



# Isle of Wight Shoreline Management Plan 2

(Review Sub-cell 5d+e)

December 2010

*Operating Authorities:*



*Consulting Engineer:*



HASKONING UK LTD.  
COASTAL & RIVERS



## Isle of Wight Shoreline Management Plan 2 -November 2010

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#### *Cover photo:*

View from Blackgang along the south-west coast of the Isle of Wight towards the Needles.

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## Glossary of terms

Term	Definition
AA/HRA	Appropriate Assessment. Also referred to as a Habitat Regulations Assessment (HRA). The AA is an independent check of the potential impacts of policies being put forward by the SMP with specific reference to designated European nature conservation sites (such as SACs, SPAs, etc.)
Accretion	Accumulation of sand or other beach material due to the natural action of waves, currents and wind.
Adaptation	Adaptation is the evolutionary process whereby a population becomes better suited to its habitat. Implies that there may be change in the way a feature, such as a habitat or a community, functions. In supporting adaptation, management has to recognise certain principles: <ul style="list-style-type: none"> <li>• That adaptation may take time and may evolve slowly so that change to the overall community does not happen immediately.</li> <li>• That management should not encourage a progressively more vulnerable situation to develop, where there is a sudden change from one condition to another.</li> <li>• That specific aspects of a feature, such as individual properties or elements of habitat may change or be lost, but without substantial loss to the value of the community or the overall ecological function of the feature.</li> </ul>
Advance the Line (ATL)	A policy decision to build new coastal defences on the seaward side of the original defences. Using this policy should be limited to those policy units where significant land reclamation is considered.
Anthropogenic	Impacts that originate from humans.
AONB	Area of Outstanding Natural Beauty: A statutory designation by the Countryside Commission. The purpose of the AONB designation is to identify areas of national importance and to promote the conservation and enhancement of natural beauty. This includes protecting its flora, fauna, geological and landscape features.
Armour	Structural protection (rock or concrete) for the shoreline
ATL	Advance the Line. Policy decision to build new defences seaward of the existing defence line where significant land reclamation is considered.
Back beach/back shore	The section of beach extending landwards from the high water mark to the point where there is an abrupt change in slope or material; also referred to as the backshore.
BAP	Biodiversity Action Plan. An element of UK environmental legislation, aimed at enhancing and protecting biodiversity within key habitat areas.
Bar	Fully or partially submerged elongated mound of sand, gravel or other unconsolidated material built on the sea-bottom in shallow water by waves and currents.
Beach face	Upper surface of the beach.
Beach nourishment	Artificial process of replenishing a beach with material from another source.
Beach profile	Side view of a beach which may extend from the top of the backshore, the face of a dune line, or a sea wall, into the sea.
Beach recharge	This is the management practice of adding to the natural amount of sediment (such as sand) on a beach by using material from elsewhere. This is also known as beach replenishment, nourishment or feeding.
Benefits (related to issue)	The service that a feature provides. In other words, why people value or use a feature. For example, a nature reserve, as well as helping to preserve biodiversity and meet national legislation, may also provide a recreation outlet much like a sports centre provides a recreation function.
Berm crest	Ridge of sand or gravel deposited by wave action on the shore just above the normal high water mark.

Term	Definition
Brackish water	Freshwater mixed with seawater.
Breaker zone	Area in the sea where the waves break.
Clastic	Pertaining to a sediment or rock composed chiefly of fragments derived from pre-existing rocks or minerals
Coastal defence	A term used to encompass both coastal protection against erosion and sea defence against flooding.
Coastal defence strategy plan	A detailed assessment of the strategic coastal defence option(s) for a management unit(s), based on Flood and Coastal Defence Project Appraisal Guidance 2.
Coastal habitat management plan (CHaMP)	A non-statutory management plan which identifies potential future changes to coastal habitats and potential compensation measures for any losses to a European designated site or group of sites.
Coastal squeeze	The reduction in habitat area that can arise if the natural landward migration of a habitat under sea level rise is prevented by the fixing of the high water mark, e.g. a sea wall.
Coastal zone management plan	Plans through which local authorities and others implement planning objectives and policies for an area of the coast, which deal with a range of issues such as landscape management, development, recreation, conservation, etc.
Communities	1) A 'community' can refer to a group of people living in one place (eg. in a coastal town or village). 2) A 'community' is also a group of organisms (e.g. plants) interacting and sharing a populated <a href="#">environment</a> , in biological terms.
Concern	This is a stated actual or perceived problem, raised by an individual or stakeholder. A concern can be strategic or local.
Conservation Area	Local Planning Authorities have a duty under The Planning (Listed Buildings & Conservation Areas) Act 1990 to designate as Conservation Areas any areas considered to be of special architectural or historic interest, the character or appearance of which it is desirable to protect or enhance. There are now 32 Conservation Areas throughout the Island.
Consequence	An outcome or impact such as economic, social or environmental impact. It may be expressed as a quantity (e.g. monetary value), categorical (e.g. high, medium, low) or descriptive (see FCDPAG4).
Conservation	The political/social/economic process by which the environment is protected and resources are used wisely.
CSG	Client Steering Group. The CSG is comprised of representatives from the key operational bodies and statutory consultees involved with coastal and estuarine management within the SMP area. They provide an overseeing steer and guidance role to technical consultants and generally oversee the consultation and approvals activities required within the SMP2 programme.
CV	Capital Value. The actual value of costs or benefits.
Deep water	Area where surface waves are not influenced by the sea-bottom.
Defra	Department for Food, Environment and Rural Affairs
Defra Procedural Guidance	The Shoreline Management Plan (SMP) Procedural Guidance produced by Defra to provide a nationally consistent structure for the production of future generation Shoreline Management Plans.
Downdrift	Direction of longshore movement of beach materials.
Downdrift effects	Impacts occurring in the lee of any coastal activity resulting from associated changes to the coastal processes, particularly sediment supply.
Dredging	Excavation, digging, scraping, draglining, suction dredging to remove sand, silt, rock or other underwater sea-bottom material.
Dune	Accumulations of wind-blown sand in ridges or mounds that lie landward of the beach and usually parallel to the shoreline.
EA Flood Zone 2	See Flood Zone 2.



Term	Definition
EA Flood Zone 3	See Flood Zone 3.
Ebb-tide	The falling tide, part of the tidal cycle between high water and the next low water.
Ebb-tide delta	An accretionary deposit of sand found on the seaward side of an inlet and usually formed by tidal currents. Ebb tidal deltas form at the mouths of many estuaries and their associated sand bars provide important natural coastal defence features to both the estuary mouth and the adjacent open coasts. The size of the delta depends on the tidal prism of the estuary and consequently the degree of natural protection can change as the prism changes through differing estuary management techniques.
Economic appraisal	An appraisal which takes into account a wide range of costs and benefits, generally those that can be valued in money terms.
Ecosystem	Organisation of the biological community and the physical environment in a specific geographical area.
EIA	Environmental Impact Assessment. Detailed studies that predict the effects of a development project on the environment. They also provide plans for mitigation of any significant adverse impacts.
EM	Elected Member. Elected Members are consulted with at key stages of the SMP programme. Endorsement of the preferred plan is sought from the EM prior to public consultation.
Enhance (improve)	The value of a feature increases.
Epoch	The three periods of time in which the Shoreline Management Plan is reviewed in. The first epoch is 0-20 years, the second epoch is 20-50 years and the third epoch is 50-100 years.
Erosion	The loss of land or encroachment by the sea through a combination of natural forces e.g. wave attack, slope processes, high groundwater levels.
ESA	Environmentally Sensitive Area. A non-statutory designation for an area where special land management payments are available through agreement with Defra to provide farming practices which are beneficial to the environment.
Estuary	Mouth of a river, where fresh river water mixes with the seawater.
European site	Any site that has been designated as a site of international nature conservation importance either as a Special Protection Area (SPA), a Special Area of Conservation (SAC) or a Ramsar Site. In regard to planning considerations it is Government policy to treat potential SPAs, candidate SACs and listed Ramsar Sites as if they were already designated.
Feature	Something tangible that provides a service to society in one form or another or, more simply, benefits certain aspects of society by its very existence. Usually this will be of a specific geographical location and specific to the SMP.
Fetch	The distance that the wind has passed across the water in one direction (the greater the fetch, the larger the wind-driven waves will be).
Flood Zone	A geographical area officially designated subject to potential flood damage. The Environment Agency defines Flood Zone 2 and Flood Zone 3 (see below).
Flood Zone 2	The area that could be affected by flooding from the sea, if there were no flood defences in place. Flood zone 2 shows the area that could be affected by an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year.
Flood Zone 3	The area that could be affected by flooding from the sea, if there were no flood defences in place. Flood zone 3 shows the area that could be affected by a flood event that has a 0.5 per cent (1 in 200) or greater chance of happening each year.

Term	Definition
Flooding	Refers to inundation by water whether this is caused by breaches, overtopping of banks or defences, or by inadequate or slow drainage of rainfall or underlying ground water levels. Flooding due to blocked drains and sewers or the escape of water from a water supply service will usually be the responsibility of the local water company and does not fall within the scope of a Shoreline Management Plan.
Flood-tide	Rising tide, part of the tidal cycle between low water and the next high water.
Fluxes	The rate of flow of water, as the tide or current, through a defined area.
Foreshore	Zone between the high water and low water marks.
Gabions	Wire mesh rectangular containers filled with stones.
Geomorphology/ Morphology	The branch of physical geography/geology which deals with the form of the Earth, the general configuration of its surface, the distribution of the land, water, etc.
GIS	Geographic Information System. Software which allows the spatial display and interrogation of geographical information such as ordnance survey mapping and aerial photography.
Greenhouse effect	Heating of the earth's atmosphere due to a presence in gases like carbon dioxide.
Groyne	Shore protection structure built perpendicular to the shore; designed to trap sediment.
Groyne field	Series of groynes acting together to protect a section of beach.
Habitat action plan	A biodiversity action plan for a habitat.
Habitat directive	EC Directive 92/43 on the conservation of natural habitats and of wild fauna and flora.
Habitat regulations	The conservation (Natural Habitats & c.) Regulations 1994. This transposes the Habitats Directive into UK Law.
Hazard	A situation with the potential to result in harm. A hazard does not necessarily lead to harm.
Heritage Coast	A non-statutory designation by the Countryside Commission for coasts of scenic quality, their largely undeveloped nature and their special wildlife and historic interest. Local authorities assist with the management of Heritage Coasts often with Heritage Coast officers.
Hold the Line (HTL)	A policy decision to maintain or change the standard of protection of the coastal defences along their existing line. This policy should cover those situations where work or operations are carried out in front of the existing defences (such as beach recharge, rebuilding the toe of a structure, building offshore breakwaters and so on) to improve or maintain the standard of protection provided by the existing defence line. This can include operations to the back of existing defences (such as building secondary floodwalls) where they form an essential part of maintaining the current coastal defence system.
Integrated	An approach that tries to take all issues and interests into account. In taking this approach, managing one issue adds value to the way another is dealt with.
Isobath	A line on a chart joining places of equal depth or height e.g. a contour
Issue	All issues and aspirations are related to flood and coastal defence and grouped or categorised under the three main themes: Technical; Environmental; or Socio-economic
Key Stakeholder	A person or organisation with a major interest in the preparation of, and outcomes from, a shoreline management plan. This includes agencies, authorities, organisations and private bodies with significant responsibilities or ownerships that affect the overall management of the shoreline in a plan.

Term	Definition
Land reclamation	Process of creating new, dry land on the seabed.
Landslide	A coastal landslide can be regarded as a flow of sediment from an area of elevated topography to the foreshore. Slope instability and a semi-continuous sediment cascade is maintained by basal erosion which can act in two ways: (i) degraded materials are removed from the base of the slope, which prevents a stable slope angle being achieved; (ii) basal erosion of in-situ strata can undercut the cliff toe so that the slope is steepened to a greater repose angle than would naturally be maintained by the ground-forming materials. From a coastal viewpoint the result is the same, in that sediment is supplied to the littoral zone, and, assuming it is removed thereafter, the coast retreats.
Listed Building	Buildings that have been recognised for their special architectural or historic interest can be listed and have legal protection under planning law, specifically "The Planning (Listed Buildings and Conservation Areas) Act 1990".
LDF	Local Development Framework. The Isle of Wight LDF is called the Island Plan.
Lithology	Mineralogy, grain size, texture, and other physical properties of granular soil, sediment, or rock.
Littoral	The littoral zone extends from the high water mark, which is rarely inundated, to shoreline areas that are permanently submerged. It always includes the intertidal zone and is often used to mean the same as the intertidal zone.
LNR	Local Nature Reserves. A statutory designation for sites established by local authorities in consultation with Natural England. These sites are generally of local significance and also provide important opportunities for public enjoyment, recreation and interpretation.
Longshore current	A movement of water parallel to the shore, caused by waves and tides.
Longshore transport	Movement of material parallel to the shore also referred to as longshore drift.
Maintain	That the value of a feature is not allowed to deteriorate.
Managed Realignment (MR)	A policy decision to allow the shoreline to move backwards or forwards, with management to control or limit movement (such as reducing erosion or building new defences on the landward side of the original defences).
Management Area (MA)	Management Area, defined by SMP2. A collection of Policy Units (PU) that are interdependent and should therefore be managed collectively.
MDSF	Modelling and Decision Support Framework. Mapping linked computer tool used in the evaluation of assets at risk from flooding or erosion.
Mean sea level	Average height of the sea surface.
MHW	Mean High Water. The average of all high waters observed over a sufficiently long period.
MLW	Mean Low Water. The average of all low waters observed over a sufficiently long period.
Natura 2000	European network of protected sites which represent areas of the highest value for natural habitats and species of plants and animals which are rare, endangered or vulnerable in the European Community.
Nearshore	The region of land extending from the backshore to the beginning of the offshore zone.
NNR	National Nature Reserves. A statutory designation by Natural England. These represent some of the most important natural and semi-natural ecosystems in Great Britain and are managed to protect the conservation value of the habitats that occur on these sites.
No Active Intervention (NAI)	A policy decision to not invest in coastal defences or operations. Where no defences are present, natural change of the coastline will continue. NAI is also a scenario or prediction used in SMP2 to understand potential future coastal change. The scenario assesses the consequences of

