

3 BASIS FOR DEVELOPMENT OF THE PLAN

Document title	Poole and Christchurch Bays Shoreline Management Plan Review Sub-cell 5f Hurst Spit to Durlston Head
Document short title	Section 3
Status	Report V3
Date	2011
Project name	Poole and Christchurch Bays SMP2
Project number	9T2052
Client	Bournemouth Borough Council
Reference	9T2052

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3 BASIS FOR DEVELOPMENT OF THE PLAN

3.1 Historical and Current Perspective

3.1.1 Physical Structure of the Coast

There are three main factors which have controlled and shaped the coastline as we observe it in the present day. These are: geology; coastal processes (sea levels, waves etc.); and (more recently) human intervention and management. The present day coastline form has been very influenced by a process of glaciation and the rising and falling sea levels associated with these climatic episodes. Three periods of glaciation have occurred during the recent geological timescale, but it was the eventual retreat of the last icecap around 9000 years ago, which led to rising sea levels and the breaching of an extensive chalk ridge, which ran westwards from The Needles (Isle of Wight) to Ballard Down. This led to over 220 km² of land being eroded and producing the present plan form and configuration of the Poole and Christchurch Bays frontage. Human intervention in the last 100 years or so has further modified the configuration of the Bays. Hard engineered coast protection structures and sea defences, plus the replenishment of beach material, continue to artificially hold the frontage in a 'stable' form.

A detailed discussion of the geology and coastal processes is presented in Appendix C. A summary of these controlling factors is provided below.

Geology

In basic terms, the open coast geology from Hurst Spit through to Studland, is mostly formed of soft Tertiary sands and clays. Shingle deposits supported by clay form the eastern end of the frontage at Hurst Spit. The Tertiary deposits begin at Milford-on-Sea with cliffs reaching heights of 35 metres at Barton-on-Sea and 36 metres at Warren Hill (Hengistbury Head). Hengistbury Head exerts control on the plan forms of both Christchurch and Poole Bays, although it is a relatively soft geological feature. Its resistance to coastal erosion is attributed primarily to the presence of ironstone nodules. This soft geology has been a primary factor in the historic recession of the shoreline along this section of the coast.

From Studland through to Durlston Head, the geology becomes more resistant. Limestone and chalk cliffs dominate the coast, with Handfast Point, Old Harry Rocks and Ballard Point are all composed of chalk. The backing cliffs of Swanage Bay itself are mostly softer Wealden beds of sands and clays. South of Swanage Bay the geology of Durlston Bay and Durlston Head is composed mainly of Jurassic Limestones of the Portland and Purbeck beds. Durlston Bay itself has been created by the erosion of softer clays that emerge at the shoreline.

During the Pleistocene, the end of the last glaciation and the associated rising sea levels caused significant cliff and shoreline erosion within Christchurch and Poole Bays, which liberated very large amounts of sediment into the nearshore system. This, together with sediment released by tidal scour of the western approaches to the Solent, is thought to have been transported eastwards by littoral drift to form Hurst Spit (in a range of different forms before reaching its current form).

Influence of Manmade Defences

Human intervention across the SMP coast has been very influential in the last 100 years in modifying the configuration of the Bays. Although much of the high value attributed to the open coast relates to a naturally evolving coastline, hard engineered coast

protection structures and sea defences, plus the replenishment of beach material, continue to dominate much of the frontage and hold the frontage in a modified and 'stable' form. Thus the defences form a very important aspect of the control on the physical coastline.

The most easterly defences are rock armour revetments, placed at the root of Hurst Spit. These extend westwards for some 500m to the eastern side of Milford-on-Sea. From there, a series of rock and timber groynes, together with two further sections of rock armour, extend for a further 1.75km, defending the frontage of Milford-on-Sea, through to the Hordle Cliff area.

A further series of rock groynes and shore parallel rock placements defend a 2.25km section of the Barton-on-Sea frontage. A section of undefended coastline at Chewton Bunny is then followed by another rock groyne field defending the Highcliffe frontage. Defences cover the entire Friars Cliff and Mudeford frontage as far as Mudeford Quay (timber and rock groynes) extending for around 1km. Mudeford Quay itself is heavily modified and defended.

Hard structures (walls, revetments, piers, quays and jetties) are in place along the northern banks of Christchurch Harbour along the Mudeford and Stanpit frontages and further up river at Christchurch itself. The western and southern parts of the harbour are largely undefended.

Hard defences (rock groynes and cliff toe rock revetments) are in place along the entire 1.5km seaward face of Mudeford Spit and the eastern Hengistbury Head cliffs, terminating at the Long Groyne, which extends out south-eastward from the eastern most tip of Hengistbury Head. The Long Groyne essentially acts to extend the headland effect of Hengistbury Head and retains a significant amount of the eastward drift of sediment from Poole Bay, although as it is generally observed to be 'full', ongoing drift around the end of the structure allows a reasonable amount of material (particularly finer material) to bypass this point and move into Christchurch Bay.

The undefended cliffs of Hengistbury Head are followed by a continuously defended 15km stretch of coastline. A combination of rock groynes, timber groynes and linear seawall structures defend the frontages from Double Dykes, westwards through Southborne, Boscombe, Bournemouth, the Chines, Canford Cliffs and Sandbanks spit.

The harbour-side face of Sandbanks spit and the northern bank of Poole Harbour are defended by a series of hard structures (walls, revetments, piers, quays and jetties). The western and southern banks of the harbour, including the Studland Frontage, are largely undefended. Most of the Poole Harbour Islands are undefended, however rock revetments are in place around the lagoon on Brownsea Island, along with some defensive walls and harbour structures. Furzey Island has jetty and quay structures in place.

There is reduced management intervention along the final section of the coast from Studland to Durlston Head. This is due to the more resistant nature of the coastline geology, however there are still seawalls and groynes in existence for around 25% of the frontage length (around 3km), primarily in Swanage Bay, with a revetment present in Durlston Bay. A training bank extends offshore of the northern Studland Peninsula and some hard structures are in place at South Haven Point, stabilising the ferry access point.

In summary, this is a heavily managed coastline with only smaller sections that function naturally. At 25km in total, the defended sections of open coast exceed the length of undefended sections. The presence of such extensive defence is obviously profoundly influential upon the behaviour of the coast, at both local level and more widely across the SMP coastline. The combination of groynes and periodic beach recharge aims primarily to maintain beach widths, retain sediment within the cell and to prevent the hard linear structures being undermined. Both Harbours are significantly modified with hard structures and management practices and in parts of the estuarine areas they dominate the natural regime (although natural processes remain dominant elsewhere).

Physical Interaction

Hydrodynamics

This section describes the wider hydrodynamic conditions experienced across the SMP frontage, encompassing tides, water levels and wave climate.

Tides

Two tidal regimes exist in Sub-cell 5f, both having very distorted tide curves. Halcrow (1999) reported that there appears to be a split in the incoming tide at Hengistbury Head. Flood tide levels within the rest of Poole Bay west of Hengistbury Head occur slightly later.

In general across the SMP frontage, the low tide duration is very short compared to the high tide duration, and the tidal rise is longer than the fall. Poole Harbour shows a 'double' high tide characteristic, which results in a long period of standing water. This gives Poole Harbour a lagoon-like nature, and also has significant implications in tidal flood events as floodwaters can stay high for long periods.

The tendency for double high waters exists along the entire frontage but is more pronounced between Mudeford and Alum Chine. These variations in tidal range plus the asymmetry, which is exhibited between flood and ebb conditions, creates a complex pattern of tidal flow (Halcrow 1999).

SMP1 identifies that the main tidal streams are generally parallel to the coastline offshore and that, as might be anticipated, during the flood tide flow and currents are in an easterly direction. During the ebbing tide the flow is westwards offshore. Negative surges can also occur, effectively meaning tide heights are lower than those predicted in Admiralty Tide Tables. Negative surges generally occur under conditions opposite to those that cause positive surges (i.e. very high pressure, little or no wind).

Wave Climate

The dominant wave direction is from the 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 and are generally limited in duration although large 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 Christchurch Bay and the easterly part of Poole Bay (Bournemouth eastwards). The area offshore of Christchurch Bay receives more energy from swell waves than Poole Bay due to its greater exposure to the south-west, however its shallower bathymetry and the presence of the Christchurch Ledge dictates that the waves are more depth-limited than in Poole Bay. This means wave heights reaching the shoreline in Christchurch Bay

are restricted and are similar to those in eastern Poole Bay. Hengistbury Head demonstrates a combination of the least depth limitation and highest relative exposure to the dominant south south-west wave climate. Waves approaching from the south to south-west undergo significant refraction and diffraction due to the presence of the various headlands and this dictates the form and plan shape of all of the bays.

