Isle of Wight Shoreline Management Plan 2

(Review Sub-cell 5d+e)

December 2010

Operating Authorities:

Consulting Engineer:

HASKONING UK LTD.
COASTAL & RIVERS

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Isle of Wight Council, Coastal Management
Directorate of Economy & Environment, Director Stuart Love

Environment Agency

Royal Haskoning

www.coastalwight.gov.uk/smp

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

Contact details:

Isle of Wight Council –Coastal Management
Directorate of Economy & Environment
Dudley Road
Ventnor
Isle of Wight
PO38 1EJ
Tel. 01983 857220
E-mail smp@iow.gov.uk
www.coastalwight.gov.uk/smp

Environment Agency
Guildbourne House
Chatsworth Road
Worthing,
West Sussex
BN11 1LD
Tel: 08708 506 506
Email: enquiries@environment-agency.gov.uk
www.environment-agency.gov.uk

Isle of Wight Council
County Hall,
High Street,
Newport,
Isle of Wight
PO30 1UD
Tel. 01983 821000
Email: customer.services@iow.gov.uk
www.iwight.com

Haskoning UK Ltd.
Royal Haskoning
Rightwell House
Bretton
Peterborough
PE3 8DW
Tel. 01733 334455
Email info@peterborough.royalhaskoning.com
www.royalhaskoning.co.uk

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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: • That adaptation may take time and may evolve slowly so that change to the overall community does not happen immediately. • That management should not encourage a progressively more vulnerable situation to develop, where there is a sudden change from one condition to another. • 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.
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 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 environment, 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 competed 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 competed 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 conservations 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

Contents

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.

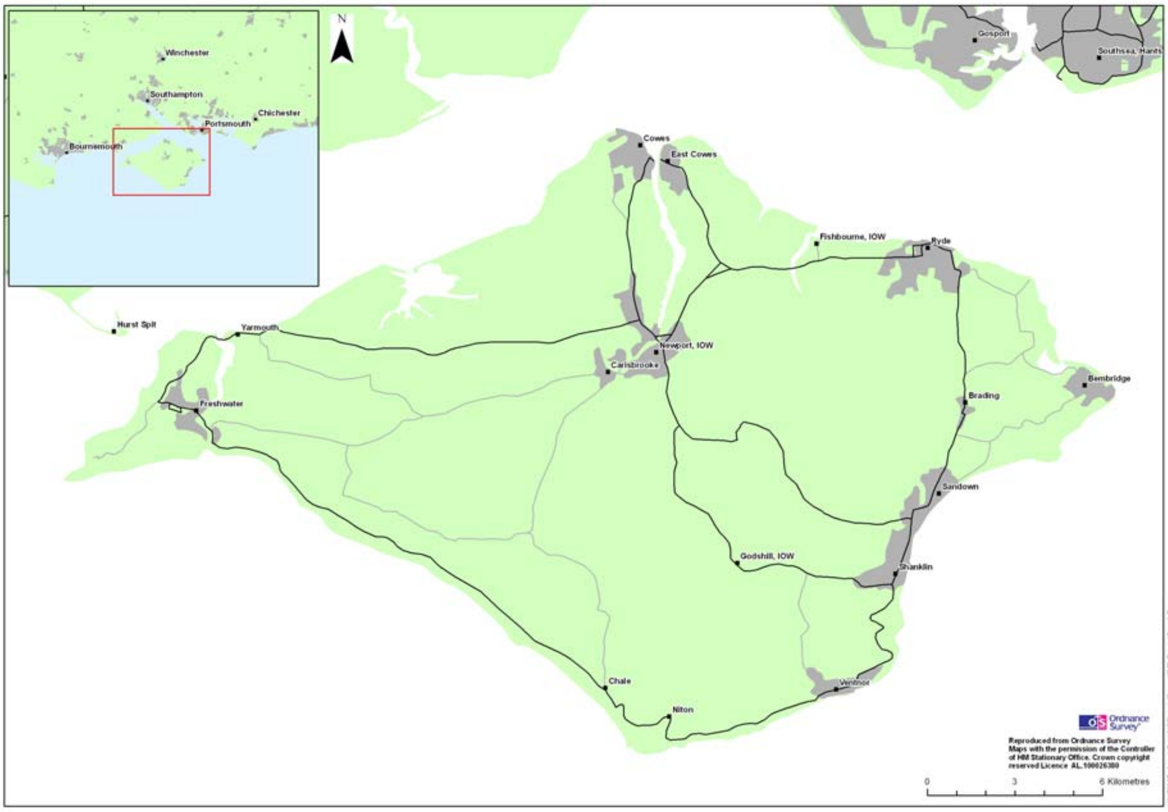

Figure 1.1: SMP coastline and estuaries,, the Isle of Wight

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^{nd} 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

Contents

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:

<u>Human population and communities:</u> 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 precint 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)**

		Policy Development Zones						
SEA Receptors	**SEA Objectives**	**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	**A:** To prevent or minimise loss / damage to residential properties from coastal erosion and flooding.	**P**	**P**	**P**	**Y**	**N**	**P**	**N**
	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**
	C: 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	**D:** To prevent or minimise the loss / damage / disruption to commercial properties and industrial sites.	**Y**	**Y**	**Y**	**Y**	**n/a**	**Y**	**n/a**
	E: To prevent or minimise the loss / damage / disruption to agricultural land.	**P**	**P**	**Y**	**P**	**N**	**N**	**Y**
	F: Prevent the loss / damage / disruption to transport and service infrastructure.	**Y**	**P**	**Y**	**P**	**N**	**Y**	**n/a**
Water Quality and Resources	**G:** To achieve the Environmental Objectives of the EC Water Framework Directive	**P**	**P**	**P**	**Y**	**Y**	**P**	**Y**
Geology & Soils	**H:** 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	**I:** 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**
Biodiveristy, Habitats and Species	**J:** 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**
	K: 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	**L:** 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
Solent	Coastal	Heavily modified water body (HMWB)	Moderate Potential	Good Ecological Potential (GEP) by 2015	2B.6, 2B.7, 2C.4, 6B.1, 6B.3	
Medina Estuary	Transitional	HMWB	Moderate Potential	GEP by 2027	1A.4, 1A.5, 1B.2, 1B.4	1B.2, 1B.5
Wootton Creek	Transitional	HMWB	Moderate Potential	GEP by 2027	2B.2, 2B.4	
Eastern Yar	Transitional	HMWB	Moderate Potential	GEP by 2027	3A.3, 3A.4	
Western Yar	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

Contents

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.

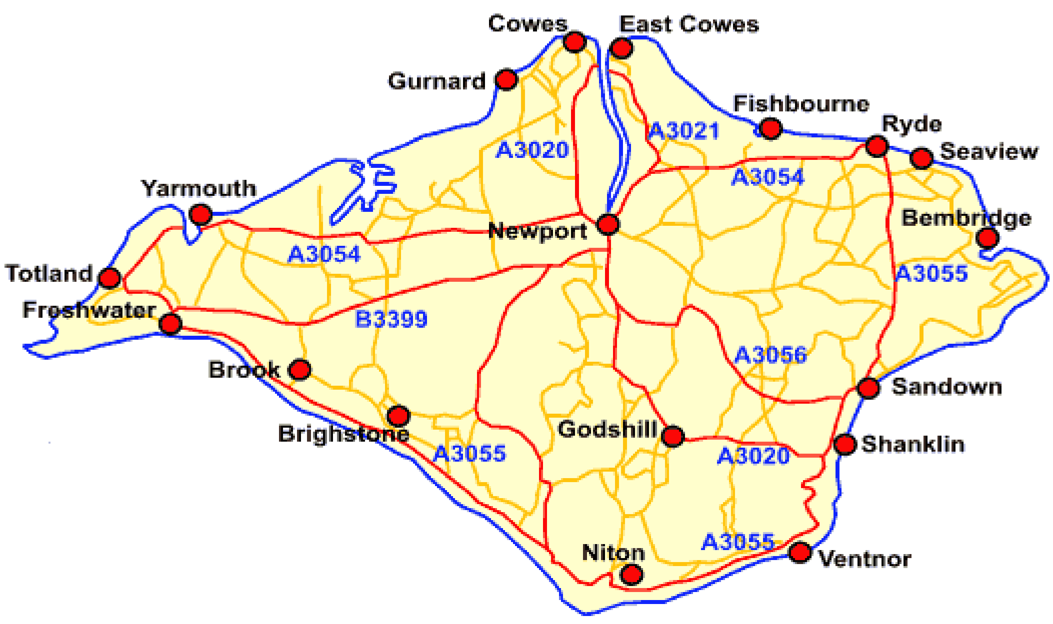

Figure 3.1 An overview of the Isle of Wight area (Isle of Wight Council).

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 $<1ms^{-1}$) compared to the West ($>2ms^{-1}$). 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^3 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 defendable 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.

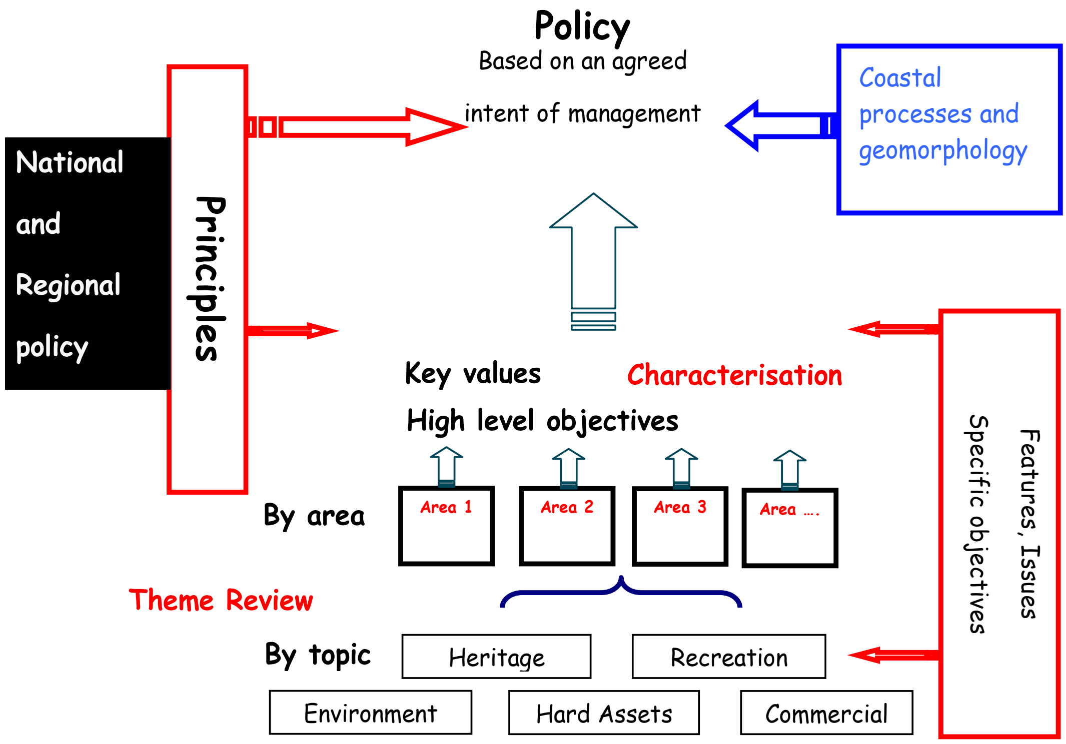

Figure 3.2 Schematic of SMP2 Policy Development

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.

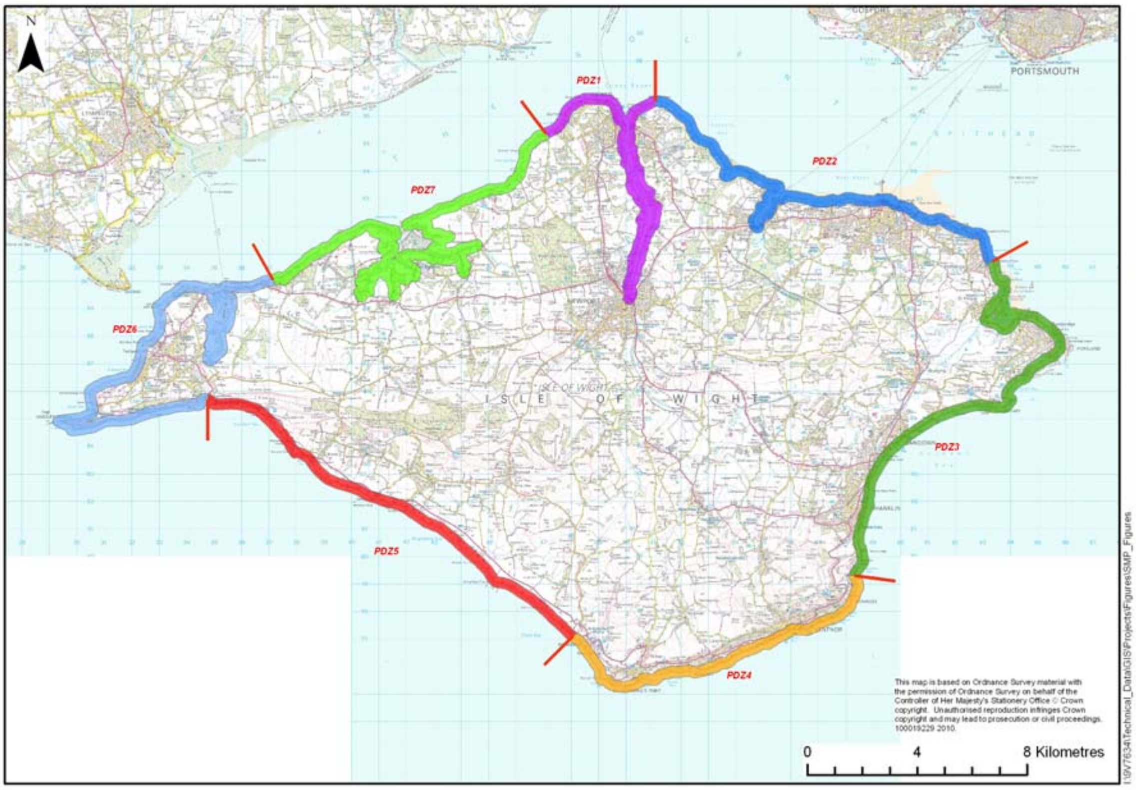

Figure 3.3 Isle of Wight SMP2 PDZs

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 Intevention' (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[1]) 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

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

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:

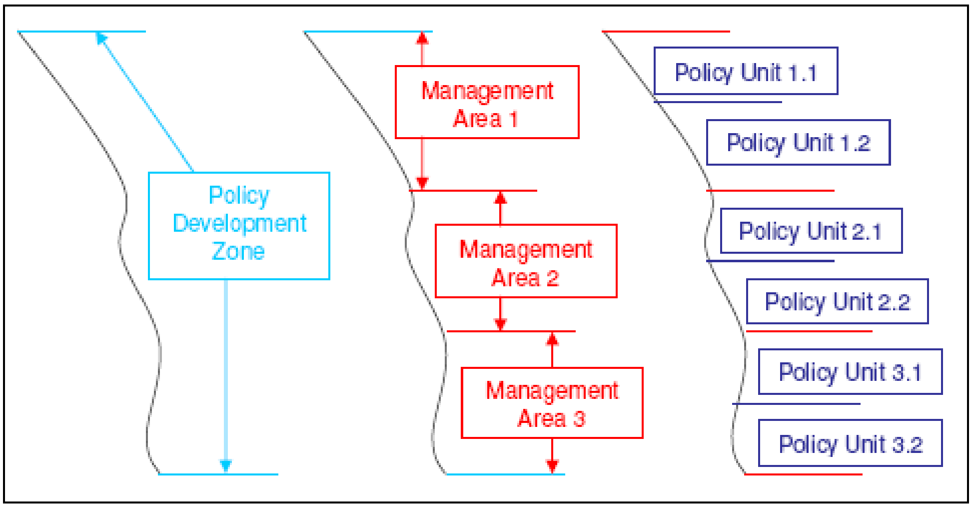

Figure 3.4 Schematic of SMP2 links between PDZ, MA and PU.

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.

4. Policy development and the preferred Plan

Contents

4. Policy development and the preferred Plan

4.1 Introduction

4.1.1 General principles and objectives for managing the Isle of Wight shoreline

Figure 4.1.1 Aerial view of the Isle of Wight, viewed from the south (Isle of Wight Council)

Chapter 1 of the Shoreline Management Plan (SMP) outlines the overall aim of the SMP process. This is the need to develop a long-term sustainable plan recognising the connectivity along the whole SMP coastline, whilst also maintaining the attention to detail that will result in the plan being deliverable and effective at a local scale.

There are diverse and important issues that provide the baseline for why there is the need to manage the coast and manage flood and coastal erosion risks. These are outlined below, and discussed in Chapter 3. It is these issues that the SMP attempts to address, which provide the framework for the development of the plan. Based upon these issues, and incorporating national and regional policy, a set of overall principles or objectives have been adopted to guide the development of the Isle of Wight SMP:

Objectives:-

- 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 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 support the cultural heritage.
- To avoid damage to and seek sustainable opportunities to enhance the natural environment.
- To maintain access to and from the Island.

The development of these objectives was discussed with the Client Steering Group (CSG) (who led the development of the plan) and the key stakeholder group including Elected Members.

A number of factors are important in setting the context for shoreline management on the Isle of Wight and assessing how the above objectives are met:

- The Isle of Wight is characterised by its unique reliance on the coastal zone. Many of the 138,000 Island residents live in towns which are located around the coastline of the Isle of

Wight and Newport located at the head of the Medina Estuary. A number of villages and smaller communities are also located on the coast and inland.

- The Island is 37 kilometres in length from the Needles in the west to Bembridge in the east, and 21 kilometres from Cowes in the north to Ventnor in the south; for a total of 380 square kilometres. The coastline, including estuaries, is approximately 168km in length. The largest towns are located in the centre, north and east of the Island (Newport, Cowes, East Cowes, Ryde, Sandown and Shanklin), and most of the Island's residents live in these towns. Totland, Yarmouth and Freshwater are also significant settlements in the west of the Island.