Term	Definition
	applying a policy of NAI to the shoreline, allowing existing defences to fail and coastal change to occur.
Objective	A desired state to be achieved in the future. An objective is set, through consultation with key parties, to encourage the resolution of the issue or range of issues.
Offshore breakwater	Structure parallel or angled to the shore, usually positioned in the sea, which protects the shore from waves.
Offshore zone	Extends from the low water mark to deeper water, and is permanently covered with water.
Operating Authority	A body with statutory powers to undertake flood defence or coast protection activities, usually the Environment Agency or maritime District Council. The two Operating Authorities for the Isle of Wight are the Isle of Wight Council and the Environment Agency.
PDZ	Policy Development Zone. A length of coastline with a particular character defined in the SMP for the purpose of assessing all issues and interactions to develop management scenarios. These zones are only used in the procedure of developing policy. Policy Units and Management Areas are then used for the Final definition of the policies and the management of the coast.
Pile	Long heavy section of timber, concrete or metal, driven into the ground or seabed as support for another structure. Especially around/or at the toe of a shore protection structure.
Policy	In the context of the SMP, "policy" refers to the generic shoreline management options (No Active Intervention, Hold the Line, Managed Realignment, Advance the Line).
Policy Scenario	A combination of policies selected against the various feature/benefit objectives for the whole SMP frontage.
Policy Unit (PU)	Policy Unit, defined by SMP2. A section of coastline for which a certain coastal defence management policy has been defined. These are then grouped into Management Areas (MA).
PV	Present Value. The value of a stream of benefits or costs when discounted back to the present day. For this SMP the discount factors used are the latest provided by Defra for assessment of schemes, i.e. 3.5% for years 0-30, 3.0% for years 31-75, and 2.5% thereafter.
Ramsar	Designated under the, "Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat" 1971. The objective of this designation is to prevent the progressive encroachment into, and the loss of wetlands.
Residual life	The time to when a defence is no longer able to achieve minimum acceptable performance criteria in terms of serviceability or structural strength.
Residual risk	The risk which remains after risk management and mitigation. It may include, for example, risk due to very severe storms (above design standard) or risks from unforeseen hazards.
Retaining wall	Wall built to hold back earth.
Revetment	Shore protection structure made with stones/ rock laid on a sloping face.
RIGS	Regionally Important Geological/Geomorphological Sites. A non-statutory designation identified by locally developed criteria and are currently the most important places for geology and geomorphology outside statutorily protected land such as SSSI's.
Risk assessment	Consideration of risks to people and the developed, historic and natural environment.
Risk management	The process of analysing exposure to risk and determining how to best handle such exposure.
SAC	Special Area of Conservation. This designation aims to protect habitats or

Term	Definition
	species of European importance and can include Marine Areas. SACs are designated under the EC Habitats Directive (92/43EEC) and will form part of the Natura 2000 site network. All SACs sites are also protected as SSSI, except those in the marine environment below the Mean Low Water (MLW).
Schedule IV	'Waters excluded for purposes of definitions of 'sea' and 'seashore' (refer to Coast Protection Act, 1949).
Scheduled Monument (SM)	Scheduled Monument. A statutory designation under the Ancient Monuments and Archaeological Areas Act 1979. This Act, building on legislation dating back to 1882, provides for nationally important archaeological sites to be statutorily protected as Scheduled Ancient Monuments.
Scour	Removal of underwater material by waves or currents, especially at the toe of a shore protection structure.
SEA	Strategic Environmental Assessment. In SMP terms an SEA is an independent audit of the SMP process and the policies it puts forward. SEA assesses policies for potential impacts against a series of environmental themes.
Seawall	Massive structure built along the shore to prevent erosion and damage by wave action.
Sediment	Particles of rock covering a size range from clay to boulders.
Sediment cell	A length of coastline and its associated near shore area within which the movement of coarse sediment (sand and shingle) is largely self contained. Interruptions to the movement of sand and shingle within one cell should not affect beaches in an adjacent sediment cell.
Sediment sub-cell	A sub-set of a sediment cell within which the movement of coarse sediment (sand and shingle) is relatively self contained.
Setback	Prescribed distance landward of a coastal feature (e.g. the line of existing defences).
SFRA	Strategic Flood Risk Assessment. The Isle of Wight SFRA assesses flood risks on the Isle of Wight, and in particular the flood risks associated with areas being considered for future development as part of the emerging Local Development Framework (LDF).
Shore	Narrow strip of land in immediate contact with the sea.
Shoreline	Intersection of a specific water height with the shore or beach, e.g. the high water shoreline is the intersection of the high water mark with the shore or beach.
Shoreline Management Plan	A non-statutory plan, which provides a large-scale assessment of the risks associated with coastal processes and presents a policy framework to reduce these risks to people and the developed, historic and natural environment in a sustainable manner. The first SMP (SMP1) was completed for the Isle of Wight in 1997. The SMP is periodically reviewed. The second SMP (SMP2) is being completed in 2010.
Significant effect	Where a plan or project is likely to affect a European Site it is necessary to decide whether or not it would have a significant effect. If there is any doubt, the operating authority must consult English Nature/Countryside Council for Wales. They will advise whether, in their view, the proposed scheme would be likely to have a significant effect.
Sink	Area at which beach material is irretrievably lost from a coastal cell, such as an estuary, or a deep channel in the seabed.
SLA	Special Landscape Area. A non-statutory designation for an area usually identified by local authorities as having a strategic landscape importance.
SMA	Sensitive Marine Area. A non-statutory designation for nationally important locations around the coast that require a cautious and detailed approach to management. They are identified by Natural England for their important benthic populations, spawning or nursery areas for fish, fragile

Term	Definition
	intertidal communities, or breeding, feeding, and roosting areas for birds and sea mammals.
SMP	Shoreline Management Plan. A non-statutory plan, which provides a large-scale assessment of the risks associated with coastal processes and presents a policy framework to reduce these risks to people and the developed, historic and natural environment in a sustainable manner. The first SMP (SMP1) was completed for the Isle of Wight in 1997. The SMP is periodically reviewed. The second SMP (SMP2) is being completed in 2010.
SNCI	Site of Nature Conservation Importance. A non-statutory designation defined by the Wildlife Trusts and Local Authorities as sites of local nature conservation interest. These form an integral part in the development of planning policies relating to nature conservation issues.
SPA	Special Protection Area. A statutory designation for internationally important sites, being set up to establish a network of protected areas of birds.
SSSi	Sites of Special Scientific Interest. A statutory designation notified by Natural England representing some of the best examples of Britain's natural features including flora, fauna, and geology.
Stakeholder	A person or organisation with an interest in the preparation of a shoreline management plan or affected by the policies produced. This broad interpretation has been taken to include agencies, authorities, organisations and private persons. See "Key stakeholder".
Storm surge	A rise in the sea surface on an open coast, resulting from a storm.
Strategic	Used to describe the undertaking of any process in a holistic manner taking account of all associated impacts, interests of other parties and considering the widest possible set of potential options for the solution of a problem. In the context of this document, the word 'strategic' does not imply any particular level in the hierarchy of the planning process.
Sustain	Refers to some function of a feature. A feature may change, but the function is not allowed to fail.
Sustainable policies	Sustainable policies lead to coastal defence solutions that avoid tying future generations into inflexible and/or expensive options for defence. They will usually include consideration of interrelationships with other defences and likely developments and processes within a coastal cell or sub-cell. They will also take account of long-term demands for non-renewable materials.
Swell	Waves that have travelled out of the area in which they were generated.
Temporal	Referring to the passage or a measurement of time
Tidal current	Movement of water in a constant direction caused by the periodic rising and falling of the tide. As the tide rises, a flood-tidal current moves in one direction and as the tide falls, the ebb-tidal current moves in the opposite direction.
Tidal inlet	A river mouth or narrow gap between islands, within which salt water moves landwards during a rising tide.
Tidal prism	The volume of water within an estuary between the level of high and low tide, typically taken for mean spring tides.
Tide	Periodic rising and falling of large bodies of water resulting from the gravitational attraction of the moon and sun acting on the rotating earth.
Toe protection	Material, usually large boulders, placed at the base of a sea defence structure like a seawall to prevent wave scour.
Topography	Configuration of a surface including its relief and the position of its natural and man-made features.
Transgression	The landward movement of the shoreline in response to a rise in relative sea level.

Term	Definition
Unconstrained scenario	The 'unconstrained' scenario provides a vision of how the coast could evolve if not controlled by man-made structures such as coastal defences. This is a key step in understanding the 'natural' response of the coast.
Updrift	Direction opposite to the predominant movement of longshore transport.
VMCA	Voluntary Marine Conservation Areas. A statutory designation to protect the marine conservation importance of a site and to provide a focus for liaison, co-operation and education for a sustainable marine environment.
Water table	The upper surface of groundwater; below this level, the soil is saturated with water.
Wave direction	Direction from which a wave approaches.
Wave refraction	Process by which the direction of approach of a wave changes as it moves into shallow water.
Wetlands	Low-lying areas that are frequently flooded and which support vegetation adapted to saturated soils e.g. mangrove swamps.
WFD	Water Framework Directive. European legislation which seeks to improve the quality of both freshwater and coastal water bodies.
WPM	With Present Management. WPM is a scenario or prediction used in SMP2 to understand potential future coastal change. The WPM scenario essentially describes the current regime of management which exists for a given frontage. WPM scenario assumes that defences will be maintained in their present position and other management practices, e.g. beach re-nourishment, will continue as at present.





## 1. Introduction

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# 1 Introduction

## 1.1 The Shoreline Management Plan

A Shoreline Management Plan (SMP) provides a large-scale assessment of the risks associated with coastal evolution and presents a policy framework to address these risks to people and the developed, historic and natural environment in a sustainable manner. In doing so, an SMP is a high-level document that forms an important part of the Department for Environment, Food and Rural Affairs (Defra) strategy for flood and coastal defence (Defra, 2001).

The plan provides both a broad scale assessment of these risks but also quite specific advice to operating authorities in their management of defences. Through this and through the identification of issues covering a wide spectrum of coastal interests, the SMP supports the Government's aims, as set out in Defra's strategy "Making Space for Water" (Defra 2005):

- To reduce the threat of flooding and coastal erosion to people and their property; and
- To deliver the greatest environmental, social and economic benefit, consistent with the Government's sustainable development principles.

This SMP2 document, developed by the Isle of Wight Council and supporting Client Steering Group (CSG), sets out the results of the first revision to the original SMP for the area of coast extending around the Isle of Wight (Figure 1.1). This SMP2 collates information from the original SMP for sub-cells 5d+e and subsequent strategies and studies.

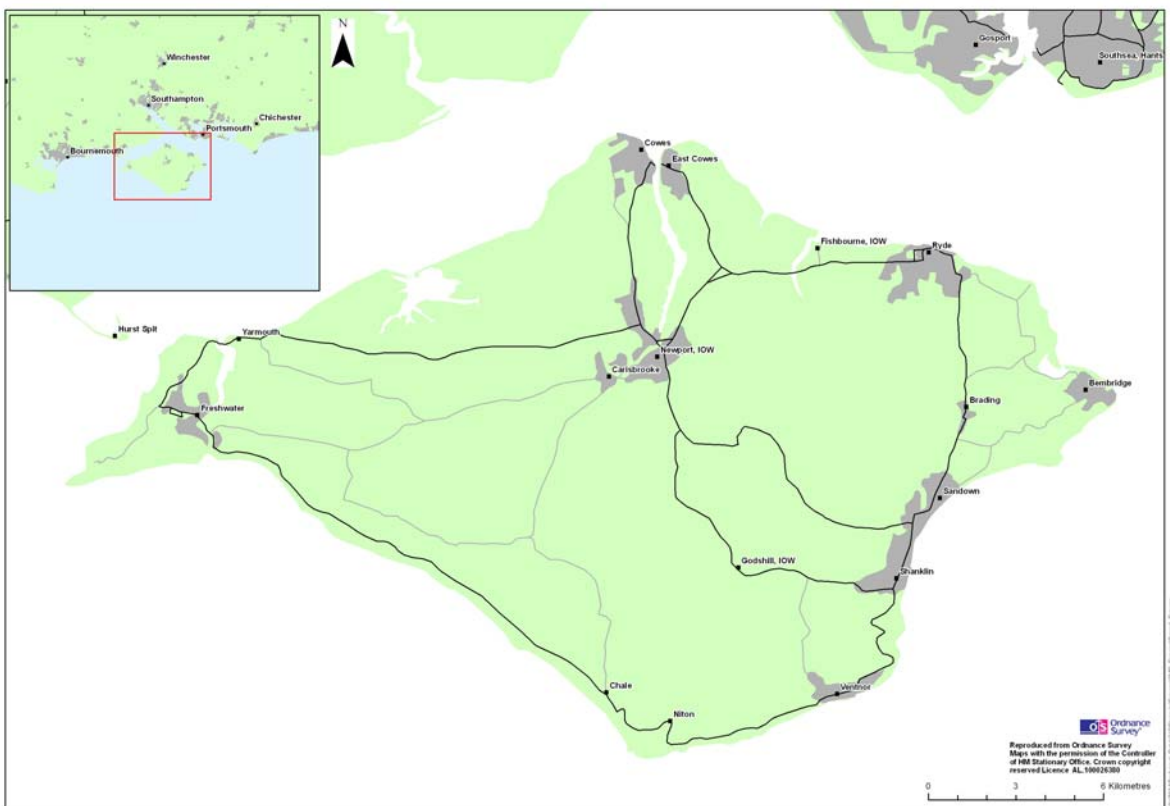


Figure 1.1: SMP coastline and estuaries,, the Isle of Wight

### 1.1.1 SMP Principles

The SMP2 is a non-statutory policy document for coastal defence management planning. It takes account of other existing planning initiatives and legislative requirements, and is intended to inform wider strategic planning. It does not set policy for anything other than coastal defence management. However, from this perspective, it aims to provide the context to, and consequence of, management decisions in other sectors of coastal management. Following the adoption of the SMP, the operating authorities will implement the Action Plan set out in Chapter 6 of this SMP, including (subject to the availability of funding) the development of Coastal Defence Strategy Studies (which identify the nature and type of works required for implementation of the SMP policy) and resulting Schemes (the design, construction and maintenance of coastal defences).

