Part C

PART C: PROCESS UNIT DESCRIPTIONS

CONTENTS

DURLSTON BAY PROCESS UNIT

(Durlston Head to Peveril Point - DUR)

This section describes the coastal processes and natural / built assets that occur within the Durlston Bay Process Unit.

Administrative Responsibility

Purbeck District Council

Process Unit Issues

Geology, Geomorphology and Sediment Processes

Durlston Bay has many similar characteristics to those described for Swanage Bay to the north. It is separated from it by Peveril Point, which acts as a barrier, preventing beach building materials from being transported from one bay to another. At the southern end is Durlston Head. Bray et al (1991) suggest that coastal processes here are similar to those acting within Swanage Bay, since both bays are of similar plan shape and orientation, however wave energy is greater in Durlston Bay as it is more exposed to the S and SE. Rapid tidal currents operate at each end of the Bay where the headlands interfere with tidal flows.

Rapid cliff recession at Durlston Bay is well documented, mainly because of its impact on coastal properties and the problems of coastal management caused by the mass movements. The cliffs are composed mainly of closely interbedded and jointed limestones and marls of the Purbeck Beds but the situation is complicated by compound faults and thrust planes. These faults are an important component of the potential instability and the site of an active slide which, at times, becomes a mudflow. Major falls are attributed to the combination of wave action at the toe, weathering of the marl and water seepage from above the marl.

The foreshore comprises a mass of limestone blocks and boulders in varying states of degradation, having become detached from the cliffs in rock fall events. These provide some protection to the cliff toes against wave attack.

In terms of the relationship of this Process Unit with adjacent ones set up, it is reasonable to suggest that material released from the cliff falls within Durlston Bay does not influence or benefit adjacent Process Units. Therefore the level of significance of the sources is related to the immediate frontages within the Bay (see Figure C1: Durlston Bay and Swanage Bay).

Figure C1 highlights the key coastal process information for this area, including locations most at risk from sea level rise, sediment sources and sinks and contemporary sediment drift directions.

Strategic Objectives

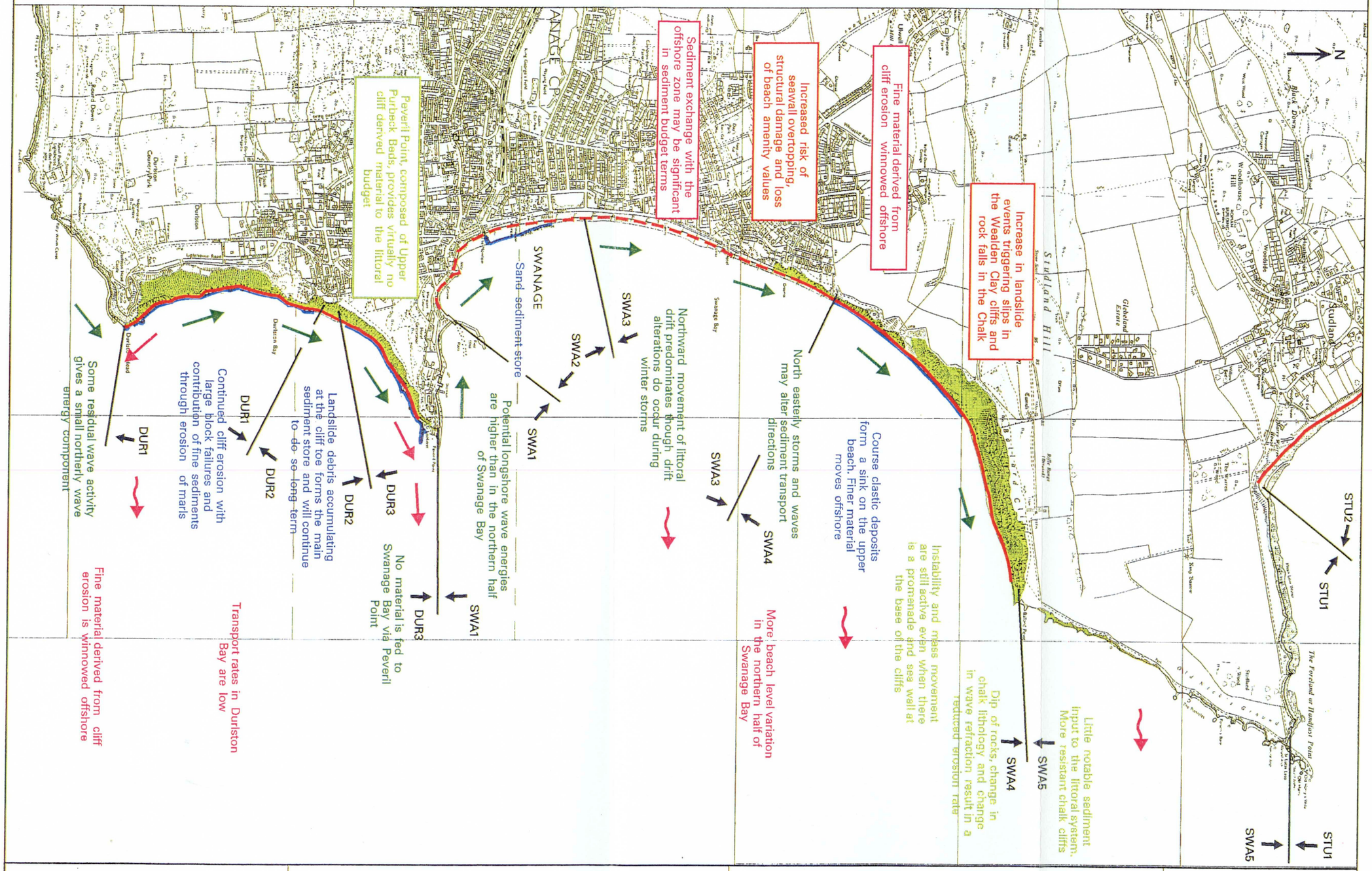
1 Where a coastal defence strategy may reduce the supply or transport of littoral sediments to the shoreline, this should not have detrimental impacts on immediate and adjacent beach levels within Durlston Bay.

2 Strategic coastal defence options should be based on a sound geomorphological understanding of Durlston Bay and be compatible with the strategies set for the wider Poole Bay area.

Poole and Christchurch Bays
Coastal Group

SHORELINE MANAGEMENT PLAN
POOLE AND CHRISTCHURCH BAYS
DURLSTON HEAD TO HURST SPIT (Subcell 5F)
Process Unit DUR Durlston Bay and SWA Swanage Bay and Ballard Down

Halcrow
1999



Sediment Sources and Stores

Sediment Sources (relevant text)

Sediment Store/Sink (relevant text)

Sediment Transport Directions

Net Littoral Drift Observations (relevant text)

Net Sediment Transport (relevant text)

Fine Grain Sediment Movement

Hydrodynamic Observations (relevant text)

Future Change and Likely Impacts

Increased Risk of Flooding or Increased Erosion to Undefended Lengths

Potential Impact If No Schemes Are Introduced (eg Beach Or Mudflat Replenishment/Upgrading etc)

TEXT Relevant Text Related To Sea Level Rise Impacts

Figure C1

The coastline within Durlston Bay is of national and international ecological and geological importance and the landscape is of high intrinsic quality. Requirements for the coast are as follows:

- Hard coastal defence structures may impinge on the high landscape quality of the coast and should therefore be avoided. Soft defence options may also be damaging, thus, where necessary, for other reasons coastal defences should be designed to be in keeping with the landscape;
- Areas of high geological importance require active erosion to maintain the exposures. Hard defences which stop the erosion should be avoided, particularly at important sites such as Durlston Bay;
- The geological exposure below the flats in Durlston Bay could be enhanced by removing the coastal protection placed on the cliff. However, the safety of residents in the flats needs to be taken into account.

Strategic Objectives

3	Coastal defence options should minimise the loss, or reduce the area, of international or nationally important terrestrial or marine habitats, nor jeopardise important earth heritage sites.
4	Coastal defence options should seek not to interfere with processes integral to the existence of valuable habitats or geological sites, such that it has adverse impacts on their sustainability.
5	Coastal defence options should not detract from the aesthetic and landscape quality of the immediate or adjacent coastline.

Developed Environment

Issues and requirements relating to coastal defence that need to be addressed include the following:

- There is a block of flats situated on the cliff top in the middle of Durlston Bay which are vulnerable to cliff erosion. The cliffs in front of the flats are part of the geological SSSI and it is important that the cliff face is exposed in order for it to remain of geological interest. There is therefore a conflict between the protection of the flats and the retention of the geological interest of the cliff face.
- Transportation of any coastal defence material by sea must consider the potential impact on inshore fisheries along the coast in this area.
- The location of offshore wrecks within the area that have not already been identified by this SMP should be determined by Dorset Archaeological Unit prior to the onset of any coastal defence works to prevent damage to these important archaeological sites.

Strategic Objectives

6 Where appropriate and economically viable, strategic coastal defence options should ensure the protection of life and property along developed frontages using sustainable and environmentally acceptable methods.

7 Coastal defence options should not adversely affect areas of known archaeological or historical value where possible.

8 Coastal defence options should not increase the risks of erosion or flooding to other developed areas nor to non-developed areas where natural land loss or inundation may not be preferred for strategic or economic reasons.

Coastal Defence Requirements

The cliff stabilisation scheme, constructed in 1989, will continue to protect this section of the cliffs from erosion in the short term. Its long term effectiveness is in doubt. However, the majority of the cliffs along this coastal process unit will be allowed to erode in order to expose the unique geological formations. This length of coast is proposed as a designated World Heritage Site. Should this be accepted in the future, it is likely that such status will protect the geological exposures from coastal defence works for future generations.

Planning

STATUTORY PLAN TITLE	COAST DEFENCE POLICIES	COASTAL DEVELOPMENT POLICIES		CONSERVATION AND ENVIRONMENTAL POLICIES	
Isle of Purbeck Local Plan	NONE	H4	Infill Housing	C1–2	Conservation Area policies
		H7	Important gaps / open areas	CC9	
				CC13	Heath farms and countryside
		H8	Flats policy area		
		T10	Caravan & Tent Camping Sites	CC19	Coastal valleys and limestone plateau
				CC21	Archaeology
		T17	Recreation / Leisure Facilities		Heritage Coast
		CC17	Quarrying		

Management Units Identified

DUR1 Durlston Head to Durlston Flats
DUR2 Durlston Flats (Cliff Stabilisation)
DUR3 Durlston Flats to Peveril Point

SWANAGE BAY AND BALLARD DOWN PROCESS UNIT

(Peveril Point to Handfast Point - SWA)

This section describes the coastal processes and natural / built assets that occur within the Swanage Bay and Ballard Down Process Unit.