The bays continue to exhibit the need to adjust their shape to a point where sediment – wave energy equilibrium is reached and this is an important consideration in developing the SMP. Increased wave heights due to climate change and sea level rise will increase the pressure for the bays to continue to adjust their plan form. This dynamic response becomes increasingly enhanced from west to east.

The shoreline from the Branksome Chine area south to Durlston Head is more sheltered from the dominant south-westerly storms and faces mainly due east to south-east. The Isle of Purbeck, Studland Bay, Swanage Bay, Durlston Bay and the western part of Poole Bay are sheltered from south-westerly waves. Their east facing nature does however make them more exposed to the less frequent east to south-easterly storms.

Waves in Poole and Christchurch Harbours are generated locally and are limited by the depth and very short fetch within the harbours. The largest waves occur along the northern side of Poole Harbour from local south-westerly storm events. A limited amount of wave energy enters through Poole Harbour mouth during south-easterly events and this can impact upon the south-eastern shoreline of Brownsea Island.

Sediment Sources

One of the principal interactions along the coast (and one that underpins the SMP sediment-cell approach) is that of sediment movement. Such interaction is determined in part by the sediment sources and sinks and in part by the manner in which features described above modify the behaviour of the coast:

- Directly in terms of sediment movement, acting as a down drift control point allowing the coast up drift to realign to a stable position but regulating sediment down drift (down-drift headland),
- Directly in terms of determining the position of the coast (restraint), restraining movement of adjacent sections of the coast,
- Indirectly influencing coastal forces, modifying direction or energy at the shoreline (Up-drift headland),
- Indirectly acting as a barrier modifying forces acting at the shoreline,
- Indirectly through influence on coastal forces, redirecting forces in the nearshore area (interruption).

The SCOPAC Sediment Transport Study (2004) gives an excellent description of the current understanding of sediment transport mechanisms for each of the process units within the SMP frontage.

Broadly speaking, sediment transport mechanisms across the SMP frontage are driven by wave energy. As the dominant direction of wave approach is south to south-west, dominant nearshore transport of sediment is from west to east, in common with much of the wider regional coast. This is mainly true for Poole and Christchurch Bays, however due to their orientation, for the bays of Durlston, Swanage and Studland, transport tends to be south to north, but again in response to south south-westerly waves. There are occasional exceptions to this dominant regime in the vicinity of the harbour mouths and headlands.

Whilst the direction of dominant littoral drift is generally a simple correlation with the dominant wave climate (particularly where tidal range is small and currents are weak, as is the case within most of this SMP frontage), the magnitude of littoral drift has a more complex relationship with the wave climate. It is a product of many more factors, including wave height, wave period, nearshore bathymetry, particle size distribution, relative cohesiveness of beach and shoreface sediments, plus the influence of tides.

The picture of offshore sediment transport across the whole area is complex and by its nature is less well understood than the nearshore littoral transport.

Sediment Supply

Natural sediment sources within the SMP area are cliff, offshore marine and fluvial sources. The key sources are inputs from the eroding cliffs along the Becton Bunny to Milford-on-Sea and Chewton Bunny to Barton-on-Sea frontages within Christchurch Bay. Fluvial inputs are not a natural key source of sediment to the open coast frontage but they are influential within the harbours and in the vicinity of the harbour mouths where ebb tide deltas are present. Harbour dredging and beach replenishment activity makes some fluvial material available artificially to the open coast.

Beach replenishment along the Poole-Bournemouth frontage is a key source of sediment under the management intent of the plan. The sediment links between Poole and Christchurch Bays means that the Christchurch Bay frontages also benefit from this material. The replenishment is essentially replacing the sediment lost due to the coast protection works within Poole Bay which prevent the natural erosion of the cliffs.

Given the importance of the cliffs in sediment supply terms, an essential part of the overall plan is to allow continued erosion of the cliffed frontages wherever possible. This is particularly important given the level of coast protection established across a wide part of Poole Bay, as indicated above. This also helps to satisfy a number of high level SMP objectives. Generally this approach is not detrimental to designated environmental sites because actively maintaining the erosional process and maintaining geological exposure is central to their citation. In adopting this approach there are some areas, particularly within Christchurch Bay, where the intent to allow recession of the cliff line will impact on residential property and local infrastructure. These impacts are minimised where possible through the policy choices and the use of managed realignment to manage the rate of erosion where possible and therefore to manage the impact on infrastructure, properties and other assets. These impacts on assets at discrete locations are identified and discussed in much more detail within the Policy Development Zone documents within Section 4. The Policy Development Zone maps within each section, which indicate the estimated position of the coast in 2105 under the preferred plan, should be consulted for a visual indication of the areas and assets anticipated to be affected by change at the coastline over the next 100 years, (under the preferred plan).

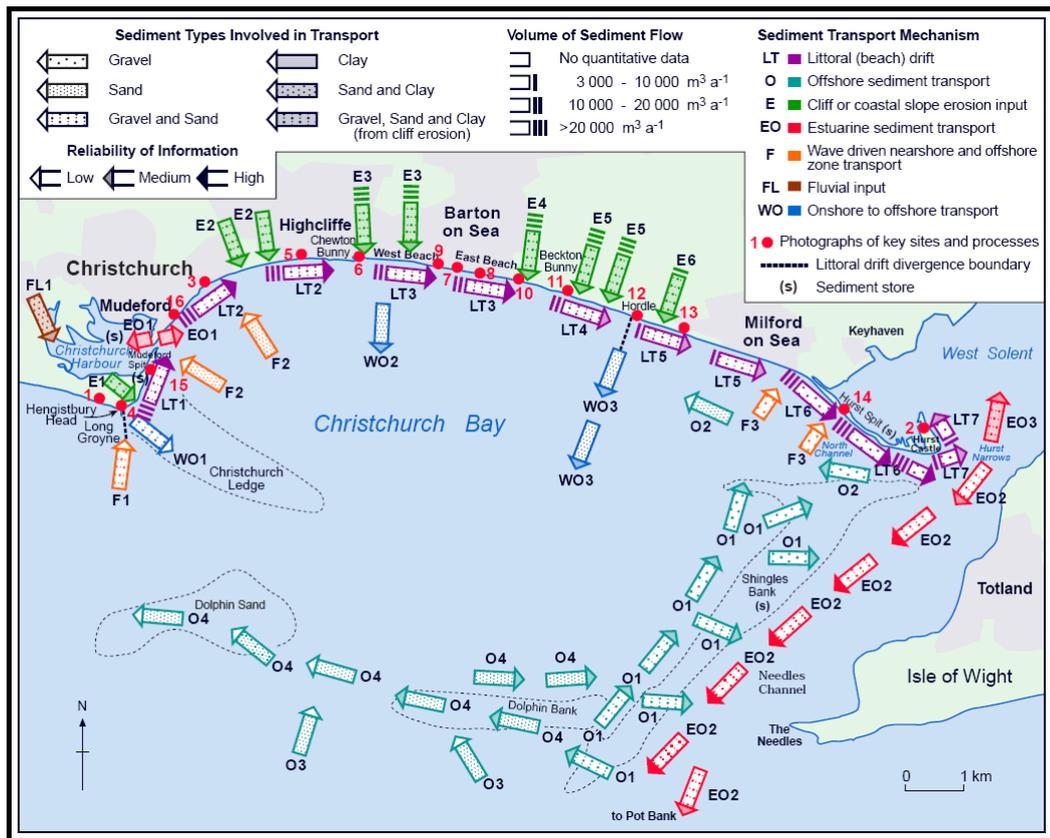


Figure 3.1 Hengistbury Head to Hurst Spit: Sediment Transport

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

Beach Recharge

A key consideration for this SMP review is the sediment made available by beach recharge activities. Beach recharge introduces new material to the frontage (as opposed to recycling and/or reprofiling which moves existing sediment around within a given sub-cell). Recharge actually represents the largest input of new material to the SMP frontage.