- The Isle of Wight relies upon six ferry routes providing essential transport links to Portsmouth, Southampton and Lymington, with hundreds of crossings every day. The ferry terminals and associated infrastructure are located by necessity on the shoreline and will be vulnerable to future increases in flood and erosion risks in Ryde, Cowes, East Cowes and Yarmouth.

- The coastal towns, scenery and transport links of the Isle of Wight play vital roles in supporting the economic viability of the community, in terms of both the tourism industry (particularly linked to sea fronts, commercial waterfronts along the estuaries, promenades and beaches) and marine industries. Tourism is a major industry on the Island with the population more than doubling during the busy summer holiday season in July and August. The unique characteristics of the Island and its tranquil and beautiful reputation have also drawn a significant number of retirees and second home owners.

- The spectacular natural environment of the Isle of Wight (including the open coast, sea cliffs, beaches and estuaries) is highly regarded and it is often the characteristics of coastal change which contribute to the value of the frontages as much as any specific existing aspect of that changing environment. The Island is home to a rich variety of important habitats, species and sites, with 70% of the Island protected by UK or European environmental designations. The natural, historic and built environment is a major asset for residents and visitors. More than half of the Island is designated as an Area of Outstanding Natural Beauty (51%).

- In addition to the challenges of future coastal erosion and sea flooding, the coastal towns of Ventnor and areas of Cowes-Gurnard are underlain by deep-seated landslide complexes. The Ventnor Undercliff landslide complex is the largest urbanised landslide complex in England and Wales, and one of the largest in north-west Europe. Sea level rise and increased winter rainfall will affect slope stability in some areas and is an important consideration in shoreline management policy in these areas.

More specific drivers and objectives, reflecting the general characteristics of each section of the coast, are discussed below.

4.1.2 High level Plan development (the importance of considering interdependencies within the SMP area)

The aim of the SMP is to provide a consistent approach to flood and coastal erosion risk management over the whole of the frontage of sediment sub-cells 5d & e. This consistency has to ensure that decisions in one area take account of the impact they have in other areas in terms of physical processes and geomorphology. It is also essential to take account of any impacts on or interrelationships between the socio-economic and ecological values identified for different areas of the coast, as these characteristics are the real drivers behind any intent of management.

The review of coastal processes (Appendix C) and the thematic review (Appendix D) reveal that the coastline is characterised by a wide variety of physical processes, ecology and socio-economic activity, with strong interrelationships between these areas and themes. The large-scale issues driving shoreline management are identified in the high level objectives discussed above, but these have to be recognised, themselves, as being interdependent. Management decisions in one area of the coast may have a significant influence elsewhere on how best to manage other areas or other interests. Such interaction may be quite local (between adjacent policy units), may extend over substantial lengths of coast (linking together the decision-making process over a group of policies) or may have potentially cumulative impacts that have to be viewed at the scale of the whole SMP; or indeed beyond the area of the SMP. In developing individual policy units, therefore, it is necessary to maintain a broad perspective of potential impacts, within which to consider important local issues.

In line with the procedural guidance for SMP2, a hierarchical approach is taken. This initial section of the plan and policy development process assesses the whole SMP coastline, considering how potential general management scenarios might influence long-term coastal change.

4.1.3 Comparison of Management Scenarios for the SMP Area (a summary of future risks for the Isle of Wight)

Description of the physical structure and key features of the Isle of Wight:

The SMP area is shown in Figure 4.1.2, illustrating the key towns and principal A-roads. The Isle of Wight coast and estuaries form a dynamic coast with a wide variety of coastal scenery in a relatively small area.

Figure 4.1.2 An overview of the Isle of Wight SMP area (Isle of Wight Council).

The solid geology of the Isle of Wight is characterised by a sequence of relatively unresistant sand, mud and clay strata. The structure of the Island is dominated by a strong east-west monocline fold which allows the Chalk (the most resistant rock type) to dominate the landscape of the Island by forming the ridge which runs through the centre of the Island, maintaining exposed headlands at either end -at The Needles in the west and Culver Cliff in the east- and capping the southern hills. The outcrop of the resistant Chalk is shown in Figure 4.1.3.

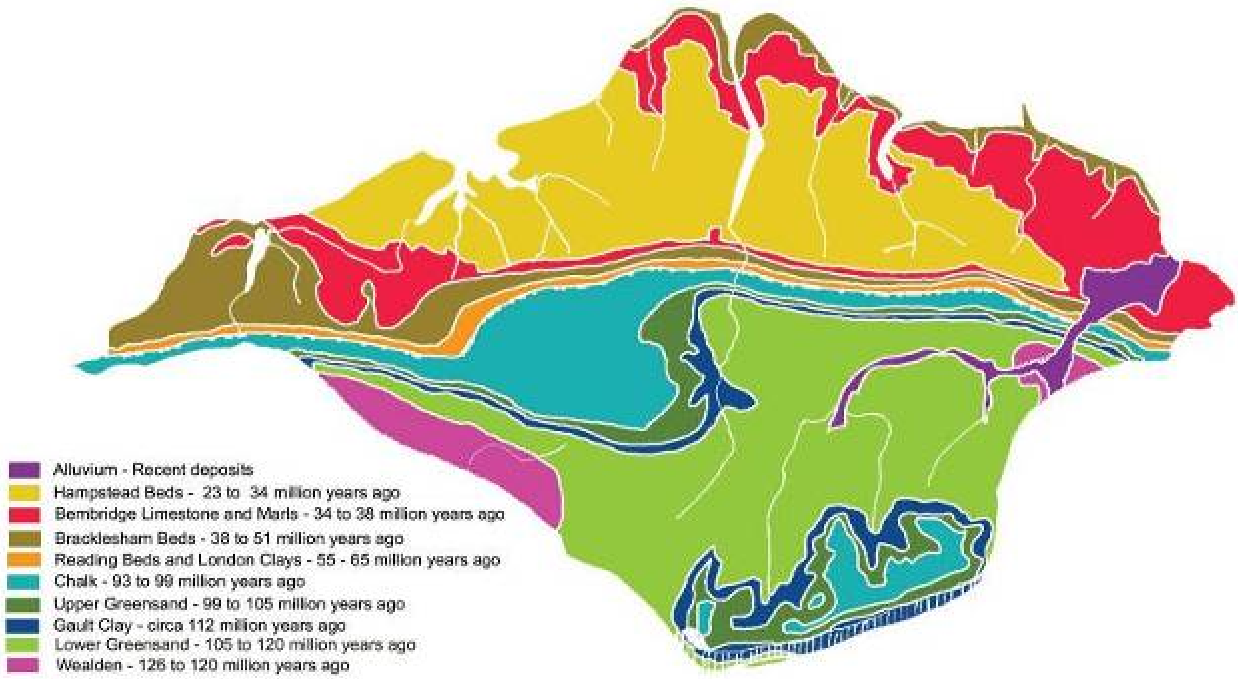

Figure 4.1.3 Geological map of the Isle of Wight (Isle of Wight Council)

As sea levels rose at the end of the last Ice Age, the former Solent River valley flooded, forming today's Solent separating the Isle of Wight from the mainland by a distance of 3-5km. The Solent (northern) coast of the Isle of Wight is more sheltered than the southern coast, which is exposed to Channel and Atlantic storm waves.

Marine erosion has continued around most of the Island to produce a near-continuous cliff line that varies greatly in terms of morphology, weathering and landslide activity, except where the cliff line is interrupted by coastal towns and promenades. There are distinct differences between the exposed southerly and westerly coasts (potentially rapid marine erosion) and the relatively sheltered north coast (more modest toe erosion).

The 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: the Western Yar; Newtown Estuary; Medina Estuary; Wootton Creek; and the Eastern Yar. By contrast the southern coast is generally characterised by steep coastal cliffs and landslides. Cliff erosion materials deposited on the foreshore are valuable inputs to the immediate littoral system and also contribute to beaches further downdrift and can provide temporary protection of the cliff toe. In spite of continued sediment inputs derived from cliff erosion, generally local beaches are not large as the sediments continue to be removed, so the beaches are often dependent upon continued inputs for their stability and even survival. The exposed (high wave energy) southern coasts have greater potential for shoreline sediment transport compared to those along the sheltered environments of the Solent to the north. Nevertheless, strong tidal currents are generated in the western Solent and these contribute towards sediment mobility in specific areas. In contrast to the general trend of erosion, a key area of significant sediment accretion is at Ryde Sands on the north-east coast of the Island. A prominent feature of the south coast is the 12 km in length Ventnor Undercliff - an ancient coastal landslide complex extending from Luccombe in the east to Blackgang in the west.

The coastline continues to change. This can be clearly seen in the retreat of the cliffs of the south-west coast, but is also occurring along the less-accessible northern coasts of the Isle of Wight. Seasonal drift of accreted sandy sediments can be seen at Appley and Ryde Sands and local changes in beach levels observed around the coast of the Isle of Wight following winter storms. In the longer term (and into the 100 year period of the SMP) these trends and pressures are likely to continue and will create significant challenges to future, appropriate management.

Description of future risks under the 'No Active Intervention' scenario:

The soft rock geology of the Isle of Wight coast is generally exposed and actively eroding, and this behaviour will continue over the next 100 years and beyond as sea level rises and wave attack of the shoreline continues. On the southern coast, cliffs will continue to erode or reactivate, and on the northern coast the generally more gentle coastal slopes will erode and areas of tidal inundation will also occur.

If no further maintenance or replacement of coastal defences occurs, a legacy of historical defences will generally fail towards the end of epoch 1 (0-20 years) or early in epoch 2 (20-50 years), exposing the majority of Isle of Wight coastal communities to the impacts and risks of erosion and shoreline retreat in the medium to long term. However, allowing the natural process of cliff retreat along areas such as the south-west coast will supply sediments to the shoreline and the littoral drift system.

Tidal flooding is a serious risk to the future of low-lying areas within the towns of Yarmouth, Freshwater, Cowes, East Cowes, Ryde, Seaview, Bembridge and Sandown/Yaverland. Over the next 100 years coastal erosion and tidal inundation will affect all the ferry transport infrastructure that the Isle of Wight relies upon.

If 'no active intervention' (NAI) takes places, tidal inundation of the Eastern Yar and Western Yar valleys will occur if the defences at the northern and/or southern ends of both valleys fail. This would potentially cut off transport links to the communities of Bembridge/Forelands and Freshwater/Totland, and could create three 'Isles of Wight' in the long-term. Coordinated decision-making is essential along these frontages.

Coastal erosion and oversteepening of coastal slopes has the potential to promote coastal slope retreat or larger-scale reactivation of coastal landslide complexes affecting the town of Ventnor (and the villages in the Ventnor Undercliff) and areas of Cowes, Gurnard, Totland and Seagrove Bay.

More detailed information on the consequences of a scenario in which 'no active intervention' is undertaken at the coast can be found in Appendix C3 of this SMP.

Consequences for the communities of the Isle of Wight:

The general objectives of reducing reliance on defences, avoiding damage to the natural environment and moving towards more sustainable communities are targeted by the changes outlined above; however the majority of objectives outlined in section 4.1.1 are not achieved. For example, this approach does not contribute to sustainable communities by supporting the main centres of economic activity or tourism, support the vitality and adaptation of smaller-scale settlements, or maintain access to and from the Island. A loss of confidence in coastal towns and deterioration of the economic viability of the area is likely. The consequences of loss of coastal habitats also need to be examined in further detail.

In terms of management objectives, the NAI scenario highlights the need to manage the coast and its future evolution to support an integrated approach to coastal planning. The Isle of Wight is characterised by both its natural beauty and its intrinsic value in terms of sustaining coastal communities. The objective for management of the natural environment is not in conflict with that of meeting the overall intent of delivering human aspirations. At the broader scale, acceptance that a significant proportion of this SMP frontage will remain a managed area is important. Coastal change will occur, but management of the coast can allow communities to adapt to these changes.

Description of future risks under the 'With Present Management' scenario:

If current shoreline management practices are continued (i.e. a scenario known as continuing 'with present management') the defences fronting coastal towns around the Isle of Wight will be maintained at their current standard and so effectively prevent coastal erosion and cliff retreat in many areas. In this scenario maintaining the defences at their 'current standard' is defined as maintaining the seawall at it's current height, for example, but not raising the level, so the defences offer reducing standards of service over time. Consequently, in future epochs (particularly over 50-100 years) the defences will be increasingly affected by wave and tidal overtopping and falling beach levels will expose the toe of defences to wave attack and undermining.

Significant lengths of coast will continue to erode and will gradually outflank the hard defence structures (such as seawalls) which front the promenades of the coastal towns including East Cowes, Ryde, Seagrove Bay, Bembridge, Yaverland, Shanklin, Ventnor, Freshwater Bay, Totland, Colwell, Yarmouth, Gurnard and Cowes. Therefore due to the increasing exposure of each defence structure, the suitability and effectiveness of the hard defence in each location needs to be considered as risk levels increase.

A key risk under the 'with present management' scenario is that, with defences maintained at their current standard, the risk of tidal flooding remains for many coastal communities. Tidal inundation already affects defended areas within Yarmouth, Cowes and East Cowes and will worsen as sea level rises by approximately 1 metre over the next 100 years.

The ground stability of coastal landslide complexes underlying the towns and villages of Ventnor, Niton, Cowes and Gurnard could be maintained by improving the current coastal defences, but areas may still reactivate due to their sensitivity to the impacts of increasing winter rainfall. However, toe erosion and toe weighting is essential to their stability and would minimise the risk of reactivation.

More detailed information on the consequences of a scenario of continuing 'with present management' at the coast can be found in Appendix C3 of this SMP.

Consequences for the communities of the Isle of Wight:

Similar to the impact of the 'no active intervention' scenario outlined above, the consequences of continuing 'with present management' do not fully deliver the objectives outlined in section 4.1.1 by not considering adequately the interactions along the coast and not allowing a fully sustainable, integrated approach to spatial planning. It does however provide a vision against which the potential impacts of management can be understood and sustainable communities be developed.

4.1.4 Defining the Policy Development Zones (PDZ)

With the understanding outlined in the scenarios above, it is possible to consider where key high level decisions have to be made. This includes drivers such as (but not limited to); the integrated management of east and west Wight, respectively, to ensure flood risk does not physically separate these sections of land; the future development of Cowes and East Cowes and the impacts on both the Medina Estuary and Newport; the economic viability of Ryde; and Ventnor and the longer term impacts of the landslide complex. These large scale issues present an opportunity to look at sections of the Island on a larger scale, grouping areas with similar issues that can be managed together. Sections of the coast are considered with respect to their influence on (and interaction with) other areas of the SMP and a series of seven Policy Development Zones (PDZ) have been identified (see Figure 4.1.4).

The boundaries are recognised not to be hard lines and there is a recognition that locally across boundaries, there will be issues in common. In effect, the PDZ's set the playing field for the detailed development of the Plan and policies for three epochs (the next 20, 50 and 100 years).

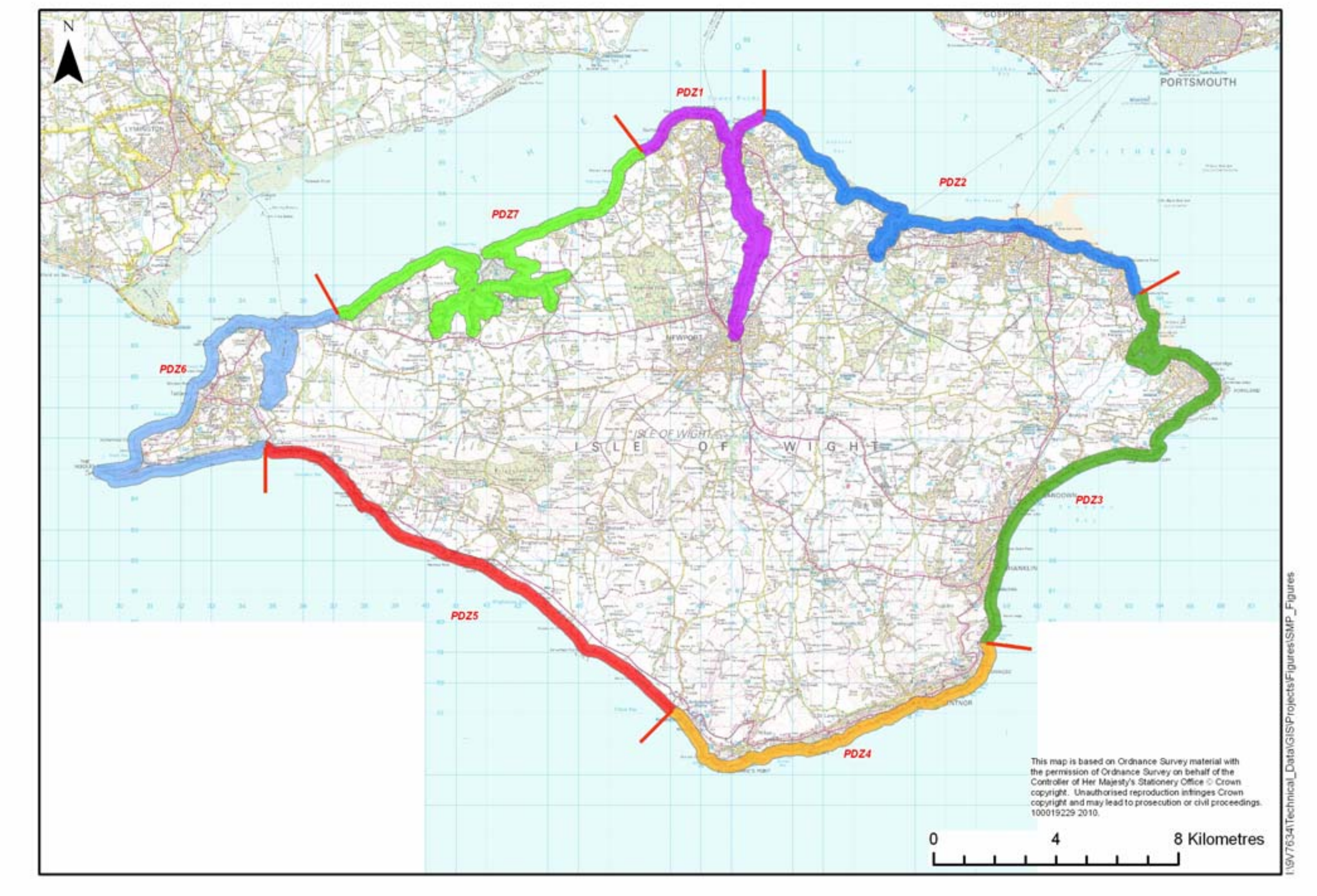

Figure 4.1.4 Isle of Wight SMP2 Policy Development Zones (PDZs).