Administrative Responsibility

Purbeck District Council

Process Unit Issues

Geology, Geomorphology and Sediment Processes

Swanage Bay is easterly facing with protection from the south by Peveril Point. The Isle of Wight provides Swanage Bay with a degree of shelter from easterly storms. The Bay is therefore susceptible only to a relatively narrow corridor of waves generated from the south-east. Tidal streams are weak but gather strength significantly towards Peveril Point. The wave climate, apart from the occasional easterly storm, is mild and the coastline exhibits a remarkable degree of stability and the amount of sediment in movement is small, although sediment can move into offshore bars in times of storms or towards the northern end of the bay.

The geology of the northern end of Swanage Bay is complex and affects the cliff processes and distribution of mass movements. Basically, the Bay is formed in less resistant Wealdon Beds, comprising sandstones, grits, marks and clays lying between harder Chalk and limestone (Jurassic) formations which form the headlands that define the Bay. Mass movements occur, particularly just north of the groynes, in the weak sand and clays so high slope angles cannot be maintained in these materials. Instability is enhanced by seepage in the material and mudflows and fans form on the beach after heavy rain. This material is soon removed by higher tides.

Littoral drift is in a northerly direction evidenced by patterns of sediment accumulation with groyne compartments. It is suggested that little to no sediment is fed to Swanage Bay via Peveril Point (Bray, Carter and Hooke, 1991).

In Swanage Bay the beach material gradually becomes finer to the south, with a decrease in shingle from the start of the sea wall southwards. The beach levels apparently varied more prior to groyning, which first took place in 1925, and the beach is now gently sloping. The main beach of Swanage (just north of Mowlem) is composed predominantly of medium sand. The beach at the southern end of the Bay is exclusively composed of sand due to the low energy and sheltered environment.

In terms of the relationship of this Process Unit with adjacent ones set up, Swanage Bay is a relatively self contained, low flux sediment system so that internal changes are unlikely to affect adjoining units or vice versa (see Figure C1: Durlston and Swanage Bays).

Figure C1 highlights the key coastal process information for this area, including locations most at risk from sea level rise, sediment sources and sinks and contemporary sediment drift directions.

Strategic Objectives

1 Where a coastal defence strategy may reduce the supply or transport of littoral sediments to the shoreline, this should not have detrimental impacts on immediate and adjacent beach levels within Swanage Bay.

2 Strategic coastal defence options should be based on a sound geomorphological understanding of Swanage Bay and be compatible with the strategies set for the wider Poole Bay area.

Natural Environment

The coastline within Swanage Bay is of national and international ecological and geological importance and the landscape is of high intrinsic quality. Requirements for the coast are as follows:

- Hard coastal defence structures may impinge on the high landscape quality of the coast and should therefore be avoided. Soft defence options may also be damaging, particularly for the sandy landscape of Swanage Bay. Where necessary, for other reasons coastal defences should be designed to be in keeping with the landscape;
- Areas of high geological importance require active erosion to maintain the exposures. Hard defences which stop the erosion should be avoided, particularly at important sites such as Ballard Down Cliffs which form part of the proposed World Heritage Site;

Strategic Objectives

3 Coastal defence options should minimise the loss, or reduce the area, of international or nationally important terrestrial or marine habitats, nor jeopardise important earth heritage sites.

4 Coastal defence options should seek not to interfere with processes integral to the existence of valuable habitats or geological sites, such that it has adverse impacts on their sustainability.

5 Coastal defence options should not detract from the aesthetic and landscape quality of the immediate or adjacent coastline.

Developed Environment

Issues and requirements relating to coastal defence that need to be addressed include the following:

- Any coastal defence works in Swanage Bay should consider the potential effect of the sandy beach on tourism. Construction of the outfall jetty in 1993, at the southern end of the bay, has already resulted in falling beach levels immediately to the north, obstructing the transport of sediment from south to north. This has, however, been offset to some extent by a considerable accretion of beach material to the south. Any future works may also have a knock on

effect on beach levels at the north end of the Bay which currently protects the cliff.

- The scale of residential development on the soft eroding cliff at Swanage has led to parts of the cliff foot being protected. Annual falls and slips occurring between Ballard Point and Ulwell Stream outfall have left properties, such as the Pines Hotel, very close to the cliff top. Any further coastal defence measures are likely to be in potential conflict with English Nature due to the proposed southward extension of the SSSI which currently terminates at Sheps Hollow.

- There is a bowl barrow (SZ 040 8132) and two round barrows (SZ 040 813) located at the eastern end of Ballard Down close to the cliff edge. Any potential coastal defence works to protect the cliff in this area should consider the effect on these Scheduled Monuments.

- Transportation of any coastal defence material by sea must consider the potential impact on inshore fisheries along the coast in this area.

- The location of offshore wrecks within the area that have not already been identified by this SMP should be determined by Dorset Archaeological Unit prior to the onset of any coastal defence works to prevent damage to these important archaeological sites.

Strategic Objectives

6 Where appropriate and economically viable, strategic coastal defence options should consider the protection of life and property along developed frontages using sustainable and environmentally acceptable methods.

7 Coastal defence options should not adversely affect areas of known archaeological or historical value where possible.

8 Coastal defence provision should not adversely affect the amenity, touristic and / or commercial value of the Swanage Area by indirectly impacting on the economies of those stakeholders using the coast (eg: fishing, tourism or recreation).

9 Coastal defence options should not increase the risks of erosion or flooding to other developed areas nor to non-developed areas where natural land loss or inundation may not be preferred for strategic or economic reasons.

Coastal Defence Requirements

Swanage Town is a medium density urban community and warrants a 100 year return period standard of protection in line with the Ministry of Agriculture Fisheries and Food (MAFF) Project Appraisal Guidance Notes (PAGN), Annex K.

Using present day water levels, the standard of protection against structural damage along the main section of Swanage Bay is greater that the 100 year event except in the following areas; along the southern half of the seawall between the Mowlem and the Outfall Jetty; the northern half of the seawall between the Ulwell Stream Outfall and the Pines Hotel and north of the Pines Hotel, where the toe of the cliffs are not protected by a seawall.

A similar analysis to assess the standard of defence following 50 years sea level rise revealed that the standard of protection against structural damage was greater than the 5 year event along the main section of Swanage Bay. In addition it was identified that the structures would overflow at the northern and southern ends of the seawall during the 1 in 100 year storm event.

Coastal defence requirements are being reviewed in the ongoing Swanage Bay Beach Management Study.

Planning

STATUTORY PLAN TITLE	COAST DEFENCE POLICIES	COASTAL DEVELOPMENT POLICIES		CONSERVATION AND ENVIRONMENTAL POLICIES	
Isle of Purbeck Local Plan	NONE	H3	Positive Infilling	C1–2	Conservation Area policies
		H6	Infill Housing		
		H7	Important gaps / open areas	CC5	NNR, SSSI, Heathlands
		H8	Flats policy area	CC12	Clay Vale
		H8A	Minimum Flat Size	CC13	Coastal valleys and limestone plateau
		H17	Occupancy of Residential Development	CC19	Archaeology
				CC21	Heritage Coast
		T10	Caravan & Tent Camping Sites		
		T17	Recreation / leisure facilities		
		C8	Enhancement Scheme		
		C9	Redevelopment of Lower High Street		
		TR9	Footpath Extension		
		TR12	Development Control Line		
		CC17	Quarrying		

Management Units Identified

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

STUDLAND BAY PROCESS UNIT

(Handfast Point to South Haven Point - STU)

This section describes the coastal processes and natural / built assets that occur within the Studland Bay Process Unit.

Administrative Responsibility

Purbeck District Council

Process Unit Issues

Geology, Geomorphology and Sediment Processes

The wave regime within Poole Bay varies spatially due to a sheltering effect of Handfast Point and waves generated from a south-westerly direction are diffracted around this headland. The degree of protection afforded increases westwards towards Handfast Point consequently wave activity within Studland Bay is low and governed primarily by waves generated from the south and south-east. Northern parts are subject to currents generated by the tidal exchange at Poole Harbour entrance. This area has been characterised by the accumulation of sandy sediments within the nearshore zone and at the shoreline forming the South Haven Peninsular dune complex which has grown since 1700. By contrast, southern parts have suffered erosion producing cliffs in Tertiary sands and clays as well as the Chalk at Handfast Point.

In terms of the relationship of this Process Unit with adjacent ones set up, Studland Bay is a net sediment sink so that it is more likely to be affected itself by changes in adjoining Process units (Poole Bay and Poole Harbour). Interference with incoming sediment supplies could result in dune erosion. Rapid recession of Shell Bay may affect the configuration of Poole Harbour inlet, though this is an unlikely event at present erosion rates (See Figure C2:Studland Bay and Shell Bay).

Figure C2 highlights the key coastal process information for this area, including locations most at risk from sea level rise, sediment sources and sinks and contemporary sediment drift directions.

Strategic Objectives

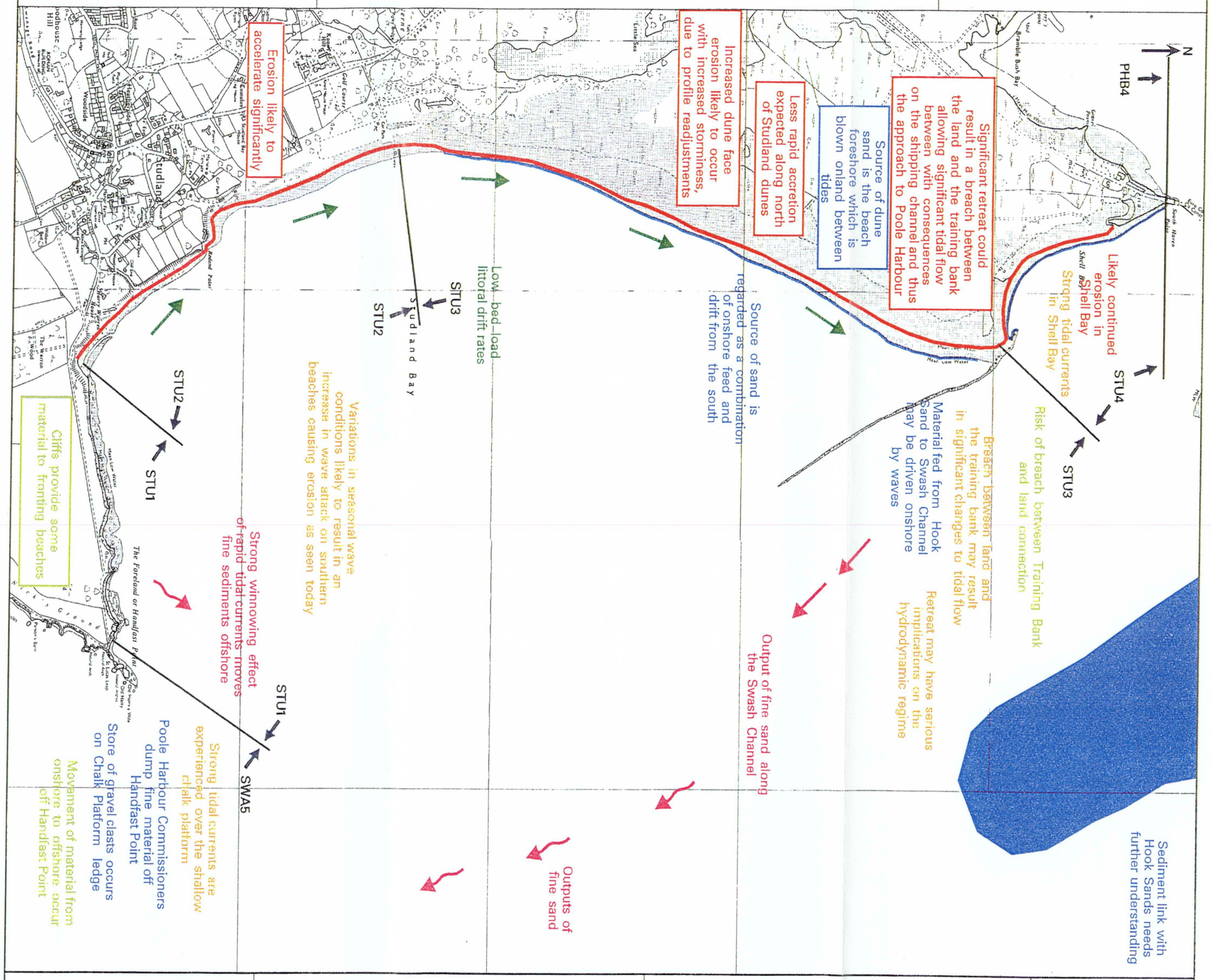
1 Where a coastal defence strategy may reduce the supply or transport of littoral sediments to the shoreline, this should not have detrimental impacts on immediate and adjacent beach levels within Studland Bay.