Recharge activities have been concentrated in Poole Bay (a recharge programme was also undertaken for Swanage). The first recharge took place in 1970 and the most recent in early 2009. Recharge occurring in Poole Bay benefits not just the frontages of Branksome Chine, Bournemouth, Boscombe, Southbourne and Hengistbury Head, but also Christchurch Bay beaches, as a significant proportion of material put on to the beaches in Poole Bay will eventually bypass the Long Groyne and be transported further east along the frontage.

Dredging

There is a view that dredging associated with the two harbours of Poole and Christchurch, which allows for the commercial shipping activities to move freely into the harbours within the region, has had an influence on coastal behaviour.

Poole Harbour is controlled by a large and shallow enclosed estuary with double sandy spits forming its mouth. Redistribution of sediments does occur in the harbour, as erosion takes place on undefended sections on the northern side and deposition occurs near river mouths. Between 2005 and 2006 around 1.1 million m³ of material was

removed from the Poole Harbour and used beneficially for beach replenishment at Poole, Bournemouth and Swanage.

Coastal Change

The coastal zone is a dynamic environment, reliant on natural process to form the boundary between land and the sea. Along the Hurst Spit to Durlston Head coastline, the main pressure for change has been erosion. In the recent geological past, large scale erosion has produced large quantities of sediment which has allowed the development of the sand and shingle shoreline seen today. In addition to the retreat of much of the coast, there have been the changes in position and shape of natural features of the shoreline, particularly the spits.

Hurst Spit, although seen as a relatively stable feature now, has been a very dynamic coastal feature in the past, as indeed have all of the spits along this frontage. It is considered to be quite a recent feature resulting from nearshore processes. During the severe storms of 1989/1990, Hurst Spit experienced landward rollback of up to 80m in places.

Mudford Spit has undergone considerable morphological change in response to changes in sediment supply and the occurrence of extreme events. Periods of sediment saturation, followed by sediment starvation, together with breaching due to storms has dictated the shape the spit as we see it today and the position of Christchurch Harbour mouth.

Historically, in the recent Holocene, Sandbanks Spit underwent some landward recession in response to rising sea levels. Installation of defences in the last century has effectively fixed it in place. As sea level rise accelerates, pressure upon this frontage will increase and the Spit will want to respond to the pressures of higher water levels and increased wave heights resulting in landward recession.

The wide sandy beach and dunes of the Studland Peninsula are thought to be geologically very recent, perhaps only forming in the last 500 years.

Coastal Change Policy

In 2009, Defra launched a consultation setting out ideas for how coastal communities can successfully adapt to the impacts of coastal change and details of the new coastal change pathfinder programme. This programme supports communities in developing and implementing adaptation techniques to coastal change and when successful can be rolled out at a national level. A new coastal change fund of up to £11 million is available to support their work.

One aspect of coastal change policy with specific relevance to SMPs is the identification and establishment of 'Coastal Change Management Areas' (CCMAs). Where the preferred plan and policy choices within the SMP indicate that a discrete area will undergo significant change, it may be useful to identify these as potential CCMAs. Although it is not clear yet on precisely the criteria which will be used to identify CCMAs, any location likely to undergo significant morphological change, loss of property, relocation of sections of the community or require major realignment, (including transport links and so forth) may potentially be flagged as a CCMA.

In March 2010 Communities and Local Government (CLG) released the Planning Policy Statement (PPS) 25 Supplement: Development and Coastal Change. . It replaces the policy on managing the impacts of coastal erosion to development set out in Planning

Policy Guidance 20, Coastal Planning. This sets out a planning framework for the continuing economic and social viability of coastal communities and aims to focus on managing risk against the impending impacts of climate change in coastal areas.

Climate Change

Sea level rise, increased wave heights and increased severity and occurrence of storms are the principal results of climate change that impact on the coast. Sea level rise is predicted to add up to a possible 1.0m to mean sea levels by the year 2105 from baseline mean sea level taken from 1990. Sea level rise of this magnitude could impact greatly on the entire SMP coast. The current trend for sea level rise which is based on the long-term record from Newlyn (1916 – present) is just under 2mm per year.

Due to the physical mechanisms involved in raising sea levels, particularly thermal expansion of the oceans (which lags behind changes in atmospheric temperature changes), there is not a smooth linear increase in sea levels, instead an accelerating growth curve is experienced. Therefore the increase per year becomes more severe as time progresses and risks increase accordingly.

The principal guidance currently used for sea level rise was released by Defra to operating authorities in October 2006 (Flood and Coastal Defence Appraisal Guidance; FCDPAG3 Economic Appraisal; Supplementary Note to Operating Authorities – Climate Change Impacts; Defra (October 2006)). These values have been used in calculating the future flood extents for 2025, 2055 and 2105. Table 5.1 below sets out the allowances provided in the guidance.

DEFRA	level mm/yr	m/yr
1990-2025	3.5	0.0035
2025-2055	8	0.0080
2055-2085	11.5	0.0115
2085-2115	14.5	0.0145

Table 3.1 Defra Sea Level Rise allowances used within the SMP2 Review

Based on the above values, the following amounts of sea level rise are calculated for the SMP frontage:

- SLR by 2025 at Poole/Christchurch/Western Solent

$$(23\text{yrs} * 0.0035) = \underline{0.081\text{m}}$$

- SLR by 2055 at Poole/Christchurch/Western Solent:

$$(23\text{yrs} * 0.0035) + (30\text{yrs} * 0.0080) = \underline{0.321\text{m}}$$

- SLR by 2102 at Poole/Christchurch/Western Solent:

$$(23\text{yrs} * 0.0035) + (30\text{yrs} * 0.0080) + (30\text{yrs} * 0.0115) + (17\text{yrs} * 0.0145) = \underline{0.912\text{m}}$$

The baseline values for current 1:200 year still water level upon which the sea level rise values have been superimposed in the flood mapping are taken from the following source: *Appendix A Table 1 pg 26* in South West Region Report on Regional Extreme Tide Levels (2003) Final Report (3H6382).

Defra (2006) have also released guidance to operating authorities advising them to allow for extreme wave heights to increase by around 10% during the period to 2100. Allowances for offshore wind speeds are also increased by a factor of 10%. These allowances are based upon the predictions made by the UK Climate Impacts Programme (UKCIP). It is also possible that there may be some changes in the prevailing wind directions but this remains an uncertainty.

It is important to note that the Defra October 2006 guidance figures on allowances for sea level rise are intended primarily to act as guidance for the design of new schemes and defences. Therefore there is a certain amount of precaution built into the figures.

During the production of this SMP, the UKCP09 Climate Change Report was released. The sea level rise predictions contained within that report were considered during the SMP development however continued use of the 2006 figures as the primary sea level rise guidance is consistent with the guidance used within the other SMP reviews.

Confidence and Uncertainty

The study of coastal behaviour and processes is far from being an exact science. Records and data can be assessed to determine particular trends to gain an understanding of how the coastline is changing. However, due to the highly sensitive and responsive nature of coastal process, there are uncertainties when predicting erosion rates and sediment movement. The coastline from Hurst Spit to Durlston Head has one of the most extensive coastal monitoring records in the UK, dating back some 38 years; however this can still be regarded as limited data when considering the longer term, particularly where cyclical processes are involved. The erosion zones presented with the SMP are to be treated as indicative lines, as they are predictions based on present day scenarios. This information should therefore be regarded as supporting data for policy development and not as absolute lines of coastal erosion. For the purpose of planning 100 years in advance, a large number of uncertainties remain.

However, such uncertainty is far more related to timing of events such as erosion rates and far less in the understanding that erosion and change will occur. One such obvious uncertainty is in the rate of sea level rise, which strongly influences erosion rates.

At a more local scale there is uncertainty as to the response of the estuaries to sea level rise. Sediment availability and increased fluvial flows (resulting from increased rainfall linked to climate change) will also be influential in shaping the estuaries in the future.

National Coastal Erosion Risk Mapping

Assessment and mapping of coastal change and erosion risks (at a national scale) have been underway for some time through Defra's National Coastal Erosion Risk Mapping (NCERM) project. Although it is envisaged that the outputs from this study will not be available until 2011, the work indicates the ongoing effort to reduce uncertainty and manage the residual risks inherent within coastal erosion. The mapping of erosion and establishment of erosion risk zones through the work of the SMP should assist in refining the outputs of the NCERM.

Conclusions

Considering the importance of the coastline, from both a natural and human perspective, there is a clear need for management in order to sustain this environment for future generations. The SMP is essentially a mechanism for creating a plan of intent, such that future strategies and schemes can consider the broader scale of the coastal zone. The plan has largely achieved a balance between human aspirations and natural process, in such a way where there is opportunity for sustainable management for the next 100 years.