PDZ1 – Cowes and the Medina Estuary

Key drivers in this area: This area includes Cowes, East Cowes, Gurnard, the Medina Estuary and Newport Harbour. Large residential communities and town centres are at significant risk from tidal flooding, alongside key tourism and marine industries driven by their waterfront location. Erosion around the headlands may trigger areas of slope instability affecting properties and access within sections of Cowes and Gurnard. Properties, businesses, ferry terminals and marine industries along the waterfront of Cowes, East Cowes, Medina Estuary and Newport Harbour are at risk, as well as areas of saltmarsh. There are significant redevelopment plans for areas of East Cowes and Cowes Harbour.

PDZ2 – Ryde and the North-east Coastline

Key drivers in this area: This area includes Osborne, Wootton Creek, Ryde and Seaview. The large residential communities, amenity and access are key drivers in this area. The functioning of the residential and tourism centre of Ryde is at risk alongside seafront areas within the surrounding communities at Wootton, Woodside, Fishbourne, Appley, Springvale, Seaview and Seagrove Bay. Key transport infrastructure at Ryde and Fishbourne will be affected (ferries, rail and road). The quiet wooded coastal landscapes in the west of the PDZ are also a key characteristic of the area.

PDZ3 – Bembridge and Sandown Bay

Key drivers in this area: This area includes Bembridge Harbour, Bembridge, Forelands and Sandown Bay. Residential communities are present along much of the coastline of this PDZ and especially in Sandown Bay they rely heavily on the tourism industry and amenity infrastructure. The natural environment is also a key driver in terms of the open and evolving coastal cliffs at Whitecliff Bay, Culver and Luccombe, the ledges at Bembridge, and also particularly the internationally important habitats of the Eastern Yar Valley and around Bembridge Harbour.

PDZ4 – Ventnor and the Undercliff

Key drivers in this area: The residential and business communities of Ventnor, Bonchurch, St. Lawrence, Niton and Blackgang along with transport links, are key issues in this area. The underlying landslide topography gives rise to the unique pattern of development, natural environment and coastal scenery found in this PDZ, which is unique in scale in England.

PDZ5 – South-west Coastline

Key drivers in this area: From Blackgang to Compton, significant drivers of shoreline policy in this area are the overriding the importance of the natural landscape and scenery, nature conservation designations, unique geology and continuous sediment supply from eroding cliffs -which controls the behaviour of the beaches and longshore drift system to the east (anti-clockwise around the Isle of Wight). A further driver is the 'Military Road' transport link running adjacent to the coastal cliffs,and the cliff-top coastal footpath, although the future of this road is currently being decided by the Isle of Wight Council. This is a popular tourist route –one the most spectacular sections of the 'round the Island' coastal road, which also provides access to scattered coastal communities and properties, which will be significantly affected by future breaches in the line of the coastal road. The road has been set-back and maintained in several locations previously, marking a substantial investment, but the road is now threatened near Brook, where the carriageway is located approx. 5m from the weak cliff edge (in November 2010) after recent failures in this area. Upgrading and widening an alternative inland route would require further substantial investment. There will be local specific issues where small communities and properties lie adjacent to the changing coastline. It is a popular coastline for tourism use.

PDZ6 – West Wight

Key drivers in this area: This area includes Freshwater, Totland and Yarmouth. The loss or deterioration of residential communities due to erosion and flooding is a key risk in this PDZ, including significant tidal flood risk at Yarmouth and Freshwater. Key road links through Freshwater and Yarmouth are also at risk, as well as the ferry terminal at Yarmouth. The internationally important habitats of the Western Yar valley and the spectacular coastal scenery surrounding the Needles peninsula are also key features of the area, and important to the tourism industry supporting West Wight communities.

PDZ7 –North-west Coastline

Key drivers in this area: From Bouldnor to Thorness the high-quality designated natural environment, relative inaccessibility and tranquillity of this coastline, including the Newtown Estuary, are key features of the area, where the coast is generally evolving naturally. There will be local specific issues where small communities lie adjacent to the changing coastline.

4.1.5 Conclusions on the Policy Development Zones

The above assessments and consideration of high level scenarios sets a framework for consideration of sections of the Isle of Wight coast in greater detail. The issues and risks outlined above are described in chapter 4 and the Appendices to develop a co-ordinated set of shoreline management policies for each policy development zone -and between neighbouring zones- for the next 20, 50 and 100 years.

The main conclusions at this stage are that:

- At an SMP level, the management of the frontages within the Isle of Wight Policy Development Zones is not going to impact on general policy for neighbouring SMP areas in terms of coastal processes and sediment supply. The Isle of Wight SMP policies can therefore be developed at a more local level considering the shoreline management of each section of the frontage.
- There are significant issues linked to the potential future tidal inundation of the Western and Eastern Yar valleys for the communities directly affected in the adjacent flood and erosion risk zones, but also for the wider communities accessed via road links across the floodplains.
- There are current and increasing future tidal flood risks to communities and infrastructure within Yarmouth, Cowes, East Cowes, Ryde, Sandown and possibly Newport town centres. This increasing sea level will lead to a reduction in tide-locked drainage and require investment in the land-drainage infrastructure.
- The eroding cliffs characterising the Isle of Wight coast will retreat and place a zone of properties at risk in many towns and villages, in some cases with clear local impacts and in others areas also affecting infrastructure, transport links or economic drivers of importance to the effective functioning of the communities.
- The risks of deep-seated landslide reactivation affecting the Ventnor Undercliff and Cowes-Gurnard communities need to be considered alongside the role of shoreline management policies in reducing levels of risk.
- The natural environment, nature conservation interest, heritage, geology and coastal and estuarine scenery are of vital importance to the character of the Isle of Wight. Beaches are often reliant on local sediment supply from eroding shorelines.
- The main ‘round the island’ coastal road is at risk from erosion or tidal inundation in various locations over the next 100 years (including the along the Ventnor Undercliff, south-west coast, Freshwater, Yarmouth, Wootton, Ryde and Morton) and will require adaptation.
- Key economic drivers of the Isle of Wight including tourism and marine industries, as well as essential ferry transport links, are dependent on coastal locations and will require adaptation.
- Potential loss in beach-width due to sea-level rise would have adverse consequences for the tourism industry in a number of areas, although would also be dependent on erosion rates and future sediment supply.

4.2 Policy Development Zone 1 – Cowes and the Medina Estuary (PDZ1)

Left to right: Looking north along the Medina (Cowes Harbour Commissioners), Aerial View of Cowes and East Cowes, Cowes seawall

4.2 Policy Development Zone 1 – Cowes and the Medina Estuary (PDZ1)

Contents

Key facts:

Policy Development Zone 1: includes the communities of Gurnard, Cowes, East Cowes and surrounding the Medina Estuary.

PDZ1 frontage = approximately. 26km in length (including the Medina Estuary)

PDZ1 boundaries = from Gurnard Luck to Old Castle Point (East Cowes)

As listed in SMP2 Appendices: areas IW55 to IW59, & IW1

Old policies from SMP1 in 1997, reviewed in this chapter:

Unit	Location	Length	Policy
NEW11	Gurnard Luck	460m	Hold the existing defence line
NEW12	West of Gurnard to Egypt Point	1744m	Hold the existing defence line
NEW13	Egypt Point to Cowes Castle	1010m	Hold the existing defence line *Or* Advance the existing defence line
NEW14	Cowes Harbour	2470m	Hold the existing defence line *Or* Advance the existing defence line
NEW15	Cowes Breakwater to Old Castle Point	880m	Hold the existing defence line *Or* Retreat the existing defence line

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Shoreline Management Plan Sub Cell 5D + E - Isle of Wight
Baseline Location Map
Policy Development Zone 1 - Cowes and the Medina Estuary

1. Overview & Description

1.1 Principal Features (further details are provided in Appendix D)

Built Environment:

Together the towns of Gurnard, Cowes and East Cowes form significant waterside communities at risk from both coastal flooding and erosion. The towns of Cowes and East Cowes have mostly promenades and residential frontages facing the Solent, with commercial, industrial frontages within the estuary mouth, including widespread harbourside facilities and marinas. Red Funnel operates a high speed passenger service from Cowes to Southampton and a car ferry service from East Cowes to Southampton. The main transport route connecting Cowes and East Cowes is the floating bridge, which is a chain ferry, without which it is necessary to drive inland around the length of the estuary. The road network is centred around the A3020 running south along the west of the Medina valley to the Island's country town, Newport.

Flood risk is reduced to holiday homes and properties at Gurnard Luck through the management of tidal water levels at the bridge on Marsh Road. Tidal flood risk at both Cowes and East Cowes is mitigated by an ad-hoc series of both private, Isle of Wight Council and Environment Agency seawalls and quays, some of which also provide recreational access to the Solent. These defences provide only a moderate standard of protection (1 in 25 years).

The Medina Estuary extends 6.8km southwards from Cowes and East Cowes to its tidal limit at Newport Harbour. Along its length are a number of farms, scattered residential areas, recreational and commercial moorings and sewage works. There is a marina and residential development on the east bank at Island Harbour. Towards the town of Newport there are industrial sites along the western frontage of the estuary and a cemetery on the eastern bank. The upper estuary around Newport Harbour is surrounded by properties, waterside offices, commercial units, quayside and wharf frontages.

Commercial wharfs and quays are sporadically distributed along both banks of the Medina Estuary from Cowes and East Cowes to Newport. The Island is wholly reliant on imports for hard stone construction and imports around 50% of its sand and gravel requirement, which is likely to increase through the planned highways improvement Public Finance Initiative (PFI). All bulk cargo transported by sea (as opposed to lorry-based) including all aggregate imports, are landed in the Medina Estuary.

Heritage and Amenity:

Heritage:

PDZ1 stretches from Gurnard Luck in the west to the Norris Castle boundary in the east and extends down the Medina Estuary to the heart of the Island, encompassing a wealth of maritime history. There are 269 monument records, 60 Grade II listed buildings and 1 Grade II* listed buildings within the coastal zone. Overall the area has a long history connected to its maritime heritage with monument recordings going back many centuries. There are Conservation Areas in Cowes, East Cowes and Newport and areas of the defences including Cowes Parade seawall are of historic interest.

The Medina Estuary is a deep river valley which was flooded by sea level rise during the past 10,000 years. This is known as a ria estuary. There is a suite of terraces relating to the Pleistocene course of the River Medina. The nationally important Middle Palaeolithic site at Great Pan Farm is located on one of these terraces and there are potentially other, as yet unrecorded, Palaeolithic sites on the lower terraces nearer to the present river. The intertidal zone contains palaeo-environmental deposits both within and at the mouth of the estuary.

In the marine-scape is Cowes Roads, an area that has eight shipwrecks listed in the NMR, ranging from Post Medieval to 20th Century. There are an additional seven wrecks recorded along the frontage and just offshore lays the air wreck of a Junkers 88.

Amenity:
The coastal frontage and estuary consists of residential, commercial and port land uses. The area is of great economic importance to the Island supporting the marine service industry, two cross-Solent ferry ports, recreational sailing, major yachting events, some commercial fishing and the main industrial/commercial shipping port.

Equally important is the extremely successful tourism industry that this area supports, particularly with sailing events such as Cowes Week. Wide esplanades run along the developed frontage of Gurnard and Cowes, and at Gurnard and from Egypt Point into Cowes the coast is backed by the densely developed town with a popular extended town centre parade of shops and cafes. There is a sailing club in Gurnard and numerous sailing clubs in Cowes, often with private mooring facilities. There are areas of parking along the promenades and good pedestrian access to the coast along the seawalls fronting the outer Medina Estuary.

The Newport to Cowes cycle track runs along the western bank of the Medina Estuary. This is popular with recreational and commuting cyclists, which is a key element of sustainable transport planning. Socially, the Medina Estuary is popular with recreational sailors and many shore based activities including walking, angling, birdwatching and cycling as well as the provision of pontoons and moorings.

There is pedestrian and vehicle access to the waterside surrounding Newport Harbour, with the surroundings including an arts centre, public house, community centre and waterside footpaths and park areas.

East Cowes Esplanade runs along the outer estuary with areas of residential development, a paddling pool and play ground and other amenities such as public toilets and a kiosk café. The no-through access road runs along the esplanade, with a dinghy park, campsite/caravan site, tennis courts, car park and housing behind the road in the west of this unit. To the east, there is a wooded coastal slope behind the road, backed by agricultural land. The esplanade is popular with walkers and anglers.

Nature Conservation:
The western headland of PDZ1 is almost entirely built up, though Gurnard Bay is backed by woodland, scrub and grassland, with an area of low lying land flanking the Gurnard Luck stream. The East Cowes headland comprises of sandflats, with mudflats and seagrass beds at the mouth of the estuary, whilst the narrow Medina Estuary comprises mudflats and wetland habitats, such as saltmarsh and saline lagoons (although non-designated).

There are two international designated areas along the PDZ coastline. The Solent Maritime Special Area of Conservation (SAC) covers the entirety of this coastline, running from Sconce Point west of Yarmouth to the eastern end of Osborne Bay (covering 11,325ha). It is designated primarily for its estuaries and saltmarsh (*Spartina* swards and Atlantic salt meadows). South of the built up areas of Cowes and East Cowes, the Medina Estuary is designated as part of the Solent and Southampton SPA and Ramsar site and as a Site of Special Scientific Interest (the Medina Estuary SSSI). The SPA protects a number of internationally important wildfowl, wading and overwintering birds that use the estuarine mudflat areas for feeding. The SSSI has been designated to protect the saltmarsh, mudflat, freshwater marsh and ancient woodland that support these important birds, in particular the high tide roosts that are supported in the area.

1.2 Key Values

This area, particularly around the entrance to the Medina Estuary is one of the most intensively developed sections of the Island and one of the principal gateways to the Isle of Wight. This coastline has significant amenity, commercial and recreational value based on waterside access, forming one of the key economic hubs for the Isle of Wight, and there are redevelopment plans for areas of East Cowes and Cowes Harbour. Balancing the residential and commercial interests and natural environment of the Medina valley is a challenge to be addressed when seeking long term investment and sustainability for the Island.

The towns of Cowes and East Cowes have a unique and historic character around which has developed an internationally recognised reputation for water sport and recreational sailing. The historic environment and the landscape particularly of Cowes town centre adds considerably to this water-based use. Further within the Medina Estuary there is significant nature conservation value and over time this has become fully integrated with the local built environment as described above. At the southern extent of the Medina Estuary, the distinct waterside area of Newport is also of high value for supporting businesses and regeneration.

1.3 Objectives

Overarching objectives for PDZ1:

- To sustain and adapt the important centres of economic activity including the Cowes waterfront and gateways to the Island and the access and use of the Medina Estuary and Newport Harbour.
- To support adaptation of the town centres of Cowes, East Cowes and Newport quay to reduce flood risk.
- To support water use and navigation in the area, taking account of the internationally important water sport activities and ferry links to the island.
- To support adaptation of local communities at Gurnard Luck.
- To maintain important access along the seafront and shoreline use of the area.
- To support opportunity for adaptation supporting and enhancing the nature conservation value of the Medina.
- To sustain the historic landscape and environment where practicable.
- To maintain the important landscape subject to natural change.

1.4 Description

Above: *Coastal erosion and defence failure at Gurnard Luck, May 2009*

PDZ1 is a generally developed and defended along the coastline and within the mouth of the Medina Estuary, although much of the inner estuary remains undefended with scattered waterside developments becoming continuous approaching Newport Harbour.

In the west of the PDZ is the small community at Gurnard Luck, an area of improved residential and holiday dwellings located in the low-lying coastal zone with risks from both erosion and flooding.

Right: Cowes Esplanade, looking west towards the Medina Estuary (Isle of Wight Council).

Moving eastwards the centre of Gurnard and the towns of Cowes and East Cowes are both significant waterside communities, with important commuter links to the mainland and linked by a ‘floating bridge’ chain ferry, infrastructure at risk from coastal flooding and erosion. Behind the long seafront esplanade the coastal slopes underlying the residential area from Gurnard to Cowes are also at risk from underlying landslide phenomena with potential for reactivation by coastal erosion, exacerbated by water in the ground. Within the mouth of the Medina Estuary private properties, marinas, wharfs and businesses line the waterfronts. The coast is intensively used and many properties have their own slipways with a variety of defence types and heights with varying conditions.

There are narrow intertidal mudflats on either side of the middle and upper estuary, largely bordered by agricultural land and woods. At low water the Estuary is not navigable upstream of Island Harbour. Several waterside pubs and areas of moorings are popular with residents and visitors whilst Seaclose Park provides the venue of the internationally recognised Isle of Wight Festival. The Medina Valley Centre runs environmental education programmes and watersports courses. Commerical sites within the estuary use the waterside facilities for the import and export of materials and goods.

The upper estuary is surrounded by the developed area of Newport Harbour, close to the centre of Newport. Newport Harbour is characterised by moorings and pontoons surrounded by access roads, car parking and an area of waterside offices, amenity and commercial units, in an area of tidal flood risk.

East Cowes Esplanade runs along the outer eastern estuary with areas of residential development, and local amenities on the waterfront, with a no-through access road along the seawall.

Above: The towns of Cowes and East Cowes at the mouth of the Medina Estuary, with the Shrape Breakwater protecting the entrance to the harbour (Isle of Wight Council).