2 Strategic coastal defence options should be based on a sound geomorphological understanding of Studland Bay and be compatible with the strategies set for the wider Poole Bay area.

Poole and Christchurch Bays Coastal Group

SHORELINE MANAGEMENT PLAN
POOLE AND CHRISTCHURCH BAYS
DURLSTON HEAD TO HURST SPIT (Subcell 5F)
Process Unit STU Studland Bay and Shell Bay

Halcrow
1999



Sediment Sources and Stores

- Sediment Sources (relevant text)
- Sediment Store-Sink (relevant text)

Sediment Transport Directions

- Net Littoral Drift Observations (relevant text)
- Net Sediment Transport (relevant text)
- Fine Grain Sediment Movement
- Hydrodynamic Observations (relevant text)

Future Change and Likely Impacts

- Increased Risk of Flooding or Increased Erosion to Undefended Lengths
- Potential Impact If No Schemes Are Introduced (eg Beach Or Mudflat Replenishment/Upgrading etc)
- TEXT Relevant Text Related To Sea Level Rise Impacts

Figure C2

Natural Environment

The coastline within Studland Bay is of national and international ecological and geological importance and the landscape is of high intrinsic quality. Requirements for the coast are as follows:

- Loss of the internationally important dune and heathland habitat would not be acceptable, particularly as it is a priority habitat under the EC Habitats Directive and therefore afforded special protection;
- Maintain the supply of sediments and the sheltered nature of Studland Bay to maintain the eel grass beds. However, over-sedimentation would be detrimental to the eel grass;
- The limestone outcrops of the Ballard Ledges and chalk platforms at Handfast Point should be maintained to protect their important marine habitats;
- Areas of high geological importance require active erosion to maintain the exposures. Hard defences which stop the erosion should be avoided, particularly at important sites such as Studland Cliffs;

Strategic Objectives

3	Coastal defence options should minimise the loss, or reduce the area, of international or nationally important terrestrial or marine habitats, nor jeopardise important earth heritage sites.
4	Coastal defence options should seek not to interfere with processes integral to the existence of valuable habitats or geological sites, such that it has adverse impacts on their sustainability.
5	Coastal defence options should not detract from the aesthetic and landscape quality of the immediate or adjacent coastline.

Developed Environment

Issues and requirements relating to coastal defence that need to be addressed include the following:

- There are a number of beach huts at Studland in addition to an interpretation centre and car park all of which are owned by the National Trust. The car park has recently been reduced in size as a result of coastal erosion. These structures are heavily used by locals and tourists alike and their value and optimum location should be taken into consideration when assessing the need for sea defences.
- The artificial reef in Studland Bay to the north of the Foreland needs to be considered in any potential coast protection works in order to prevent damage to the lobster breeding ground that has been developed.
- The location of offshore wrecks within the area that have not already been identified by this SMP should be determined by Dorset

Archaeological Unit prior to the onset of any coastal defence works to prevent damage to these important archaeological sites.

Strategic Objectives

6 Where appropriate and economically viable, strategic coastal defence options should ensure the protection of life and property along developed frontages using sustainable and environmentally acceptable methods.

7 Coastal defence options should not adversely affect areas of known archaeological or historical value where possible.

8 Coastal defence options should not increase the risks of erosion or flooding to other developed areas nor to non-developed areas (eg: Studland Dunes) where natural land loss or inundation may not be preferred for strategic or economic reasons.

9 Coastal defence provision should not adversely affect the amenity, tourism and / or commercial value of the Studland Area by indirectly impacting on the economies of those stakeholders using the coast (eg: fishing, tourism, navigation or recreation).

10 Coastal defence options should not compromise or damage the lobster breeding ground that has developed off Studland or inshore fisheries off Hook Sand.

Coastal Defence Requirements

There are a series of dunes along the majority of Shell and Studland Bays. Although these dunes have a typical crest level of +5.0mODN they do not provide defence against flooding of the heath behind since gaps occur frequently in the dunes. At the southern end of Studland Bay the land rises to cliffs with a typical level of +13mODN. The village of Studland is on this higher ground. Therefore the only structures at risk are temporary timber buildings and beach huts inshore of the beach. This area therefore only warrants defence against a 5 year return period storm event, since there are very few properties at risk from coastal erosion or flooding.

In many areas the toe of the cliffs will still be subject to erosion during extreme storm events, however this would not cause any direct flood damage to any permanent structures. At the southern end of the bay the gabion wall is in a poor state of repair and the beach huts in this area have been moved inland to prevent storm damage. It is likely that this wall will be removed in the near future to return the foreshore to its natural state as coast protection / planning consent was not established for this structure.

Planning

STATUTORY PLAN TITLE	COAST DEFENCE POLICIES	COASTAL DEVELOPMENT POLICIES		CONSERVATION AND ENVIRONMENTAL POLICIES	
Isle of Purbeck Local Plan	**NONE**		NONE	C1–2 CC4 CC5 CC7 CC8 CC11 CC15 CC19	Conservation Area policies Nature conservation / LNRs NNR, SSSI, heathlands Heaths, Harbour and island Heaths, Harbour and Island Chalk Ridge policy area Ball Clay Conservation Area Archaeology

Management Units Identified

STU1	Handfast Point to the Warren
STU2	The Warren to Studland Sandpit
STU3	Studland Sandpit
STU4	Shell Bay

POOLE HARBOUR PROCESS UNIT

(South Haven Point to North Haven Point – PHB)

This section describes the coastal processes and natural / built assets that occur within the Poole Harbour Process Unit.

Administrative Responsibility

Borough of Poole

Purbeck District Council

Process Unit Issues

Geology, Geomorphology and Sediment Processes

Poole Harbour is a shallow estuary, with an irregular, indented coastline of just over 100kms. It is a product of postglacial sea-level rise, but its shape and plan form reflect both the original topography of the inundated basins of the Frome and Piddle rivers together with subsequent modifications by marginal erosion and accretion. Physical and biotic characteristics show distinct west to east environmental gradients reflecting the increasing marine influence and energy levels in that direction. Artificial reclamation and shoreline protection have modified much of the north-eastern sector of the harbour, but elsewhere, natural processes and habitats have been preserved.

Tidal amplitudes are modest, but long periods of rising and standing water result from a double high tide effect, which creates a lagoon-like character. Extensive mudflats reflect a long-term imbalance in the sedimentary system in favour of deposition, although at the present time there may be a condition approaching dynamic balance between input and output. Input of sediment derives from suspended load discharging by rivers draining into the harbour and from cliff/marsh bluff erosion. Introduction of sediments from marine sources, via the harbour mouth, is possible but has not yet been satisfactorily demonstrated.

Transport pathways are complex, and are not understood in detail although littoral drift is generally from west to east along the more exposed shorelines. Both wave and tidal processes initiate and sustain sediment transport, with tidal scour being the dominant influence. There is believed to be loss of material from the harbour on ebb tides though the net sediment transport at the entrance remains very uncertain. A detailed study of littoral drift in Poole Harbour by May (1976), carefully examined the association of cliffs, beaches and spits in the vicinity of Shipstal Point. He observes that the southern spit is migrating southwards, whilst the net direction of longshore transfer of sediment along the northern spit is south to north. The southern spit is in an equilibrium condition, adjusted to prevailing local wave climate, whilst the northern spit is currently adjusting to alterations in the longshore transport sediment budget.

Taking into account evidence of input, circulation and output near the Harbour mouth, it may be tentatively stated that the inner and outer sectors of Poole Harbour have a negative sediment balance whilst the central area is in positive balance. There is not sufficient transport evidence to support the contention in the Master Plan Study (1985) that sediment in the Harbour as a whole serves to balance input from fluvial sources with output at the mouth.