The SMP2 promotes management policies for a coastline into the 22<sup>nd</sup> Century that achieve long-term objectives without committing to unsustainable defence. It is, however, recognised that due to present day objectives and acceptance, wholesale changes to existing management practices may not be appropriate in the very short-term. Consequently, the SMP provides a timeline for objectives, policy and management changes; i.e. a 'route map' for decision makers to move from the present situation towards the future.

The first SMP for the Isle of Wight was completed in 1997 and worked clockwise around the coast. Since that time, more detailed Strategy Studies have been undertaken over sections of the coastline (listed in section 1.3.1) and these, together with academic research and monitoring by the responsible authorities, have improved our understanding of how the coast behaves. In addition, many lessons have been learnt with respect to how the SMP should be conducted and indeed how we should be viewing the management of the shoreline. Defra (2001, 2003) undertook a review of the results from SMP1, considering their strengths and weaknesses. This has led to revised guidance. Some of this guidance is targeted at achieving greater consistency in the assessments and presentation of the plans, but there are more fundamental issues that have been identified, which this and other SMP2s must address.

One significant issue is the inappropriateness of certain policies which, when tested in more detail with a view to being implemented, may be found to be unacceptable or impossible to justify; either in terms of economics or from a perspective of what communities need from the coast. It is, therefore, important that the SMP2 must be realistic given known legislation and constraints. There will be no value in a long-term plan which has policies driven by short-term politics or works that prove to be detrimental when considered several decades into the future.

Equally, the plan must also remain flexible enough to adapt to changes in legislation, politics and social attitudes. The plan, therefore, considers objectives, policy setting and management requirements for 3 main epochs; from the present day, medium term and long term, corresponding broadly to time periods of 0 to 20 years, 20 to 50 years and 50 to 100 years respectively. There is a need to have a long-term sustainable vision, which may change with time, but the SMP must demonstrate that defence decisions made today are not detrimental to achievement of that vision.

This plan covers an area of significant environmental value, but also has a strong history of human settlement and present use. These uses and interests are not inherently opposed. In reality it is the natural attraction combined with the historical coastal use, which gives this

area its distinct and considerable value to man in the present day. While individual core objectives or aims may therefore be set, and indeed are set with respect to each specific aspect of the area, the aim of the SMP2 must be to develop policy where, as far as possible, these specific objectives are not set in conflict. The underlying principle for the development of the plan has been to consider the specific circumstances of the differing sections of the coast and through this understanding, attempt to deliver the greatest benefit to the totality of coastal communities in an area.

### **1.1.2 SMP Process Objectives**

The objectives of the SMP process (as distinct from the objectives for management of the coast) are as follows:

- To provide an understanding of the coast, its behaviour and its values;
- To define, in general terms, the risks to people and to the developed, natural and historic environment within the SMP area over the next century;
- To identify the likely consequence of different management approaches and from this;
- To identify the preferred policies for managing those risks or creating opportunity for sustainable management;
- To examine the consequences of implementing the preferred policies in terms of the objectives for management;
- To set out procedures for monitoring the effectiveness of the SMP policies;
- To inform others so that future land use and development of the shoreline can take due account of the risks and preferred SMP policies; and
- To comply with international and national nature conservation legislation and biodiversity obligations.

### **1.1.3 Key Principles**

The following list of principles reflects the aspirations of all stakeholders. It will be used together with stakeholder objectives identified for each area of the coast and will aid policy development and identification of specific objectives. These objectives have been developed by consulting the CSG, Elected Members and key stakeholders, and are presented as aggregated objectives for each area. It is important to note that these come from the values that stakeholders place on the issues and features in each area. Some of these objectives therefore conflict with others. Because of this, the SMP will not be able to achieve all of these objectives. It should be noted that these principles have been set out in no particular order.

- To support an integrated approach to spatial planning, in particular recognising the interrelationships between:
  - Centres of development and surrounding communities;
  - Human activity and the natural and historic environment -in being essential for community identity, well being and vitality and in being highly significant for tourism and economic regeneration.
- To contribute to sustainable communities and development:
  - To maintain and support the main centres of economic activity;
  - To sustain the vitality and support adaptation, resultant from climate change and predicted sea level rise/increased erosion rates, of smaller scale settlements.
- To maintain the iconic status of the Isle of Wight.
- To minimise reliance on coastal defence and increase the resilience of communities.
- To maintain or enhance the high quality landscape.

- To support tourism and recreational opportunities.
- To avoid damage to and seek sustainable opportunities to enhance the natural environment in line with natural processes.
- To support the historic environment and cultural heritage where practicable.
- To maintain access to and from the Island.

#### 1.1.4 Policies

The generic shoreline management policies considered are those defined by Defra; they are represented by the statements:

- **No Active Intervention (NAI):** where there is no investment in coastal defences or operations.
- **Hold the existing defence Line (HTL):** by maintaining or changing the standard of protection. This policy should cover those situations where work or operations are carried out in front of the existing defences (such as beach recharge (see the glossary), rebuilding the toe of a structure, building offshore breakwaters and so on) to improve or maintain the standard of protection provided by the existing defence line. You should include in this policy other policies that involve operations to the back of existing defences (such as building secondary floodwalls) where they form an essential part of maintaining the current coastal defence system.
- **Managed Realignment (MR):** by allowing the shoreline to move backwards or forwards, with management to control or limit movement (such as reducing erosion or building new defences on the landward side of the original defences).
- **Advance the existing defence line (ATL):** by building new defences on the seaward side of the original defences. Using this policy should be limited to those policy units where significant land reclamation is considered.

Further information to clarify these policies is provided below:

##### **No Active Intervention**

The policy of NAI has developed from two distinct sets of circumstances. In the first, the SMP has identified the need for the coast to be allowed to develop naturally. Typically, it may be that erosion of a frontage is providing sediment to other sections of the coast and therefore, it may be important that the coast is allowed to continue to erode if sustainable intervention is to be achieved elsewhere. Where this or some similar condition applies, this is discussed in the SMP. The other situation where the policy of NAI is defined may arise, is where it is unlikely that operating authorities would provide funding for defence. It may be that works have a benefit/cost ratio which is not high enough, or there may not be priority funding. Where appropriate, the SMP introduces caveats to make this distinction. The SMP has identified that privately funded works may still be permissible, however, there may be conditions associated with this such that private works do not result in negative impacts on other interests.

##### **Hold the Line**

The intent of this policy is to maintain defence protection to important assets or interests at the coast. This does not necessarily mean that the existing defences would be maintained in exactly the same form as they are at present. There may be a need to adjust the local alignment in the future or to replace, or add, structures. In this way, constructing cross shore or shore linked structures, such as groynes or breakwaters, may be the approach adopted in the future under this policy, in specific cases. The proposed policy therefore sets the intent to maintain defence of the important features in an appropriate manner. In areas where HTL has been recommended, it is possible that funding may not be

forthcoming from the Flood and Coastal Erosion Risk Management (FCERM) budget, the main source of Government funding. The SMP has highlighted this and also identified what additional opportunities and benefits may be gained from a HTL policy. HTL also allows maintenance or improvement of private defences by landowners. Caveats are made in these circumstances highlighting the need for collaborative funding to achieve the proposed management plan. It may be difficult to deliver the HTL policy if neither Government nor alternative funding can be secured.

### **Managed Realignment**

This policy may arise from a series of different circumstances and objectives. The ethos of this policy is that management of the shoreline would be improved by either allowing for and/or creating the conditions for the coast to realign. A very obvious example of this is in moving a linear flood defence back from the active coastal zone, providing a more secure position for such a defence while the shoreline re-adjusts. Other examples are where intervention at the coast may be less onerous if the coast is allowed to retreat before intervention is undertaken. This may, for example, create the opportunity to retain a beach in front of a set back hard defence. A further example of MR is in considering how adjacent policy units function together. For example there could be a situation where in one unit there is a HTL policy and by implementing this, the coast in the adjacent unit is managed in a way to function more naturally. In summary, MR is used where there is a need for continued intervention either locally or more remotely, so as to achieve a specific outcome.

### **Advance the line**

An ATL policy may be adopted where advancement of the shoreline would assist in creating a more robust defensive position and provide additional opportunity for increased intertidal width and/or land reclaim. Advancement of the line may not necessarily require the construction of structures seaward of the existing shoreline. Examples include the construction of tidal barriers or outer harbour walls where this provides a more sustainable solution based on the objectives and core values of a given community or settlement. Alternatively, advancing the line can be used in order to introduce variation into the plan shape of a coastal frontage and encourage the accumulation of sediment and promote sustainable management of the intertidal width.

This defines the level of detail required by the SMP. However, in developing these generic policies there is also a basic requirement to state the intent of the policy, such that it is the intent, not the definitions given above, that drive future management.

## **1.2 Structure of the SMP**

The preferred plan and policies presented in this SMP are the result of collating and interpreting information from all the available studies and assessments of how the coast behaves physically. There is, therefore, a need to draw these threads together to provide clarity for different readerships. To this end, the documentation to communicate and support the plan is provided in a number of parts. At the broadest level these are divided into two; the SMP itself, and a series of supporting appendices. In addition, key contributing information is collated in a geographical information system (GIS) and database allowing information to be taken forward in implementing the plan for future users.

### **1.2.1 SMP Report Structure**

This document provides a plan for the future and the policies required for this plan to be implemented. This is intended for general readership and is the main tool for communicating the intention of future management. Whilst the justification for decisions is

presented, it does not provide all of the information behind the recommendations, this being contained in other documents. The plan is presented in seven parts:

- Chapter 1 *Introduction:* Gives details on the principles, aims, structure and background to the development of the Shoreline Management Plan. This chapter includes definitions of the four choices of management policies that can be applied to the shoreline.
- Chapter 2 *Environmental assessment:* Provides details of how the SMP meets the requirements of an Habitats Regulations Assessment (HRA) and Strategic Environmental Assessment (SEA).
- Chapter 3 *Basis for development of the Plan:* Provides a broad overview of the Isle of Wight coast, describing the concepts of seeking sustainable policies and an understanding of the constraints and limitations on adopting certain policies.
- Chapter 4 ***Policy development and the preferred Plan:*** This chapter contains the core of the SMP –the policies for each Policy Unit. It is important to understand the thought process of developing the SMP policies, not just the actual policies themselves. This chapter, therefore, is a key component of the SMP2 and leads the reader through the process of understanding why the decisions have been made.

The chapter starts with a discussion of the key risks the Isle of Wight coast faces in the future, followed by the definition of large segments of the coast, each with its own character (called Policy Development Zones; PDZs). The Isle of Wight coast is divided into seven PDZs, so Chapter 4 is then divided into seven sections.

- Cowes and the Medina Estuary (PDZ1)
- Ryde and the North-east Coastline (PDZ2)
- Bembridge and Sandown Bay (PDZ3)
- Ventnor and the Undercliff (PDZ4)
- South-west Coastline (PDZ5)
- West Wight (PDZ6)
- North-west Coastline (PDZ7)

Within each of the seven sections the coast is described and the potential future behaviour of the coast is explained in two ways:

- A) if no further coastal defence work was undertaken (the NAI or 'No Active Intervention' scenario);
- B) if present coastal management practices are continued into the future (the WPM or continuing 'With Present Management' scenario).

These are defined as the two 'baseline scenarios' in this SMP. These two predictions provide an understanding of what will be at risk if natural change is allowed to occur, or where our previous approach to management may become unsustainable in the future. It allows an assessment to be made of whether, under each scenario, the important uses and characteristics of the coast are retained or lost. This reveals where efforts are required to reduce the risks of coastal flooding and erosion in the future.



From this assessment, the preferred Plan is developed. To achieve this Plan, individual policies for sections of the coast are derived (Policy Units; PU). The Policy Units are grouped together into Management Areas (MA). Within a Management Area, the policy units have a basic interdependency. Together, the policies deliver co-ordinated management for the whole of the Management Area.

Within each of the seven sections (PDZ), the final part of the section is a series of **Management Area Statements**. These summarise how each area will be managed in the future and present the specific Policies for each Policy Unit within the area. The necessary actions over different time scales and the impacts of the preferred policies are summarised. Starting from an initial seven PDZs, the Isle of Wight coast is divided into sixty one Policy Units which are grouped into fifteen Management Areas.

Chapter 5 *Policy summary of preferred Plan and implications*: Provides a brief summary of the policies specified in Chapter 4 above, and brings together the overall plan, highlighting important issues in relation to the future management of the coast. It is appreciated that many readers will focus upon the local conclusions of the SMP. However, it is important to recognise that the SMP is produced for the coast as a whole, considering issues beyond specific locations. Therefore, this summary should be read in the context of the wider-scale issues and implications reported in Chapter 4 and supported by information in the Appendices.

Chapter 6 *Action Plan*: Following consultation on the draft plan, an Action Plan is completed, providing a programme of future activities which are required to progress the SMP between now and its next review in 5 to 10 years time, and in the longer term.

### 1.2.2 The Supporting Appendices

The accompanying documents provide all of the information required to develop and support the SMP policies. This is to ensure that there is clarity in the decision-making process and that the rationale behind the policies being promoted is both transparent and auditable. This information is largely of a technical nature and is provided in eleven Appendices:

- A. *SMP Development*: This reports the history of development of the SMP, describing more fully the plan and policy decision-making process.
- B. *Stakeholder Engagement*: Details of the stakeholder involvement process are provided here, together with information arising from the consultation process.
- C. *Baseline Process Understanding*: Includes reports on coastal processes, the current condition of the coastal defences, and the future coastal flooding and erosion risks (NAI and WPM scenarios).
- D. *Natural and Built Environment Baseline (Thematic Review)*: This report identifies the human, natural, historical and landscape features around the coast in terms of their significance and how these need to be recognised by the SMP.
- E. *Issues and Objectives Evaluation*: Identifies a series of issues and objectives for each section of the Isle of Wight coast, used as part of the Plan development.