The coastline is a dynamic environment and is constantly changing (particularly along the Bournemouth to Hurst Spit frontage) there will be continued pressure from erosion. The hard geology which dominates coastal behaviour along the Swanage and Durlston frontages will continue to do so, but even here erosional pressures require policy to deliver an integrated approach in establishing a sustainable position for the coastline. These sections of the coast, where there is more resistant high ground or major geomorphological features, such as the nearshore banks and the nesses, have allowed the coast to develop a relatively stable alignment to the dominant wave energy so that change is far slower.

Notwithstanding the uncertainties, the SMP can project forward the behaviour of the coast in the short term and in many areas through to the medium term. The SMP can also predict with a degree of confidence the longer term general behaviour of the coast, identifying where there is evident long term change and pressure. However, the uncertainties are recognised to be important and the SMP has to acknowledge this, particularly with respect to timescales. In several areas this has to be reflected in policy development from one epoch to the next in terms of rates of change rather than in terms of specific periods of time. This projection forward is important, as management decisions made now will influence longer term trends and the long term sustainability of management.

The SMP is putting forward a plan for managing change in a sustainable way taking account of the overall physical structure of the coast and man's influence on this structure and behaviour.

3.1.2 The Purpose of the SMP in Relation to the Physical Structure and Processes

The aim of the SMP is to ensure that a proper account is taken of the impact or interaction between areas, such that management in one area does not have a detrimental impact elsewhere. Typically this implies the need to consider the reliance of defences or erosion rate and cliff stability on secure beach levels. From this, and from the broader picture of the sediment supply (potentially from the nearshore and offshore areas and from erosion of the land), there is the need to consider the potential sediment pathways, the possible interruption of those pathways and the potential for erosion or retention of sediment. At the same time the SMP has to provide flood and erosion risk policy guidance to a level that may feed practically into local planning and management of specific defence lengths. In developing this, therefore, the SMP has to maintain a perspective at a broad level while still addressing local interactions.

3.1.3 Natural and Cultural Heritage

Appendix D (Thematic Review) provides a detailed definition of the natural heritage, landscape, historic environment and land use. The following paragraphs draw this together in a general appreciation of the values of the area.

Geology

The SMP shoreline is highly diverse in terms of its natural and cultural heritage; those aspects of the coastline that give an essential and important quality and backdrop to the current use and appreciation of the area.

With respect to geology, this has already been discussed (Section 3.1.1) in terms of the physical structure. However, the coastline has been described as an area where geological processes, in particular erosion of the coastline cliffs, should be celebrated.

Geological Sites of Special Scientific Interest (SSSIs) and Regional Important Geological and Geomorphological Sites (RIGS) in the study area are extensive and cover the majority of cliff frontage along Christchurch Bay (and harbour), Poole Bay (and harbour), Studland Bay, Swanage Bay, and Durlston Bay. In fact, the majority of this cliff frontage has been selected as Geological Conservation Review (GCR) sites as they display sediments, rocks, fossils, and other features of the landscape that make a special contribution to understanding and appreciation of Earth science and the geological history of Britain. Such areas are significant for research, in understanding the very long-term perspective of change, for education, in developing an appreciation of this change, and for enjoyment of the varied landscape, habitats, flora and fauna. In addition to this general varied collection of interest, reflecting the diversity over the whole coast, are the more specific sites, focussing on such aspects as palaeontology. These specific qualities are recognised in the extensive range of designations at international, national, regional and local levels.

Heritage

As significant as the geological history, is the long-term occupation of, and activity on our coastline, including what was once land but has now been lost to erosion, and where other areas have developed into the coastal environment inhabited today by our coastal communities. The historic landscape of the coast, shore and intertidal zone and its component features demonstrate the extent to which human communities have occupied and used the coast, sea and shore over thousands of years. Present and submerged landscapes and deposits hold vital and irreplaceable evidence of the development of the landscape and seascape and the strong influence of past communities in shaping and exploiting the shoreline. The management of this heritage is therefore critical in sustaining the social and historical values of the coast.

Heritage contributes vitally to local character not only underpinning community identity, but also acting as a major attraction for visitors and a key element of the economic benefits of tourism. The coast here boasts many buildings, sites and monuments of national or regional interest, for example Hurst Castle.

The key archaeological assets, in particular Scheduled Monuments (SM) and historic sites within the Poole and Christchurch Bays SMP2 are associated with the surrounding areas of Poole Bay, Poole Harbour, and the Isle of Purbeck Bays (Durlston, Swanage and Studland). Archaeological remains are a finite and non-renewable resource, highly fragile and vulnerable to damage and destruction. Upstanding and buried remains need to be protected and managed sympathetically within new development.

There are areas in Poole and Christchurch Bays which can be identified as having especially high archaeological potential. This is where applications for development are particularly likely to require an archaeological programme including:

- The Old Town;

- Lower Hamworthy (Roman military site and port);
- The Stour Valley;
- The Northern Heathland;
- Upper Hamworthy (Rockley Sands, Turlin Moor and Upton Park);
- The shores and bodies of Poole Harbour including Lytchett, Holes and Parkstone Bays;
- The Poole Bay Littoral; and
- The Roman Road and its environment.

In addition to SMs, there are also several hundred listed buildings in the area of Poole and Bournemouth. Historic Parks and Gardens include Compton Acres, part of Coy Ponds on the boundary with Bournemouth, Poole Park, Poole Cemetery, and Durlston Estate.

Areas of productive agricultural land within the study area are mainly confined to river terrace deposits boarding the floodplains of the main rivers, which discharge into Christchurch and Poole Bay and surrounding heathlands.

The entire Hengistbury Head feature is listed as a SM covering an area of 87 hectares and archaeological interest is considered to be of international significance for many reasons. Dating back to well before the Iron Age the site is rich in archaeological remains including a late Palaeolithic camp and evidence of Bronze and Iron Age Man, including pottery finds and a settlement. Hengistbury Head is the only non-cave occupation site known in the region that dates back to the earliest (Palaeolithic) period. The discovery of a rich range of artefacts from the Iron Age promontory fort constructed at Hengistbury Head, reveals that the promontory was a trading centre for goods, such as wine and glass, from the continent and Mediterranean with copper goods from Cornwall.

This type of history is important in understanding the area and its development and, in particular along this section of the coast, the way in which man's use and values have adapted to or been altered by the changing coastline. In addition to the important cultural and educational context, the varied assemblage of heritage interest supports a significant tourism industry.

In some areas, sites or monuments are at risk from erosion or flooding. As an overall approach within SMPs, the objective is not to defend every site or monument, but to identify those which are most at risk, so that prior survey and recording can be undertaken before the sea encroaches and destroys them. Each area does have to be considered on its own merit. There are areas where the heritage value is embedded within present day values of our existing settlements and there are features where their context within the coastal zone is essential to understanding their value and where they contribute importantly to the overall historic landscape character of the coast. While an underlying principle, in line with that of the SMP as a whole, is to minimise reliance on defence, the SMP also has to consider the opportunity to sustain the historic environmental values in an appropriate manner.

Natural Environment

The Poole and Christchurch Bays coast contains some of the largest areas of developed coastline in the UK, with small sections being characterised by low-lying marshes, reedbeds, sand and shingle beaches, reclaimed tidal land, heathland, forest and farmland. Each of these habitats in turn supports a range of species of high conservation value, including those listed on Annex II of the Habitats Directive (Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and

Flora). The high conservation value is reflected in the fact that the majority of the coastline, even with the high level of development, is subject to statutory nature conservation and landscape designations, which have had important implications for the Poole and Christchurch SMP.

Along the Poole and Christchurch Bays coastline there are several areas of International and European conservation importance, with these designations being underpinned by national legislation. Areas of conservation importance with pertinence to the SMP process are presented in Table 3.1.