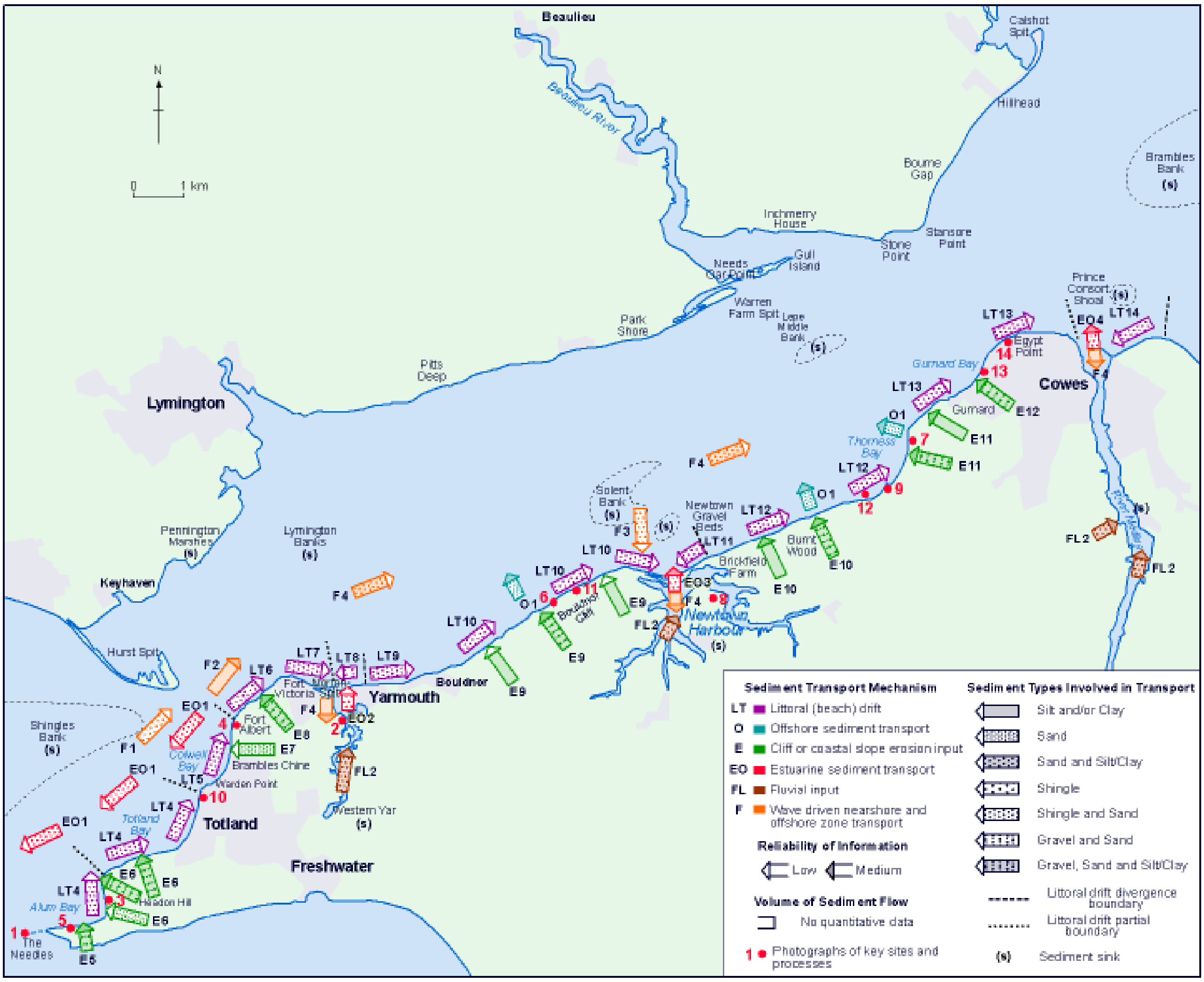
Right: Flooding surrounding Newport Harbour, March 2008.

1.5 Physical Processes

1.5.1 Coastal Processes (further details are provided in Appendix C1).

The following summary outlines the wave climate, tidal flows, geomorphological controls, sediment supplies and coastal processes characterising PDZ1. The general pattern of sediment movement is summarised in the following diagram from the SCOPAC Sediment Transport Study.

NW Wight (Needles to Old Castle Point): Sediment Transport



Sediment transport sources, pathways and sinks on the north west coast, from SCOPAC Sediment Transport Study, 2004.

The small low-lying valley of Gurnard Luck at the western limit of the PDZ is fronted by a mixed gravel and pebble beach, and weak net eastwards littoral drift is reported along the depleted beach from Gurnard Bay around Egypt Point towards Cowes. Concrete rubble groynes at Egypt Point selectively intercept sediments, but quantities are small because of the presence of protection structures and a lack of available material. Beaches comprise sandy gravels becoming coarse gravel and cobbles under the seawall and are depleted around Egypt Point, but widen eastwards to Cowes.

The north-facing coastal slopes extending under the towns of Cowes and Gurnard form a prominent headland separating the Medina Estuary from the Western Solent and are affected by significant slope stability and landslide problems. The nature of ground movement along this frontage is by:

i) subsurface movements associated with the progressive creep of deep-seated landslides;
ii) surface or superficial slope movements arising from the erosion or failure of steep slopes;
iii) the differential movement and settlement of clay slopes and compression or ground heave.

Contemporary problems arising from ground movement tend to result almost entirely from superficial movements, the nature and significance of which varies along the frontage. At Gurnard, the slopes were reactivated after the winter of 2001. At Gurnard Cliff, coastal mudslides have resulted in undermining and recession of the cliff top, active settlement of the cliffs and translational movement of debris to the foreshore. Outward displacement and heave of mudslide lobes at the base of the coastal cliffs has prompted the destruction of coastal defences along this section. Poor drainage, increased rainfall, beach steepening and increased toe erosion will promote active landsliding and could result in rapid retrogression upslope towards cliff top development. East of Gurnard slipway, the coastal slope becomes less steep and is protected at the toe by seawalls and an esplanade. Slope morphology comprises numerous irregularities, which indicate past and active seepage erosion and the presence of relic deepseated and shallow landslides. Between Egypt Point and West Cowes the upper coastal slopes exhibit evidence of instability, but the toe has been protected by an esplanade and sea wall since 1894, so no contemporary sediment supply occurs so long as it maintains its function. It should be noted that increases in winter rainfall (effective precipitation) that are likely to result from future climate change could have serious implications as it would raise groundwater levels, potentially causing more widespread reactivation of the coastal slope along this frontage.

The Medina Estuary is described in the Medina Estuary Management Plan as the product of the flooding of a pre-existing narrow, river eroded valley over the past 10,000 years. The estuary has been formed by the physical processes associated with the coast, the hydrography and hydraulic regime of the estuary and associated sediment transport or accretion. The estuary is tidal from Cowes to Newport. Cowes Harbour and the outer estuary are influenced by high energy conditions resulting from coastal waves, currents and the tidal regime, which declines rapidly inland. As hydraulic gradients weaken, sediment mobility diminishes and marine influences, in general, become weaker. As a result, over several millennia, there has been a net input of sediment into the estuary. The hydraulic regime of the Medina Estuary may be regarded as largely natural though modified in places due to waterfront development, the dredging of the main channel and the installation of protection structures. The estuary narrows at the Point where the floating bridge crosses and this constriction is considered to be a geological control on the estuary, such that the future evolution of the estuary will remain strongly influenced by this zone. Due to this it is argued that the 'true' estuary mouth is at this location and the areas to the north exhibit some characteristics of an open coast bay (ABPmer, 2007).

The Medina Estuary lies within a wide shallow valley with a gentle incline on either side. Sediment build up has formed characteristic mudflats which support a large number of species, including shellfish, algae and locally and regionally important species of worm, and also important sources of food for fish and bird populations. At low water a single, relatively wide but shallow channel remains. The mid and upper reaches are largely bordered by agricultural land, hedgerows and woods, whereas the lower reaches and mouth are lined by docks, boatyards and marinas. Along the estuary, minor relic industrial and agricultural defences have been constructed in the past, which in most cases they are no longer functioning, although they may provide some limited resistance to erosion.

The Medina operates as a natural littoral transport boundary as its dominant ebb tidal flow generates net offshore flushing of incoming shoreline sediments. The process is probably less significant than in the past because there is very little incoming littoral drift due to widespread shoreline stabilisation and drift interception. The flushing effect was enhanced by construction of the East Cowes (Shrape) breakwater in 1936/37 to limit the amount of suspended sediment entering the Estuary, and ebb tidal flow was shifted westward by the breakwater into the centre of the inlet. The flood currents dominate along the western margin. Comparisons of hydrographic charts dating back to 1856 indicate that some cyclic variations of the sea bed may have occurred prior to construction of the breakwater, but subsequently the bed has been relatively stable. This is attributable to the net offshore transport of sediment which maintains stable channel configurations and prevents siltation even in recently dredged berths. Small sand and gravel banks exist where dominant ebb and flood flows crossover; these are probably not sediment sinks but temporary accumulation zones for sediment subject to net offshore transport. Banks further offshore such as Prince Consort Shoal and Brambles Bank are probably permanent sediment sinks and in the past might have been supplied with sediments flushed seaward out of the Medina Estuary.

The SCOPAC Sediment Transport Study (2004) records that the Medina Estuary has a mean flow of $0.5m^3s^{-1}$ and this comprises only 0.67% of the tidal volume entering at the mouth during a corresponding tidal period. Thus, marine sediment input to estuarine mudflats and saltmarshes must be the dominant source of supply and fluvial sources are considered to be relatively insignificant. Historical chart analysis, a review of estuary processes and morphometric analysis on the estuary (ABPmer, 2007) suggests that accretion of fine material has continually occurred since 1856 (albeit at a relatively slow rate) but the man-made interventions, mostly between the 1920s and 1950s, probably caused a temporary change to the system. This changed the hydrodynamics, inducing additional flows at the lower states of the tides (particularly ebb) which have scoured the low water channel. This scour has mainly been at the edges, removing the finer fractions of sediments to leave the coarser gravels as bed armouring thus reducing the effect depth-wise. This temporary change appears to have worked through the system up to the area around Island Harbour and the net accretionary regime has re-established down estuary. The rates of future accumulation are, however, likely to be lower than those before the construction of the Shrape breakwater due to its effect on reducing the supply of sediment into the system. The Shrape breakwater has contributed (along with coastal protection works) to reduce the overall supply of sediment to the estuary, compared to 1856 but since the 1980s the estuary has had a net accretionary trend, particularly over the intertidal. Rates of change are small, being measured in millimetres per year. There has been a net reduction in surface area (at high water) due to coastal squeeze, predominantly from embankments and reclamation.

Since the 1940s the area of saltmarsh has reduced by 10.3 ha as a consequence of direct reclamation, capital dredging or impoundment such as at Island Harbour as well as from natural processes. A reduction in area of saltmarsh has occurred throughout the Solent Area and therefore a proportion of the natural change may reflect regional trends rather than local developments. The rate of erosion has slowed considerably in recent years. Upstream of Dodnor, the net accretionary trend has been continuous but may be reduced for a period in the future as the effects of the developments continues to work its way up the estuary, unless the effect has decayed sufficiently not to cause a significant change relative to the accretion and erosion thresholds.

At the eastern boundary of PDZ1 Old Castle Point is a drift divergence zone. The overall trend in PDZ2 to the east is for eastwards sediment drift over 10km from Old Castle Point towards Ryde Sands. Cowes Harbour entrance represents a drift convergence boundary and sediment movements affect the navigable channel, although relatively small quantities of sediment are moved by littoral transport towards the Medina entrance, and the Shrape breakwater further controls sediment input to the harbour channel. Some accretion against the eastern side of Shrape Breakwater (at the mouth of the Medina Estuary) since its construction in 1936/37 indicates a long-term trend for weak net westward littoral drift over the short distance of 1km from Old Castle Point. Similar accumulations against other smaller structures provide a corroboration of this drift direction. Sand and shingle have accumulated on the upper foreshore with mud on the lower foreshore indicating that all grades of sediment are transported in the same direction. Falling beach levels and lack of significant accretion against the breakwater indicate low drift rates, due to the small source area and the impact of protection structures in reducing cliff erosion.

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. Without defences, the toes of the coastal slopes would be likely to be eroded at variable slow to moderate rates throughout the coastal areas of the PDZ dependent on the underlying landslide morphology and weak coastal slopes. This could remove support and destabilise the relic landslides on the slopes above along the Cowes-Gurnard frontage. The northern shore of the Isle of Wight is more sheltered than the south coast, however locally the frontage from Gurnard to the Royal Yacht Squadron is the most exposed to wave attack and also supports the steepest slopes, suggesting that it may be the most vulnerable to future re-activation. An adequate supply of sediment is important to maintaining the wildlife habitats of the Medina Estuary and although past work has identified that the estuary may be 'sediment starved' the estuary appears to be capable of continuing to accrete fine sediments in the upper reaches which appears to be getting sandier. As a consequence there has been a change in the invertebrate fauna to reflect this and a change in the birds feeding there. The rate of saltmarsh erosion has slowed considerably in recent years. Since this is a valley type estuary with relatively steeply sloping margins the saltmarsh is likely to be sensitive to future sea-level rise and coastal squeeze unless vertical accretion can compensate.

1.5.2. Existing Defences

The following description of coastal defences outlines the current condition and expected remaining effective life of the defences in the area, if no further maintenance is carried out. In addition to the following summary, individual defences are described in Appendix C2 -Defence Appraisal (areas IW55 to IW59, & IW1).

In the west of the PDZ at Gurnard Luck defences are in place, with the exception of an undefended coastal slope 'Gurnard Cliffs'. These coastal defences fronting Marsh Road are in poor condition, and have locally failed causing active erosion. The freshwater outlet of Gurnard Luck incorporates tidal flap valves protecting Gurnard Marshes from flooding.

Defences extend from Gurnard eastwards to Cowes and the mouth of the Medina Estuary. As discussed earlier this defence line is primarily an ad-hoc series of both private and Environment Agency seawalls and provide only a moderate standard of protection (1 in 25). During periods of high spring tide/swell, areas of seawall backed by wide roads and parades are locally overtopped causing flooding. Active slope movement behind Egypt Esplanade periodically causes movement of the defences. A shingle ridge fronting Queens Road provides toe weight to the active coastal slope. The recently constructed Royal Yacht Squadron Jubilee Haven has improved the protection of The Parade from westerly storms. From the Parade to Cowes floating bridge consists of ad-hoc defence, mainly private, leisure and industrial marine infrastructure. The coastline from Cowes floating bridge to Medina Wharf is defended and fronted by sailing and industrial marine facilities and commercial wharf.

The central west side of the Medina Estuary is typically undefended until West Medina Mills Wharf which is currently being developed with the South East England Partnership Board. Upstream is a mix of undefended and sailing, residential and industrial defended frontages that includes the Vestas Marine Transfer Facility. This ajoins the undefended Medina Riverside Park. The frontage then is defended until the boundaries of Newport Harbour, with harbour-side walls surrounding the tidal harbour. The central east side of the Medina Estuary is typically undefended, with the exception of Island Harbour marina that incorporates a tidal lock, and limited defences near the Folly Inn. Historically, enclosure of tidal inlets in the Medina has occurred as a result of tidal millponds at Island Harbour and Dodnor Creek and from the construction of the former railway on the western bank (now forming the cycle track). Some structures survive, mostly in a deteriorating condition, which may impede natural tidal inundation.

Moving north into East Cowes, the north east side of the Medina Estuary from Kingston Wharf to the north consists of private, leisure, and industrial related defences and infrastructure.

At the eastern shore of the estuary mouth, from the Cowes floating bridge to the Shrape Breakwater consists of private defended frontages and slipways including the car ferry terminal, then public defences with a seawall and number of concrete groynes between Venture Quays and Old Castle Point. SEEDA recently improved the commercial facilities of Venture Quays by installing steel sheet piling and rock armour revetment. East Cowes suffers from localised flooding during periods of high spring tides/swell. The South East England Partnership Board and Cowes Harbour Commission are investigating construction of an outer breakwater and additional marina facilities. Outside the Shrape Breakwater (currently forming the harbour limit) defences extend eastwards to Old Castle Point protecting the coastal slope from erosion.

1.5.3 Potential Baseline Erosion Rates

The SMP reviewed a wide range of data to define the current and potential rates of coastal erosion and cliff retreat along the Isle of Wight coast using the best available information. Full details can be found in Appendix C3. Future erosion rates are predicted using Walkden & Dickson formula (2008) and allow for future sea level rise – the full methodology is explained in the Appendix. Predicted sea level rise rates of 4mm/yr (to 2025), 8.5mm/yr (to 2055), 12mm/yr (to 2085) then 15mm/yr (to 2105) have been used, in accordance with SMP national guidance by Defra. These rates equate to 7cm of sea level rise (above the 2009 baseline) by 2025, 32cm by 2055 and 98cm by 2105. The IW numbering units refer to lengths of coast for which future behaviour is described and mapped in Appendix C based on SMP1 and Strategies. These are not SMP2 policy units which are developed in section 3 below.

Potential total erosion over the next 100 years is shown, however it is important to note that this is an estimate that is based on an undefended coastline. Within Appendix C3, these erosion rates are only applied following the predicted failure date of each individual element of the defences within the unit; therefore the resulting erosion amounts shown in the Appendix C3 tables and maps (and used in the development of this SMP) will show smaller erosion totals than the overview provided below.