- F. *Strategic Environmental Assessment*: Provides a systematic appraisal of the potential environmental consequences of the high-level decision-making of the SMP.
- G. *Scenario Testing*: This table assesses whether a policy of 'No Active Intervention' and also the 'Preferred Plan' achieve the objectives set for each length of coast.
- H. *Economic Appraisal*: Presents the economic analysis undertaken in support of the Preferred Plan.
- I. *Habitat Regulations Assessment – Appropriate Assessment (AA)*: Sets out the information for an AA of the SMP.
- J. *Water Framework Directive (WFD)*: Presents the WFD assessment with respect to the SMP policies.
- K. *Reference list & bibliographic database*: Presents the sources of data used in the development of the SMP.
- L. Information to the Secretary of State according to Regulations 49(5) and 51(2) of the Habitats Regulations.
- M. Statement of Environmental Particulars.

### 1.2.3 GIS and Database

The SMP2 provides a future management framework. It is accepted that our understanding of the coast can be improved, addressing the many areas of uncertainty that we are presently confronted with. There will also be changing circumstances not only as the coast evolves but as our use of the coast changes. During the development of the SMP, information such as the condition of defences, heritage information and erosion rates has been recorded.

This supplementary information is summarised in the SMP and recorded in a GIS and database provided to the operating authorities. This information is recorded in association with the actual plan so that, as new information emerges, this may be used to update the management system. The intent is two-fold. First, that information is recorded and may be compared with our existing knowledge such that better informed coastal management decisions can be made. Second, when the review for SMP3 is commissioned, the information is readily available for this process.

One important feature of this information is in the responses and issues which were raised during the stages of the consultation process. This data is recorded and contributes to the issues, features and objectives appendix (supporting appendix E) used for developing and appraising policy and in developing the final plan. Management of this information will help those managing the coast in the future to identify issues at a local scale, ensuring that views can be readily identified during the actual implementation of the Plan. The degree of effort all consulted have put in to developing the Plan is fully appreciated. The storage of issues information should help ensure that people's concerns are recognised in the future.

## 1.3 The Plan Development Process

### 1.3.1 The Need for Revision

The original SMP1 for the Isle of Wight (sub-cells 5d+e) was completed in 1997. It has always been recognised that part of the SMP process is that plans should be reviewed on a regular basis and re-considered in line with changes in legislation and guidance. In this first

revision, therefore, the development of the Plan has been able to draw upon and has had to take account of:

- Latest studies and modelling undertaken since the last SMP such as that provided by Futurecoast and the SCOPAC Sediment Transport Study (2004);
- Issues identified by most recent defence planning (i.e. the several draft and published coastal defence strategy plans which have now been produced to cover most of the Isle of Wight coastline –listed below);
- Changes in legislation (e.g. the EU Directives, guidance with respect to the Water Framework Directive (WFD), PPS25);
- Changes in national flood and coastal defence planning requirements (e.g. the need to consider 100 year timescales in future planning, modifications to economic evaluation criteria etc.);
- Improved information from strategic flood risk assessments; and
- The emerging thinking on Integrated Coastal Zone Management.

Recent Strategies, produced following the production of SMP1, have been as follows:

- North East Coastal Defence Strategy, led by Isle of Wight Council (completed in 2004);
- Eastern Yar Flood and Erosion Risk Management Strategy, led by Environment Agency (completed in 2010);
- West Wight Coastal Defence Strategy (in progress, scheduled for review and completion in the SMP Action Plan following completion of the SMP -action 0.18);
- Sandown & Undercliff Coastal Defence Strategy (in progress, scheduled for review and completion in the SMP Action Plan following completion of the SMP -action 0.19).

The period between the development of SMP1 and SMP2 has, therefore, been one of quite rapid change. With the manner in which the SMP2 has now been organised and the further understanding that has been developed, shoreline management has to be seen as an ongoing process providing a platform for more local decision making. It is anticipated that subsequent reviews may be undertaken in 10 years time. This timescale would ultimately be driven by the scale of change on the coast itself.

### **1.3.2 Review and Development Procedure**

The development of the SMP has been led by a steering group (called the Client Steering Group or CSG) which for this sub-cell comprises representatives from the two operating authorities (voting members) with associate partners and several key stakeholders (non-voting members). The operating authorities are the Isle of Wight Council-Coastal Management (Lead Authority) and the Environment Agency. The associate partners include Natural England and English Heritage. Due to the unique nature of the IW SMP with a limited number of Operating Authorities covering a wide area, several key stakeholders were also included as part of the CSG to ensure the information used in the development of the plan was accurate and to provide regular stakeholder input. These include: National Trust (significant landowner); Isle of Wight Council Planning Policy, Ecology and the IW Archaeological Centre; and also the Isle of Wight Estuaries Officer (a partnership including Cowes Harbour Commissioners and Yarmouth Harbour Commissioners). Together with the appointed Consultants, Royal Haskoning, the CSG have managed the necessary stages of the SMP2 process to produce this management plan.

The SMP development process has sought involvement from over 270 organisations or individuals including elected representatives, with principal periods of consultation being conducted during the in October 2008 and March 2010, with a three-month period of consultation on the full Draft Plan in July to October 2010. In addition, key stakeholders have also been involved through the CSG throughout the Plan development process.

The main activities in producing the SMP have been:

- Analysis of coastal processes, coastal defences and coastal evolution for baseline cases of not defending and continuing to defend as at present;
- Thematic reviews, reporting upon human, historic and natural environmental features and issues, evaluating these to determine relative values of the coast;
- Development and analysis of issues and objectives for various locations, assets and themes;
- Agreement of objectives with the CSG and stakeholders, and from this determining possible policy scenarios;
- Development of policy scenarios which consider different approaches to future shoreline management;
- Examination of the coastal evolution in response to these scenarios and assessment of the implications for the human, historic and natural environment; and
- Determination of the preferred plan and policies through review with the CSG, prior to compiling the SMP draft document.

This was followed by:

- Consultation on the proposed plan and policies;
- Consideration of responses and finalising the SMP; and
- Dissemination of the findings and policy contained within the Plan
- The finalisation of the action plan, to include Strategy Studies.

## 2 Environmental Assessment

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## 2 Environmental assessment

In carrying out the Isle of Wight SMP it is important to understand the relationship between the areas of environmental value (e.g. nature conservation and cultural heritage) and coastal processes, and understand how coastal defences can alter these coastal processes and therefore have an impact on the nature of the environment. In addition coastal defences may also have an impact on the landscape of an area, depending on the type of defence used, and the significance of this may depend upon the importance placed upon a particular landscape.

This chapter outlines the strategic process undertaken for the environmental appraisal of the Isle of Wight SMP based on the key requirements of the European Strategic Environmental Assessment (SEA) Directive (2001/42/EC), the EC Habitats Directive (92/43/EEC) and the Water Framework Directive (WFD) (2000/60/EC). It contains the following sections; environmental assessment within the SMP2 process, SEA, Habitats Regulations Assessment (HRA) and the WFD assessment.

### 2.1 Environmental Assessment within the SMP Process

#### 2.1.1 Existing Environment

The geology and geomorphology of the Isle of Wight coastline provides for a very rich natural environment, with a diversity of coastal habitats that include maritime cliffs and slopes, coastal saltmarsh, coastal saline lagoons, intertidal sand and mudflats and seagrass, grazing marshes, intertidal and subtidal rocky reefs and caves, estuaries and coastal woodland. These habitats are recognised for their international and national ecological and geomorphological value to nature conservation. The international designations along the coastline include five Special Areas of Conservation (SAC) including one European Marine Site (EMS), one Special Protection Area (SPA) and one Ramsar site; these are:

Special Areas of Conservation (SAC)	Special Protection Areas (SPA)	Ramsar sites
Solent Maritime	Solent and Southampton Water	Solent and Southampton Water
Briddlesford Copse		
Solent and Isle of Wight Lagoons		
South Wight Maritime		
Isle of Wight Downs		

The northern shores of the Island are composed mainly of soft and slumping clay cliffs and sheltered estuarine creeks and harbours. There are five small but important estuaries on the Island that have some significant areas of valuable intertidal mudflats, saltmarsh and coastal grazing marsh, which are of high conservation interest as they provide important feeding grounds for large populations of internationally important bird species such as waders, gulls and waterfowl. These estuaries are:

- Western Yar Estuary;
- Newtown Estuary;
- Medina Estuary;
- Wootton Creek; and
- Eastern Yar Estuary (Bembridge Harbour);

The coastal habitats of the south of the Island contrast with those of the north coast and consist mainly of cliffs. There are high Chalk cliffs, which support important plant communities and cliff nesting bird colonies, whilst the softer cliffs composed of sand and clay slump into a series of grassy terraces.

The Isle of Wight encompasses a diversity of geology, with exposures along stretches of coastal cliffs recording millions of years of coastal change. The geology is of great significance on account of the completeness of a variety of historical time periods that make a special contribution to the understanding and appreciation of earth science and geological history of the region and Britain. As a result, there are a number of nationally important geological features along the coastline, including seven geological Sites of Special Scientific Interest (SSSI) and two Regionally Important Geological and Geomorphological Sites (RIGS).

The above combination of selected natural environmental assets, supported by natural processes, associated with this particular SMP creates a coastline of great value, with a regionally important tourism economy. However, these existing environmental assets could quite easily be damaged by inappropriate coastal defences.

The current state of the natural and built environment for the Isle of Wight SMP study area is described in the Thematic Review presented in Appendix D of this report. This study identifies the key features of the natural, human, historical and landscape environments of the coastline, including a commentary on the characteristics, status, relevant designations, as well as the importance of these features and the 'benefits' they provide to wider society.

This is supplemented by the review of the coastal processes within the Baseline Process Understanding report, in Appendix C, which identifies the contemporary physical form of the coastline and the processes operating upon it.

### **2.1.2 The Appraisal Process**

A SMP provides an assessment of the risks associated with coastal evolution and provides a framework to address these risks to people and the developed, historic and natural environment in a sustainable manner. The SMP is a non-statutory, policy document for coastal defence management planning, which takes account of other existing planning initiatives and legislative requirements, being intended to inform wider strategic planning. It does not set policy for anything other than coastal defence management.

Full details on the background to the SMP and the appraisal process are set out in chapters 1 and 3, with the exact details of the procedure followed in development of the Plan being set out in Appendix A.

### **2.1.3 Stakeholder Engagement**

A wide variety of stakeholders have been involved in the development and the review process of the SMP, with regular consultation having been undertaken. This is one of the key changes from the first SMP, with this involvement having:

- Been undertaken throughout the development of the SMP;



- Given people and organisations an opportunity to comment on the environmental appraisal of options; and
- Allowed representations made by the organisations, communities and the public to be taken into account in the selection of policy options.

Stakeholders for the SMP have included representatives from local authorities, government agencies and industry. They have met periodically through the development of the SMP, including several key stakeholders attending the regular Client Steering Group (CSG) meetings, to input information and review outputs as the SMP has progressed. The CSG for the Isle of Wight SMP has comprised representatives from the Isle of Wight Council, Natural England (NE) and the Environment Agency (including the National Environmental Assessment Service - NEAS), with a remit to agree the various stages of the SMP as it progresses. The views of those whom the SMP policies will affect have therefore been involved in its development, which has ensured that all relevant issues have been considered.

Full details of all stages of stakeholder engagement undertaken during development of the draft Plan are presented in Appendix B. This includes copies of briefing materials.

#### **2.1.4 Environmental Objectives**

An integral part of the SMP development process has been the identification of issues and definition of objectives for future management of the shoreline. This was based upon an understanding of the existing environment, the aspirations of stakeholders and an understanding of the likely evolution of the shoreline under the hypothetical scenario of NAI (Appendix C3), which identifies the likely physical evolution of the coast without any future defence management and hence potential risks to shoreline features.

The definition and appraisal of objectives has been undertaken with engagement with stakeholders during development of the SMP (as identified in Appendix B). The full list of issues and objectives defined for this SMP is presented in Appendix E, which is supplemented by background information provided in the Thematic Studies (Appendix D). Appendix G includes consideration of how the objectives and hence the environment, would be affected under a NAI scenario, while chapter 5 of the SMP provides and draws together the overall potential environmental effects of the preferred policies.

#### **2.1.5 Environmental Effects of the Preferred Plan**

The rationale for development of the preferred plan within each PDZ is reported in chapter 4, which includes a summary policy statement for each MA, containing the environmental implications of the various scenarios recorded. A summary of how the preferred plan might perform with respect to different themes is presented in chapter 5.

Within the MA Summary Statements in chapter 4, further detail of the implications of the preferred plan for all of the internationally, nationally or regionally designated environmental areas are presented, as well as an identification of any mitigation measures that would be required in order to implement the policy. This is further supported through undertaking a SEA, HRA and WFD assessment of the SMP, with

the supporting information being provided in Appendices F,I and J, respectively (a brief overview of each of these environmental assessments are given below in sections 2.2, 2.3.and 2.4). Appendix L then provides the HRA Stage 4 Report, which provides details on the negative effects that the SMP2 has on any international designations and how this needs to be compensated for; this is the document that will be submitted to the Secretary of State alongside a supporting letter from Natural England stating the Imperative Reasons of Overriding Public Interest for why the SMP2 should be implemented.

## **2.2 Strategic Environmental Assessment (SEA)**

### **2.2.1 Background**

The Defra SMP guidance states that the environmental effects of all policies must be considered before deciding which policies will be adopted (Defra, 2006). Consideration should be made with regards to both the positive and negative effects of options on the environment.