Table 3.2 Areas of conservation importance with pertinence to the Poole and Christchurch Bays SMP2 process

International Designation	Site Name
Special Area of Conservation (SAC)	Dorset Heaths Dorset Heaths (Purbeck & Wareham) & Studland Dunes Isle of Wight Downs Isle of Portland to Studland Cliffs River Avon South Wight Maritime Solent Maritime St Albans Head to Durlston Head New Forest
Special Protection Area (SPA)	Avon Valley Dorset Heathlands New Forest Poole Harbour Solent Southampton Water
Ramsar	Avon Valley Dorset Heathlands New Forest Poole Harbour Solent Southampton Water

National Designation	Site Name
Site of Special Scientific Interest (SSSI)	Arne Avon Valley (Bickton-Christchurch) Bell Vau Quarry Blashenwell Farm Pit Blue Pool and Norden Heaths Bourne Valley Brenscombe Heath Burton Common Canford Heath Christchurch Harbour Corfe and Barrow Hills Corfe Common Corfe Mullen Pastures Ham Common Hartland Moor Headon Warren & West High Down Highcliffe to Millford Cliffs Holton and Sandford Heaths Hurst Castle & Lymington River Estuary Luscombe Valley Moors River System Poole Bays Cliffs Poole Harbour Purbeck Ridge Purewell Meadows Studland & Godlingston Heaths Rempstone Heaths River Avon System South Dorset Coast Stoborough & Creech Heaths Studland Cliffs The Moors The New Forest Thrashers Heath Town Common Townsend Turbay and Kinson Commons Upton Heath Wareham Meadows
Local Nature Reserve (LNR)	Luscombe Valley Ham Common Millford-on-Sea Hengistbury Head Stanpit Marsh Parkstone Bay

The variety of habitats fringing the coastline has presented paradoxes for shoreline management; many areas of freshwater habitat were of a coastal nature prior to reclamation, with these areas now being located either at, or below, mean sea level. As such, the development of SMP policy for these areas has attempted to provide for the

most sustainable future management of these areas, with the effects of policy having been assessed through both the SEA and AA processes.

In this context ‘sustainability’ is assessed based on the ability to maintain the shoreline in its current position without adverse impacts. Where it is not technically sustainable to hold the line along a given frontage, the objective to establish a long-term sustainable position for the shoreline dictates the policy. In this case the plan is seen to achieve sustainability for the shoreline per se, but it is acknowledged that this may not represent sustainability for a freshwater habitat above MHW. However, the sustainability of such habitats cannot be guaranteed when residual risk is allowed to increase seaward of the defences and the risk of substantial overwhelming of defences and inundation of freshwater areas results.

Landscape

All the above interests contribute to the exceptional landscape value of the coastline. The Poole and Christchurch Bays coast conjures images of sand and shingle beaches, shingle ridges, sandy spits, high chalk cliffs, the wide open but sheltered harbour areas, the sandy dunes of Studland and the imposing presence of Hengistbury Head. This character is reflected in the designation of much of the coast through the Dorset Area of Outstanding Natural Beauty (AONB). Essential features of the coast are the villages such as Barton-on-Sea or Milford-on-Sea, quite literally living on the edge.

In many ways this landscape quality draws together the many aspects and activities associated with the coastline, and in turn provide a valuable asset both to local residents and to the regional economy through tourism.

3.1.4 Human (Socio-Economic) Environment and Activity

The Poole and Christchurch Bays coastline has a unique and dynamic nature, underpinned by the diversity of values found along the coast. These values provide the fundamental building blocks in determining the intent of the management plan. The values range in both scale and function, from the major urban centres in Bournemouth and Poole, to large areas of open space used for both agriculture and recreation. Other key features comprise the thousands of homes and businesses that are situated along the coast, together with a heavy dependency on tourism for communities such as Christchurch and Swanage. These are some examples of how people are interacting with the coastal environment both at present, but also historically through the numerous heritage sites and scheduled ancient monuments along the coast. These features and issues can be found within Appendix E. Although each value is specific, many features share common grounds; whether it is proximity to one another, or multiple functions/interests of an individual feature which appeal to a variety of stakeholders. In developing the SMP it has been important not just to capture the mass of individual features but to acknowledge the manner in which these values and interests interact. This has been attempted in defining the broad level Stakeholder Objectives, which form the basis of the policy development process. These are found within the Policy Development Documents within Section 4 of this report.

In considering these objectives it is important to appreciate that these values are not fundamentally in conflict but act to support the overall socio-economic aspect of the area.

There are specific important activities essential to the welfare of the area. Major port activities are centred at Poole, while Bournemouth is a large commercial centre. Both

towns are a popular base for tourists and visitors and rely heavily on both commercial and recreational activities

These settlements rely on the infrastructure of the road network, regionally in terms of the main A35 and more locally through the cliff top roads linking communities on the coast. In several areas these roads are at risk from erosion, or in the case of the Sandbanks Rd, flooding or inundation. This applies more to the more actively eroding areas at Milford-on-Sea, Barton-on-Sea and Highcliffe. The Studland, Swanage and Durlston Bay areas are less at risk, although the South Haven Point to Studland Village road may be at flood risk from the Poole Harbour side.

The SMP process has to consider all such aspects balancing the possible difficulty of maintaining the socio-economic structure against the continuous change and erosion along the frontage. An important role of the SMP is to examine how these various communities can be sustained in the context of an eroding coast. Equally important, however, is to reflect what it is about each centre that is important, so that in maintaining defence to an area, or in considering the need for change in defence policy, the values of the coastal frontages are equally maintained. This requires a long term view to be taken, considering how management of defences may be best adapted to longer-term changes and the threat of sea level rise and climate change.

3.2 Sustainable Policy

A SMP, therefore, has to identify how the coast can be managed in a sustainable way in terms of managing and adapting to flood and coastal erosion risk in the light of future climate change and sea level rise. In addition to this, it also aims to deliver wider environmental and social benefits as part of the SMP policies.

As an overall principle it is adequate to take the definition provided by the original 1987 statement of sustainable development: *“development which meets the needs of the present without compromising the ability of future generations to meet their own needs”*, subsequently amended and adopted in the Defra SMP guidance, in relation to defence management policy as avoiding: *“tying future generations into inflexible and expensive options for defence.”*

While this provided an initial intent, encapsulating the long-term view being taken by the first review of the SMP, it has to be realised that such a definition lacks (quite correctly, given its context) specific guidance as to the day to day, area by area management of individual sections of the coast or of risk. It is essential, therefore, to interpret this in relation to the actual situations that exist and the future that is envisaged.

There are two aspects to sustainability:

- The effort needed to deliver an outcome – such as pressure resulting from changing the coastal form, such as resisting erosion; and
- The harm or benefit resulting from the outcome - the vision of what is wanted of the coast.

These have to take account of the issues in a particular area, for example: natural processes, ecology, homes, businesses, navigation or recreation.

The issues along the Poole and Christchurch Bays coast have been identified from the following sources of information:

- Earlier studies, such as the first SMP, strategies and scheme studies;
- Stakeholder meetings and discussions with the EMF, Key Stakeholders Group (KSG) and CSG;
- Locally based public workshops; and
- A review of policy documents, structure and local plans.

The most sustainable approach is to not intervene on the coast and to let it respond in a dynamic way to natural processes occurring in the bays. There is an increasing need to manage flood and erosion risk through alternative methods, such as flood warnings and improving the resilience of individual properties, in an attempt to adapt to climate change and sea level rise.

This fits with the intentions of the European Water Framework Directive, which aims to restore water bodies (including coastal areas) to their natural state, unless there is a good reason not to. This can be done where there are no issues that need managing. However, the coast and hinterland are home to a wide variety of activities, features and issues often with complex interactions.

There are parts of the coast that people would not wish to change as the impact would have a detrimental effect on the sustainability of other issues or features elsewhere on the coast. These may be natural, man-made or social features that the present generation wants to pass on to future generations.

The right balance needs to be achieved between these two extremes, at the same time as making sure inflexible and expensive management plans are not passed on to future generations. Even where the coast is currently managed, future intervention may not be the right choice if it is likely that on-going management will have a detrimental effect on natural processes or impact on other parts of the coast long-term. It is likely that management in these places will increase in the future as the coast evolves or because of climate change. Careful consideration would therefore be needed to decide whether it would be sustainable to continue existing management practices rather than letting the coastline behave more naturally.