Poole and Christchurch Bays Coastal Group

SHORELINE MANAGEMENT PLAN
POOLE AND CHRISTCHURCH BAYS
DURLSTON HEAD TO HURST SPIT (Subcell 5F)
Process Unit PHB Poole Harbour

Halcrow
1999

Managed retreat is likely to alter the hydrodynamic regime of the Harbour by increasing the tidal prism. Sediments may be released in suspension thus impacting on navigation channels

Managed retreat is likely to alter the hydrodynamic regime of the Harbour by increasing the tidal prism. Sediments may be released in suspension thus impacting on navigation channels

Low volume of suspended material provided from rivers

Likely coastal squeeze of saltmarsh and mudflat habitats impacting possibly on biodiversity levels and habitat extent

Small coarse sediment store (cuspate feature)

Mudflat stores of fine sediment

Coarse sediment store

Coarse clastic spit (store)

Mudflat stores of fine sediment derived from fluvial flow, marginal erosion and reworking of bed deposits

Sediment transport and deposition is controlled by wind direction

The southern shores of Poole Harbour will be influenced by increased sea level rise where topographic levels are low (<2m)

PHB2 PHB3 PHB4 PHB5 PHB6 PHB7 PHB8 PHB9 PHB10 PHB11 PHB12 PHB13 PHB14 PHB15 PHB16 PHB17 PBY1 STU3 STU4

POOLE HARBOUR

POOLE

Guernsey 6½ hours
Jersey 6½ hours
Cherbourg 4½ hours*
*(Summer only)

Ferry P... (April to September)

Main Channel

Wych Channel

South Deep

Ferry (April to Sept)

Sediment Sources and Stores

- Sediment Sources (relevant text)
- Sediment Store/Sink (relevant text)

Sediment Transport Directions

- Net Littoral Drift Observations (relevant text)
- Fine Grain Sediment Movement
- Net Sediment Transport (relevant text)
- Hydrodynamic Observations (relevant text)

Future Change and Likely Impacts

- Increased Risk of Flooding or Increased Erosion to Undefended Lengths
- Potential Impact If No Schemes Are Introduced (eg Beach Or Mudflat Replenishment/Upgrading etc)
- TEXT — Relevant Text Related To Sea Level Rise Impacts

Figure C3

In terms of the relationship of this Process Unit with adjacent ones, it is unlikely that activities within Poole Harbour are likely to significantly affect adjacent areas, though it is more likely for activities within the adjoining Swash Channel or along the shoreline immediately outside the Harbour entrance. This might have a higher probability of changing the sediment budget regime within the Harbour (see Figure C3: Poole Harbour).

Figure C3 highlights the key coastal process information for this area, including locations most at risk from sea level rise, sediment sources and sinks and contemporary sediment drift directions.

Strategic Objectives

1 Coastal defence options should not significantly alter estuarine processes unless paramount to the protection of life, critical assets or navigation in Poole Harbour.

2 Strategic coastal defence options should appreciate the implications of its implementation on adjacent stretches of coast and acknowledge the Harbour as an inter-linked hydrodynamical unit.

3 Implications of changes to dredging regime should be appropriately studied.

Natural Environment

Poole Harbour is, ecologically, a very important area that would be easily damaged by inappropriate coastal defences. The requirements for the area include:

- Maintenance of the physical and chemical composition and natural processes of the Harbour to ensure high ecological interest of the area;
- Maintain extensive inter-tidal mudflats and saltmarshes in Poole Harbour to ensure continuation of high ecological interest;
- A need to address the present end of structure (gabions) erosion fronting Rockley Park and the implications for conservation;
- Maintain channels and harbour bathymetry variety to protect nursery and spawning areas;
- Minimise disturbance to contaminated sediment in Back Water Channel and Holes Bay where identified;

Strategic Objectives

4 Coastal defence options should minimise the loss, or reduction in the area, of international or nationally important terrestrial or marine habitats in Poole Harbour where possible.

5 Coastal defence options should minimise interference with the overall coastal processes or saline interaction /prevention requirements integral to the formation / existence of valuable habitats.

6 Coastal defence options should not detract from the landscape quality of the immediate coastline.

Developed Environment

Issues and requirements relating to coastal defence that need to be addressed include the following:

- Poole forms part of a major conurbation and its continued protection is vital;
- Any coastal defence works within Poole Harbour should consider potential effects on tourism such as aesthetic implications which are an issue throughout the harbour. This is particularly important at Rockley Sands where the beach is vital to the attraction of tourists to the caravan park. Gabions are currently in place at Rockley Sands but these are in a bad state of repair. Future works may affect the SSSI which is in close proximity or alter beach levels;
- Future works should make full provision for public access to the shoreline as this is a major constraint within the Harbour;
- Coastal defence policy in this Area should not adversely affect navigable access to, and recreational use of, the Port and Harbour facilities;
- Transportation of any coastal defence material by sea must consider the potential impact on inshore fisheries along the coast in this Area, particularly the nursery and shellfish grounds within Poole Harbour;
- The impact of Port and Harbour dredging regimes within Poole Harbour upon future coastal defence works and coastal processes should be minimised where possible;
- There is a need to minimise and mitigate against potential adverse impacts of coastal defence on known sites of archaeological remains, built heritage and Conservation Areas within the Harbour. These remains and excavations are an important finite resource for educational, recreational and tourist related reasons.
- An archaeological assessment of the Area, with an emphasis on maritime archaeology, should be carried out prior to the onset of any coastal defence works being implemented.

Strategic Objectives

7 Strategic coastal defence options should be able to adapt to the onset of sea level rise without compromising the protection of life and property in Poole Harbour.

8 Coastal defence options should not adversely affect areas of known archaeological / historical value.

9 Coastal defence options should not increase the risks of erosion or flooding to other developed areas nor to non-developed areas in Poole Harbour where natural land loss or inundation is not preferred for strategic, environmental or economic reasons.

10 Coastal defence options should seek not to adversely affect the amenity, touristic and / or commercial value of Poole Harbour over the long term (and parts thereof) by indirectly impacting on the economies of those stakeholders using the coast (eg: navigation, fishing, recreation).

11 Coastal defence options should seek to improve access in Poole Harbour where appropriate.

Coastal Defence Requirements

Poole is a medium density urban community which warrants a 100 year return period standard of protection in line with the Ministry of Agriculture Fisheries and Food (MAFF) Project Appraisal Guidance Notes (PAGN), Annex K.

The standard of defences were assessed using extreme wave height and water level data as discussed in the coastal processes section of the report. Hind-casting analysis provided the wave climate within Poole Harbour.

Using present day water levels the standard of protection against structural damage varies along the shore of the Harbour. The standard of protection is greater than 1 in 100 years; on the inshore face of Poole Sandbanks, Parkstone, Poole Quay, Holes Bay, Hamworthy, Lower Hamworthy, Hamworthy Park and Lake Pier. In other areas the standard of protection was much lower, between 1 and 20 years; Sandbanks Road, Blue Lagoon, Parkstone Bay, Baiter, Fisherman's Dock and Holes Bay.

A similar analysis for the standard after 50 years, allowing for future sea level rise, the only areas with a 100 year standard of protection against structural damage were Holes Bay, Hamworthy and Lower Hamworthy. In other areas the standard of protection was lower, in general between 1 and 20 years.

Planning

STATUTORY PLAN TITLE	COAST DEFENCE POLICIES	COASTAL DEVELOPMENT POLICIES		CONSERVATION AND ENVIRONMENTAL POLICIES	
Poole Town Centre Local Plan	NONE	6.10 5.13 5.15 7.09 7.12 7.16 7.20 10.57 12.03, 5,7	Deep water frontage Retail floor space Car Parking Hotel development (East Quay depot) Marina development Recreation facilities Open space Highway Control Lines Poole Quay policies	7.10 9.04 9.17	Conservation Area Policies Listed buildings / archaeology Archaeology
Broadstone Creekmoor local Plan	NONE	4.18 10.21 10.26 10.28 10.38 10.45	Green Belt Green Belt development Upton Country Park Recreation Pedestrian footpaths Caravan / Chalet Parks	10.31 10.33	Protection of Roman Road Archaeology
Poole Coastal Local Plan	NONE	5.04 – 5.14 5.17-5.19 9.40,10.08-9 10.11 10.13 10.17 10.22 10.29	Flats policy Area A Flats policy Area B Open space Beach Car parking facilities Beach hut/chalet development Tourism (the beach) Recreation facilities Accommodation development	9.06, 08, 9.11 9.25 9.35 9.36 9.38	Conservation Area Policies Archaeological / historical interest SSSIs Luscombe Valley Nature Reserve Specially protected flora and fauna
Isle of Purbeck Local Plan	NONE	NONE		CC5 CC6 CC7 CC8 CC15 CC19 CC21	NNR, SSSI, heathlands Frome Valley Heaths, Harbour and Island Heaths, Harbour and Island Ball clay conservation area Archaeology Heritage Coast

STATUTORY PLAN TITLE	COAST DEFENCE POLICIES	COASTAL DEVELOPMENT POLICIES		CONSERVATION AND ENVIRONMENTAL POLICIES	
North East Purbeck Local Plan	NONE	CC1 CC2A,3,4,6-13A CC5 CC5A E1 E6 E9 S1 T3 T4 T9 H4A	Green Belt Development in Green Belt Agricultural diversification Disabled Study Centre Industrial Allocation Industrial Redevelopment Industrial Development in the Green Belt Out of Town Shopping Redundant Buildings in Green Belt Caravan / camping zones Open space Low Density Housing Areas	CC2 CC13A CC14 CC15 CC16 CC20 CC21 CC22-3 T10	Protection of strategic gaps Conserving character of landscape Protection of Heritage Coast Protection of nature conservation sites Management of land for nature conservation Minerals in Heritage Coast /SSSI Minerals in Strategic Gaps Archaeological sites Conservation

Management Units Identified

PHB1	The Islands (excluding Brownsea)
PHB2	Brownsea Island (eastern half)
PHB3	Brownsea Island (western half)
PHB4	South Haven Point to Hydes Quay (south coast of Poole Harbour)
PHB5	Hydes Quay to Holton Point
PHB6	Lytchett Bay
PHB7	Rockley Viaduct to start of defence 681/2442
PHB8	Defence 681/2442 to Hamworthy Quay
PHB9	Hamworthy Quays
PHB10	Holes Bay (E,N & W)
PHB11	Town Quays
PHB12	Parkstone Bay and Baiter Park
PHB13	Parkstone Yacht Club to Salterns Marina
PHB14	Salterns Marina to Lilliput Pier
PHB15	Whitley Lake (HR's Unit 3 boundary)
PHB16	Whitley Lake to North Haven Point
PHB17	North Haven Point to Sandbanks Ferry Slipway

POOLE BAY PROCESS UNIT

(Sandbanks Ferry Slipway to Hengistbury Long Groyne – PBY)

This section describes the coastal processes and natural / built assets that occur within the Poole Bay Process Unit.

Administrative Responsibility

Bournemouth Borough Council

Borough of Poole

Process Unit Issues

Geology, Geomorphology and Sediment Processes

Within this Process Unit, longshore drift is predominantly eastward in Poole Bay, although in the area between Durley Chine and Poole Sandbanks, drift can be in both directions. Beach material in the Bay varies spatially, with material generally being coarser to the east. There is a sediment link between Hook sands and Poole Sandbanks which is not fully understood to date. Hook Sands also alters the local wave climate, as its shape alters over time.

Whilst a good understanding of longshore littoral drift has been attained from research over the past twenty years, very little has been done on the on-shore offshore transport of beach material. Any inferred seaward or landwards net movements of beach material are therefore often very dubious and should be treated with caution.