Under Directive 2001/42/EC of the European Parliament and of the Council, and the legislative act which transposes the Directive into domestic law - the "Environmental Assessment of Plans and Programmes Regulations (SI 1633, 2004)" a Strategic Environmental Assessment (SEA) must be made of plans and programmes that are required by legislative, regulatory or administrative provisions. The intention of the Directive is to "*provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes with a view to promoting sustainable development*". SMPs clearly set a framework for future development and have much in common with the kind of plans and programmes for which the Directive is designed. As a result, Defra guidance recommends that operating authorities assess policies using the approach described in the Directive and the Regulations (Defra, 2006).

The SEA provides a systematic appraisal of the potential environmental consequences of high-level decision-making (i.e. plans, policies and programmes). By addressing strategic level issues, the SEA aids the selection of the preferred options, directs individual schemes towards the most appropriate solutions and locations and helps to ensure that resulting schemes comply with legislation and other environmental requirements. Within the SEA process and in a manner analogous to that used throughout the SMP, the term environment is used to cover the SEA receptors of biodiversity, habitats and species, populations and health, land use, material assets and infrastructure, geology and soil, water, air, climatic factors, landscape, cultural heritage (objects of archaeological, architectural or historical interest) and the intrinsic relationship between these (Defra, 2004). The SEA process follows five stages, though there are three distinct deliverables, the scoping report, the environmental report of the SMP2, and finally the Statement of Environmental Particulars which is completed following public consultation to demonstrate how the results of the environmental assessments (SEA, HRA and WFDA) and stakeholder and public comments are integrated into the Final SMP2 (refer to Appendix M of this report). The purpose of producing a scoping report is to establish the environmental baseline and identify the key environmental issues to be considered during subsequent stages of the SEA. It also includes the development of SEA assessment criteria and indicators for each of the SEA receptors so that there is the basis for the

assessment of SMP policy. With this in mind, the overall aims of the SEA associated with this SMP were to:

- Provide for a high level of environmental protection;
- Ensure that likely significant effects on the environment from the implementation of the SMP are identified, described and evaluated, so that they can be taken into account before the plan is adopted; and
- Evaluate the alternative SMP policies for their likely significant effects, taking into account the objectives and geographical scope, so that these can inform the nature and content of the SMP.

### **2.2.2 Evaluation of the Plan and Alternatives**

The function of a SMP is to consider the coast as a whole from the perspective of managing coastal flood and erosion risk. The behaviour of the Isle of Wight coastline is driven by its geological and geomorphological make-up and it is therefore evident that no one aspect of the coastal environment (in terms of its physical behaviour, natural or built) dominates. There is a complex interdependence between different values along the coastline that means that in some places a decision taken within one Policy Development Zone (PDZ) has the potential to affect other PDZs. It was, therefore, considered inappropriate that a simple rigid procedure of option appraisal over individual sections of the coast could be undertaken in deriving policy.

### **2.2.3 Monitoring Requirements**

In assessing the Isle of Wight SMP, areas of uncertainty have remained which were critical to the implementation of shoreline management. The SEA process has developed mitigation and monitoring to address specific issues identified throughout the development of the SEA. The need for this is management area specific and should largely be the responsibility of the operating authority or coastal manager within that area. This not only would then provide the information necessary to inform the on-going development of the plan but also provides essential contact between the development of the coast at this local level and decisions being made.

In finalising the Plan, an action plan has been created which brings together important linkages between the environment and the SMP, and introduces overall coherence for monitoring the SMP area, which will be delegated to one organisation. The approach to and requirement for monitoring is discussed in section 9 of the SEA. Detailed monitoring and definition of mitigation requirements will be undertaken as part of on-going management and development of strategy studies.

### **2.2.4 Summary of the SEA Environmental Report**

The predicted potentially significant impacts associated with the preferred policy options are presented in **Appendix F**, with a summary for each SEA receptor below and a summary of whether the objectives have been met in Table 1 below:

Human population and communities: There are seven key urban areas where the preferred SMP policy is to maintain existing defences, since they have been deemed economically viable in the long-term. This will result in a beneficial impact on people, their health and property by protecting the communities and their assets from flooding

or erosion. Protection is predominantly focussed upon larger conurbations, where the highest level of benefit is achieved. Under the recommended policies the majority of residential and commercial assets will be protected.

Land use, infrastructure and material assets: The SMP has aimed to protect major infrastructure, commercial and industrial areas and material assets for the entire plan's period, where economically viable to do so, to minimise risk, particularly where they are of great importance to the Island's economy.

Water quality and resources: In most areas around the Isle of Wight, the preferred SMP policy provides protection from flooding or erosion to potentially polluting features such as landfill sites. The separate WFDA (Appendix J) has addressed impacts of proposed policies under the SMP on freshwater, transitional, coastal and groundwater bodies in detail, with affects to one coastal water body (Solent) and four transitional water bodies (Medina, Wootton Creek, Eastern Yar and Western Yar). Refer to Section 2.4 below for more details.

Geology and soils: The preferred policies of NAI or MR have been mostly recommended in areas where there are limited human assets or along areas of undeveloped coastline. The cumulative impact on coastal geology of constraining coastal processes along the shoreline is of minor significance given that only small parts of two geological Sites of Special Scientific Interest and features of the South Wight Maritime SAC have been affected.

Landscape: Overall there is no plan to construct new defences in currently undefended areas, therefore most of the coastline which is nationally important for its landscape, with one Area of Outstanding Natural Beauty and the two Heritage Coasts will have negligible cumulative impacts as they will remain as today. As natural processes are to be allowed where possible, these are assessed as cumulative beneficial effects.

Biodiversity, habitats and species: A MR policy in PDZ 6 will result in the creation of mudflat and saltmarsh habitat in the Western Yar Estuary, however, it will also result in the loss of 31 hectares of internationally important coastal grazing marsh habitat in Thorley Brook and Barnfields Stream, which will need to be compensated for (refer to Section 2.3 below). The effects of the SMP2 policies on International designated sites are addressed in detail in the Appropriate Assessment of the HRA (see **Appendix I** of this SMP), whilst further details on the national and locally important designations is given in more detail in the SEA ER in **Appendix F**.

Historic Environment: Moderate cumulative adverse impacts on heritage assets are likely, as all policy options cause some adverse impact. There is a wide range of heritage assets around the Isle of Wight coast, with many more of these being protected through the SMP policies than would survive under a NAI policy. Significant protected features include the three Scheduled Monuments: Puckpool Mortar Battery, Sandown Barrack Battery and Yarmouth Castle and a large number of Grade I and II\* Listed Buildings. Quarr Abbey, a Scheduled Monument is landward of a NAI policy frontage and the precinct walls are at risk of coastal flooding in Epoch 3. In addition, Yaverland Fort Battery, a Scheduled Monument on a continuing unprotected coastline within Sandown Bay will start to incurr damages/losses in Epochs 2 and 3. These increased risks have been recognised and appropriate programmes of survey, recording and investigation to record these important sites will need to be undertaken.

**Table 1: Achievement summary of the SEA Objectives by PDZ (Y = yes achieved SEA objective, N = no did not achieve objective, P = partly achieved objective)**

SEA Receptors	SEA Objectives	Policy Development Zones						
		PDZ 1: Cowes and the Medina Estuary	PDZ 2: Ryde and the North-east Coastline	PDZ 3: Bembridge and Sandown Bay	PDZ 4: Ventnor and the Undercliff	PDZ 5: South-west Coastline	PDZ 6: West Wight	PDZ 7: North-west Coastline
Population, Communities and Human Health	<b>A:</b> To prevent or minimise loss / damage to residential properties from coastal erosion and flooding.	P	P	P	Y	N	P	N
	<b>B:</b> To prevent or minimise coastal erosion and flooding to key community assets (doctors, hospitals), recreation & tourism assets (leisure areas, beaches).	Y	Y	P	Y	P	P	n/a
	<b>C:</b> To prevent or minimise the loss / disruption to public footpaths and cycle routes.	P	P	P	P	N	N	P
Land Use, Material Assets / Infrastructure	<b>D:</b> To prevent or minimise the loss / damage / disruption to commercial properties and industrial sites.	Y	Y	Y	Y	n/a	Y	n/a
	<b>E:</b> To prevent or minimise the loss / damage / disruption to agricultural land.	P	P	Y	P	N	N	Y
	<b>F:</b> Prevent the loss / damage / disruption to transport and service infrastructure.	Y	P	Y	P	N	Y	n/a
Water Quality and Resources	<b>G:</b> To achieve the Environmental Objectives of the EC Water Framework Directive	P	P	P	Y	Y	P	Y
Geology & Soils	<b>H:</b> To prevent or minimise coastal erosion / flood management works that cause the loss / damage to designated geomorphological or geological interest features or significantly interrupt the supply of sediment to other areas of the Island.	P	Y	P	Y	Y	P	Y
Landscape	<b>I:</b> To protect and enhance the character and quality of the landscape and visual amenity from flooding and flood risk management works.	Y	Y	Y	Y	Y	Y	Y
Biodiversity, Habitats and Species	<b>J:</b> Identify and promote biodiversity opportunities to maintain, improve and avoid net loss of internationally and nationally important sites and habitats by sustainably managing coastal erosion and flood risk.	P	P	Y	Y	Y	P	Y
	<b>K:</b> Promote a balanced approach when maintaining, improving and avoiding net loss of terrestrial, freshwater and coastal habitats.	Y	Y	P	Y	Y	P	Y
Cultural Heritage	<b>L:</b> To prevent heritage assets from being lost / damaged by coastal erosion or flooding without implementing appropriate mitigation measures or preservation of evidence by record.	P	P	P	P	Y	P	N

## **2.3 Habitats Regulations Assessment (HRA)**

### **2.3.1 Background**

A Habitats Regulations Assessment (Stage 3 of which is the Appropriate Assessment) is a requirement of the EC Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora) and its implementation in the UK under the Conservation of Habitats and Species Regulations 2010 (hereon in referred to as the “Habitats Regulations”). Under Regulation 61 (1), an assessment of the implications a plan or project is required, which determines whether the plan or project either alone or in combination with other plans or projects is likely to have a significant effect on European sites or European offshore marine sites and is not directly connected with or necessary for the management of the site. A European site is defined as being either a Special Area of Conservation (SAC) (sites designated under EC Habitats Directive 92/43/EEC) or a Special Protection Area (SPA) (sites designated under Council Directive 79/409/EEC on the conservation of wild birds). Furthermore, Planning Policy Statement 9 (PPS9) specifies that wetlands of international importance designated under the Ramsar Convention (known as ‘Ramsar sites’) should also be subject to the provisions of the Habitats Regulations (ODPM, 2005a).

HRA is the mandatory process to support a decision by the 'Competent Authority', in this case the Isle of Wight Council, as to whether the proposed plan or project would have an adverse effect on the integrity of any international site. The “integrity of the site” is defined in the Government Circular: Biodiversity and geological conservation – statutory obligations and their impact within the planning system. Adverse effect is quantified as one that prevents the site from maintaining the same contribution to favourable conservation status of the qualifying feature(s) for which it was designated. The conservation status and integrity of the site is defined through the site's conservation objectives and it is against these objectives that the effects of the plan or project must be assessed. Conservation objectives set out the physical, chemical and biological thresholds and limits of anthropogenic activity and disturbance which are required to be met to achieve the integrity of the site. Conservation objectives for European Marine Sites are set out in the Relevant Regulation 33 documents for each site, which for English European Marine Sites are the responsibility of Natural England.

Where it is not possible to determine that a plan or project under consideration will not have an adverse effect on the integrity of an international site, then Stage 4 of the HRA process needs to be implemented (this is recorded in Appendix L of this report), which involves assessing any alternative solutions which avoid harming site integrity must be sought. If alternatives are not possible, then the plan or project can only proceed on the basis of Imperative Reasons of Over-riding Public Importance (IROPI). If IROPI is agreed by the Secretary of State, then compensatory measures must be secured to offset damage done by the plan or project, such that the overall coherence of the SAC/SPA network is maintained.

### **2.3.2 Habitats Regulations Assessment in the Land Use Plan Context**

The Office of the Department for Communities and Local Government (DCLG) has produced draft guidance on how to determine the need for an AA for a given land use plan and the provision of an assessment if one is considered to be required (DCLG,

2006). Natural England has provided an internal draft document relating to the provision of AAs for Regional Spatial Strategies (RSSs) and Sub-Regional Strategies (SRSs), while more specific guidance on assessing SMPs in terms of the Habitats Regulations 2010 is available from the Environment Agency (Natural England, 2006 and Environment Agency, draft). These three guidance documents provide the most cohesive source of guidance relating to the provision of Stage 3 Appropriate Assessments for SMPs. These documents relate explicitly to land use plans; however, given that SMPs have the potential to influence the development of land, this guidance has been applied in this report to SMP policy. An HRA is simply a mechanism to establish the actual scale and implications of impacts and to provide a determination on whether a course of action is acceptable or unacceptable, in terms of its impacts on the integrity of international sites.

### 2.3.3 Summary of the HRA Stage 2: Scoping

During the development of the Isle of Wight SMP, the opportunity has been presented to align the development of SMP policy with the requirements of the Habitats Regulations, allowing for the development of SMP policy which takes into account site integrity. The area covered by the Isle of Wight SMP2 supports significant assemblages of habitats and species that are protected through international nature conservation designations, which include SACs, SPAs and Ramsar sites. SACs and SPAs are collectively termed Natura 2000 sites. The Isle of Wight SMP2 area includes five SACs, one SPA and one Ramsar site (see Section 2.1 above). On the basis of the nature of SMPs, in terms of their critical role in determining key coastal processes, and thus the extent and status of the internationally designated natural habitats along the coastline of Isle of Wight, ***it cannot be concluded that there would not be a likely significant effect of the SMP on the site.*** The SMP has therefore been subject to a full HRA.