3.2.1 Natural Processes

The geological exposures of the coast are clear evidence of how sea levels in the area have changed. Over the last 2,000 years, this change has been quite minimal. However, we are now entering a period of accelerating sea level rise that will impose greater pressure on the coast to erode and could in some areas (particularly where the shoreline is dependent on natural protection provided by beach material) result in significant change. There is also the potential for changes in sediment supply. This problem has been exacerbated across much of the Poole and Christchurch Bays SMP frontage over the last century due to human intervention reducing the contemporary sediment supply from cliff erosion by the construction of coastal defences. Although attention is focused upon the shoreline position, this process also has the potential to produce a deepening of the seabed at any particular point. We have to plan for this change. In general terms we have to expect greater energy against the coast and against defences coupled with a potential reduction of sediment along sections of the shoreline. If we choose to continue to defend our shorelines in the same locations that we do at present, then the size of the defences may need to increase. We need, therefore, to be looking to create width where this is possible, either through setting back defences or through modifying the approach we take. Equally we need to recognise the

importance of the geomorphological control that exists to the coast, working with this to sustain the shape of the coast and thus to retain and maximise the use we make of the sediments which are available.

As discussed earlier, there are areas of quite significant transfer of sediment along the shoreline. This is a coast where action in one area can have a major impact elsewhere. In considering the sustainability of managing areas of the coast we have to understand the significance of these impacts such that we are able to maximise the use of sediment without creating problems elsewhere. A sustainable shoreline sediment system is one that is allowed to behave as naturally as possible, without significant further intervention.

3.2.2 Economic Sustainability

One of the difficulties facing us, as a nation, is the cost of continuing to protect shorelines to the extent that we do at present. Many of the defences that exist today have been the result of reactive management with often limited understanding (or perhaps knowledge) of the long-term consequences, including financial commitment.

Studies over the past few years have established that the cost of maintaining all existing defences is already likely to be significantly more than present expenditure levels. In simple terms, this means that either more money needs to be invested in coastal defence, defence expenditure has to be prioritised, or funding has to come from other sources based on the benefit they bring. Whilst the first option would clearly be the preference of those living on or owning land along the coast, this has to be put into context of how the general UK taxpayer wishes to see their money used. Given that the cost to provide defences that are both effective and stable currently averages between £2million and £5million per kilometre, the number of privately owned properties that can be protected for this investment has to be weighed up against how else that money can be used, for example education, health and other social benefits. Furthermore, because of the climate changes being predicted, which will accelerate the natural changes already taking place, these recent studies have also established that the equivalent cost of providing a defence will increase during the next century, possibly in some areas to between 2 and 4 times the present cost. Consequently those areas where the UK taxpayer is prepared to continue to fund defence may well become even more selective and the threshold at which an area is economically defensible could well shift. Whilst it is not known how attitudes might change, it is not unreasonable to assume that future policy-makers will be more inclined to resist investing considerable sums in protecting property in high risk areas, such as the coast, if there are substantially cheaper options, such as constructing new properties further inland.

It is extremely important that the long-term policies in the SMP recognise these future issues and reflect likely future constraints. Failure to do so within this Plan would not ensure future protection; rather it would give a false impression of a future shoreline management scenario which could not be justified and would fail to be implemented once funding was sought. The implications of these national financial constraints are that protection is most likely to be focussed upon larger conurbations and towns, where the highest level of benefit is achieved for the investment made, i.e. more properties can be protected per million pound of investment. The consequence is that rural communities are more likely to be affected by changing financial constraints, but from a national funding perspective, i.e. best use of the taxpayer's money, this makes economic sense.

However, sustainability cannot only be judged on the effort necessary to defend areas. There has also to be consideration of what values and heritage may be passed on to future generations. This is not just in the bricks and mortar that is being defended but is the character and vitality of the coastal communities. There has to be, therefore, a sensible balance achieved between those areas where the increasing pressure from the changing shoreline will make defence unacceptable in reality and those where defences can be maintained but at increased cost. The SMP has to consider this in terms of:

- What is the value that is being defended, whether this is in terms of a viable community or merely from the economic perspective of a hard asset;
- Whether defences themselves are causing a further deterioration in conditions which makes their maintenance increasingly difficult; and
- How management practice will itself evolve. For example in moving down one course of action will this lead to further defence, and further resource being put into defence.

In this latter case the SMP attempts to identify where there is a need to possibly take earlier action to support existing natural structures or to take advantage of existing width, so as to provide a more sustainable defence system in the future.

In many respects, sustainability and the balance which we are attempting to achieve, may be considered in terms of how our actions now, and therefore the consequences will be considered in the future. Either in terms of these consequences or in deciding to defend or not defend, a simple test of sustainability is the degree of regret that might be felt in the future of the decision which is being made now. Will we wish that we had taken a different course of action?

3.2.3 Natural Environment

The forces of nature have created a variety of landforms and habitats along the Poole and Christchurch Bays coastline. The special quality of the natural habitats and geological/ geomorphological features on this coast are recognised in a number of national and international designations, protected under statutory international and national legislation, as well as regional and local planning policies. There is a legal requirement to consider the implications of any 'plan' or 'project' that may impact on a Special Protection Area (SPA) or Special Area of Conservation (SAC), through the European Union Habitats Directive (Council Directive 92/43/EEC) and Birds Directive (Council Directive 79/409/EEC). The Defra High Level Target for Flood and Coastal Defence (Target 9 – Biodiversity) also requires all local councils and other operating authorities to:

- Avoid damage to environmental interest;
- Ensure no net loss to habitats covered by Biodiversity Action Plans; and
- Seek opportunities for environmental enhancement

A key requirement for the SMP is therefore to promote the maintenance of biodiversity or enhancement, through identifying biodiversity opportunities.

Coastal management can have a significant impact on habitats and landforms, both directly and indirectly. In places, coastal defences may be detrimental to nature conservation interests, e.g. producing coastal squeeze, but in other locations defences may protect the interest of a site, e.g. freshwater sites. Coastal habitats may also form the coastal defence, e.g. Hurst Spit, which in turn protects intertidal habitats on its lee

side. Therefore, coastal management decisions need to be made through consideration of both nature conservation and risk management. Although the conservation of ecological features in a changing environment remains key, in terms of environmental sustainability, future management of the coast needs to allow habitats and features to respond and adjust to change, such as accelerated sea level rise. It is recognised that true coastal habitats cannot always be protected in situ because a large element of their ecological interest derives from their dynamic nature and this is important to ensure the continued functionality of any habitat. Similarly, in terms of many of the geological designations, many of these rely on fresh exposure of the cliffs. This poses a particular challenge for nature conservation and shifts the emphasis from site 'preservation' to 'conservation'. Therefore, accommodating future change requires flexibility in the assessment of nature conservation issues, possibly looking beyond the designation boundaries to consider wider scale, or longer term, benefits. The SMP also needs to consider opportunities for enhancing biodiversity throughout the SMP area, not just at designated sites.

The natural environment of the SMP coastline, quite apart from its intrinsic value, is acknowledged to be of exceptional importance in tourism and to the very way of life of people living in the area. In looking to sustain this environment, therefore, the SMP has to consider how both the *natural* and *built* environment co-exist on this dynamic coastline.

3.3 The Scale of SMP2 Review

It is evident from Section 3.1 above and Appendix D that there is a high degree of diversity over the SMP2 coastline. This is in terms of the physical processes, natural and cultural heritage and socio economic drivers; and in considering sustainability (Section 3.2) that there is significant interaction within each theme and between the different themes or individual sectors of interest. Furthermore, depending on the scale at which the coast is considered there are different interactions. Nominally, for example, it may be appropriate to say that over the whole SMP2 coastline there is a west to east sediment drift. At a high level this might be valid but ignores, at a slightly more detailed level, the more complex fact that the Studland frontage seems to be supplied by sediment derived from sources to the north and east. Similarly in terms of transport or coastal footpaths, the Jurassic Coast World Heritage Site or indeed the contribution that Poole and Bournemouth have on the economic welfare to the region, there are many interactions at differing levels of detail.

The aim of the SMP is to provide an assessment of flood and erosion risks at a scale appropriate to the plan area (this could generally be thought of as at a semi-regional level). It should then be assessed at national level in regards to affordability of the proposed management response to those risks. Associated with this is an indication of the overall level of commitment to defence in these areas. Equally the SMP aims to provide a general assessment of appropriate policy for risk management at a level that will assist direct management of defences. In other words the SMP must also provide a detailed enough assessment to facilitate delivery at the local level. This is then used by operating authorities to inform other statutory plans and provide clarity of the future drivers. As well as supporting the production of further coastal strategies and studies, the SMP should aim to inform a number of key areas of spatial planning at the coast, particularly through influencing the following plans and frameworks:

- The Regional Spatial Strategy

- Local Development Frameworks – including Planning Policy Guidance (PPG) – specifically identifying ‘coastal change areas’
- Local and Regional Transport Plans
- Local Biodiversity Action Plans

SMP should also now be informing Defra’s *Coastal Change Pathfinder Programme*, which aims to set out plans for how coastal communities can successfully adapt to the impacts of climate change.