Tidal currents within the Bay are generally low except at the outer end of Long Groyne and the entrance to Poole Harbour. To the east of the Process Unit, the integrity of the beaches between Double Dykes and the Long Groyne at Hengistbury Head are partially dependent on the supply of beach material released from local cliff falls. A supply of material may be available from residual losses after periodic beach replenishment at Solent Beach and within Poole Bay (last 1988-89 replenishment). In general terms, recent additions of sediment by beach replenishment have far outweighed typical annual gains from cliff erosion. However, as the replenishment material has dispersed so the cliff inputs will begin to assume a proportionately more important role until the planned 2003 replenishment. Although a substantial shingle beach has accumulated against the Long Groyne, the cliffs have continued to erode suggesting that the beach does not provide full protection of the cliff and may be insufficient to maintain the long term integrity of Hengistbury Head.

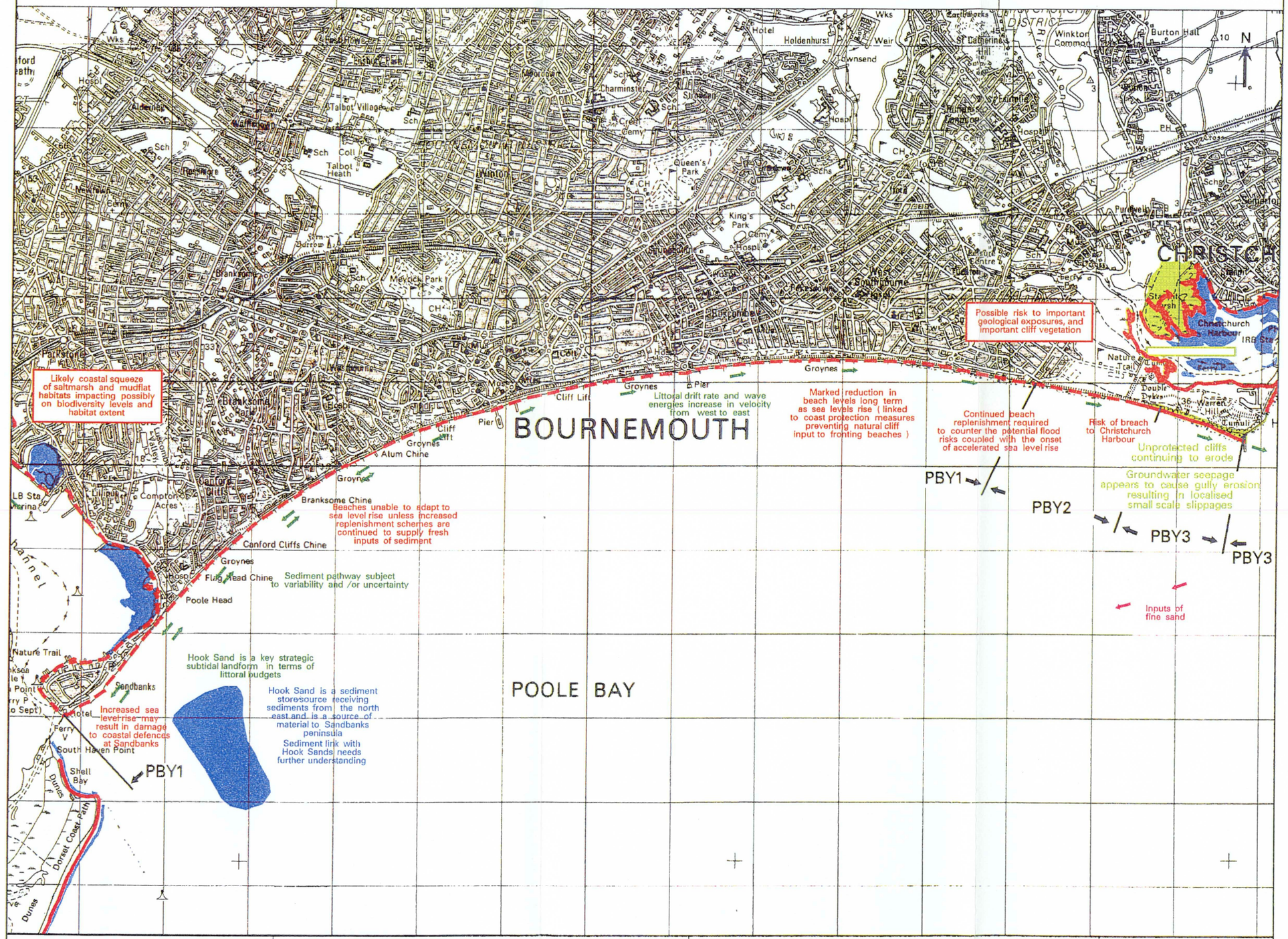
In terms of the relationship of this Process Unit with adjacent ones set up, there is believed to be a littoral link between Poole and Christchurch Bays with some material being transported around Long Groyne. The variations in the configuration of Mudeford Sandbank before (accreting) and after (eroding) the construction of the Long Groyne suggest strongly that in their natural state, Christchurch and Poole Bays would be quite closely linked. The continuing existence of Hengistbury Head has a controlling influence on the bay shape. (see Figure C4: Poole Bay).

Figure C4 highlights the key coastal process information for this area, including locations most at risk from sea level rise, sediment sources and sinks and contemporary sediment drift directions.

Poole and Christchurch Bays
Coastal Group

SHORELINE MANAGEMENT PLAN
POOLE AND CHRISTCHURCH BAYS
DURLSTON HEAD TO HURST SPIT (Subcell 5F)
Process Unit PBY Poole Bay

Halcrow
1999



Sediment Sources and Stores

- Sediment Sources (relevant text)
- Sediment Store/Sink (relevant text)

Sediment Transport Directions

- Net Littoral Drift Observations (relevant text)
- Net Sediment Transport (relevant text)
- Fine Grain Sediment Movement
- Hydrodynamic Observations (relevant text)

Future Change and Likely Impacts

- Increased Risk of Flooding or Increased Erosion to Undefended Lengths
- Potential Impact If No Schemes Are Introduced (eg Beach Or Mudflat Replenishment/Upgrading etc)
- TEXT — Relevant Text Related To Sea Level Rise Impacts

Figure C4

Strategic Objectives

1 Where a coastal defence strategy may reduce the supply or transport of littoral sediments to the shoreline, this should not have detrimental impacts on immediate and adjacent beach levels within Poole Bay.

2 Strategic coastal defence options should be based on a sound geomorphological understanding of Poole Bay and be compatible with the strategies set for adjacent lengths of coast.

Natural Environment

The coastline in this area includes sections that are of high ecological, geological and landscape importance. These can be maintained by ensuring the following:

- Protect the high landscape quality of Hengistbury Head by ensuring coastal protection works are in keeping with the area;
- Allow cliffs below Warren Hill to erode, though not necessarily at an unmanaged rate, thereby maintaining their geological exposures and providing sediments to Christchurch Bay;
- In contradiction to the above, Warren Hill requires protection to maintain the extent of various habitats;
- Artificial cliff drainage could damage the ecology and therefore care should be taken where it is planned;
- Maintain sand dune and herbaceous vegetation habitats in an open condition to provide suitable habitat for the rare sand lizard and coastal rare plants;
- Prevent damage and vegetational colonisation to geological exposures along the Bournemouth coast front;
- Maintain the supply of sediments around the coast to prevent erosion of the eel grass beds off Hengistbury Head.

Strategic Objectives

3 Coastal defence options should not cause the loss, or reduce the area, of international or nationally important terrestrial or marine habitats in Poole Bay.

4 Coastal defence options should not compromise the existence of valuable habitats, or geological sites, such that it has adverse impacts on their sustainability or the existence of rare faunal/floral species.

Developed Environment

The Bournemouth and Poole frontage, a length of approximately 13km from Southbourne in the east to the Sandbanks peninsula in the west, forms the developed part of Poole Bay, and is characterised by many seawalls and promenades in front of residential and commercial properties. Wide, sandy beaches and timber and rock groynes provide the primary defence mechanism.

Alum Chine marks the District Council boundary between Bournemouth and Poole.

Issues and requirements relating to coastal defence that need to be addressed include the following:

- A breach at Double Dykes to Christchurch Harbour would increase flooding and erosion and affect the evolution of both Poole and Christchurch Bays ultimately.

- Bournemouth and Poole form part of a major conurbation and their continued protection is vital. Future nourishments should be undertaken within the context of Poole Bay as a whole.

- The scarcity of archaeological sites within the Bournemouth area increases the need for their preservation. There is a need to minimise and mitigate against potential adverse impacts of coastal defence on archaeological remains, built heritage and conservation areas along the Bournemouth and Poole coastal frontage. This is particularly important at Hengistbury Head where the volume of shingle to the west of the Long Groyne is diminishing due to an absence of beach control measures and possibly lack of contemporary supply.

- The coastline experiences significant littoral drift resulting in sediment loss along the coastal frontage. Preservation of the beaches at Bournemouth and the Sandbanks area of Poole is vital to the local economy and the continued success of the local tourism industry. Future coastal defence works must aim to reduce littoral drift processes which affect beach levels though such schemes must not detract from the aesthetics and value of the area.

- The location of offshore wrecks within the Area should be determined prior to the onset of any coastal defence works to prevent damage to these important archaeological sites.

- Transportation of any coastal defence material by sea must consider the potential impact on inshore fisheries along the coast in this Area, particularly the use of gill nets in the vicinity of Bournemouth seafront. The last beach re-nourishment campaign in 1988/90 for Bournemouth demonstrated the value of close co-operation with the local fishing industry.

- Coastal defence at Poole Sandbanks must consider any impact on the Harbour entrance and channel. Similarly, dredging of the approach channel must take into account potential changes to the inshore wave climate and consequential beach movement. Both must be taken into account in an environmental impact assessment.

Strategic Objectives

5 Where appropriate and economically viable, strategic coastal defence options should ensure the protection of life and property along the seaward section of the Bournemouth and Poole conurbation using sustainable and environmentally acceptable methods.

6 Coastal defence options should seek to not adversely affect areas of known, or potential, archaeological or historical value.

7 Coastal defence options should not increase the risks of erosion or flooding to other developed areas along this frontage.

8 Coastal defence provision should seek not to adversely affect the amenity, touristic and / or commercial value of an area over the long term by indirectly impacting on the economies of those stakeholders using the coast (eg: shipping fishing, tourism or recreation).

Coastal Defence Requirements

The standard of defences were assessed using extreme height and water level data as detailed in the coastal processes section of the report.

Bournemouth and Poole are medium density urban communities which warrant a 100 year return period standard of protection in line with the Ministry of Agriculture Fisheries and Food (MAFF) Project Appraisal Guidance Notes (PAGN), Annex K. Hengistbury Head Long Groyne and Double Dykes also warrant a 100 year standard of protection because of their strategic importance in the defence of the coast and protection of properties within Christchurch Harbour.

Using present day water levels the standard of protection against structural damage is in excess of the 100 year return period event for all of the structures in this coastal process unit. Allowing for 50 years of sea level rise, the standard of protection against structural damage is also in excess of the 100 year return period.