Potential coastal erosion rates (all figures in metres/year):-

Numbering in SMP2 Appendices (2010) *(area and name, clockwise)*		**Historical Rate**	**Current to 2025**	**2025 to 2055**	**2055 to 2085**	**2085 to 2105**	**Potential 100 year erosion (if undefended) -total in metres**	**Notes**
IW55	**Gurnard Luck**	0.30	0.35	0.46	0.53	0.58	48	
IW56	**Gurnard & Cowes Esplanade**	0.30	0.35	0.46	0.53	0.58	48	Coastal erosion could trigger potential landslide reactivation (approx. 2m/yr slope retreat); see Appendix C3 for details of the zone at risk.
IW57	**Cowes Parade & Harbour**	0.30	0.35	0.46	0.53	0.58	48	
IW58	**Medina Estuary**	0.10	0.12	0.15	0.18	0.19	16	
IW59	**East Cowes Outer Harbour**	0.10	0.12	0.15	0.18	0.19	16	

Numbering in SMP2 Appendices (2010) *(area and name, clockwise)*		**NE Strategy Study Morphodynamic Unit No.**	**Current to 2055**	**2055 to 2085**	**2085 to 2105**	**Potential 100 year erosion (if undefended)**	**Plus potential slope reactivation triggered by coastal erosion**
1	**East Cowes Esplanade**	1	0.26	0.31	0.34	29	n/a
		2	0.26	0.31	0.34	29	Plus 65m potential slope reactivation at end of epoch 1

Note:
i) Erosion rates have been determined from monitoring data and examination of historical records and have been calculated to take account of sea level rise. –see Appendix C3 for details.
ii) The IW numbering units refer to lengths of coast described in Appendix C. These are not SMP2 policy units.

2. Baseline management scenarios

2.1 Present Management

Present management of the shoreline is taken as the policy defined by SMP1, modified by subsequent strategies or studies. It should be noted that in the case of SMP1 the period over which the assessment was carried out was 50 years. SMP2 extends this to an assessment period to 100 years. The table below sets out the current shoreline management policies for PDZ1. This SMP2 will assess all the available evidence and update these previous management policies.

The key documents outlining the present management of the shoreline in this PDZ are:-

Isle of Wight Shoreline Management Plan 1 (1997)
The first Shoreline Management Plan (SMP1) for the Isle of Wight 's coast was published in 1997. It consists of two volumes.

- Volume 1 is the 'Data Collection and Objective Setting', which presents information on a range of topics including coastal processes, natural environment, etc.
- Volume 2 is the 'Management Strategy', which presents information for each Management Unit around the Island's coast and sets a management Policy for each unit.

Coastal Defence Strategy Studies, Isle of Wight
Whilst the Shoreline Management Plan provides the risk framework for management of the coast, Coastal Defence Strategy Studies provide a more detailed assessment of particular frontages in order to identify the most suitable type of coastal defence schemes that may be required to fulfil the agreed shoreline management policy and to plan a programme of future works.

North East Coastal Defence Strategy Study, Isle of Wight (2004)
The North-East Coastal Defence Strategy Study, which extends from the Shrape Breakwater at East Cowes to Culver Cliff, was completed in 2004 and adopted in 2005. The Plan sets out the works programme along the north-east coast frontage for the next five years including details on costings. The North-East Strategy consists of a summary report and detailed Appendices.

West Wight Coastal Defence Strategy Study
A Coastal Defence Strategy Study for the West Wight Coastline will be completed following the publication of SMP2. Work to date included the areas of Cowes and East Cowes seaward of the floating bridge.

Catchment Flood Management Plan
The Environment Agency has undertaken a programme of Catchment Flood Management Plans (CFMPs) for the major river catchments in the Southern Region. A CFMP is a large scale plan that covers an entire river catchment or group of catchments that identifies long-term, sustainable policies to manage flood risk within the catchment. These policies form the basis for development of Strategy Plans, covering all or part of the overall catchment area, which will identify in more detail appropriate flood defence measures.

Whilst CFMPs principally address fluvial (river) flooding, SMPs address tidal (sea) flooding, alongside coastal erosion. The Isle of Wight Catchment Flood Management Plan (Summary Report) was published in December 2009.

- Sub Area 3: Lower River Medina and Gurnard Luck

"The issues in this sub-area: The River Medina and Gurnard Luck can flood from a number of causes. Both rivers are responsive to rainfall and both are affected by tide locking. Potential flood levels at Newport and Gurnard are particularly sensitive to future sea level rise due to a number of low lying properties. The scale of flood risk in this subarea is such that estimated

property damages are relatively high in comparison to other parts of the catchment because of the significant population in the catchment. The relatively high number of properties at risk means that flood risk management activities are employed and existing defences which protect Newport and Gurnard need to be maintained."

Policy Option 4 – areas of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change.

Medina Estuary Management Plan
The Medina Estuary Management Plan was written in 1997 and revised in 2000. It sets out key issues, policies and actions that contribute to the integrated management of the area and highlight the need for the sustainable use of the estuary's resources. Key Issues for the estuary addressed in the Management Plan are: Agriculture, Commercial and Economic Use, Fisheries, Historical and Cultural Resources, Landscape, Nature Conservation, Physical Processes, Recreation and Leisure, Water Management, Public Awareness and Education, Research and Monitoring.

The Physical Processes theme includes the following objective:

- Objective P2: To ensure the co-ordination of appropriate coastal protection and flood relief.

The previous shoreline management policies set for this PDZ are listed in the table below:

The IW numbering units refer to lengths of coast for which previous shoreline management policies have been set in SMP1 modified by subsequent Strategy Studies. These are not SMP2 policy units, which are developed in section 3 below.

Numbering in SMP2 Appendices (2010)		**SMP1 (1997)**		**North East Coastal Defence Strategy Study (2004)**		
Area *(clockwise)*	**Name**	**Unit**	**Policy**	**Strategic Management Unit**	**Preferred Generic Policy Option**	**Trigger Governing Change in Generic Policy Option**
IW55	**Gurnard Luck**	NEW 11	Hold the existing defence line	N/A		
IW56	**Gurnard & Cowes Esplanade**	NEW 12	Hold the existing defence line			
		NEW13	Hold the existing defence line *Or* Advance the existing defence line			
IW57	**Cowes Parade & Harbour**	NEW 14 (includes both east & west banks of the estuary mouth)	Hold the existing defence line *Or* Advance the existing defence line			
IW58	**Medina Estuary**	N/A	-			
IW59	**East Cowes Outer Harbour**	NEW 14 (includes both east & west banks of the estuary mouth)	Hold the existing defence line *Or* Advance the existing defence line			
IW1	**East Cowes Esplanade**	NEW15	Hold the existing defence line *Or* Retreat the existing defence line	SMU1	Hold the Line, followed by No Active Intervention, but Monitor	Economic viability of maintaining existing defences.

2.2 Baseline Scenarios for the Policy Development Zone

2.2.1 No Active Intervention (Scenario 1, NAI):

Under this scenario no further work would be undertaken to maintain defences. Where defences fail they would not be repaired. The principal difference between this scenario and the unconstrained scenario discussed earlier is the residual impact existing defences would have on the behaviour of the coast. A detailed description of this NAI scenario is given in Appendix C3, area by area. The following discussion provides a summary, drawing together an overview with particular focus on how the use of the coast would be affected. In particular, this baseline scenario is discussed with respect to the overarching objectives set out previously in sub-section 1.3 of this PDZ1.

Gurnard Luck
Gurnard Luck is a low lying community surrounding Gurnard Luck stream. From Gurnard Luck the village of Gurnard continues along the cliff top to the east and central Gurnard forms the seafront at the western end of the Cowes-Gurnard seawall. At Gurnard Luck sections of the defences are already failing. Under this scenario, there would be no future maintenance works so erosion of the low-lying coastal frontage will continue and tidal inundation would occur more frequently and at higher levels with sea level rise. Inland of these processes, Gurnard Luck stream flows through flapped culverts before exiting to the sea. The Luck can only drain during low tide conditions, and excess waters overflow into the Marsh area. The Marsh quickly fills during fluvial events and with no maintenance and failure of the gates, Gurnard Luck stream will divert and flow over Marsh Road, flooding Marsh Road properties. This suggests that within the first epoch the village of Gurnard would be exposed to a number of threats simultaneously; increased sea flooding and increased erosion of coastal land and fluvial flooding. The village would struggle to co-exist with these natural processes and once started these processes would likely accelerate deterioration and collapse of the defences. The collapse of the defences and flooding of the Marsh area would result in the creation of intertidal mudflat and saltmarsh in the medium to long term, as the coastal grazing marshes become more brackish and erode to more sustainable intertidal mudflats and saltmarsh areas.

Gurnard to Cowes Esplanade
At Gurnard Cliff, the wooded and developed coastal slope is undefended for approximately. 0.5km, then moving eastwards from central Gurnard around Egypt Point and eastwards into Cowes a continuous series of concrete seawalls extend for over 2km and beyond and are expected to fail near the end of the first epoch. The cliff and seawall are backed by the urban residential areas of Gurnard and Cowes on marginally stable slopes, which will be at risk of initial erosion leading to a significant landslide reactivation. Coastal erosion at the toe of the coastal slope could trigger landslide reactivation at 2m/year. Therefore, a wider potential reactivation zone is shown on the maps of the 'No Active Intervention' scenario beyond the direct zone of expected erosion. Additionally, the esplanade road from Gurnard to Cowes will be increasingly affected by episodes of tidal inundation through the first epoch prior to seawall failure. The public highway, residential properties, footpath access and public open space will be affected in this area.

Cowes, East Cowes and the Medina Estuary
The frontage at Cowes Parade begins a defended section close to 3km in length fronting Cowes town centre and lining the mouth of the Medina Estuary. Under this scenario no works would be taken to maintain the existing assortment of concrete and masonry seawalls and steel sheet pile defences. The patchwork but continuous defence line is inadequate to prevent tidal flooding, which already affects the town centre of Cowes and over time sections of the frontage would give way. Lining the outer Medina Estuary, the low-lying coastal land is heavily developed with a combination of residential, commercial and industrial properties including wharfs, large marinas and associated facilities essential to the marine industries of the town. The central undeveloped reaches of the estuary are generally undefended, whilst the remaining sections are characterised by an assortment of landowner maintained defences. These sections of defences, varying in size,

height and material, provide protection from flooding or essential waterside access whilst helping to maintain the channel to allow commercial operation of the harbour and estuary. In the first epoch, there are a large number of properties on Cowes High Street south of the Parade and the shoreline assets running along to the floating bridge and to the southern limit of Cowes at risk, which includes a number of historic listed buildings. Moving towards the third epoch, with sea level rises, both East Cowes and Cowes town centres will experience flooding on most tides. The central sections of the estuary will evolve more naturally, though there is a waterside development area and a marina present, which will impede natural change along limited frontages during the first epoch prior to defence deterioration and failure (if unmaintained under the No Active Intervention scenario), followed by potential inundation or loss of properties. The popular West Cowes to Newport cycle track is also at risk, an important element of sustainable transport planning. Loss of the defences surrounding the Folly Inn would result in the loss of a local amenity and tourism focus for the estuary waterside. Elsewhere in West Cowes, East Cowes and the Medina the failure of defences and wharfside walls would severely impact upon the commercial operation of the estuary, including marine industry and aggregate imports. Natural change may involve loss and change of important intertidal habitats (i.e. erosion of saltmarsh to mudflats), particularly around the estuary mouth and some areas of the central estuary, since natural roll-back would be constrained naturally by height of the land, leading to more frequent saline intrusion of reedbeds and loss of mudflats. However, through the No Active Intervention policy option there are opportunities to allow the estuary to evolve more naturally, for example, near Dodnor Cottages, around Blackbush Copses and to create habitat from the south of Somerton Farm to Little Werrar Wood.

At the southern limit of the Medina Estuary, around Newport Harbour and Little London approximately 750m of both banks are protected by masonry and concrete seawalls and steel sheet piles. With no maintenance these defences are expected to fail late in the first epoch or very early in the second epoch affecting property, a number of listed buildings and infrastructure. The failure of defences would only allow for marginal roll-back of the intertidal habitats due to the relatively steep topography of the river.

On the eastern shore of the Medina Estuary mouth, the shoreline defences around the town of East Cowes tend to be low concrete and masonry walls, similar to Cowes Parade and Harbour. This urban area is at risk principally from significant coastal flooding and overtopping, both situations already occurring, and with no further intervention or maintenance the defence structures in the north and south of the frontage will breach at the end of the first epoch. A dominant feature along this frontage is the Shrape Breakwater forming the outer limit of the large harbour and the failure or breach of the structure with no maintenance would lead to a number of issues. Specifically this would include increased quantities of sediment to drift westwards and possibly impede navigation in Cowes Harbour and increased wave penetration into the estuary/wave attack to the frontage. This change in the estuary mouth would alter the tidal flow through the harbour entrance. Further eastwards, loss of the seawall leading to Old Castle Point will trigger erosion resulting in localised slope reactivation. However the impacts along this frontage are limited to an Esplanade road backed by grassy public open space with scattered buildings, decreasing eastwards moving into thickly wooded coastal slopes that form part of the historic Norris Castle park and gardens, although this Esplanade (inside and outside the Shrape breakwater) forms the main waterfront access within East Cowes. The degradation of defences would allow the coast to eventually roll-back naturally, providing beach material.

Overview of Impacts

There remains uncertainty as to the degree of slope reactivation around the future headlands and the re-established natural estuary behaviour under this scenario given the complexities of the surrounding frontage. However, the important conclusion is that there would be substantial change to the area leading to a significant impact on the use of the harbour and shoreline. NAI in this area would not sustain or allow adaptation of the communities and local commercial interests. It would also not significantly enhance the existing nature conservation values of the Solent and Southampton Water SPA and Ramsar sites, the Solent Maritime SAC and the Medina Estuary SSSI (features including intertidal sandflats and mudflats, salt marshes, coastal grazing marsh and important wader roost sites), due to the combination of increased erosion, sea level rise and the naturally steep topography of much of the estuary constraining natural roll back of the coastline. Due also to the increased flood risk both at the estuary mouth and along the estuary, there would be significant disruption to the economic drivers supporting to the urban areas of Cowes, East Cowes and some disruption to Newport, affecting marine industry and commercial wharfs. Most notably vital ferry transport links would be lost in both Cowes and East Cowes. Arguably the landscape, though changed, would still be much valued, but there would be loss to the historic environment. Access to the shoreline would be affected, including loss of the popular seafront promenades, but most significantly the future use of the Harbour, without some form of intervention and control, would be difficult.

2.2.2. With Present Management (Scenario 2, WPM):

Overview

This scenario examines the effectiveness of maintaining and continuing existing coastal defence structures and policies within the PDZ. This present management scenario is based on that set by SMP1 and updated in limited areas through the development of the published North East Coastal Defence Strategy Study**.** These policies are outlined in the table in section 2.1 above and are used to describe the intent of WPM within this baseline scenario. In summary the intent defined by the existing management policies is to provide continued protection to all existing areas currently defended, or possibly advance the existing defence line at Gurnard, Cowes and East Cowes if the opportunity arose related to shorefront development. To the east of East Cowes there is a management intent to hold existing defence line in the short term and then move to no active intervention.

The Medina Estuary was excluded from SMP1 and the Catchment Flood Management Plans (CFMPs) only included the river upstream of the A3020 road bridge at Newport Harbour, marking the main transition from tidal to fluvial dominated processes. The Medina Estuary Management Plan was revised in 2000 and set out key issues, policies and actions that contribute to the integrated management of the area and highlight the need for the sustainable use of the estuary's resources. One of the main objectives was to ensure the co-ordination of appropriate coastal protection and flood relief.

In 2005 a three year project began to develop a set of assessment tools for the Medina Estuary. The aim of the project was to improve the understanding of the estuary and its processes and to develop a hydrodynamic model that would help the statutory authorities with their assessments of proposed coastal developments. As the Medina had become a focus for the regeneration of East Cowes and the Isle of Wight, it was felt that the assessment of individual applications may not reflect the combined impact of small developments on the European designated sites (i.e. Solent Maritime SAC and Solent and Southampton Water SPA and Ramsar sites). The research undertaken since 2004 was therefore carried out in the context of development proposals for the regeneration of the East Cowes area and its potential impact on these designated sites. The research and reports produced for the project contain information that significantly increases the level of understanding of the estuary and provides the tools to assist with the assessment of any new structure or development.

Gurnard Luck

At Gurnard the existing defence line would be maintained and replaced as required. This continued maintenance will prevent further breach and erosion of the frontage, but the existing defence level is not high enough to prevent overtopping and tidal flooding. The community, even with current management, is at high risk. Over the first epoch, the foreshore is expected to narrow as sea level rise reduces the beach area available, as well as being starved of local sediment supply, which will impact on the amenity use of the frontage. Limited sediment supply from PDZ7 to the east is likely to continue. Holding the existing line at Gurnard is achievable, but heights of defences would need to be increased against current and future flood risk combined with sea level rise. The 'with present management' scenario is not adequate to project the community much past the first epoch. The landward coastal grazing marshes would be maintained under this management option, though there would coastal squeeze of the beach as it was constrained from natural roll back by the maintained defences. However, the beach is of poor sediment and ecological quality and would therefore not significantly affect the integrity of the Solent Maritime SAC.

Gurnard to Cowes Esplanade
At Gurnard Cliff, the coastal slope would remain undefended and eroding at the cliff toe so within the first epoch significant slope reactivation and retreat would continue to be triggered in line with the 'No Active Intervention' scenario, with cliff toe erosion and retreat outflanking the adjacent defences at Gurnard Luck to the west and Gurnard Bay to the east. It would be important to link any potential works at Gurnard with the erosion issues along this section. From central Gurnard to Cowes the existing coast protection would be sustained by maintaining and replacing the existing seawalls at their current standard. Under the current management intent, with ongoing maintenance, the existing seawalls are not high enough to protect against very frequent and serious overtopping that will occur towards the end of the second epoch so their levels will need to be raised. These events could otherwise inundate roads and infrastructure along the frontage (seafront properties between Queens Road and the Esplanade) and may also assist in saturating and destabilising the coastal slopes at risk of landslide reactivation. Slope failure underlying the developed areas could be triggered by high groundwater levels as ground conditions worsen with predicted increases in winter rainfall despite maintaining the sea wall. Maintenance of the seawalls will however significantly reduce the risk of landslide reactivation by continuing to prevent coastal slope toe erosion and undermining. By maintaining the existing defences the foreshore will steepen over time with erosion and sea level rise, with coastal squeeze of the coarse shingle frontage. The relatively poor ecological condition of the beach means there would be very no significant effect on the integrity of the Solent Maritime SAC.