Again it can be seen that the SMP needs to deliver both regionally and locally. Clearly to address both levels there needs to be a layered approach to the SMP analysis. To achieve this, despite maintaining a clear awareness of the broader levels of interactions between areas, it is necessary, to allow focus on all issues, to consider sections of the coast in detail and within which individual policy units can then be derived. In taking such an approach, consideration has to also be given to the higher level issues, such that the interaction between these is not lost.

The consultation undertaken at the start of the SMP allowed issues to be identified for individual features within the area, providing an insight to what the public regard as the key values of their coastline. This was used to develop an overall characterisation of the coast, which in turn assisted in agreeing specific objectives for management. Consideration of this overall characterisation allows the coast to be divided into sections, through which more detailed consideration could be given to the development of policy. This process is discussed in Section 3.4.

The figure below illustrates the approach and understanding of the development of policy for SMP2, incorporating all the aspects of work detailed in the previous sections.

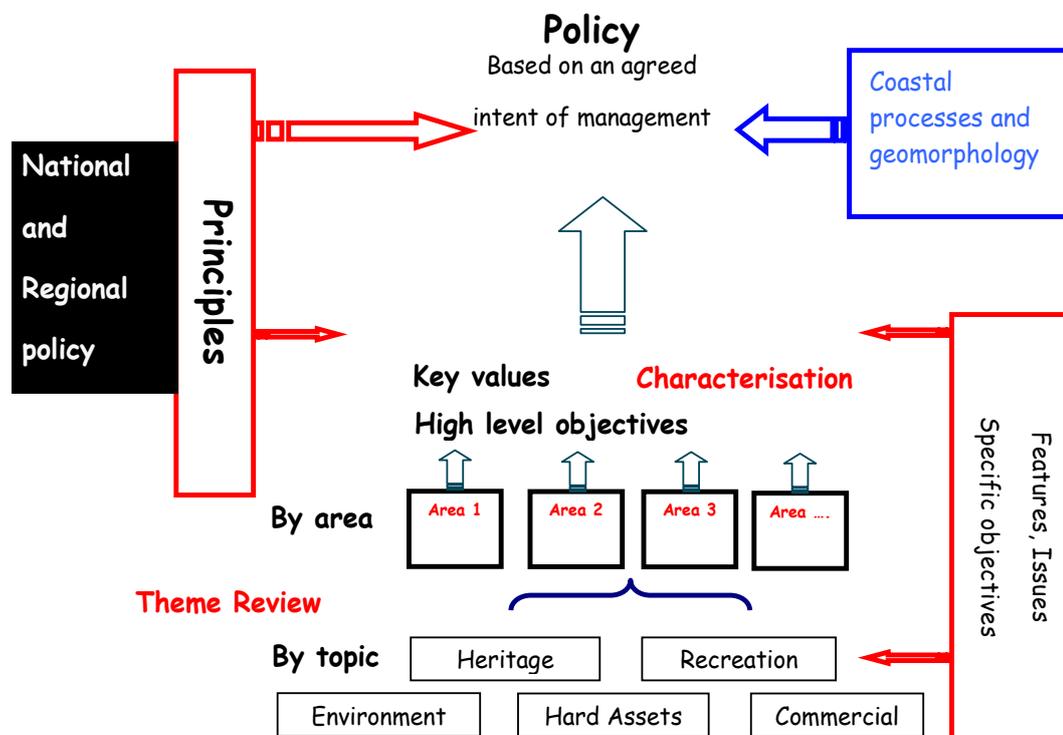


Figure 3.2 Schematic of SMP2 Policy Development

3.4 Development of Policy

3.4.1 Consideration of the Catchment Flood Management Plans (CFMPs)

As part of the SMP2 a review of the policies developed through the Catchment Flood Management Plans was undertaken. The CFMP's bordering this SMP2 coastline are presented below in Table 3.3 and are compatible with the proposed SMP2 policies.

Table 3.3 Catchment Flood Management Plans (CFMP's) Bordering the Poole and Christchurch Bays SMP2

CFMP Name (listed from east to west)	Status
New Forest	Completed
Hampshire Avon	Completed
Stour (Dorset)	Completed
Frome & Piddle	Completed

3.4.2 Derivation of Policy Development Zones (PDZs)

There is quite clearly no single issue which dominates the development of policy on the coast. From whichever perspective the coast is viewed, there are always overlapping issues and interests between sections. Purely from the manageability of developing policy in sufficient detail, however, the coast has to be divided. This has been done in such a manner as to minimise the residual linkages between one section of the coast and the adjacent section, but also to ensure that in developing and discussing policy, all major interactions across all themes are able to be considered. It is within these sections or zones that individual policy units may be developed. The high level division is shown in the figure below. This division is not intended to define hard barriers along the coast as a whole but solely a practical means of examining the coast in detail. So as not to be confused with the final policy units, the sections are called, merely as a matter of labelling and convenience, PDZs. Below are the four PDZs as developed for the Poole and Christchurch Bays SMP2.

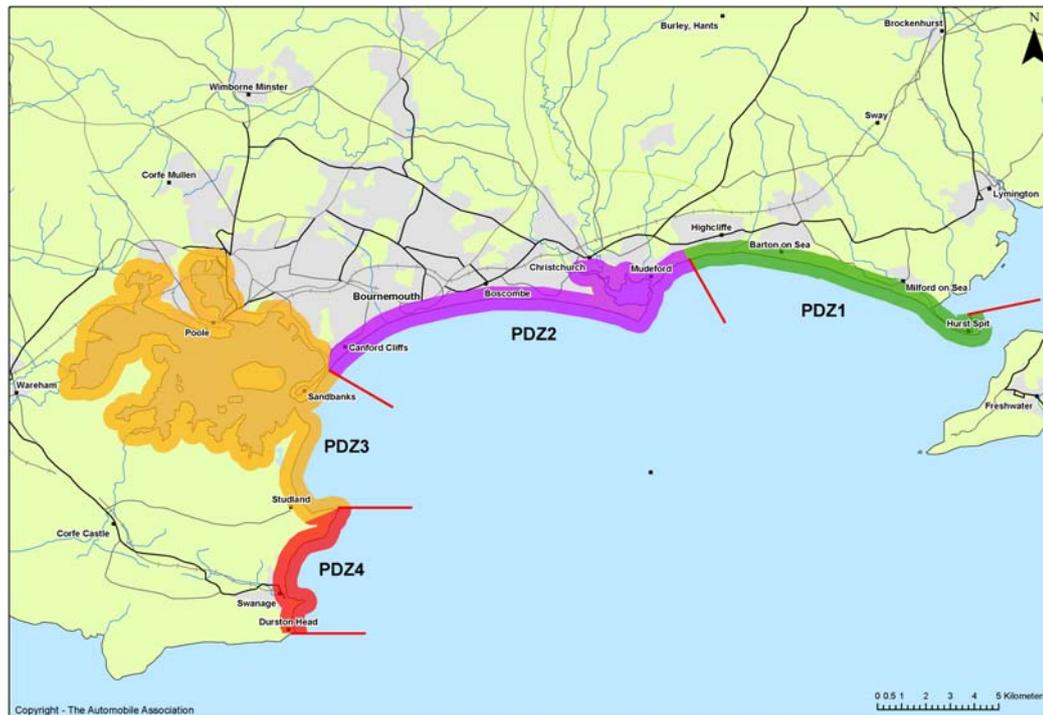


Figure 3.3 Poole and Christchurch Bays SMP2 PDZs

3.4.3 Identification of Policy Units (PUs)

Within each PDZ different scenarios are considered; always starting with the policy for NAI for all locations within the PDZ. This provides the baseline for considering the need or the sense in actively managing the coast. The second scenario is based on the policy developed from SMP1, taking into account further detail or modification which may have been developed during the following strategy studies. These are termed WPM (i.e. that policy which the SMP2 is reviewing¹) and provides the starting point for considering future management. This WPM scenario sets out a series of policies for individual lengths of coast within each PDZ. Within any PDZ these individual policies may be different along the shoreline, such that one length may be to hold the line, in a different length the policy may be for MR.