Bournemouth Borough Council (BBC) intend to continue monitoring the beach, refurbishing their existing groynes on a rolling programme (which assumes a groyne design life of some 25 years) and predict that the next beach replenishment scheme will be carried out in 2003. The only remaining undefended section of coast along this coastal process unit is between Double Dykes and the Hengistbury Head Long Groyne. BBC are in the process of developing a scheme along this frontage to prevent a breach to Christchurch Harbour. The scheme may involve a series of short armour rock groynes and possibly beach recharge. Borough of Poole are reviewing their defences particularly at the middle section of Poole Sandbanks and are in the process of testing a number of innovative coast defence solutions.

Planning

STATUTORY PLAN TITLE	COAST DEFENCE POLICIES		COASTAL DEVELOPMENT POLICIES		CONSERVATION AND ENVIRONMENTAL POLICIES	
Poole Coastal Local Plan		NONE	5.17 5.19 9.40 10.08, 09 10.13, 14 10.17	Flat Development Flat Redevelopment Public & Private Open Space Open Space Development Beach Hut Development Environmental Improvements	9.06, 08, 9.11 9.25 9.35 9.36 9.38	Conservation Area Policies Archaeological / historical interest SSSIs Luscombe Valley Nature Reserve Specially protected flora and fauna
Boscombe Local Plan	T & I 29 T & I 30	Cliffs Unstable Ground	P & H2 T5 R4	Flats Development Entertainment/ recreation development Public gardens, sea front & cliff areas	R5 C&T20	SSSIs, SPA, SAC and Ramsar Sites Archaeology
Bournemouth Borough Local Plan	8.8 11.47 11.48	Land liable to flooding Cliffs Unstable ground	8.7 9.10 9.15	Recreation Public gardens, sea front & cliff areas Water based recreation	8.9 9.13 9.14 10.25	Nature conservation SSSIs, SPA, SAC and Ramsar sites Heathland Archaeology
Bournemouth Town Centre Local Plan		NONE	7.1 7.4	Tourism and recreation Public gardens seafront and Cliff Areas		NONE

Management Units Identified

PBY1 Sandbanks Ferry Slipway to Point House Cafe
PBY2 Point House Café to Warren Hill
PBY3 Warren Hhill to Hengistbury Head Long Groyne

CHRISTCHURCH HARBOUR PROCESS UNIT

(Mudeford Sandbank to Hengistbury Long Groyne - CHB)

This section describes the coastal processes and natural / built assets that occur within the Christchurch Harbour Process Unit.

Administrative Responsibility

Christchurch BC

Bournemouth BC

Process Unit Issues

Geology, Geomorphology and Sediment Processes

Christchurch Harbour comprises the lower portions of the flood plains of the Rivers Avon and Stour flooded immediately north of Hengistbury Head by rising sea-levels in the late Holocene. Littoral drift on the open coast has resulted in the development of two spits which enclose a narrow entrance channel subject to rapid tidal flows. Flood and ebb tidal deltas composed primarily of sandy sediments are present close to the inlet which itself is lined by gravels. The Harbour margins are mostly low-lying and a significant grazing marsh has developed in the NE.

Sediment transport is governed by the currents generated by tidal exchange, freshwater discharge and also by wave action from the open coast although this does not penetrate very far into the Harbour. Wave action is weak due to limited fetch. Both the ebb tidal delta and the southern spit are dynamic and have undergone periods of growth and erosion thought to be related to variations in quantities of material drifting around Hengistbury Head. The Harbour is subject to significant seasonal freshwater discharges from its two rivers producing notable variations in salinity and is a low energy accretionary environment but contains only relatively thin recent sediment sequences of 1m to 2m thickness suggesting a low rate of sediment input since its formation.

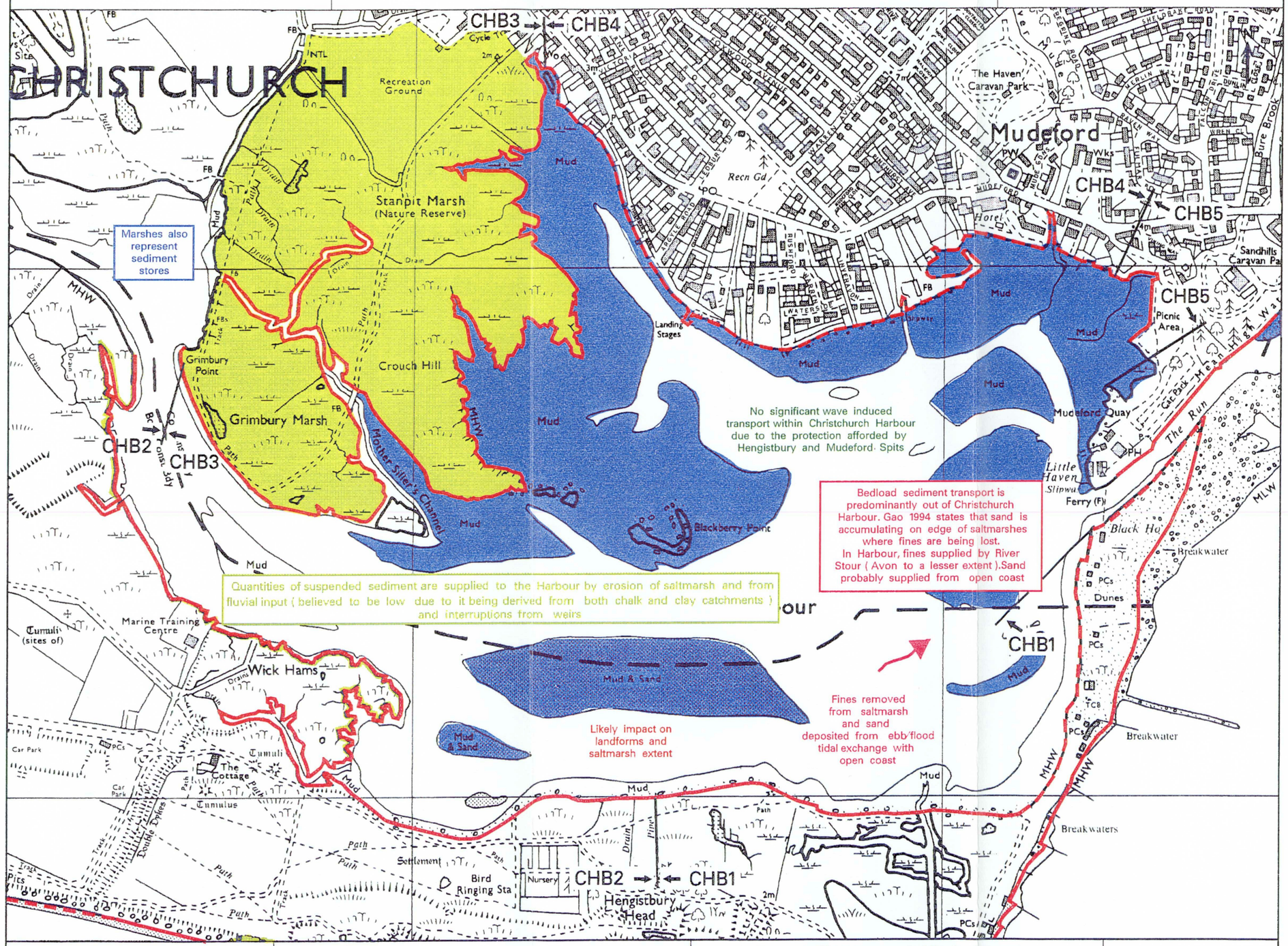
Bedload and suspended load sediment transport are estimated to operate in a net seaward direction (Gao, 1993) resulting in theoretical loss of sediments from the harbour and possibly explaining the limited accretion. Surface sediments within the harbour are predominantly sands and muddy sands which are transported towards the east within the southerly area of the river channel (ebb dominant) and to the NE along the northern margin of the harbour (flood dominant). Within this area of local flood dominance there may be significant net inputs of sediment from the open coast to areas where it cannot be returned seaward by ebb currents. On balance, the harbour is probably a net sediment sink receiving very small quantities of suspended fluvial sediments (and some bedload sands, possibly during flood events) and limited inputs of marine derived sand within the northern flood dominated portion.

In terms of the relationship of this Process Unit with adjacent ones set up, changes in the tidal prism due to any future reclamation would affect tidal currents at the Harbour entrance and thus the configuration of the ebb tidal delta (and flood delta). This therefore could affect conditions on the open coast. The possibility of a breach at Double Dykes or Mudeford Sandbank could affect the regime of the open coast (and the Harbour) if a permanent tidal channel and ebb tidal delta were to become established.

Poole and Christchurch Bays Coastal Group

SHORELINE MANAGEMENT PLAN
POOLE AND CHRISTCHURCH BAYS
DURLSTON HEAD TO HURST SPIT (Subcell 5F)
Process Unit CHB Christchurch Harbour

Halcrow
1999



Sediment Sources and Stores

- Sediment Sources (relevant text)
- Sediment Store/Sink (relevant text)

Sediment Transport Directions

- Net Littoral Drift Observations (relevant text)
- Net Sediment Transport (relevant text)
- Fine Grain Sediment Movement
- Hydrodynamic Observations (relevant text)

Future Change and Likely Impacts

- Increased Risk of Flooding or Increased Erosion to Undefended Lengths
- Potential Impact If No Schemes Are Introduced (eg Beach Or Mudflat Replenishment/Upgrading etc)

TEXT — Relevant Text Related To Sea Level Rise Impacts

Figure C5

Figure C5 highlights the key coastal process information for this area, including locations most at risk from sea level rise, sediment sources and sinks and contemporary sediment drift directions.

Strategic Objectives

1 Coastal defence schemes should not adversely interfere with sediment transport pathways operating within or at the mouth of Christchurch Harbour, unless paramount to the protection of life and critical assets.

Natural Environment

Christchurch Harbour is an ecologically sensitive area and is locally important for its landscape. This area requires a number of measures to ensure its long-term protection. These include:

- Protection of the high landscape appeal of Christchurch Harbour through the use of appropriate materials in defence design (where required);
- Consideration of managed retreat at Stanpit Marsh. In the long-term consideration may have to be given to the removal or protection of the landfill site north of the Marsh;
- Maintaining natural processes, especially the supply of sediments from the Rivers Avon and Stour to ensure the ecologically important mudflats in the Harbour;
- Maintain channels and harbour bathymetry variety to protect nursery and spawning habitats;
- Plan for managed retreat to mitigate loss of areas as a result of sea level rise;
- Minimise disturbance to birds.

Strategic Objectives

2 Coastal defence options should minimise the loss, or reduction in the area, of international or nationally important terrestrial or marine habitats.