Cowes
The management intent over this section is based on holding the existing defence line, but this is difficult with increasing sea level rise. To protect Cowes, and deliver the management plan, one would need to build a high defence wall around Cowes or move Cowes town centre to higher ground. Piecemeal raising of the levels of existing private defences by individuals is likely to be insufficient to reduce flood risk in the town centre. Preliminary investigations into 'advancing the line' along small sections have been discussed, but there has been some resistance from landowners who are concerned about losing direct access to the shoreline. Working with the Isle of Wight 'Island Plan' (LDF) the management intent at Cowes, and East Cowes discussed later, needs to be influenced by the long term vision of this area within the technical constraints. With the present management there would continue to be significant flood risk, and some limited bank erosion to approximately 1.5km of commercial, residential and historically important properties along the Medina fronting Cowes and East Cowes, just upstream of the floating bridge. Maintaining the existing defences would over time lead to the loss of the small pockets of intertidal mudflats through coastal squeeze. Some of these mudflats are in poor condition and some designated as Biodiversity Action Plan (BAP) habitats and a feature of the Solent Maritime SAC.

Medina Estuary
Along the Medina Estuary, continued maintenance of the defences at Cowes, East Cowes, limited sections of the central estuary (including Island Harbour) and at Newport Harbour will hold the shoreline in its present position. Additionally this will help support the borders of the estuary, maintaining commercial harbours, wharfs and operations at Cowes, East Cowes and Newport. While the majority of the central estuary will remain undefended, maintaining the fixed location of the mouth may affect the natural functioning of the estuary, which is a feature of the Solent Maritime SAC. Upstream of Cowes there is also flood risk at Folly Lane, Island Harbour, Stag Lane and to a number of commercial and residential properties surrounding Little London and Newport Harbour. Similar to the issues facing the rest of this PDZ, the impacts of sea level rise will

result in increased tidal flood frequency and increasing depth of tidal flooding. Regular inundation of significant areas of Cowes, East Cowes, waterside developments along the estuary margins, Island Harbour and Newport Harbour is likely as the majority of defence levels are likely to be insufficient as they were not designed to protect against the prevailing conditions on a 50-100 year timescale nor do they provide a continuous defence line. Where the defences are maintained to protect properties and assets there will be loss of important estuarine habitats through coastal squeeze, this will affect the integrity of the SAC, SPA, Ramsar and SSSI within the estuary. However, where the defences are allowed to fail since they are not designed to prevail over the 100 year period there is the potential for habitat gain through natural roll back and for the estuary to function more sustainably.

East Cowes

As discussed throughout the management of this PDZ, continuing the maintenance of the existing sea walls and private defences without improving the current standard of protection will prevent shoreline change due to erosion but will not reduce the current and future levels of flood risk. Tidal inundation already encroaches into the developed area and the flood risk zone will expand in future epochs and the area will be at high flood risk. While keeping the shoreline in the current alignment will preserve the harbour channel entrance, the economic implications to local businesses and the cross-Solent ferry links could be significant (possible abandonment of key areas) and significant upgrading of defences will be required. Maintaining the existing defences would protect the few historic buildings from erosion, though potentially not from flooding, as well as the Norris Castle park and gardens from being eroded away. However, the intertidal mudflat and sandflat areas fronting these defences would become increasingly affected by coastal squeeze, thus affecting the integrity of the relevant European designated sites.

Overview of Impacts

The potential economic damages under this scenario are identified in Table 1 at the end of this sub-section.

The intent of the scenario is to reduce the frequency and extent of tidal flooding at Gurnard Luck and prevent erosion to reduce the risk of landslide reactivation from Gurnard to Cowes. It is important to consider that the risks along these frontages cannot be viewed independently as the combination of increased overtopping, tidal flooding and wave attack will increase the pressure to the cliff toe potentially leading to landsliding, therefore the standard of defences needs to be improved. One could not undertake substantial works to stabilise the coastal slope, either through drainage and direct slope stability techniques, without also doing works to the defence line against tidal flooding and erosion. Defences at the community of Gurnard Luck will become increasingly difficult to maintain as their short to medium term sustainability is questionable, particularly with the potential for habitat creation landward of Marsh Road to mitigate/compensate for the loss of coastal habitats elsewhere on the island, however, there is a strong small community in this area. Also long-term defence of the Cowes and East Cowes seafront will become increasingly difficult with sea level rise. In the areas with wide esplanades there is room to increase the standard of defences, but within the estuary mouth properties directly front the waterline on both sides of the estuary. As such, the objective of ‘managing risk to properties where sustainable’ is only considered to be partially addressed.

While the towns of Cowes and East Cowes can be maintained, the use and appearance of the seafront would be significantly altered through increasing levels of defence.

There is a potential loss of mudflats, saltmarsh and coastal grazing marsh areas along the Medina Estuary as flood defences are maintained, which will affect the integrity of the European designated sites. Alternatively, in undefended areas where tidal flooding is allowed, important habitats will be lost or altered. This may constrain an adaptive approach to management of this feature. WPM will also affect archaeological and palaeo-environmental sites within the Medina Estuary.

Table 1a. Economic Assessment – Erosion damages

The following table provides a brief summary of damages determined by the SMP2 MDSF analysis for the whole PDZ. Further details are provided in Appendix H. Where further, more detailed information is provided by studies, this is highlighted. The table aims to provide an initial high level assessment of potential damages occurring under the two baseline scenarios.

Assessment of Erosion damages

Epoch	0 -20 year			20 – 50 years			50 – 100 years			
No Active Intervention	**Number of properties:**		**Value x £1000**	**Number of properties:**		**Value x £1000**	**Number of properties:**		**Value x £1000**	**PV Damages (£x1000)**
Location	*Residential*	*Commercial*		*Residential*	*Commercial*		*Residential*	*Commercial*		
Gurnard Luck	0	0	0	5	3	919	26	8	4,678	948
Gurnard Cliff	0	0	0	0	0	0	2	2	404	53
Gurnard to Cowes Esplanade	0	6	0	1	10	360	117	29	20,856	2,076
Central Cowes	0	27	585	18	34	3,720	75	71	20,407	4,009
East Cowes	0	18	0	0	2	60	3	11	1,533	145
East Cowes Outer Esplanade	1	5	73	0	0	0	0	0	0	73
									Total for PDZ1	**7,303**
With Present Management	**Number of properties**		**Value x £1000**	**Number of properties**		**Value x £1000**	**Number of properties**		**Value x £1000**	**PV Damages (£x1000)**
Location	*Residential*	*Commercial*		*Residential*	*Commercial*		*Residential*	*Commercial*		
Gurnard Luck	0	0	0	1	0	172	0	1	30	49
Gurnard Cliff	0	0	0	0	0	0	2	2	404	53
Gurnard to Cowes Esplanade	0	0	0	0	0	0	0	0	0	0
Central Cowes	0	0	0	0	0	0	0	0	0	0
East Cowes	0	0	0	0	0	0	0	0	0	0
East Cowes Outer Esplanade	0	0	0	0	0	0	0	0	0	0
									Total for PDZ1	**102**
Notes										
No Erosion Damages for MA1B as it lies completely within the Medina Estuary										

Table 1b. Economic Assessment – Flood damages

The following flood damages have been determined through use of MDSF. These figures are aimed to indicate the level and impact of flood risk rather than being a detailed economic appraisal. In many areas substantial numbers of properties would be liable to flooding on the more frequent events both under NAI and WPM, a nominal write off value has been allowed in the table for properties at frequent risk; this generally excludes values at risk at present on a 1:1 year event, in 50 years time for the 1:10 year event and in 100 year time the 1:50 year event.

ASSESSMENT OF POTENTIAL FLOOD RISK

	Flood risk tidal 2010			**Flood risk tidal 2060**			**Flood risk tidal 2110**			
No Active Intervention	**No. of properties**		**AAD**	**No. of properties**		**AAD**	**Number of properties**		**AAD**	**PVD**
Location	< 1:100yr	>1:100yr	**x £1000**	< 1:100yr	>1:100yr	**x £1000**	< 1:100yr	>1:100yr	**x £1000**	**(£x1000)**
Gurnard and Gurnard Luck (A, B1&2)	62	7	147	73	3	193	79	6	278	5,214
Egypt Promenade (B3)	9	10	35	19	4	61	26	3	103	1,486
Cowes (C1, 2 & 3)	413	156	9,774	597	52	18,609	708	30	38,656	460,694
Cowes East (E)	272	27	7,566	303	52	13,829	470	31	27,896	345,228
Central Medina (D1 & 3)	53	6	708	59	15	1,349	83	8	2,962	41,654
Newport (D2)	52	16	571	68	0	1,293	68	0	2,773	30,330
Agricultural Total			12.05			14.77			18.99	407
									Total for PDZ1	885,013

With Present Management	**No. of properties**		**AAD**	**No. of properties**		**AAD**	**No. of properties**		**AAD**	**PVD**
Location	< 1:100yr	>1:100yr	**x £1000**	< 1:100yr	>1:100yr	**x £1000**	< 1:100yr	>1:100yr	**x £1000**	**(£x1000)**
Gurnard and Gurnard Luck (A, B1&2)	62	7	147	73	3	193	79	6	57	4,518
Egypt Promenade (B3)	9	10	35	19	4	61	26	3	23	1,232
Cowes (C1, 2 & 3)	413	156	193	597	52	304	708	30	449	7,552
Cowes East (E)	272	27	142	303	52	207	470	31	368	5,531
Central Medina (D1 & 3)	53	6	708	59	15	186	83	8	82	14,711
Newport (D2)	52	16	571	68	0	193	68	0	64	12,219
Agricultural Total			12.45			15.23			19.54	419
									Total for PDZ1	46,182

Table 2. General Assessment of Objectives

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

STAKEHOLDER OBJECTIVE	NAI			WPM		
	Fails	Neutral	Acceptable	Fails	Neutral	Acceptable
To sustain and adapt the important centres of economic activity including the Cowes waterfront and gateways to the island and the access and use of the Medina Estuary and Newport Harbour.						
To support adaptation of the town centres of Cowes, East Cowes and Newport quay to reduce flood risk.						
To support water use and navigation in the area, taking account of the internationally important water sport activities and ferry links to the island.						
To support adaptation of local communities at Gurnard.						
To maintain important access along the seafront and shoreline use of the area.						
To support opportunity for adaptation supporting and enhancing the nature conservation value of the Medina.						
To sustain the historic landscape and environment						
To maintain the important landscape.						

3. Discussion and detailed policy development

The overview and discussion provided above of the two baseline scenarios highlight the existence of major flood, erosion and landsliding risks to the economic future of the towns of Cowes and East Cowes including risks to key ferry transport links and commercial sites that benefit the whole Isle of Wight. These are key drivers for policy development and continued management must aim not only to address these risks but to do so in such a manner as to allow the sustainable use and development of the area.

It also demonstrates the importance of the natural behaviour and constraints governing the use and future of the Medina Estuary. The economic drivers of the area need to balance with sustaining and enhancing the natural and historic environmental values.

The overall conclusions that may be drawn are that a policy of 'No Active Intervention' (scenario 1) fails to address the substantial threat to the economic, navigational and heritage value of the area, and does not assist adaptation of the town centres and seafront communities. The NAI scenario could deliver some benefits for the natural environment, but does not deliver a balanced sustainability of values. The scenario of continuing 'With Present Management' (scenario 2) demonstrates the viability of maintaining defences to reduce slope stability issues in Cowes to Gurnard, but is likely to be insufficient to address the increasing scale of flood risks to the intensively developed waterfronts and town centres of Cowes and East Cowes and the community of Gurnard Luck. The WPM scenario delivers benefits for the important water use and navigation in the area, for potential adaptation of the nature conservation interest of the Medina and maintains the important landscapes, but long term adaptation of the communities needs to be addressed.

PDZ1 is set to benefit from the Cowes Waterfront Initiative, which is a holistic regeneration project for the whole of the Medina valley, including potential expansion of the outer harbour. It is intended to create jobs, attract investment and bring new facilities to the communities of Cowes, East Cowes and Newport Harbour. The initiative is being promoted by a collaboration of the Isle of Wight Council, the Isle of Wight Economic Partnership and the South East England Partnership Board.

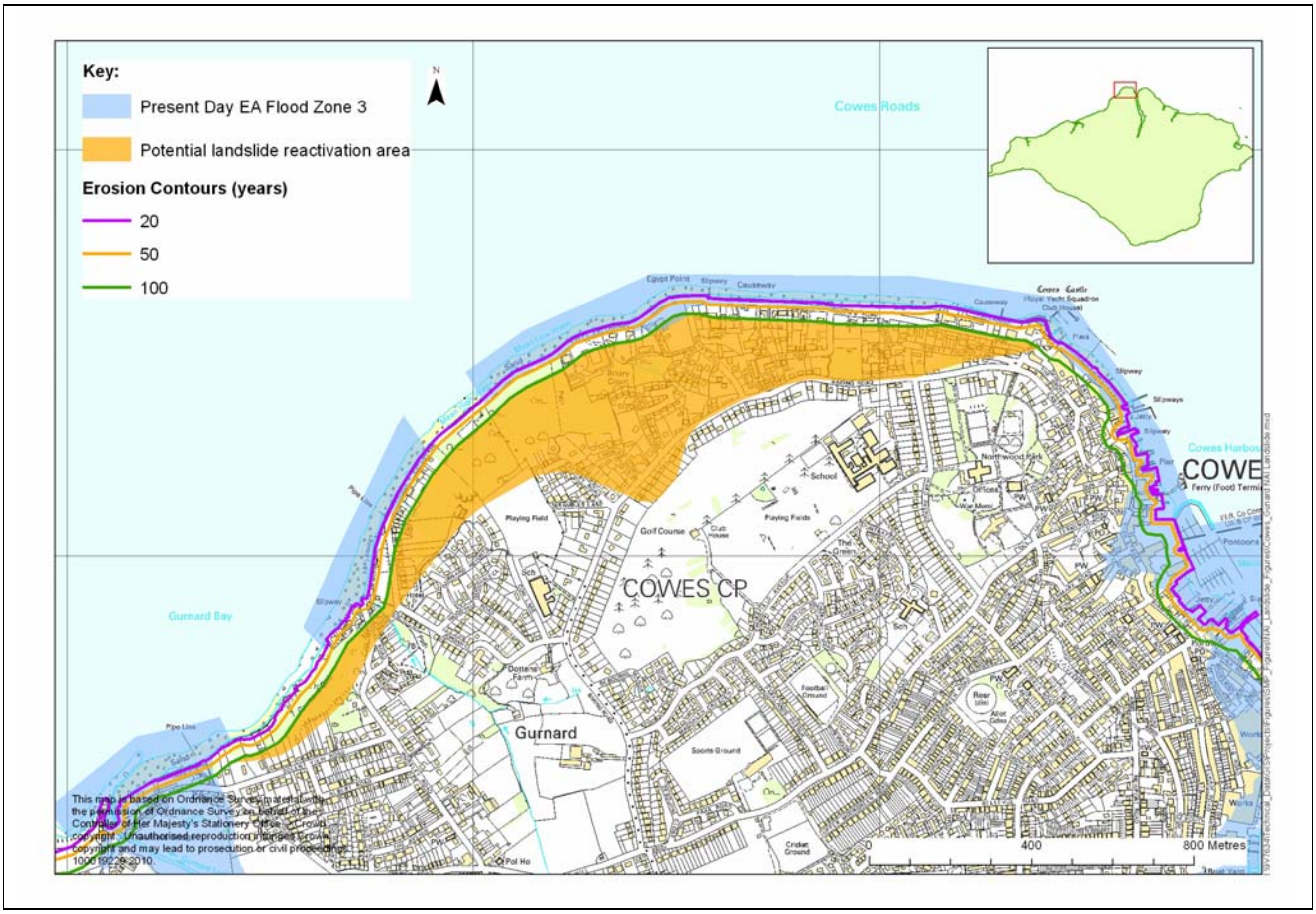
Gurnard Luck

The NAI scenario places the community at Gurnard Luck at risk from multiple risks (erosion, tidal flooding and fluvial flooding). This would result in significant loss of residential properties. Past management of this area has been in the form of hard defences. The SMP1 policy in this area was to hold the existing defence line, however maintaining the current failing coastal defences under a policy of WPM would prevent further breaches and prevent coastal erosion, but would not address all the risks in the area. Improvement or extension of the current defence line would need to also address the incursion of tidal flooding and fluvial flooding centred around Gurnard Luck stream which runs through the area and there is potential for realignment. Raising the heights of defences would delay the commencement of serious tidal flooding, but risk levels will continue to increase with future sea level rise of approximately 1m over the next 100 years. Raising defence levels is not sustainable in the longer term and adaptation of the community needs to be addressed. Homeowners in the area have begun to adapt to increasing risks of flooding by raising the level of properties. The impact of continuing erosion causing increasing slope reactivation on adjacent frontages either side of the Gurnard Luck valley also needs to be taken into account in the future management of this area, although some limited additional sediments may be supplied from the west as cliffs reactivate.

The overall intent of management is to address the short to medium term risks to the community by a policy of 'Hold the Line' for the first epoch allowing defences to be maintained for the next 20 years. Transferring to a policy of 'No Active Intervention' (NAI) in the second and third epochs (20-50 and 50-100 years) indicates the need for increasing medium to long term adaptation of the community to reduce the potential assets at risk as the impacts of sea level rise and fluvial flooding continue to increase in the medium to long term. The area is unlikely to qualify for national funding of coastal defences but the focus in this area will be to support the aspirations of the existing local community through allowing maintenance of private defences and encouraging adaptation -whilst it is practical to do so in the face of increasing risks. No Active Intervention cannot preclude maintenance of existing private defences, but the clear intent of the shoreline management policy for the area is to indicate that this is a coastal area liable to significant change and the existing community will need to adapt, not continue to rely on defences in the long term.

