty. Even so, where the shoreline is likely to be quite clearly defined by a change such as the crest of a cliff the estimated position is shown as a single line.
- Where there is a difference between With Present Management and the Preferred Policy this distinction is made in showing two different lines:
 -  With Present Management.
 -  Preferred Policy.
-  In some areas, the Preferred Policy either promotes a more adaptive approach to management or recognises that the shoreline is better considered as a width rather than a narrow line. This is represented on the map by a broader zone of management:

Flood Risk Zones

-  General Flood Risk Zones. The explanation of these zones is provided on the Environment Agency's web site www.environment-agency.gov.uk. The maps within this SMP document show where SMP policy might influence the management of flood risk.
-  Indicate areas where the intent of the SMP policy is to continue to manage this risk.
-  Indicate where over the 100 years the policy would allow increased risk of flooding.

The maps should be read in conjunction with the text within the SMP document.



SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN:

The intent of the plan is to develop a long term readjustment of defence approach to the area:

- Protecting the eastern sea front development of Barton-on-Sea from erosion (Marine Drive East), while maintaining the important open space of the cliff and coastal slope. Works would be undertaken to improve stability of the coastal slope but accepting further loss due to cliff crest recession, particularly over the steep crest cliff.
- Allow gradual failure of the defences to the western end of the town (Marine Drive and Marine Drive West) allowing adaption to loss of property and progressive loss of the holiday park (Naish Cliff). The intent would be to maintain a degree of control through adaption of existing defences and drainage so as to reduce the rate of loss of assets and to provide some transition between Naish Cliff and the defended section to the east. This might be supported by limited recharge to the frontage but the intent would not be to provide long term defence to Naish Cliff.
- To develop a transitional approach to management between the eastern frontage of Barton-on-Sea and Barton Cliffs to the east but with the intention not to extend defence further east but to allow natural erosion and recession of the coastline through to Hordle Cliff.

PREFERRED POLICY TO IMPLEMENT PLAN:	
From present day	Maintain defence to central and east Barton-on-Sea and to undertake minimal readjustment of defence further to the west. Maintain drainage. To investigate minimising defence east of Barton-on-Sea.
Medium term	Maintain defence to east Barton-on-Sea and work with communities to develop a plan for loss of properties to the western end.
Long term	Maintain defence to central and east Barton-on-Sea and work with communities to develop a plan for loss of properties to the western end.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			
		2025	2055	2105	Comment
CBY.B.1	Hordle Cliff to Barton	NAI	NAI	NAI	Allow natural rollback.
CBY.B.2	Barton-on-Sea Marine Drive East	MR	MR	MR	Maintain defence and improve drainage. The crest of the cliff will however continue to set back.
CBY.B.3	Barton-on-Sea Marine Drive and Marine Drive West	MR	MR	MR	Initially maintain defence and drainage allowing this to adapt to provide a transitional defence to Naish Cliff.
CBY.B.4	Naish Cliff	MR	MR	MR	Potential limited intervention with recharge to allow adaption of use.
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention MR – Managed Realignment					

CHANGES FROM PRESENT MANAGEMENT

There would be a reduction in defence to the western end of Barton-on-Sea, resulting in significant increased risk to property. Defences would be maintained beneath Marine Drive East, but the information from monitoring indicates that there may be longer term losses even along this section. Management of Naish Cliff may include some beach recharge but there would be a change in long term policy in that this would aim to slow erosion but not to significantly alter the natural behaviour of the cliffs. The coast between Barton and Hordle Cliff would be allowed to erode as at present.

IMPLICATION WITH RESPECT TO BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	184	739	16360	17313
	Preferred Plan Damages £k PV	0	0	1701	1701
	Benefits £k PV	184	739	14661	15584
	Costs of Implementing plan £k PV	5494	1833	1252	8579





Location reference:	Highcliffe to Friars Cliff
Management Area reference:	CBY C
Policy Development Zone:	PDZ1

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change, these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan, reference should be made to the baseline data.




The following descriptions are provided to assist interpretation of the map shown overleaf.

100 year shoreline position:

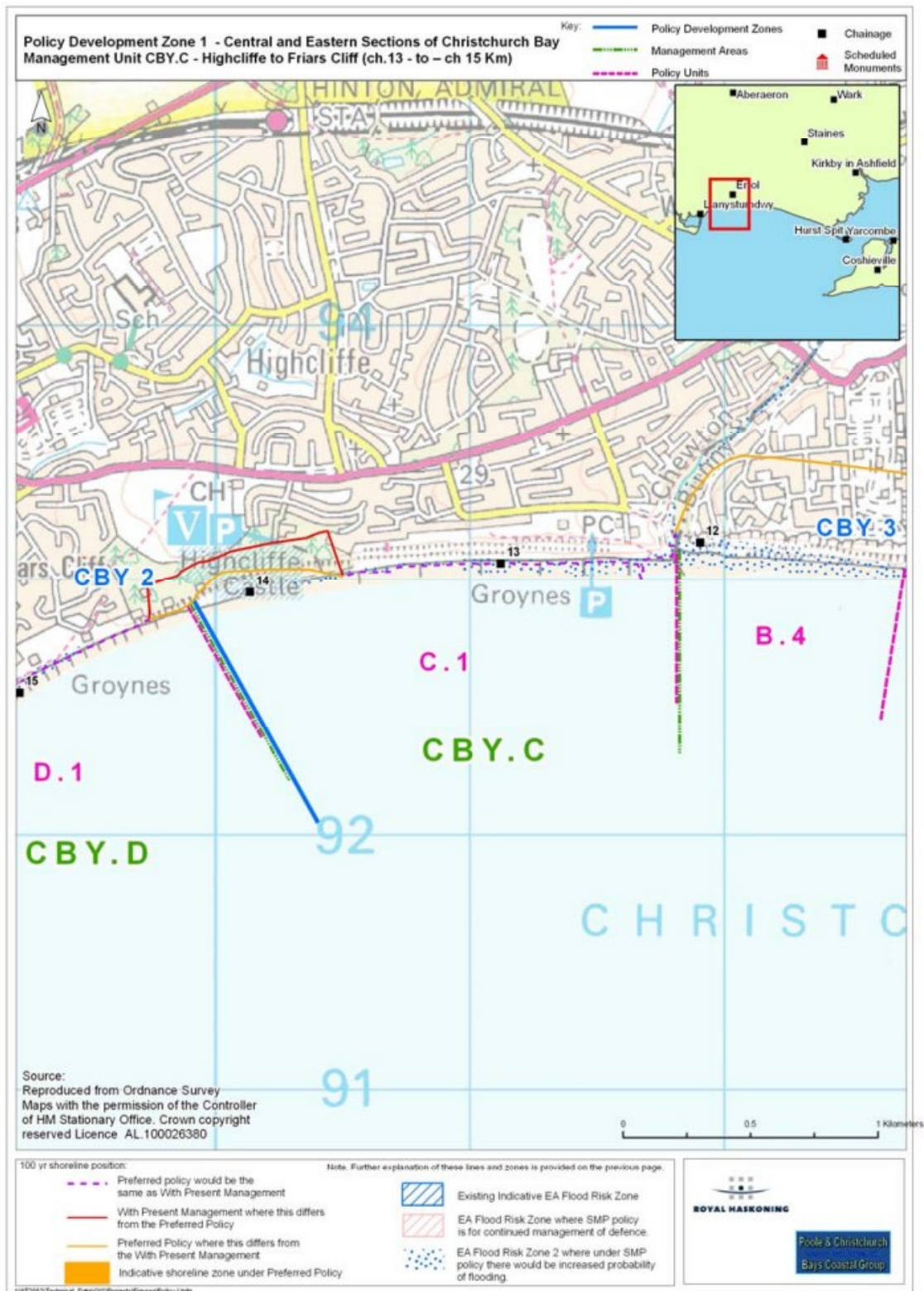
The following maps aim to summarise the anticipated position of the shoreline in 100 years under the two scenarios of "With Present Management" and under the "Preferred Policy" being put forward through the Shoreline Management Plan.

-  In some areas the preferred policy does not change from that under the existing management approach. In some areas where there are hard defences this can be accurately identified. In other areas there is greater uncertainty. Even so, where the shoreline is likely to be quite clearly defined by a change such as the crest of a cliff the estimated position is shown as a single line.
- Where there is a difference between With Present Management and the Preferred Policy this distinction is made in showing two different lines:
 -  With Present Management.
 -  Preferred Policy.
-  In some areas, the Preferred Policy either promotes a more adaptive approach to management or recognises that the shoreline is better considered as a width rather than a narrow line. This is represented on the map by a broader zone of management:

Flood Risk Zones

-  General Flood Risk Zones. The explanation of these zones is provided on the Environment Agency's web site www.environment-agency.gov.uk. The maps within this SMP document show where SMP policy might influence the management of flood risk.
-  Indicate areas where the intent of the SMP policy is to continue to manage this risk.
-  Indicate where over the 100 years the policy would allow increased risk of flooding.

The maps should be read in conjunction with the text within the SMP document.



SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN:

The intent of the Plan is to maintain defences to Highcliffe with the aim of sustaining both protection to properties and the amenity use of the coastal slope and foreshore. The aim would be to maintain the width of the defence retaining beaches.

PREFERRED POLICY TO IMPLEMENT PLAN:	
From present day	Maintain existing defences and beach recharge.
Medium term	Maintain existing defences and beach recharge.
Long term	Maintain existing defences and beach recharge. Examine risk to Highcliffe castle with the potential to improve defence in this area while substantially maintaining exposure of the natural cliff.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			
		2025	2055	2105	Comment
CBY.C.1	Highcliffe to Friars Cliff	HTL	HTL	HTL	Detailed consideration of need for defence to Highcliffe Castle in the long term.
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention MR – Managed Realignment					

CHANGES FROM PRESENT MANAGEMENT

No significant change.

IMPLICATION WITH RESPECT TO BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	0	251	3711	4022
	Preferred Plan Damages £k PV	0	0	0	0
	Benefits £k PV	0	251	2711	4022
	Costs of Implementing plan £k PV	0	713	70	783

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