Developed Environment

The hinterland of Christchurch Harbour includes the western part of Christchurch town. The construction of the Long Groyne at the Head itself led to the accumulation of beach material to the west, which in turn helped to reduce the risk of a breakthrough by the sea into Christchurch Harbour and the surrounding low lying hinterland.

Issues and requirements relating to coastal defence that need to be addressed include the following:

- Harbourside properties are vulnerable to tidal flooding events and wave attack. A detailed assessment should be made of flood risks to such properties, particularly in the light of sea level rise and relevant protection measures should be taken.

- As Christchurch is an area of high road traffic, the transportation of coastal defence materials may be most beneficially brought to the area by sea.

- Due to the high tourism and recreational use of Christchurch Harbour it is recommended that any future coastal defence works, if required, are undertaken out of the holiday season.

- Some low-lying areas of the Hengistbury Head Scheduled Monument will be affected by sea level rise and parts of it will become submerged. Further research is required to ascertain the impact of sea level rise and whether protection works are required for the sensitive low-lying sites.

- There are a number of Scheduled Monuments around Christchurch Harbour that need to be maintained. Any future coast protection works must be mindful of the scenery and respect the value of natural history and archaeology in this area.

- The physical nature of the Harbour leaves it vulnerable to siltation which is perceived to be a problem. The issues of navigation and dredging within the harbour need to be addressed so they do not affect any future protection works through interference with natural coastal processes. The issue of reconstituting the Christchurch Harbour Management Committee by both Bournemouth and Christchurch Borough Councils in order to effectively manage the important issues of navigation, siltation and dredging should be reviewed.

Strategic Objectives

1 Where appropriate and economically viable, strategic coastal defence options should ensure the protection of life and property along the periphery of Christchurch Harbour using sustainable and environmentally acceptable methods.

2 Strategic coastal defence options should not be detrimental to the Harbour as a whole.

3 Coastal defence options should not detract from the aesthetic quality of the immediate or adjacent coastline, especially those areas designated for historical importance.

4 Coastal defence provision should seek to not adversely affect areas of known, or potential, archaeological or historical value.

5 Coastal defence options should not increase the risks of erosion or flooding to other developed areas nor to non-developed areas in Christchurch Harbour where natural land loss or inundation is not preferred for strategic or economic reasons.

6 Coastal defence provision should seek not to adversely affect the amenity, touristic and / or commercial value of Christchurch Harbour over the long tem by indirectly impacting on the economies of those stakeholders using the coast (eg: shipping and navigation, fishing, tourism or recreation).

Coastal Defence Requirements

Christchurch Harbour is a medium density urban community and will warrant protection against a 1 in 100 year return period storm event, in line with MAFF recommendations (PAGN, Annex K).

The standard of defences were assessed using extreme wave height and water level data as discussed in the coastal processes section of the report. Hind-casting analysis provided the wave climate within Christchurch Harbour.

Under present day water levels, seawater will overflow the majority of the structures on the north shore of Christchurch Harbour when the water level is greater than the 1 in 10 year event. Taking account of 50 years of sea level rise, water will also overflow these structures on any event more severe than the 1 in 1 year event.

Structural damage due to overtopping will occur as a result of any storm more severe than the 1 in 5 year and the 1 in 1 year events, for existing and 50 year water levels respectively.

Considering the coastal defences on the inner shore of Mudeford Sandbank, under present day water levels, the defences will provide protection against structural damage during 1 and 20 year storm events, dependant upon the particular length. Taking account of 50 years sea level rise, the defences will provide protection against structural damage during the 1 and 2 year storm events. Overflow calculations provided similar results.

CBC are in the process of developing a scheme on Mudeford Sandbank to improve the standard of the defences. Environment Agency have examined the feasibility of improving protection to the north shore of Christchurch Harbour however there was insufficient economic justification.

Planning

STATUTORY PLAN TITLE	COAST DEFENCE POLICIES		COASTAL DEVELOPMENT POLICIES		CONSERVATION AND ENVIRONMENTAL POLICIES	
Christchurch Borough Local Plan	**ENV 5**	Flood Plain development	**ENV16**	Green Belt	**ENV 11**	SSSIs
			T14	Cycle Track	**ENV 13**	SNCIs
			L1	Public Open Spaces	**ENV 14**	Other Wildlife Sites
					BE1-7	Conservation Area Policies
	ENV 6	Flooding/ surface water run-off	**BE10**	Mudeford Quay		
			L12	Fishermans Bank	**BE11&12**	Development in Mudeford Quay Conservation Area
			L17	Harbour Bank Access		
	ENV 7	Protection of the Coastal Zone	**L18**	Boating facilities	**BE13**	Mudeford Quay Conservation area
			ET6	Sandhills Caravan Park	**BE22&23**	Archaeology
Bournemouth Borough Local Plan	**8.8**	Land Liable to flooding	**8.7**	Recreation	**8.9**	Nature conservation
			9.10	Public gardens, sea front & cliff areas	**9.13**	SSSIs, SPA, SAC & Ramsar sites
	11.47	Cliffs				
	11.48	Unstable ground			**10.25**	Archaeology

Management Units Identified

CHB1	Harbour side of Mudeford Sandbank
CHB2	South side of Christchurch Harbour (to Grimbury Point)
CHB3	Stanpit and Grimbury Marshes
CHB4	Mudeford Town Frontage
CHB5	Mudeford Quay

CHRISTCHURCH BAY PROCESS UNIT

(Hurst Spit to Hengistbury Long Groyne- CBY)

This section describes the coastal processes and natural / built assets that occur within the Christchurch Bay Process Unit.

Administrative Responsibility

New Forest DC

Christchurch BC

Bournemouth BC

Process Unit Issues

Geology, Geomorphology and Sediment Processes

Christchurch Bay is subject to wave action from both south-westerly and south-easterly directions. Incoming offshore waves are transformed and dissipated by refraction and shoaling effects resulting from the complex bathymetry of the outer reaches of the Bay, including Christchurch Ledge, Dolphin Bank, Dolphin Sands and Shingles Bank.

Littoral drift along the Christchurch Bay frontage occurs predominantly in an easterly direction towards Hurst Spit and due to cyclical paths of sediment transport operating within it, Bray, Carter and Hooke (1991) have regarded Christchurch Bay as a relatively closed sediment system for shingle. This is because the Long Groyne and Christchurch Ledge at Hengistbury Head provide a sufficient barrier to prevent coarse material entering Christchurch Bay whilst it is considered that only fine sediments and sand can negotiate the outer reaches of the groyne or pass over it.

The main sediment input within this Process Unit has historically been from cliff erosion. However, magnitudes of eroded material are believed to have reduced over recent centuries. Overall cliff input into Christchurch Bay has declined from an estimated 63,000 m^3pa (>0.08mm diameter) for 1887-1932 to 44,000 m^3pa for 1932-68 (Lacey 1985). Although this may partly reflect early stabilisation measures involving drainage interceptors, groynes and sea walls at Highcliffe, Barton and Milford, effective cliff stabilisation was not achieved until the 1960s and 1970s. Reduction of supply may therefore be related to improved beach conditions within Christchurch Bay.

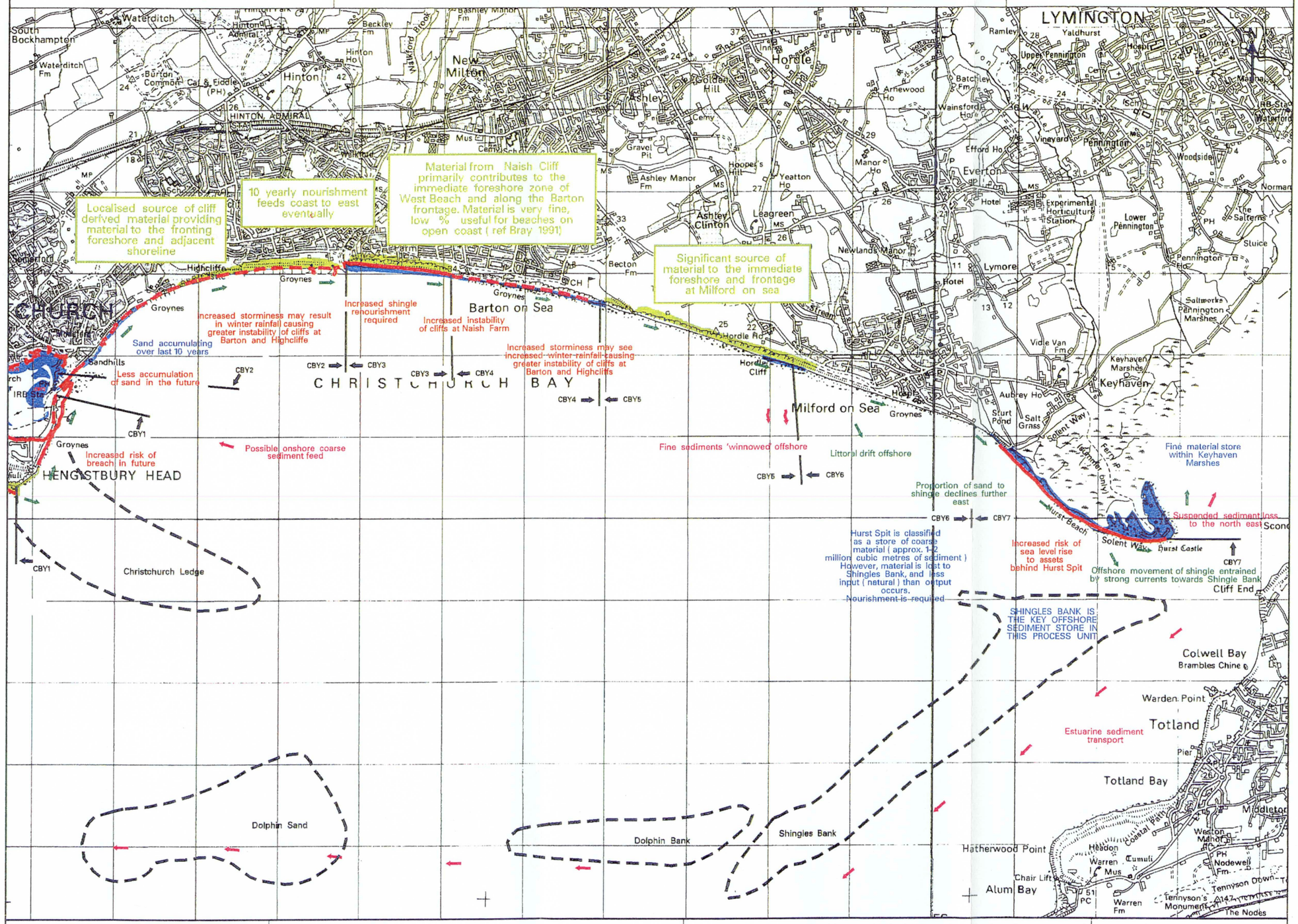
An important factor as part of the conceptual sediment process model is the general shortage of beach material in Christchurch Bay (Lacey 1985). Contributory factors causing this are the interception of littoral input from Poole Bay by the Hengistbury Long Groyne and a legacy of reduced cliff input. Cliff stabilisation has therefore contributed towards concentration of erosion on remaining unprotected frontages which would need to recede at increasingly rapid rates to maintain steady cliff sediment input.