Gurnard to Cowes Esplanade
The cliffs from Gurnard Luck to Gurnard in the west of this frontage are undefended, and likely to continue to retreat and increasingly reactivate under the NAI scenario. Complete re-activation of the coastal cliffs and slopes below Solent View Road properties may occur over 100 years. Continued erosion of this frontage is likely to outflank defences in the adjacent coastlines, therefore careful attention is required of the transitions from defended to undefended coast if this section remains largely undefended. There are some remains of some local defences and groyne structures reducing the rate of erosion. The area is unlikely to qualify for national funding of coastal defences and coastal retreat of the undefended cliffs is likely to continue under a policy of NAI.

The scale of potential landslide reactivation increases eastwards. From Gurnard to Cowes the low lying shoreline is backed by marginally stable degraded slopes and deep-seated coastal landslides. This is described further in the Cowes to Gurnard Coastal Slope Stability Study Ground Behaviour Assessment (Isle of Wight Council, 2000). The underlying landslide topography is vulnerable to slope failure and significant reactivation. The esplanade seawall shows signs of ground movement and between Egypt Point and West Cowes the upper coastal slopes exhibit evidence of instability. Coastal erosion at the toe of the coastal slope could trigger landslide reactivation at 2m/year affecting a zone 200-300m wide and over 2km in length, shown in the map below. This would be exacerbated by water in the ground, particularly winter rainfall. However, the pattern, intensity and progression of coastal slope retreat within the risk zone will be dependent on local conditions throughout the zone and the precise locations of breach of defences. This potential landslide zone is significantly larger than the 50m width zone of assets at direct risk from coastal erosion and flooding. Therefore the NAI erosion zones do not fully represent the risk to this residential area of Cowes and Gurnard.



Map showing potential erosion over the next 20, 50 and 100 years if 'No Active Intervention' occurs and coastal defences are allowed to fail and are not replaced. The map also shows (in orange) the zone of potential landslide reactivation or destabilisation which may result if significant shoreline erosion and cliff retreat occurs. Tidal Flood risk is shown in blue (note: the outer edges of the flood zones are simply cropped over the sea)

Several points should be noted in relation to proposed continuation of the 'With Present Management' scenario along the majority of the frontage. Without defences, complete reactivation of the coastal slope between Egypt Point and the Royal Yacht Squadron may occur and although the full reactivation process could involve relatively long timescales, it is important to note that initial ground movements could occur quite rapidly following the onset of toe erosion. Areas affected would be highly localised and related to the distribution of relic landslides on the slopes. Slope failure could also be triggered by high groundwater levels as ground conditions worsen with predicted increases in winter rainfall, but the current management practice (WPM scenario) of maintaining and replacing the existing seawalls is effective in minimising the major cause of landslide reactivation by continuing to prevent coastal slope toe erosion and undermining. Commencement of erosion would deliver some benefits for nature conservation and deliver additional sediments to the shoreline which would be transported east into the mouth of the Medina Estuary.

The intent of the plan is to maintain a policy of Hold the Line for the frontage from central Gurnard to Cowes Parade due to the scale of assets at risk from coastal slope failure and landslide reactivation, with the addition of the impact of increasingly frequent tidal inundation of infrastructure and properties along that frontage. Tidal inundation would also add to the factors promoting slope destabilisation. A Hold the Line Policy would involve raising the level of the seawalls to protect against sea level rise. From central Gurnard to Cowes Parade there are wide seafront esplanades fronted by seawalls, allowing space to raise the level of defences (with the exception of the short constrained frontage of the Royal Yacht Squadron), although raising this barrier and potentially sections of the coastal road would raise issues of access to the shoreline or access to properties on the landward side of the road that would need to be addressed.

Cowes and East Cowes
The towns of Cowes and East Cowes surround the mouth of the Medina Estuary, linked by a 'floating bridge' chain ferry. The transition from the open coast to the more sheltered Medina Estuary is recognised to occur at the floating bridge, which is important in terms of processes and environment, but the developed waterfronts of Cowes and East Cowes extend further inside the estuary mouth and face the same management problems of flood risk and maintenance of assorted private defences as the outer sections of the towns therefore are included in this discussion. Management of the area upstream of the Cowes floating bridge was not included within SMP1 so existing shoreline management policy has not been tested in part of this developed area. Cowes waterfront is dominated by detached and semi-detached properties and a range of maritime related industries. The waterfront of East Cowes is characterised by industrial activity. There are Conservation Areas within both towns. At the southern margins of the towns there are commercial wharfs at Medina Wharf and Kingston Wharf. Marine industries are generally reliant on their waterside locations. The land along either side of the estuary is relatively flat and is currently within the Flood Zones. Inland the land quickly rises in elevation. The NAI scenario places the coastal margins, ferry terminals and significant areas within the adjacent town centres of both towns at risk from increasing tidal inundation over the next 100 years, which is unacceptable if an alternative solution can be found which maintains the character and economic use of the area.

Periodic inundation already occurs in these developed frontages where the character of the existing defence line presents challenges to the implementation of a Hold the Line policy. The waterside frontages of Cowes are characterised by a historical patchwork of individual buildings and slipways forming the hard boundary of the estuary and holding the position of the estuary channel, but these structures were often constructed to provide private water access and not with a significant coastal protection function in mind. Piecemeal upgrading of these defences cannot reliably provide protection against the increasing levels of tidal flood risk. There is no uniform linear shoreline or current space within which to construct a raised defence in several stretches.

The present management of the shorelines of these towns has considered potential areas of building new defences immediately adjacent to the current defence line in Cowes, although this raises landowners concerns of losing private access to the shoreline. This can be examined further in the Coastal Defence Strategy Study and there may be opportunities to consider this option related to development proposals at specific locations. Significantly advancing the defence line could further constrict the estuary mouth and impact upon the Solent Maritime SAC and/or coastal processes.

If an effective way to minimise current and future flood risk cannot be implemented, the alternative will be to relocate parts of the town centre shopping streets to adjoining higher ground. Increasingly frequent tidal flooding may eventually lead to effective abandonment of areas over the next 100 years. Where marine industries and commercial wharfs in the south of the towns are reliant on a waterside frontage to maintain their businesses this provides an effective impetus for adaptation of improvement of private defences. Implementing a widespread policy of managed realignment would result in the loss of the existing waterfront commercial businesses and properties supporting the town. There are a large number of assets within this risk zone and the area is backed by residential areas or further development, therefore suitable sites to recreate these commercial interests are largely unavailable.

Raising the level of defences would need to be achieved in a way which preserves or enhances the character of the towns and maintains the navigable channel of the Medina, in order to achieve a successful and sustainable future for Cowes and East Cowes.

Therefore the overall intent of the plan is to strengthen the defences or Hold the Line. In detail or practice this may involve specific areas where defences would be held and improved, areas where there may be scope for local advance in the line and areas where flood defence would be set back. The intention of 'Hold the line' may also include construction of defences immediately adjoining the current defence line. This would aim to address the short, medium and long term risks to the communities and commercial interests whilst allowing time for adaptation to the challenges of sea level rise. It is clear from the above that while the overall intent is to sustain the important built environment in the area, the approach needs specific development. This should be taken forward through the Coastal Defence Strategy Study and contribute to the Cowes Waterfront Initiative and it would be inappropriate for the SMP to develop such detail further. However, the essential role of the SMP is seen in highlighting that the present expectation of defence in its existing form is not considered sustainable and improvements in the standard of protection will be needed. The policy of Hold the Line is intended to allow maintenance of critical infrastructure to the Island including commercial wharfage/quays and infrastructure including the Power Station at the southern margin of East Cowes. At the eastern limit of East Cowes waterfront (outside the Shrape breakwater), the outer section of the existing seawall and esplanade provides popular waterfront access. The intention of the plan is to continue to maintain this structure in the short term whilst achievable to do so, whilst recognising that there are not the assets at risk or economic justification to significantly improve or replace this section of seawall in the medium to long term therefore transition to a policy of no active intervention is necessary.

Central Medina Estuary

The central section of the Medina Estuary is largely undefended and bordered by agricultural land, hedgerows and woods, including the shorelines from the southern limit of Cowes and East Cowes to the northern limit of the defences in Newport. A policy of No Active Intervention along the central estuary would allow natural processes to continue, including natural evolution of the saltmarsh habitat. Saltmarsh erosion is occurring predominantly in the middle and upper reaches of the estuary. The habitat is an important roosting and breeding ground and is known to support seven nationally important species. The Werrar saltmarsh provides some protection to the banks of the estuary and the important cycleway. There are scattered recreational and commercial moorings and short lengths of defended quays. There is a marina and residential development on the east bank at Island Harbour upstream of which the estuary towards Newport Harbour is not navigable at low water. The Marina is separated from the main channel by a grassed embankment and entrance lock. The West Medina Mills Wharf on the western bank is recognised as an important commercial wharf and development area.

Management of the area upstream of the Cowes floating bridge was not included within SMP1 so existing shoreline management policy has not been tested in this area of the central Medina Estuary. The overall intent of management in the plan is to maintain the natural character and evolution of the central Medina Estuary through a policy of No Active Intervention, whilst recognising that more local-scale issues are present within this overall intent. NAI would not preclude maintenance of limited areas of existing private defences at supporting properties at Island Harbour, Folly Inn and Dodnor Lane, but the longer-term intent is to move to more natural functioning of the estuary waterfront as flood risk increases in future epochs. The short defended frontage of West Medina Mills Wharf is a site of strategic commercial importance reliant on its waterfront location, and private maintenance, improvement or realignment of the quayside or flood defence at this location must take full consideration of the surrounding environment. Future development aspirations for the Medina valley may raise local issues at specific locations which cannot be addressed at SMP level. Points along the Cowes-Newport cycle route are likely to be inundated in flood events and future maintenance of this route will need to allow for increasing risks along the waterside.

Newport Harbour

The upstream limit of the SMP2 and the boundary with the CFMP is where the A3020 bridge crosses the river Medina at Newport, or effectively the walls surrounding Newport Harbour. The developed area of Newport Harbour is a functioning harbour characterised by moorings and pontoons surrounded by access roads, car parking and an area of waterside offices, amenity and commercial units, quayside and wharfs in an area of increasing tidal flood risk. The potential sites most vulnerable to tidal flooding and an increase in sea level are those on both banks of the Medina between Seaclose Park and the crossing of the A3020, where the flood risk is significantly more extensive in the second and third epochs. The areas immediately upstream of the A3020 near Coppins Bridge and beyond the Quay Arts Centre are also at risk. There is a risk of multiple sources of flooding induced by a (spring) high tide occurring with a high rainfall event. Further information can be found in the IW SFRA Appendix Q (in press). Management of this area was not included within SMP1 so existing shoreline management policy has not been tested in this area. The current defences surrounding the harbour and upper reaches of the estuary are insufficient to prevent tidal flood risk therefore continuing 'With Present Management' would require the level of defences to be raised. There are open areas of car parking/boat storage around the narrowing upper harbour where further defences could be constructed but may impede access to the functional waterway, although there are restrictions elsewhere in some areas where access space around the river is restricted by adjacent buildings and private industrial units. These issues can be addressed in more detail through a Coastal Defence Strategy Study.

The management intent of the Shoreline Management Plan for this defended area is to implement a policy of Hold the Line which will maintain the navigational use of the channel and the functioning harbour and surrounding waterside commercial interests.

PDZ1
Management Area Statements

- **Gurnard, Cowes and East Cowes (Gurnard Luck to East Cowes Promenade and Entrance to the Medina) (MA 1A)** includes six policy units
- **Central Medina Estuary and Newport (MA 1B)** includes five policy units

Within these areas a summary of policy is provided below. Management Areas statements are provided in the following sheets, with maps showing each area.

Location reference	**Gurnard, Cowes and East Cowes**
Management Area reference	**MA 1A**
Policy Development Zone	**PDZ 1**

The following descriptions are provided to assist interpretation of the maps shown of each Management Area.

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical rates and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change, these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan, reference should be made to the baseline data (see Appendix C3).

100 year shoreline position:

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

In some areas the preferred policy does not change from that under the existing management approach. In some areas where there are hard defences this can be accurately identified. In other areas there is greater uncertainty. Even so, where the shoreline is likely to be quite clearly defined by a change such as the crest of a cliff the estimated position is shown as a single line.

- Where there is a difference between With Present Management and the Preferred Policy this distinction is made in showing two different lines:

With Present Management.
Preferred Policy.

- In some areas, the Preferred Policy either promotes a more adaptive approach to management or recognises that the shoreline is better considered as a width rather than a narrow line. This is represented on the map by a broader zone of management:

Flood Risk Zones:

All flood risk zones are based upon the current tidal EA Flood Zone 2. This is an extreme flood event (1:1000 year at current levels) meaning that it has 0.1% chance of occurring each year.

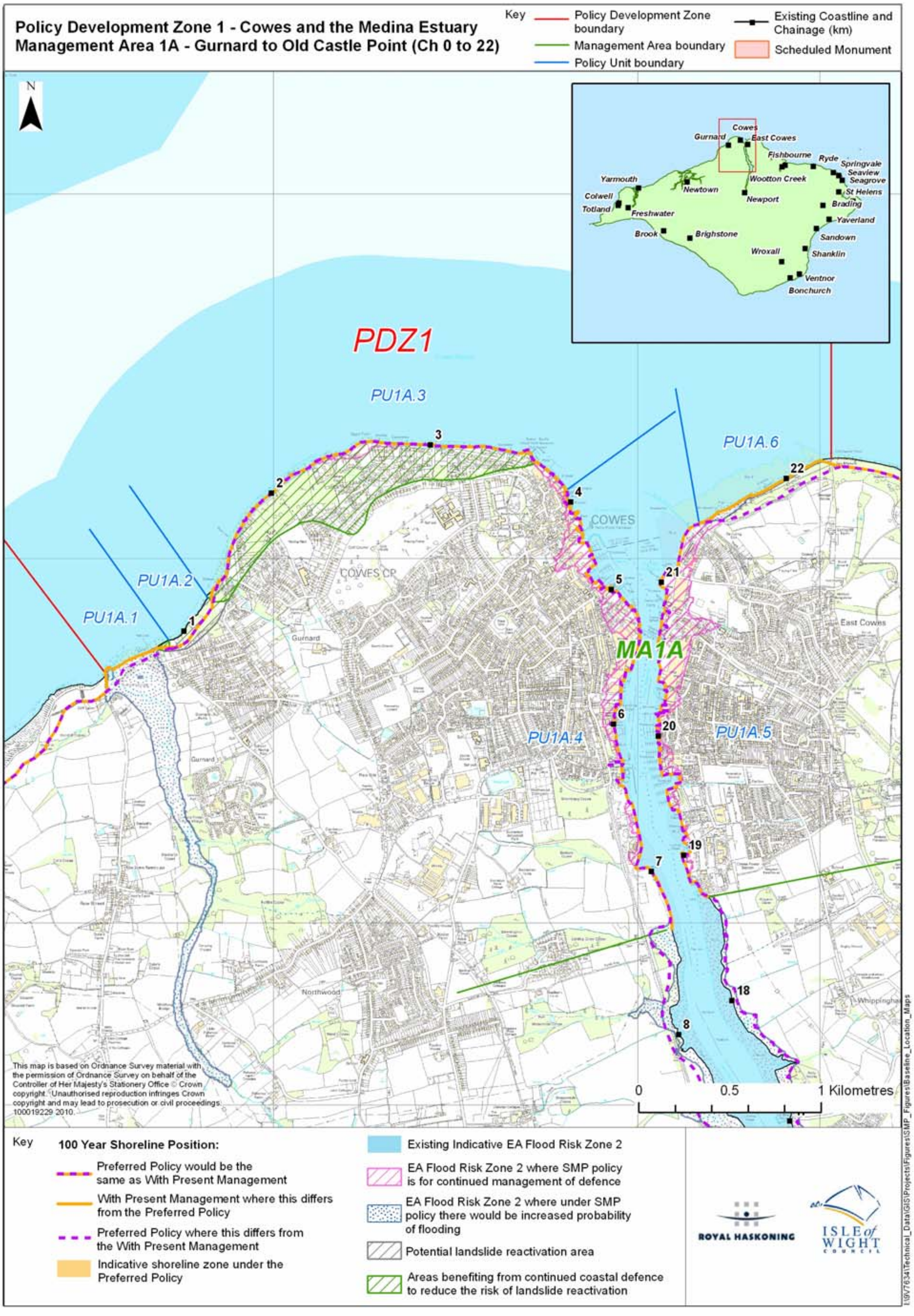
General Flood Risk Zones. The explanation of these zones is provided on the Environment Agency's web site www.environment-agency.gov.uk. The maps within this SMP document show where SMP policy might influence the management of flood risk.

Indicate areas where the intent of the SMP policy is to continue to manage this risk.

Indicate where over the 100 years the policy would allow increased risk of flooding.

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

Note: This Management Area corresponds to IW55,56,57,59 and IW1 in selected Appendices.


Policy Development Zone 1 - Cowes and the Medina Estuary
Management Area 1A - Gurnard to Old Castle Point (Ch 0 to 22)
Key
Policy Development Zone boundary
Management Area boundary
Policy Unit boundary
Existing Coastline and Chainage (km)
Scheduled Monument
PDZ1
PU1A.1
PU1A.2
PU1A.3
PU1A.4
PU1A.5
PU1A.6
MA1A
COWES
East Cowes
Gurnard
Northwood
Cowes
East Cowes
Fishbourne
Ryde
Springvale
Seaview
Seagrove
St Helens
Brading
Yaverland
Sandown
Shanklin
Ventnor
Bonchurch
Wroxall
Brighstone
Brook
Freshwater
Totland
Colwell
Yarmouth
Newtown
Newport
Wootton Creek
0
0.5
1 Kilometres
This map is based on Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. 100019229 2010.
Key
100 Year Shoreline Position:
Preferred Policy would be the same as With Present Management
With Present Management where this differs from the Preferred Policy
Preferred Policy where this differs from the With Present Management
Indicative shoreline zone under the Preferred Policy
Existing Indicative EA Flood Risk Zone 2
EA Flood Risk Zone 2 where SMP policy is for continued management of defence
EA Flood Risk Zone 2 where under SMP policy there would be increased probability of flooding
Potential landslide reactivation area
Areas benefiting from continued coastal defence to reduce the risk of landslide reactivation
ROYAL HASKONING
ISLE of WIGHT COUNCIL

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN:
The overall intent of the management of this area is to sustain the existing built environment use of the waterfront, but recognising that in some areas including the outer East Cowes Promenade and at Gurnard Luck there are going to be sections of existing defence that will need to abandoned or realigned in the medium to long term. The transition from the open coast to estuary is recognised to occur at the Cowes floating bridge and this will remain an important control on the future evolution of the area; however, the developed coastlines of the towns of Cowes and East Cowes extend inside the estuary mouth and face the same problems of flood risk and maintenance of an assortment of private defences as the outer sections of the towns. Therefore, the entire developed coastline is included within one management area to encourage an integrated approach to address the significant future risks the area faces.