### 2.3.4 Summary of the HRA Stage 3: Appropriate Assessment for the SMP2

The findings of the assessment have determined that the Isle of Wight SMP2 will have **an adverse effect** on the integrity of **two European nature conservation designated sites** as a result of the policy at Yarmouth Mill and Thorley (PU6C.5). These sites are the **Solent & Southampton Water SPA and Ramsar sites** for 31 hectares of coastal grazing marsh. The loss of this coastal grazing marsh will also result in the potential loss of seaward feeding and high tide roost sites important for internationally important wader and wildfowl bird species. The preferred policy for Policy Unit 6C.5 (Yarmouth Mill and Thorley) is to Hold The Line in the short term (Epoch 1), followed by Managed Realignment in the medium term (Epoch 2), and No Active Intervention in the long term (Epoch 3). The loss of habitats over the 100 year period from this policy suite is given in Table 1 below.

Table 1: Loss of habitats over the SMP2 period for the Solent and Southampton SPA/Ramsar site

Habitat Types	Loss of Habitat Area (ha)			Total (ha)
	0-20 years	20-50 years	50-100 years	
Coastal grazing marsh	0	31	0	31

### 2.3.5 Stage 4 of the HRA

Since this Assessment concludes that the Final SMP2 will lead to an adverse effect on the integrity of two European designated nature conservation sites through the loss of 31 hectares of coastal grazing marsh, then Stage 4 of the Habitats Regulations Assessment is required to be submitted to the Secretary of the State according to Regulations 62 (5) and 64 (2) of the Habitats Regulations 2010. This is found in Appendix L of this SMP2 and will be submitted with the support from Natural England. This last stage assesses whether there are any alternative solutions or preventative measures to the policy (PU6C.5) that is resulting in the adverse effect, and to determine that the SMP2 should be permitted for Imperative Reasons of Overriding Public Interest. Compensatory habitat measures must therefore be secured to ensure that the overall coherence of the Natura 2000 network is protected. **Appendix L** will also record the compensation habitat required to pass onto the Environment Agency's Southern Regional Habitat Creation Programme for delivery, which is the Government's recommended vehicle for delivering strategic habitat compensation and are funded in advance of policies that cause damage. The full detail of Stages 1 to 3 of the HRA for the international sites associated with the Isle of Wight SMP is provided as **Appendix I**, whilst Stage 4 is provided in **Appendix L**.

## 2.4 Water Framework Directive Assessment (WFDA)

### 2.4.1 Background

The Water Framework Directive (WFD) 2000/60/EC is the most substantial piece of EC water legislation to date and needs to be taken into account in the planning of all new activities in the water environment. The WFD was transposed into law in England and Wales by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003. The requirements of the Directive to protect, improve and provide for sustainable use of the water environment is implemented through the recently approved (by the Secretary of State for the Department for Environment, Food and Rural Affairs) River Basin Management Plans (RBMPs), of which the Isle of Wight falls within the South East RBMP. Furthermore, the European Floods Directive (2007/60/EC on the assessment and management of flood risks) requires that the environmental objectives of the WFD are taken into account in flood and coastal erosion plans.

The WFD therefore needs to be considered at all stages of the river and coastal planning and development process. The Environment Agency (the competent authority in England and Wales responsible for delivering the Directive) has recommended that decisions setting policy, including large-scale plans such as Shoreline Management Plans (SMPs), take account of the requirements of the Directive. This has been done according to the *Water Framework Directive: Guidance for Assessment of SMPs under WFD*, which was recently developed for the Environment Agency (Royal Haskoning, 2009). The guidance describes the methodology for assessing the potential hydromorphological change and consequent ecological impact of SMP2 policies and ensuring that SMP2 policy setting takes account of the Directive.



## 2.4.2 Evaluation of the Plan

The methodology devised for WFDA consists of a series of clearly defined steps, broadly following the tasks and activities described within the Defra guidance on producing SMPs, to provide a transparent and accountable assessment of the SMP2 policies (Defra, 2006).

The Directive requires that Environmental Objectives be set for all surface and ground waters in each EU Member State. The generic Environmental Objectives (based on Article 4.1 of the Directive) have been used for the assessment of the SMP2 in relation to the Directive; the objectives are:

- WFD Objective 1: No changes affecting high status sites.
- WFD Objective 2: No changes that will cause failure to meet surface water Good Ecological Status or Potential or result in a deterioration of surface water Ecological Status or Potential.
- WFD Objective 3: No changes which will permanently prevent or compromise the Environmental Objectives being met in other water bodies.
- WFD Objective 4: No changes that will cause failure to meet good groundwater status or result in a deterioration of groundwater status.

## 2.4.3 Mitigation Measures

Specific mitigation measures have been set for each River Basin District (RBD) to achieve the Environmental Objectives of the Directive. These measures are to mitigate impacts that have been or are being caused by human activity, such as flood and coastal defence works. In other words, measures to enhance and restore the quality of the existing environment. These mitigation measures are delivered through the RBMPs and listed in a Programme of Measures within the relevant RBMP.

## 2.4.4 Conclusions of the Water Framework Directive Assessment

The WFD assessment of the Final SMP2 policies identified that there is potential that four of the seven PDZs have the potential to contribute to the failure to meet Environmental Objective WFD2. Whilst, there are two PDZs that have the potential to fail to meet Environmental Objective WFD3 (see Table 2 below). The policies that cause the potential for failure are presented in Table 2 below. The water bodies likely to be affected is one coastal water body (Solent) and four Transitional water bodies (Solent, Medina Estuary, Wootton Creek, Eastern Yar and Western Yar) within the Isle of Wight SMP2 area. As a result, Water Framework Directive Summary Statements have been completed for these five water bodies, which can be found in Appendix J.

It must be noted that this assessment is based upon a precautionary approach where it has been determined that there is potential for SMP2 policies to result in deterioration of Ecological Status or Potential of a water body and hence potential for failure to meet WFD Environmental Objectives. Therefore, a precautionary check has been made against the conditions outlined in Article 4.7 of the Directive. The Summary Statements in Section J3 of the WFDA outline the reasons behind selecting the preferred SMP2 policy and any relevant South East River Basin Management Plan mitigation measures that have been incorporated into policies, or that must be included in the SMP2 Action Plan so that all strategy or schemes incorporate these

measures to ensure that Good Ecological Potential/Status is achieved or maintained by either 2015 or 2027 at the latest. The WFD assessment for the SMP is provided as **Appendix J**.

**Table 2: Summary of the policy units that have the potential to fail the WFD Environmental Objectives**

Water Body	TraC Type	Designation	Current Ecological Status / Potential	Overall Objective	Policy Units against WFD 2	Policy Units against WFD 3
<b>Solent</b>	Coastal	Heavily modified water body (HMWB)	Moderate Potential	Good Ecological Potential (GEP) by 2015	2B.6, 2B.7, 2C.4, 6B.1, 6B.3	
<b>Medina Estuary</b>	Transitional	HMWB	Moderate Potential	GEP by 2027	1A.4, 1A.5, 1B.2, 1B.4	1B.2, 1B.5
<b>Wootton Creek</b>	Transitional	HMWB	Moderate Potential	GEP by 2027	2B.2, 2B.4	
<b>Eastern Yar</b>	Transitional	HMWB	Moderate Potential	GEP by 2027	3A.3, 3A.4	
<b>Western Yar</b>	Transitional	HMWB	Moderate Potential	GEP by 2027	6C.3, 6C.6	6C.5

## References

Defra (2004). Guidance on SEA. Department of Environment, Food and Rural Affairs.

DCLG (2006). Planning for the protection of European Sites: Appropriate Assessment Guidance for Regional Spatial Strategies and Local Development Documents. Department for Communities and Local Government.

Natural England (2006). The Assessment of Regional Spatial Strategies under the Provisions of the Habitats Regulations – Draft Guidance. English Nature.

Environment Agency (draft). Appropriate Assessment of Flood Risk Management Plans Under the Habitats Regulations

Royal Haskoning (2009) Water Framework Directive: Guidance for Assessment of SMPs under WFD. January 2009.

### 3. Basis for development of the Plan

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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 Isle of Wight coastline has been shaped by major sea level fluctuations which have occurred in response to periods of glaciation. During the last cold period of the Ice Age sea levels fell by up to 140 metres. At this time, the Island's Chalk spine would have extended to the Isle of Purbeck in Dorset. As the ice sheets melted and sea levels rose over the period 15,000 to 5,000 years BP (before present), the Chalk ridge was eroded and the valley behind flooded, forming the Solent and separating the Isle of Wight from the mainland. During this period of fluctuating sea levels the Isle of Wight coastline was subject to rapid rates of erosion. The sediments resulting from the erosion of the Island's cliffs were transported to form various sand and gravel banks in the eastern Solent.

The present day northern coast of the Isle of Wight is generally characterised by relatively low-lying coastal slopes, with five estuaries and rivers draining north into the Solent. By contrast the southern coast is generally characterised by steep coastal cliffs and landslides. Hard engineered coast protection structures and sea defences, plus the replenishment of beach material, continue to artificially hold the frontage in a 'stable' form.



Figure 3.1 An overview of the Isle of Wight area (Isle of Wight Council).

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

#### Geology

The solid geology and structure of the Island is dominated by a strong east-west monocline – a Chalk ridge which cuts through the centre of the Island and is exposed at either end to form headlands at The Needles in the west and Culver Cliff in the east. This ridge is the result of tectonic activity 30 million years ago (the Cainozoic era) causing a folding of the Isle of Wight rocks. The sedimentary rocks forming the Isle of Wight are relatively weak and vulnerable to erosion, forming relatively low-lying coastal slopes and estuaries in the north and steep sea cliffs in the south. A prominent feature of the south coast is The Undercliff - an ancient coastal landslide complex extending from Luccombe in the east to Blackgang in the west. The feature is approximately 12km in length and extends approximately 500m inland and nearly 2km seawards. The Undercliff is formed below the Lower Cretaceous and Chalk outlier known as the Southern Downs.

### **Influence of Manmade Defences**

A number of chapters of the Islands coastline have been modified by the construction and maintenance of hard coastal defences; namely Cowes, East Cowes, Ryde, parts of east Wight, Ventnor, Sandown Bay, Freshwater Bay and in the extreme north-west. This means that in some areas natural shoreline dynamics may be altered, which has implications for future shoreline management.

A relatively sheltered and low energy shore unit is identified to extend along the heavily protected coast from Ryde to Nettlestone Point. The regionally significant sediment sink of Ryde Sands fronts Ryde Esplanade and marina backed by seawalls. The coast around Ryde is enclosed entirely by sea-wall structures and coastal slopes appear stable.

With the emergence of the twin resorts of Shanklin and Sandown in the 19th century, installation of substantial sea walls and promenades removed the former cliff line from the direct influence of wave-induced attack. The coastal frontage between Yaverland and Shanklin Chine is fully protected by a variety of structures. These include sea walls, revetments and groyne fields that have been subject to both renewal and extension for more than a century. Immediately north-east of Yaverland the seawall terminates and there is no northwards protection against marine erosion. Although isolated from wave activity by sea defences, the former 40m high sea cliffs along the Sandown to Shanklin coastline remain geomorphologically active to a limited extent, due to sub-aerial weathering and minor mass movement. Various protection techniques including cliff-top regrading, drainage, timber shuttering, geofabric/grass matting, netting, rock bolting and talus reprofiling and removal have been implemented to manage this problem over a 3.5km length, including recent cliff stabilisation works at Shanklin in May 2008.

From Monks Bay to Ventnor the shoreline is stabilised by continuous seawalls with some boulder revetments. Rock revetments are also present from Ventnor and Steephill Cove, with seawalls in the east of this chapter. Defences function directly to halt toe erosion and also to provide support to the toe of the coastal slope to reduce occurrences of instability within the Ventnor Undercliff Landslide Complex. Several cliff stabilisation schemes involving re-grading and drainage have been developed in addition to the general toe protection and weighting. Interventions around Ventnor and Bonchurch appear to have significantly reduced the occurrences of landslide re-activations within the landward terraces.

Most of the north coast of the Isle of Wight is natural but there has been localised shoreline stabilisation by seawalls near the settlements of Totland, Yarmouth, Cowes and East Cowes. Norton Spit at the entrance to the Western Yar Estuary has been stabilised and its sediments impounded such that natural adjustments of this feature are no longer possible.

## **Physical Interaction**

### *Hydrodynamics*

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

### *Wave Climate*

The wave climate varies greatly across the Isle of Wight SMP coast due to the multi-directional frontage. 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 south-east and 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 involving local temporary movement of sediment.

The largest waves (and therefore greatest amount of wave energy) are received by the area of south-west coast from St. Catherine's Point to The Needles. This frontage occupies one of the most exposed locations on the south coast of England with long fetches in excess of 4,000km to the south-west extending directly into the north-east Atlantic as well as shorter fetches to the south across the English Channel.

The east-facing coast is relatively protected from waves generated by dominant westerly winds, although it is subject to the residual energy of swell waves refracted by a combination of offshore seabed topography and the change in coastal plan at Dunnose. It is, however, fully exposed to a fetch distance of just over 200km, extending east and east-south-east within the Channel; over which large waves can be propagated in association with easterly gale-force winds.

The south-facing Undercliff has a maximum fetch of 150km (except at Blackgang, which is directly exposed to Atlantic swell waves), defined by the opposing Channel coast of France, although it is also in receipt of refracted ocean swell from the west and south-west (SCOPAC, 1991/2004).

The Needles headland provides significant shelter to much of the north-west facing frontage from waves approaching from the south and south-west. Despite this, this frontage is potentially exposed to dominant waves approaching from the west and north-west.

### *Tides*

Strong tidal currents are generated in the western Solent and these contribute additionally towards sediment mobility in specific areas. Tidal currents are less rapid in the East Solent (generally  $<1\text{ms}^{-1}$ ) compared to the West ( $>2\text{ms}^{-1}$ ). Tidal currents are often strong, especially during spring tides and where either the shape of the coast or the seabed contours cause a concentration of the flows. Along the Undercliff coast, tidal

currents are particularly strong in the vicinity of St Catherine's Point, resulting from the coastal topography and seabed depth helping to concentrate flows at this location.