In terms of the relationship of this Process Unit with adjacent ones, the key strategic link between Poole and Christchurch Bays is Hengistbury Head. This landform plays an important role in the integrity and configuration of both Bays and so it is important to fully recognise the status and position of it as part of an

Poole and Christchurch Bays
Coastal Group

SHORELINE MANAGEMENT PLAN
POOLE AND CHRISTCHURCH BAYS
DURLSTON HEAD TO HURST SPIT (Subcell 5F)
Process Unit CBY Christchurch Bay

Halcrow
1999



Sediment Sources and Stores

- Sediment Sources (relevant text)
- Sediment Store/Sink (relevant text)

Sediment Transport Directions

- Net Littoral Drift Observations (relevant text)
- Net Sediment Transport (relevant text)
- Fine Grain Sediment Movement
- Hydrodynamic Observations (relevant text)

Future Change and Likely Impacts

- Increased Risk of Flooding or Increased Erosion to Undefended Lengths
- Potential Impact If No Schemes Are Introduced (eg Beach Or Mudflat Replenishment/Upgrading etc)
- TEXT — Relevant Text Related To Sea Level Rise Impacts

Figure C6

integrated process system and thus the future management of Christchurch Harbour, Christchurch and Poole Bays.

Figure C6 highlights the key coastal process information for this area, including locations most at risk from sea level rise, sediment sources and sinks and contemporary sediment drift directions.

Strategic Objectives

1 Where a coastal defence strategy may reduce the supply or transport of littoral sediments to the shoreline, this should not have detrimental impacts on immediate and adjacent beach levels within Christchurch Bay.

2 Coastal defence schemes should not interfere with sediment transport pathways operating within Christchurch Bay, unless paramount to the protection of life and critical assets.

3 Strategic coastal defence options should be based on a sound geomorphological understanding of Christchurch Bay and be compatible with the strategies set for adjacent lengths of coast.

Natural Environment

Parts of the coast of Christchurch Bay are of national and possibly international geological and ecological importance. Hurst Spit is also of high landscape importance. The following measures are required to ensure the protection of the area:

- Encourage and restore the natural processes of erosion and littoral drift to ensure both the geological exposures and the natural accretion of shingle to the geomorphologically important Hurst Spit;
- Maintain Hurst Spit to ensure the protection of saltmarsh to the north;
- Protect shingle habitats on Hurst Spit;
- Prevent physical damage to the delicate ecology of Mudeford Sandbanks;
- Ensure sediments used in beach recharge operations are chemically and biologically compatible with the existing environment:
- Maintain sediment supply around Hengistbury Head to stabilise the rare eel grass beds;
- Maintain the high landscape appeal of the area by minimising coastal defence works, and using "soft" engineering defences where possible. This is particularly important at Hurst Spit.

Strategic Objectives

4 Coastal defence options should minimise the loss, or reduction in area, of international or nationally important terrestrial or marine habitats, nor jeopardise the sustainability of earth heritage sites.

5 Coastal defence options should not detract from the landscape quality of the immediate or adjacent coastline.

Developed Environment

Milford on Sea and Barton on Sea, west of Hurst Spit, are both protected by significant coastal defences. West of Chewton Bunny, which forms both the district and county boundary, lie the developments of Highcliffe on Sea and Christchurch which have been the subject of intensive coastal protection works over the last fifty years.

Mudeford Sandbank, which lies in the lee of Hengistbury Head, has suffered a significant loss of beach material, partly following construction of the Long Groyne on the headland in 1938. This has resulted in very large slips of non-cohesive material from the coastal slopes of the headland's south eastern face and the threat of a breach to Christchurch Harbour, leading to successive coast protection schemes.

Issues and requirements relating to coastal defence that need to be addressed include the following:

- The soft eroding cliffs fronting Naish Holiday Village are designated a geological SSSI and are unprotected for this very reason. However, increasing pressure is being mounted for beach stabilisation measures to be employed at Naish beach which reduce erosion and improve the aesthetics of the beach without affecting the geological interest of the area. The developed areas to the west and east are at risk of outflanking in the longer term.

- The future appearance, ecology and public access to the coast is of great importance both to residents and tourists. Any future coast protection works must aim to balance engineering stabilisation objectives with the need to enhance the visual appearance of the cliffs and beach, and enhance recreational access and amenities.

- Barton golf course, on the edge of the town is suffering from coastal erosion and has had to be expanded inland to replace areas lost to the sea. This action should be encouraged where possible in instances where land at risk from erosion does not warrant major expenditure on coast protection works.

- Hurst Spit Castle is of national importance and is a Scheduled Monument. Reductions in sediment supply caused by previous coast protection measures have resulted in a number of breaches. Any future coast protection works must aim to reduce their impact on sediment loss to lessen the risk of future breaches.

- A breach at Mudeford Sandbank would increase flooding of the developed land around Christchurch Harbour, as well as increasing wave activity and erosion.

- Parts of the cliffed section of coastline between Milford and Highcliffe suffer from erosion providing material that contributes to the sediment budget of the cell. This source, if maintained, would provide valuable beach material for the protection of areas of residential importance.

- The coastal areas of Highcliffe and Chewton Bunny have been exposed to direct wave attack due to the low volumes of beach material at the foot of local cliffs. These low volumes have, since the early 1900's, suffered from a steady decline in the natural sediment supply of as a result of the construction of the coast protection measures in Poole Bay. Research work in 1974/80 demonstrated that beach renourishment work carried out in Poole Bay enhanced the levels of sediment supply to the coastline of Christchurch Bay and Christchurch Borough Council has taken advantage of this supply to reinforce beaches east of the harbour entrance by erecting rock groynes. A more strategic approach to shoreline management is thus in need of being pursued as part of this SMP.

- Between Hurst Spit and Chewton Bunny the cliff face is constantly eroding and as it erodes, archaeological material is being exposed. Finds are so far isolated and are commonly not part of a larger structure or structures. Any fragile archaeological material would undoubtedly be under threat and a long term monitoring programme to monitor the coastline as it erodes is required to record and recover any archaeological material that is discovered. Coastal works in this area must also take into account the high potential for archaeological finds.

- There are four offshore wrecks in this area. The location of these should be determined prior to the onset of any coastal defence works to prevent damage to these important archaeological sites. Any development should also be aware of the potential for further material being exposed during work.

- Transportation of any coastal defence material by sea must consider the potential impact on the commercial inshore fisheries along the coast in this area.

Strategic Objectives

6 Where appropriate and economically viable, strategic coastal defence options should ensure the protection of life and residential property along the Christchurch, Highcliffe, Barton and Milford on Sea frontage using sustainable and environmentally acceptable methods.

7 Coastal defence provision should seek to not adversely affect areas of known, or potential, archaeological or historical value.

Strategic Objectives

8 Coastal defence options should not increase the risks of erosion or flooding to other developed areas nor to non-developed areas where natural land loss or inundation is not preferred for strategic or economic reasons.

9 Coastal defence options should seek not to adversely affect the amenity, touristic and / or commercial value of an area over the long term by indirectly impacting on the economies of those stakeholders using the coast (eg: shipping fishing, tourism or recreation).

10 Coastal defence options should seek to improve coastal access where appropriate.

11 Coastal defence options should not compromise inshore fisheries at Mudeford.

Coastal Defence Requirements

Christchurch, Highcliffe, Barton on Sea and Milford on Sea are medium density urban communities which would warrant a standard of protection against the 1 in 100 year storm event. The other lengths of the frontage are protecting agricultural and rural land, or holiday camps, for which a 50 year return period standard of protection would normally be adequate.

Using present day water levels the standard of protection against structural damage was in excess of the 100 year return period event for all structures between Hurst Spit and Christchurch Harbour entrance. Between the Harbour entrance and Hengistbury Head Long Groyne, the standard of protection varies from less than 1 in 1 year to greater than the 1 in 10 year storm event. The agreement with English Nature that enabled the defences to be built in 1985/86 between the Harbour entrance and the Hengistbury Head Long Groyne required a less than recommended standard of defence to be provided to enable high spring tides to bring sea borne vegetation and seeds to the foot of the cliffs. This was accepted by BBC and the funding authority MAFF.

A similar analysis for the standard after 50 years, allowing for future sea level rise, revealed that the standard of protection against structural damage was in excess of the 100 year return period event for all structures between Hurst Spit and Christchurch Harbour entrance, apart from the tip of Hurst Spit which affords a 20 year return period standard of service. English Heritage are seeking funds to protect Hurst Castle. Between the Harbour entrance and Hengistbury Head Long Groyne, the standard of protection is less than the 1 in1 year event for the entire length.

Christchurch Borough Council (CBC) are in the process of developing a coast protection scheme to improve the standard of defences along Mudeford Sandbank.

Planning

STATUTORY PLAN TITLE	COAST DEFENCE POLICIES		COASTAL DEVELOPMENT POLICIES		CONSERVATION AND ENVIRONMENTAL POLICIES	
New Forest District Local Plan	DW-E41 DW-C3 DW-C4 DW-C5 DW-C6	River and Coastal Flooding Coast Protection and Flood Defence Development requiring coastal works Coastal erosion Reclamation of land from the sea	DWE28 DW-C1 DW-C7 DW-C8	Green Belt Coastal development Pedestrial and vehicular coastal access Coastal car parks	DW-E33 DW-E32	Nature Conservation Sites Development in AONBs
Christchurch Borough Local Plan	ENV 5 ENV 6 ENV 7	Flood Plain Development Flooding/surface water run-off Protection of the Coastal Zone	ENV16 T14 L1 L5 L6 BE11 BE19	Green Belt Cycle Track Public Open Spaces Castle Grounds/ beach access Highcliffe Coastal Park Castle Park Landscaping Highcliffe Castle Uses	ENV 11 ENV 13 ENV 14 BE1-7 BE11&12 BE13 BE22&23	SSSIs SNCIs Other Wildlife Sites Conservation Area Policies Development in Mudeford Quay Conservation Area Mudeford Quay Conservation area Archaeology

Management Units Identified

CBY1a & b Hengistbury Long Groyne to the tip of Mudeford Sandbank
CBY2 Mudeford Sandbank to Chewton Bunny (including Mudeford Quay)
CBY3 Chewton Bunny to start of defence (ie undefended length)
CBY4 Start of defence to Barton Golf Course
CBY5 Barton Golf Course to Hordle Cliff
CBY6 Hordle Cliff to Hurst Spit
CBY7 Hurst Spit