The two initial scenarios are compared and the way in which they allow the coast to develop and the manner in which they meet or fail to meet objectives defined within the SMP2 is considered. For some sections of coast the scenarios may be the same. In other areas one scenario may address certain issues but fail to address others. In this comparison, therefore, there may be the opportunity to introduce adaptation which will move forward to a more sensible approach to long term management. In such cases new scenarios are then considered, looking how best to deliver the objectives of the SMP.

From this approach either the WPM policies are confirmed or new policies developed for individual sections of the shore. A preferred defence policy is then defined for a specific section of the coast. This section of coast is the policy unit. This defines how that section of coast should be managed over the life time of the SMP.

¹ It is recognised that the purpose of the SMP is to review this present management, making recommendations where necessary for these policies to be updated. As such the SMP2, on completion and approval, will define present management for the future.

There is appreciation that there may be a need for transition from present management through to the long term policy. This may be a result of a new policy being recommended or it may be in recognition of the way in which the coast is likely to evolve. To allow adaptation there is scope within the SMP for changes in policy over time. Policy for each unit is therefore defined over time periods; 0-20 years (short term), 20-50 years (medium term) and 50-100 years (long term).

The aim of developing policy for individual units of the coast within the framework of the PDZ is to ensure that the broader implications of managing one policy unit with respect to another are considered; hence the scenario approach. These implications are discussed in the process of developing policy within Section 4. Inevitably, therefore, there are dependencies between policy units, the intent being to manage groups of policy units to best deliver objectives for management of areas of the coast. This is discussed below.

3.4.4 Management Areas (MAs)

PDZs, as described above, are merely a convenient mechanism for ensuring that policy is developed over appropriate lengths of the coast to ensure interactions are taken into account. Policy units are then sections of the coast for which a specific defence management policy (NAI, HTL, MR and ATL) are defined. However, as discussed above there may be dependencies between Policy Units (for example to justify a policy of retreat in one area may be on the assumption that an adjacent section of coast is held). Having defined these policies, therefore, it is equally important to group policy units where there is this dependency. Such groups of policy units are defined as MAs. It is within these MAs that the overall intent of management of the coast can best be described.

The definition of the MA is only at the end of the policy development process. A statement can then be produced providing the understanding of why a specific area of the coast is to be managed in this way and how individual policies work to deliver that intent:

Within each 'PDZ' the coast has been further sub-divided into a series of 'Management Areas' and within each of these management policies have been selected for a series of 'Policy Units', as schematised below:

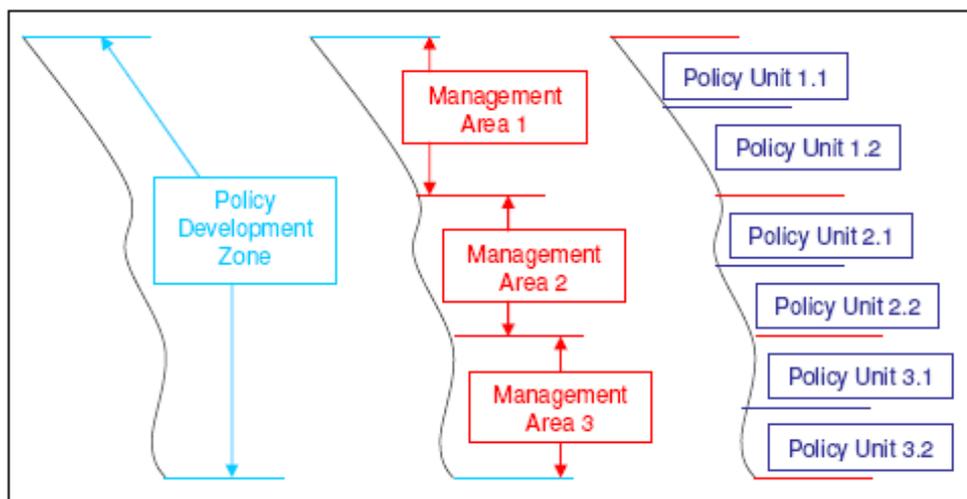


Figure 3.4 Schematic of SMP2 links between PDZ, MA and PU.

3.5 Policy Development Zone (PDZ) Analysis

The analysis and discussion for each zone aims to provide an understanding of the issues and nature of the area in a manner which is logical and rigorous and which may be referred to and understood by both coastal managers and people who use or live on the coast. Each PDZ is presented as a series of reports in Section 4. Each zone is presented in a standard approach, in line with the SMP guidance. Within each report information has been set out in three sections:

- Description,
- Physical Processes and
- Management.

These are explained below:

DESCRIPTION

The initial section provides a brief overview of issues relating to the coast. Within this first section is a list of Stakeholder objectives quite specific to the zone. These objectives and principles attempt to summarise the overall aim derived from the more detailed list of objectives in Appendix E.

This section merely describes where things are and what they are, in terms of: the underlying physical nature of the coast, together with the use being made of specific areas. This section aims to set the scene, starting to pull together the overall picture. More detail on the physical processes is provided in Appendix C.

PHYSICAL PROCESSES

Basic Parameters

These provide direct information on wave climate and water level within each zone, together with a synopsis of rates of erosion for different sections of the coast within the zone.

Existing Processes

A brief description of how the coast is behaving is provided, aiming to explain exposure conditions and where the coast is attempting to change. From this may be understood where there may be pressure developing in relation to the use of the coast and an initial appreciation of what may or may not be sustainable in the long term.

Unconstrained Evolution

Although recognised to be a totally theoretical scenario where there has been or is still major modification of the coast, this section briefly examines what would happen if all man's influence were suddenly removed. The aim of this is to provide a better understanding of how we are influencing the coastal behaviour and therefore the stresses and broader scale impacts that are introduced. This assists in assessing first how the coast might wish to change but also in defining the limits of interaction which the SMP should be considering.

MANAGEMENT

Present Management

A table is provided in the discussion of each PDZ setting out the SMP1 policy for various frontages together with further information where strategies or studies have provided

more detail on the With Present Management approach. Where this changes SMP1 policy this is highlighted.

Scenarios

The section provides a more detailed description and assessment of the two baseline scenarios for the whole zone. This starts with the NAI Scenario and then considers the current management scenario. In many cases strategies have only looked over a period of 50 years. The SMP2 extends the implication and intent of the current management policy over the full 100 years and comments, where appropriate, on the further implications of this beyond this period of time. The aim of NAI is to identify what would be at risk if defences were not maintained. In a similar way WPM aims to examine how the coast may develop, identifying where there are benefits in this management approach and where there may be issues arising in the future. Associated with each scenario is a brief summary of the key risks and strategy findings. This provides a headline assessment of how each scenario achieves the key objectives set out in Section 1 above.

Discussion and Detailed Development of Policies

This sub-section uses the two baseline scenarios to consider specific issues in more detail, looking at both the long term implications of the current policies and stepping back from the more local strategy development areas to consider any impacts on the coast as a whole. The discussion also considers any detailed proposals put forward in strategies and comments on these from the broader perspective. Where the current policy is felt not to fully address some of the issues being identified, further scenarios are developed. Typically this has been found to be a variation within one of the baseline scenarios, rather than a scenario with such wide reaching impacts that the influence of management affects areas outside the development zone being considered. From this discussion and from the analysis of different approaches and their consequences, recommendations are made for the SMP policy. This principally starts with where management would take the coast in the long term, working back to how policy should therefore be adapted over the short and medium term.

Management Areas

Policy units are grouped as management areas, providing coherent intent as to the management and dependencies over the area.

3.6 Management Area Policy Statements

The policy units and management areas are developed in the analysis described above. A summary or statement is presented for each management area. This is set out in the following manner.

SUMMARY OF POLICY

The format for this summary is based on the PU summary suggested by the procedural guidance. However, because of the nature of the coast and in many cases because distinct policy units have an association and cannot really be managed independently; the policy summaries have been developed by management area. A brief overview of the preferred plan recommendations is presented together with an overview of implementation for the short and medium term, followed by the long term intent. Finally the specific policies are identified. These summaries should be read together with the more detailed information given in the main body of the PDZ report.

CHANGES FROM PRESENT MANAGEMENT

The essential changes from current management are highlighted.

IMPLICATIONS

For each management area, a summary is provided of the potential impacts these policies will have in terms of the various specific themes and in term of residual risk and risk reduction. This assessment summarises the findings of the SEA and AA.

MANAGEMENT AREA ACTION PLAN

The management area action plan would be developed following the consideration of responses to the draft plan. These actions will be drawn together for the whole of the SMP2 coastline in Section 7.