Entry of coarse sediments into the West Solent from Christchurch Bay is normally restricted by tidal conditions at Hurst Narrows. Examination of tidal curves for Lymington, Yarmouth and Totland reveal marked asymmetry, because the ebb flow is concentrated into a shorter time period than the flood (SCOPAC, 2004). The ebb flow is therefore considerably more rapid than the flood and transport of coarse bedload sediments (sand and gravel) is therefore likely to be in a net southeastward direction, parallel to the shoreline between Fort Albert and the Needles, determined by peak current velocities. Dyer (1971, in SCOPAC, 2004) has shown that ebb and flood tidal streams have sinuous courses in the West Solent; thus the relative effectiveness of tidal currents varies spatially, with strongest flows adjacent to meander bends. Locally strong currents are generated by exchange of tidal waters at the mouths of the Western Yar, Newtown Harbour and Medina Estuaries.

Tidal flow through narrow entrances to estuaries and inlets generates rapid currents which interrupt littoral sediment transport causing local circulation effects and associated changes in coastal configuration.

#### *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 in the chapters above control and modify the behaviour of the coast either directly or indirectly:

- Directly in terms of sediment movement, for example with a down-drift headland acting as a control point allowing the coast up-drift to realign to a stable position but regulating sediment down-drift, ,
- Directly where a restraint determines the position of the coast, restraining movement of adjacent chapters of the coast,
- Indirectly where an up-drift headland influences coastal forces, modifying direction or energy at the shoreline,
- Indirectly where a natural or artificial barrier modifies forces acting at the shoreline,
- Indirectly where forces in the nearshore area are interrupted or redirected.

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. There are occasional exceptions to this dominant regime in the vicinity of the harbour mouths and headlands.

Marine erosion has continued around most of the Island to produce a near-continuous cliff line that varies greatly in terms of morphology and rates and styles of weathering and landslide activity. The south coast in particular is vulnerable to large storms



crossing the Atlantic and rates of erosion are particularly rapid in the softer Wealden rocks along the south-west coast of the Island. The exposed (high energy) southern coasts also allow greater potential for shoreline sediment transport compared to those along the sheltered environments of the Solent to the north.

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*

There are distinct differences between the exposed southerly and westerly facing coasts (potentially rapid marine erosion) and the relatively sheltered north coast (more modest toe erosion), although in both areas erosion can trigger a degree of further slope failure and retreat. Cliff erosion materials deposited on the foreshore are valuable inputs to the immediate littoral system and also contribute to beaches further downdrift. Cliff sediments provide more permanent protection of the cliff toe if they are sufficiently durable to remain on the local beach and are not removed by littoral drift. In spite of continued cliff erosion sediment inputs, local beaches are not large, suggesting that most materials continue to be removed and that the Island's beaches are open systems dependent upon continued inputs for their stability and even survival. Since sedimentation is generally confined to Ryde Sands and limited areas at small spits or within the estuaries, the Island apparently functions as a sediment source or donor to other areas including the offshore zone.

Around the coast of the Isle of Wight, seabed sands and gravels are highly mobile during peak flow conditions, with a general eastward transport of bedload sediment. In sites where this general trend is interrupted, for example at Thorness Bay and Hurst Narrows, sand and shingle banks have formed.

Given the importance of the cliffs in sediment supply terms, an important part of the overall plan is to allow continued erosion of the cliffed frontages wherever possible. This also helps to satisfy a number of high level SMP objectives. Generally this approach is not detrimental to designated environmental sites because allowing natural erosional process to continue and maintaining geological exposure is key to their citation.

#### *Beach Recharge*

Another 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). However recharge actually represents a small input of new material to the SMP frontage.

The small scale recharge activities have been concentrated in the region from Bembridge Point to Forelands Fields where several small-scale beach recharges have also been practised since the 1980s.

Limited beach nourishment has been undertaken in the past at several locations in response to falling beach levels so as to temporarily prevent undermining of coast protection structures and reduce the historical trend of inter-tidal narrowing (Halcrow, 1997). In all cases, volumes are small and designs governed by the perception of critical losses rather than thorough and systematic long term monitoring of beach profiles and volumes. The main sites are:

- Yarmouth Pier to Yarmouth Common: Small scale gravel replenishment was introduced in response to falling beach levels east of Fort Victoria (Hydraulics Research, 1977a).
- Norton Spit: Stabilisation of the spit by groynes and revetments and ad hoc reinstatement of beaches by gravel nourishment/replenishment (Lewis and Duvivier, 1981; Barrett, 1985; Posford Duvivier, 1989a) has been undertaken over the past 25 years.
- Fort Victoria: Co-ordinated shingle replenishment and groyne construction occurred immediately east of Fort Victoria, to prevent shoreline recession affecting the coastal access road (Lewis and Duvivier, 1981; Barrett, 1985; Posford Duvivier, 1989a). The source materials were predominantly rounded pebbles from Solent Bank, and other marine sources.
- Old Castle Point to Shrape Breakwater, Cowes Harbour entrance.

#### *Dredging*

The entrances to the Western Yar and Medina Estuaries have been dredged to maintain navigable channels for car ferries. Dredging at estuary entrances and within the main West Solent channel represents a net output from the sediment budget and may result in loss of sediments that might otherwise be transported to shorelines. Dredging of Yarmouth Harbour entrance has been undertaken for navigation purposes and in 2009 a trial of beneficial use moved the dredged shingle to the north of the breakwater in order to keep the sediment in the system and help to defend the breakwater structure.

Solent Bank, a major gravel and sand accumulation within the Western Solent, has been denuded of sediment by aggregate dredging over the period 1950-1990. This intervention has resulted in removal of around 10 million m<sup>3</sup> of material, with consequent lowering of the bank by over three metres. The impacts of these actions are difficult to determine although wave shoaling and refraction could have been affected (primarily at low tide).

#### *Coastal Change*

The coastal zone is a dynamic environment, reliant on natural process to form the boundary between land and the sea.

Along the Dunnose to The Needles coastline, the main pressure for change has been cliff erosion and slope failure. 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.

Along the south-west coast rising sea-levels of the mid to late Holocene re-occupied former degraded cliffs initiating renewed erosion of its soft Cretaceous sands and clays to form a rapidly retreating linear or slightly embayed cliff coastline some 15km in length. As the coast retreated it has produced a shallow nearshore shelf, or shore platform extending seaward for some 4km which is thought to indicate the extent of late Holocene coastal recession.

The coast between Culver Cliff and Dunnose has developed through marine erosion of the predominantly soft clays and sands of the Lower Cretaceous strata and Upper Cretaceous Chalk. Erosion would have operated over the past 5,000-6,000 years, since the rising sea-level has approached its present elevation. Extensive shore platforms provide evidence for long-term recession in outcrops of more resistant bedrock, and appear to extend seawards of low water. In total, several kilometres of recession have occurred; sufficient to release large quantities of predominantly sandy sediment.

The north coast of the Isle of Wight comprises the north facing valley side of the former Solent River that became occupied/re-occupied by marine inundation 7,000 to 8,000 years before present. It is generally more exposed than the corresponding mainland shore to waves and tidal currents. Erosion has therefore prevailed of the toes of coastal slopes formed in soft Palaeocene, Eocene and Oligocene clays and mantled by relic landslides. In this situation the slopes and cliffs are inherently sensitive to erosion and renewed landslide activity, even when the driving marine forces are relatively weak.

### **Coastal Change Policy**

Planning Policy Statement 25 (PPS25) on Development and Flood Risk (revised in March 2010) sets out the Government's spatial planning policy on development and flood risk. The PPS25 Development and Flood Risk -Practice Guide was published in December 2009, complementary to *PPS25 Development and Flood Risk* and providing guidelines on how to implement development and flood risk policies by the land use planning system. In March 2010 Communities and Local Government (CLG) released the PPS25 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.

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 chapters of the community or require major realignment, (including transport links and so forth) may potentially be flagged as a CCMA.

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 coastal change fund of up to £11 million is supporting the work.

## 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 expected. 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 1 below sets out the allowances provided in the guidance.

South-east England	Net sea level rise in mm/yr
1990-2025	4.0
2025-2055	8.5
2055-2085	12
2085-2115	15

Table 1: Sea level rise predictions published by Defra in 2006 as a supplementary note to Operating Authorities, defining the sea level rise allowances to be used in coastal management schemes and plans, including the SMP2 review.

Based on the above values, the following amounts of sea level rise are calculated for the SMP frontage, used in the development of this Shoreline Management Plan. The amounts of predicted sea level rise (in centimetres) are displayed as increases above the standard 1990 baseline sea level, or alternatively as increases from the start of 2009, until 2105:

Epochs	Sea level rise in cm:	
	From 1990 (standard baseline):	From 2009:
By 2025	+14cm	+7cm
By 2055	+39.5cm	+32cm
By 2105	+105.5cm	+98cm

Table 2: Sea level rise predictions for the Isle of Wight (based on Table 1).

The SMP2 flood mapping draws on the 2009 Isle of Wight SFRA –Tidal Climate Change Mapping Update (courtesy of Entec UK Ltd. & Isle of Wight Council Planning Services, September 2009), with work by Royal Haskoning for SMP2. In future, where appropriate, the Environment Agency Extreme Tide figures could be utilised as a data source by implementation activities (eg. in Coastal Defence Strategies). The SMP2 assessment has used baseline flood and topographic data generated by the

Environment Agency and taken account of the sea level rise allowances shown in Table 1 to provide potential water inundation outlines and assess future risks. Further information is provided in Appendix C3.

The flood zones show the areas that could be affected by flooding from the sea, if there were no flood defences in place. In chapter 4, the introductory map for each PDZ shows the current tidal Flood Zone 3. Flood zone 3 shows the area that could be affected by a flood event that has a 0.5 per cent (1 in 200) or greater chance of happening each year. The Management Area Statement maps provided at the end of chapter 4 show the current tidal Flood Zone 2. Flood zone 2 shows the area that could be affected by an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year.

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 Projections were released (<http://ukclimateprojections.defra.gov.uk/>). 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 current guidance and consistent with other SMP reviews. Further information can be found in Appendix C1-Annex B (section 4.2).

### **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 Isle of Wight has excellent coastal monitoring records; however this can still be regarded as limited data when considering the longer term, particularly where cyclical processes are involved. The erosion zones presented within the SMP are to be treated as indicative lines, as they are predictions based on present day understanding. 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) is underway 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 that there is opportunity for sustainable management for the next 100 years.

The coastline is a dynamic environment and is constantly changing and there will be continued pressure from erosion. The relatively hard geology which dominates coastal behaviour along the western and eastern headlands of the frontage will continue to do so, but even here erosional pressures require policy to deliver an integrated approach in planning for a sustainable position for the coastline. The chapters of the coast where there is more resistant high ground or major geomorphological features have allowed the coast to develop a relatively stable alignment to the dominant wave energy.

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. 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 of 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 on defences, the erosion rate or 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 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 (chapter 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 valued. It creates a landscape which is major attraction for visitors and a key element of the tourism-based economy.

Geological Sites of Special Scientific Interest (SSSIs) in the study area are extensive and cover the majority of the cliff frontages, Chines and ledges along the Isle of Wight coastline. 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 collection of varied interest, reflecting the diversity along 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. The Isle of Wight is recognised as an important source of Cretaceous Dinosaur remains.

#### **Heritage**

As significant as the geological history, is the long-term occupation of, and activity on the coastline, including what was once land but has now been lost to flooding and 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 demonstrates 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 an 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.

The key archaeological assets, in particular Scheduled Monuments (SM) and historic and palaeoenvironmental sites, considered within the Isle of Wight SMP2 are associated with the areas of Cowes, Wootton-Quarr, Ryde (and surrounding villages), Bembridge,

Ventnor, Yarmouth, Bouldnor and the north-west coastline including Newtown. 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. Coastal change reveals unique palaeoenvironmental archives in the intertidal and subtidal zones.

This type of history is important in understanding the area and its development and, in particular along this chapter 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 the 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 Isle of Wight coast includes long chapters of natural, undeveloped coastline, with chapters being characterised by sand and shingle beaches, soft cliffs, low-lying marshes, reedbeds, 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 significant areas of development, is subject to statutory nature conservation and landscape designations, which have had important implications for the Isle of Wight SMP.

Along the Isle of Wight 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 detailed in Appendix D and the SEA.

The variety of habitats fringing the coastline has presented paradoxes for shoreline management; 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 current 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 Isle of Wight coast conjures images of sand and shingle beaches, shingle ridges, sandy spits, high Chalk cliffs, the wide open but sheltered harbour areas and the imposing presence of the Needles. 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 Isle of Wight 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 of Cowes and Ryde, 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 further communities such as, Sandown and Shanklin, Yarmouth and Ventnor. 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 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 Zone discussions within chapter 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. The Isle of Wight is reliant on ferry service links to the mainland, an essential component of coastal infrastructure. Major port and sailing activities are centred at Cowes, which along with Ryde, Sandown and Shanklin are popular bases for tourists and visitors and rely heavily on commercial and recreational activities.

The majority of settlements on the Isle of Wight are located around the coast and rely on the infrastructure of the local road network including cliff top roads linking communities on the coast. In several areas these roads are at risk from erosion, in particular the

Military Road along the south-west coast, and from tidal inundation along the Western and Eastern Yar valleys.

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 coastal defence management policy as avoiding: *“tying future generations into inflexible and expensive options for defence.”*

While this provides an initial intent, encapsulating the long-term view being taken by this 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 chapters 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 resisting erosion or changing the coastal form; 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 Isle of Wight SMP coast have been identified from the following sources of information:

- Earlier studies, such as the first SMP, Strategies and scheme studies;
- Stakeholder meetings and responses from key stakeholders, elected members and the Client Steering Group;
- 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 along the coastline, although this depends on the harm or benefit resulting from the outcome. 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 result in significant change (particularly where the shoreline is dependent on natural protection provided by beach material). There is also the potential for changes in sediment supply. This problem has been exacerbated across much of the 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 chapters 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 at 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 adapt 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 Isle of Wight SMP 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 a natural coastal defence, e.g. mudflat and saltmarsh environment, 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 chapter 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 (chapter 3.2) that there is significant interaction within each theme and between the different themes or individual sectors of interest.

The aim of the SMP is to provide an assessment of flood and erosion risk at a regional level to then be assessed at national level in regards to affordability, and associated with this, an indication of the overall level of commitment to defence in the area. 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. This is then used by operating authorities to inform other statutory plans and provide clarity of the future drivers of coastal management. 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 chapters of the coast in detail 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 forming specific objectives for management. Consideration of this overall characterisation allows the coast to be divided into chapters, through which more detailed consideration could be given to the development of policy. This process is discussed in chapter 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 chapters.

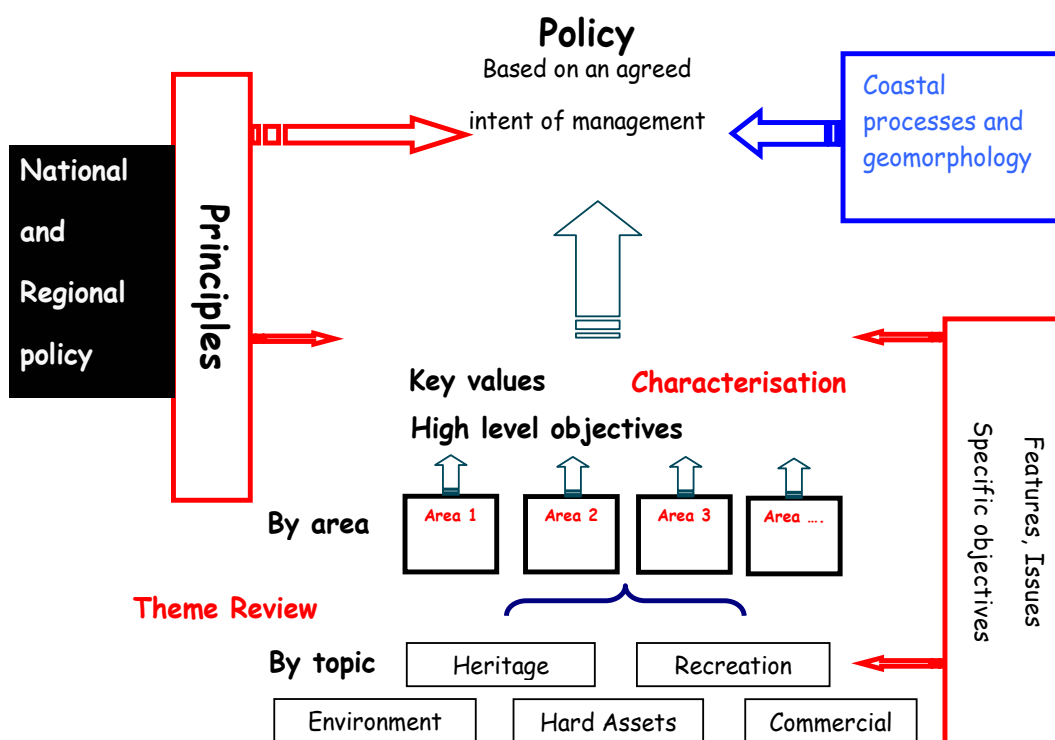


Figure 3.2 Schematic of SMP2 Policy Development

### 3.4 Development of Policy

#### 3.4.1 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 chapters. 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 chapter of the coast and the adjacent chapter, 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 chapters 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 chapters are called, merely as a matter of labelling and convenience, PDZs or Policy Development Zones. Below are the seven PDZs identified for the Isle of Wight SMP2.

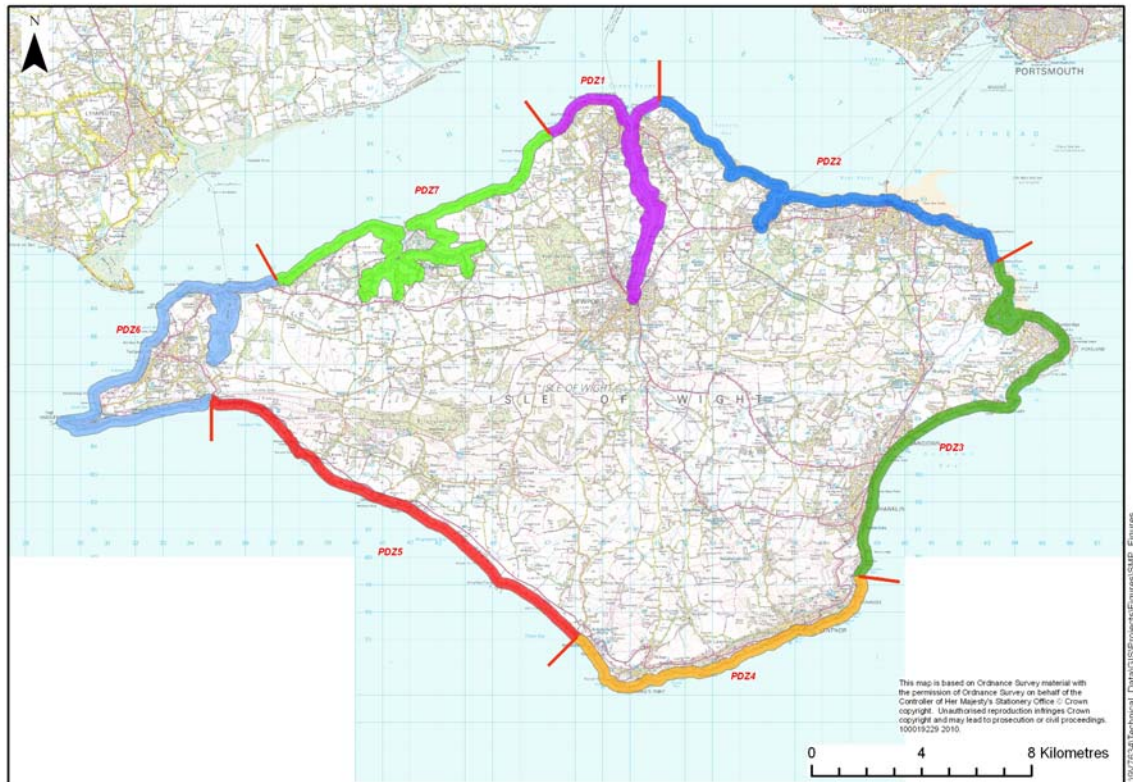


Figure 3.3 Isle of Wight SMP2 PDZs

### 3.4.2 Identification of Policy Units (PUs)

Within each PDZ different scenarios are considered; always starting with the policy and consequences of ‘No Active Intervention’ (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. The second scenario therefore assesses the consequences of continuing ‘With Present Management’ (WPM) –i.e. the policy which the SMP2 is reviewing<sup>1</sup>) and provides the starting point for considering future management. This WPM scenario considers 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 managed retreat.

The two initial scenarios (NAI and WPM) are compared and the way in which they allow the coast to develop and the manner in which they meet or fail to meet the objectives defined within the SMP2 is considered. For some chapters 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

<sup>1</sup> 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.



management. In such cases alternative 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 chapters of the shore. A preferred defence policy is then defined for a specific chapter of the coast. This chapter of coast is the policy unit. This defines how that chapter of coast should be managed over the lifetime of the SMP.

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, the maximum benefit being sought from existing defences, 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 or epochs; 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 a coordinated approach in 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 chapter 4 of this report. 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.

### **3.4.3 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 coastal frontages for which a specific defence management policy (NAI, HTL, MR and ATL) is 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 chapter 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 Management Areas (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 co-ordinated series of 'Policy Units', as schematised below:*

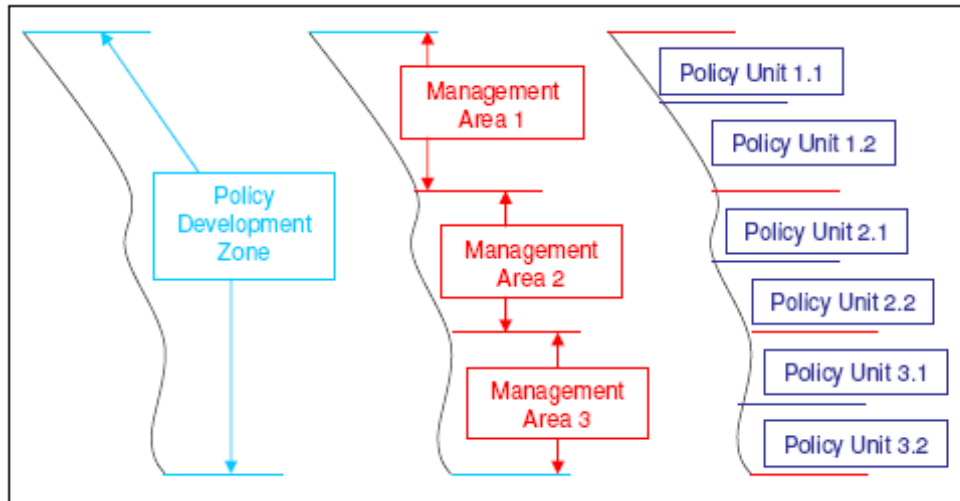


Figure 3.4 Schematic of SMP2 links between PDZ, MA and PU.

### 3.5 Policy Development Zone (PDZ) Analysis (provided in Chapter 4)

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 Chapter 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 chapters:

- Overview and description;
- Baseline management scenarios;
- Discussion and detailed policy development.

These are explained below:

#### 1. Overview and description

This chapter describes where things are and what they are, in terms of the underlying physical nature of the coast, existing defences and features, together with the use being made of specific areas. This chapter aims to set the scene, starting to pull together the overall picture.

##### *Principal Features*

The initial chapter provides a brief overview of issues relating to the coast, describing features of the built environment, heritage, amenity, natural environment.

##### *Key Values; Objectives; Description*

Within this first chapter is a summary of the key values of the PDZ, a list of stakeholder Objectives quite specific to the zone, and an overall illustrated description of the area. The objectives and principles attempt to summarise the overall aims derived from the more detailed list of objectives in Appendix E, and are used in the following discussions to assess the implications of SMP policy.

##### *Physical Processes*

*Coastal Processes:* A brief description of how the coast is behaving is provided, including coastal processes, wave climate, geomorphological controls, sediment supplies and transfers, 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. More detail on the physical processes is provided in Appendix C1.

*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.

*Existing defences:* The existing coastal defence structures present in the area are described. Full detail of the defences is provided in Appendix C2.

*Potential Baseline Erosion Rates:* A summary of erosion rates for different sections of the coast within the zone is provided.

## **2. Baseline Management Scenarios**

### *Present Management*

A description and table is provided setting out the SMP1 policy for various frontages together with further information where Strategies or studies have provided more detail, or changed the present management approach.

### *Baseline Scenarios for the Policy Development Zone*

The chapter provides a description and assessment of the two baseline scenarios for the whole zone, drawing on the current defences and current management. This starts with the NAI scenario and then considers the current management scenario. Appendix C3 provides supporting information listing the NAI & WPM scenarios in detail. In many cases past management has 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 or pressures arising in the future. Associated with each scenario is a summary of the key risks. This provides a headline assessment of how each scenario achieves the key Objectives set out in chapter 1 of the PDZ description.

Tables are also provided which summarise the economic damages likely to arise from future coastal erosion and tidal flooding. A table also summarises achievement of the Objectives assessed and described in the scenarios above.

## **3. Discussion and detailed policy development**

This chapter builds on the two baseline scenarios to consider specific issues in more detail, looking at both the long term implications of the current policies and also stepping back from local areas to consider any impacts on the coast as a whole. 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. For example, it may discuss clear specific challenges and adaptations in how 'WPM' could be delivered. 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 set, including how policy can allow adaptation 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 Statements, including Policies (provided in Chapter 4)

The policy units and management areas are developed in the analysis described above. The final chapter of each PDZ chapter within chapter 4 provides Management Area Statements. 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 summary or statement is presented for each Management Area. These summaries should be read together with the more detailed information given in the main body of the PDZ report.

Each Management Area Statement is set out in the following manner:

**Predicted shoreline mapping:**

A map summarises the anticipated position of the shoreline in 100 years under the two scenarios of "With Present Management" and under the "Draft Preferred Policy" being put forward through the Shoreline Management Plan.

**Summary of Preferred Plan recommendations and justification:**

*Plan:* A description of the preferred plan recommendations is presented providing the clear intention of management of the area, together with an overview of implementation for the short and medium term, as well as the long term intent.

*Preferred policy to implement plan:* A table summarises the present day, medium and long term intention of the preferred policy.

*Summary of specific policies:* Policy Units are confirmed and specific Policies set for each unit, including accompanying wordings of specific relevance.

*Changes from Present Management:* The essential changes from current management are highlighted.

*Implication with respect to the built environment:* A summary of the economic damages and costs associated with the Policy options is provided.

### **3.7 Policy summary of preferred Plan and implications: (provided in Chapter 5)**

This chapter of the SMP provides an overview and summary of the preferred plan and preferred policy choices to implement that plan. A table compares previous shoreline management policies (from SMP1 and Coastal Defence Strategies) against the new preferred plan policies in SMP2. Importantly this chapter also aims to emphasise the implications of the preferred plan at each location, based on an assessment against five themes: Property and Land Use; Nature Conservation; Landscape; Historic Environment; Recreation and Amenity. Each of the 15 Management Areas and 61 Policy Units identified previously in chapter 4 has a summary of anticipated implications of the plan again set out in tabular form using the five themes identified above. This assessment summarises the findings of the SEA and AA.

### **3.8 Action Plan (provided in Chapter 6)**

The Action Plan will be completed following the consideration of responses to the draft plan. These actions will be drawn together for the whole of the SMP2 coastline in Chapter 6.