The intention of shoreline management of the area is to recognise and support the intrinsic nature of the waterfront location essential to a successful and sustainable future for Cowes and East Cowes. The management approach recommends the maintenance and raising of the standard of the current public and private defences lining the majority of the Gurnard, Cowes and East Cowes seafronts to address flood, erosion and landslide risks to these significant communities. This will also maintain the navigable channel of the Medina Estuary, supporting use of the Estuary waterfront within this area and also in the management unit to the south (MAN1B). It is recognised however that raising the level of existing private flood defences may be difficult to achieve in the centre and south of Cowes and East Cowes in a way which preserves or enhances the character of the area and the nature conservation interest of the Medina, whilst maintaining waterfront access. The scale of the assets at risk (including residential and amenity development, marine industries and commercial wharfs) and their importance to the local and Isle of Wight economies justifies further examination and the development of a detailed approach through a Coastal Defence Strategy Study. Whilst the specific shoreline management approach may vary for localised areas of defence (e.g. defences immediately adjacent to current defences, or opportunities linked to developments), the intention would be in-keeping an overall management approach of holding the defence line of the wider area. It is important to note that this management intent should not preclude consideration of medium to long term adaptation of the town centres and communities; adaptation should be encouraged as risks will continue to increase as sea level rises and storm events occur.

At the western limit of this area the intent of management at Gurnard Luck is to support the existing community in the short term whilst allowing medium to long term adaptation. This area faces increasing risks of tidal and fluvial flooding and erosion. The intention of shoreline management policy is to recognise the aspirations of the existing local community to maintain private defences and continue implementing adaptation techniques to the increasing risks whilst it is practical to do so, including raising the level of their own properties. The intention is to transfer from a Hold the Line policy to a No Active Intervention policy in the medium term. Although the NAI policy cannot preclude maintenance of existing private defences, it is important to recognise that the frontage is unlikely to qualify for national funding of coastal defences and the clear intent of the shoreline management policy for the area is to highlight that this is a coastal area liable to significant change and the existing community will need to adapt, not continue to rely on defences in the long term. To the east, the cliffs from Gurnard Luck to Gurnard are largely undefended, and coastal retreat and resulting slope reactivation is expected to continue which will provide some sediments to the shorelines to the east.

At the eastern limit of the area the outer section of the defended East Cowes esplanade (outside the Shrape breakwater) provides popular waterfront access towards Old Castle Point. The intention of the plan is to continue to maintain this seawall in the short term whilst achievable to do so, whilst recognising that there are not the assets at risk to justify replacement of this defence in the medium to long term therefore transition to a policy of no active intervention is necessary. This will have impacts on the surrounding nature conservation interest and increase local sediment supply to the shore as the coast begins to retreat with potential impacts on the mouth of the estuary as sediments drift to the east, although the source area is limited.

Elsewhere, continued retreat of the coastal cliffs along the north-west coastline of the Isle of Wight may supply additional sediments into this management area from the west by longshore drift. Local drift divergence means that additional sediment inputs are not anticipated into this management area from the east.

PREFERRED POLICY TO IMPLEMENT PLAN:	
From present day	Maintain and improve existing defences (seawalls) along the majority of the frontage, including developing a co-ordinated approach to addressing tidal flood risk to Cowes and East Cowes. NAI at Gurnard Cliff.
Medium term	Maintain and improve existing defences (seawalls) along the majority of the frontage, with the following exceptions: continue NAI at Gurnard Cliff; transfer to NAI at Gurnard Luck and outer East Cowes esplanade.
Long term	Maintain and improve existing defences along the majority of the frontage, with the following exceptions: continue NAI at Gurnard Cliff, Gurnard Luck and outer East Cowes esplanade.

SUMMARY OF SPECIFIC POLICIES

Policy Unit (& length)		**Policy Plan**			
		to 2025	**to 2055**	**to 2105**	**Comment**
PU1A.1	**Gurnard Luck** (433m)	HTL	NAI	NAI	HTL supports the existing community and allows time for adaptation. Unlikely to qualify for national funding but HTL would allow small scale private defences to be maintained. Moving to NAI reflects the medium to long term increasing risks and need for increasing adaptation. NAI would not preclude maintenance of private defences
PU1A.2	**Gurnard Cliff** (346m)	NAI	NAI	NAI	
PU1A.3	**Gurnard to Cowes Parade** (2,616m)	HTL	HTL	HTL	
PU1A.4	**West Cowes** (3,481m)	HTL	HTL	HTL	Recognise that HTL may be difficult to achieve with sea level rise and the community may need to consider coastal adaptation. This will be examined further in the Strategy Study.
PU1A.5	**East Cowes** (2,814m)	HTL	HTL	HTL	Recognise that HTL may be difficult to achieve with sea level rise and the community may need to consider coastal adaptation. This will be examined further in the Strategy Study.
PU1A.6	**East Cowes Outer Esplanade** (828m)	HTL	NAI	NAI	HTL by maintenance of the existing seawall until the end of its effective life, gradually removing the influence of management.
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention MR – Managed Realignment					

CHANGES FROM PRESENT MANAGEMENT

The management outlined above is overall in accordance with SMP1 (1997) and the North East Coastal Defence Strategy (2004), with the following changes:

- Removal of the alternative option of Advance the Line from Cowes and East Cowes, (although the management intent of SMP2 is to consider opportunities for localised areas of shoreline change within the overall intent to Hold the Line of the towns bordering the Estuary mouth).
- A change at Gurnard Luck from a policy of Hold the Line for 50 years in SMP1 to a more realistic and sustainable policy of HTL for 20 years followed by NAI (which would not preclude maintenance of existing private defences) to indicate the need to adapt to increasing risks and not rely on defences in the long-term.
- For the outer East Cowes esplanade, to accord with the intention stated in the North East Strategy (and raised as HTL or Retreat the Line in SMP1) that at the end of life of the existing maintained seawall, not to rebuild the defence.

IMPLICATION WITH RESPECT TO BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	220,025	281,555	318,350	819,931
	Preferred Plan Damages £k PV	6,480	7,463	7,093	21,036
	Benefits £k PV	213,545	274,092	311,257	798,895
	Costs of Implementing plan £k PV	976	1,391	3,428	5,794

The preferred plan for this Management Area is clearly economically viable overall. Individual schemes will need to be investigated in further detail to assess their economic viability and affordability.

Location reference	**Central Medina Estuary and Newport**
Management Area reference	**MA 1B**
Policy Development Zone	**PDZ 1**

The following descriptions are provided to assist interpretation of the maps shown of each Management Area.

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical rates and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change, these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan, reference should be made to the baseline data (see Appendix C3).

100 year shoreline position:

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

In some areas the preferred policy does not change from that under the existing management approach. In some areas where there are hard defences this can be accurately identified. In other areas there is greater uncertainty. Even so, where the shoreline is likely to be quite clearly defined by a change such as the crest of a cliff the estimated position is shown as a single line.

- Where there is a difference between With Present Management and the Preferred Policy this distinction is made in showing two different lines:

With Present Management.
Preferred Policy.

- In some areas, the Preferred Policy either promotes a more adaptive approach to management or recognises that the shoreline is better considered as a width rather than a narrow line. This is represented on the map by a broader zone of management:

Flood Risk Zones:

All flood risk zones are based upon the current tidal EA Flood Zone 2. This is an extreme flood event (1:1000 year at current levels) meaning that it has 0.1% chance of occurring each year.

General Flood Risk Zones. The explanation of these zones is provided on the Environment Agency's web site www.environment-agency.gov.uk. The maps within this SMP document show where SMP policy might influence the management of flood risk.

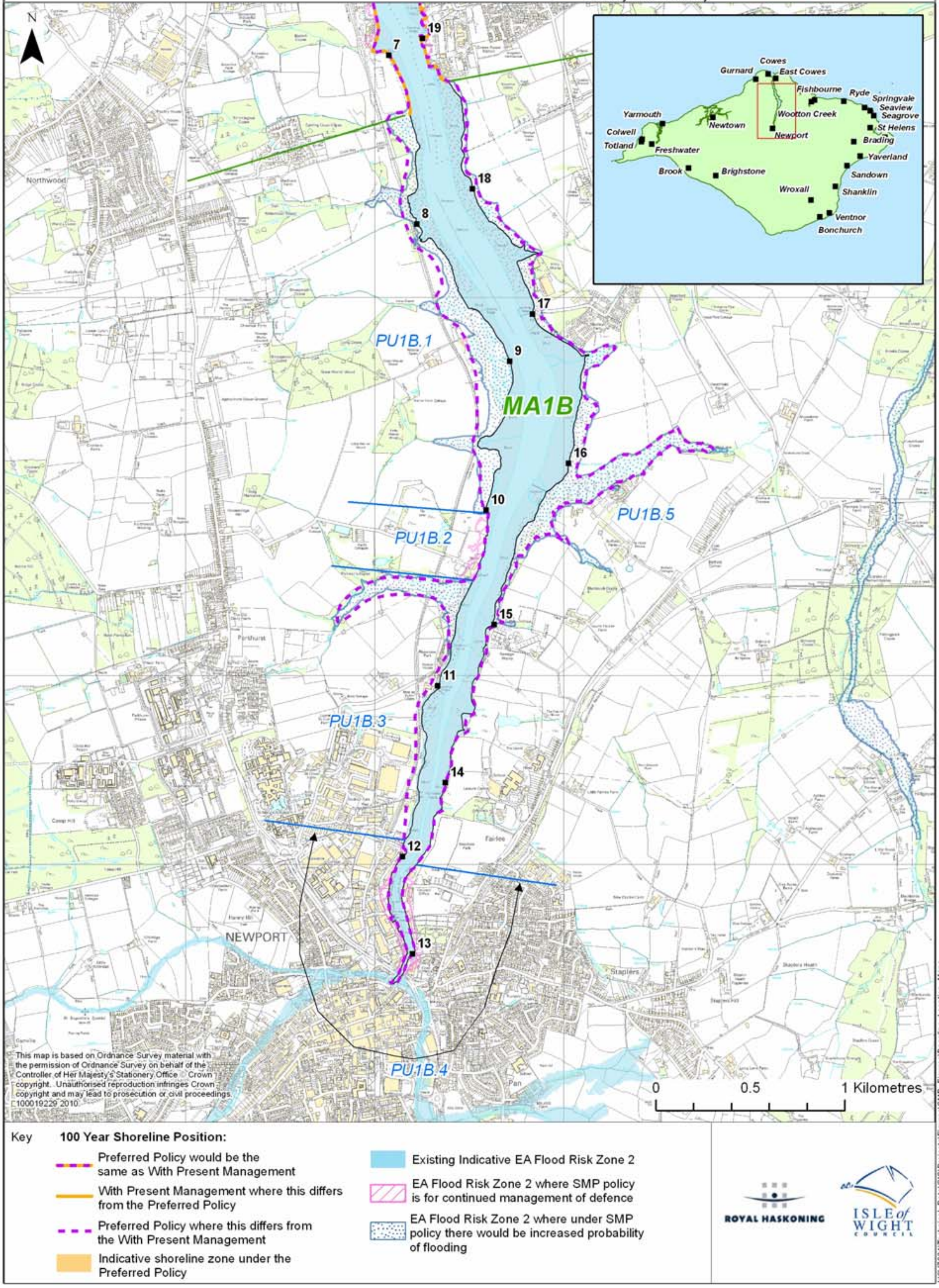
Indicate areas where the intent of the SMP policy is to continue to manage this risk.

Indicate where over the 100 years the policy would allow increased risk of flooding.

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

Note: This Management Area corresponds to IW58 in selected Appendices.

Policy Development Zone 1 - Cowes and the Medina Estuary
Management Area 1B - Northwood to East Cowes (Ch 7 to 19)



SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN:

The overall intent of management in this area is to allow the estuary to adapt as naturally as possible to sea level rise. Within this it is recognised and considered viable to defend important areas of Newport and strategic commercial wharfs without overall impact on the broader scale intent. The balance sought is to sustain appropriate commercial and community use of the Medina Estuary within the context of maintaining and enhancing the internationally important natural environment and adapting to future flood risk.

The intention of shoreline management is to maintain the alignment and functioning of the existing defended frontages in the upper estuary within the town of Newport and at West Medina Mills Wharf, where maintaining the waterfront location and access are intrinsic to the effective functioning of these developed sites. In contrast to these limited frontages, the intent of management for the majority of the area is to allow the long central stretches of the Estuary to adapt naturally to sea level rise (on both the eastern and western banks) through a policy of No Active Intervention, in keeping with the importance of the natural and historic environment. This will include large stretches of shoreline remaining undefended, although also within this area there are limited areas of existing private defences protecting isolated developments or properties including at Dodnor Lane, Island Harbour and Folly Inn. Whilst the policy of No Active Intervention cannot preclude maintenance of existing private defences which will maintain the existing use of the sites in the short to medium term, the intention of management is to allow and encourage adaptation to increasing flood risk in the medium to long term. The intention of the management is to avoid significant increase in the extent of assets at future flood risk, recognising there will not be public investment in further defences and that the existing defences should not be maintained indefinitely in the face of future sea level rise. In the long term the policy will reduce the impact of the defences over time and to restore as much as possible of the natural function and capacity for the estuary to adapt to sea level rise. It will reduce the potential impact of tidal flooding and provide benefits for the nature conservation interest of the area. It is important to note that future development aspirations for the Medina valley may raise local issues at specific locations which cannot be addressed at SMP level.

PREFERRED POLICY TO IMPLEMENT PLAN:	
From present day	No active intervention in the central Medina Estuary (although this would not preclude maintenance of limited areas of existing private defences), with the following exception: Hold the Line of existing defences at West Medina Mills Wharf to maintain functional quayside. Hold the line at Newport Harbour and the upper Medina by maintaining or raising the existing defences forming the harbour walls and quaysides.
Medium term	Continue NAI in the central Medina Estuary (although this would not preclude maintenance of remaining areas of existing private defences), with the following exception: Maintain or raise defences at West Medina Mills wharf to maintain functional quayside. Maintain or raise defences surrounding Newport Harbour.
Long term	Allow natural adaptation of the central Medina Estuary to sea level rise. Maintain defences at West Medina Mills Wharf to maintain functional quayside. Maintain or improve defences surrounding Newport Harbour.

SUMMARY OF SPECIFIC POLICIES

Policy Unit (& length)		**Policy Plan**			
		to 2025	**to 2055**	**to 2105**	**Comment**
PU1B.1	**Central Medina – NW** (2,697m)	NAI	NAI	NAI	NAI would not preclude maintenance of private defences
PU1B.2	**West Medina Mills** (370m)	HTL	HTL	HTL	Private defences will be maintained
PU1B.3	**Central Medina – SW** (1,486m)	NAI	NAI	NAI	NAI would not preclude maintenance of private defences
PU1B.4	**Newport Harbour** (1,634m)	HTL	HTL	HTL	HTL with public and private defences

PU1B.5	**Central Medina – East** (5,111m)	NAI	NAI	NAI	NAI would not preclude maintenance of private defences
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention MR – Managed Realignment					

CHANGES FROM PRESENT MANAGEMENT

This area was not included in SMP1 or Coastal Defence Strategy Studies therefore shoreline management policies have not been tested in this area.

IMPLICATION WITH RESPECT TO BUILT ENVIRONMENT

Economics		**by 2025**	**by 2055**	**by 2105**	**Total £k PV**
Property	Potential NAI Damages/ Cost £k PV	17,411	24,408	30,166	71,984
	Preferred Plan Damages £k PV	16,022	15,731	14,365	46,118
	Benefits £k PV	1,389	8,677	15,801	25,866
	Costs of Implementing plan £k PV	104	812	50	966

The preferred plan for this Management Area is economically viable overall. Individual schemes will need to be investigated in further detail to assess their economic viability and affordability.

4.3 Policy Development Zone 2 - Ryde and the North-east Coastline (PDZ2)


Left to right: Seagrove Bay; Ryde Sands

4.3 Policy Development Zone 2 - Ryde and the North-east Coastline (PDZ2)

Contents

Key facts:

Policy Development Zone 2: includes the communities of Wootton, Fishbourne, Woodside, Ryde, Seaview, and Nettlestone.

PDZ2 frontage = approx. 22km in length

PDZ2 boundaries = From Old Castle Point (East Cowes) to Horestone Point (Nettlestone).

As listed in SMP2 Appendices: areas IW2 to IW12

Old policies from SMP1 in 1997, reviewed in this chapter:

Unit	Location	Length	Policy
RYD1	Old Castle Point to West Woodside	6091m	Do nothing or Retreat the existing defence line
RYD2	West Woodside to Chapelcorner Copse	1156m	Retreat the existing defence line
RYD3	Wootton Creek	4135m	Hold the existing line
RYD4	Fishbourne to Pelhamfield	2730m	Retreat the existing defence line
RYD5	Pelhamfiled to Puckpool Hill	4180m	Hold the existing defence line
RYD6	Puckpool Hill to Salterns Road, Seaview	980m	Hold the existing defence line
RYD7	Salterns Road to Pier Road Seaview	858m	Hold the existing defence line
RYD 7	Pier Road Seaview to Horestone Point	740m	Hold the existing defence line

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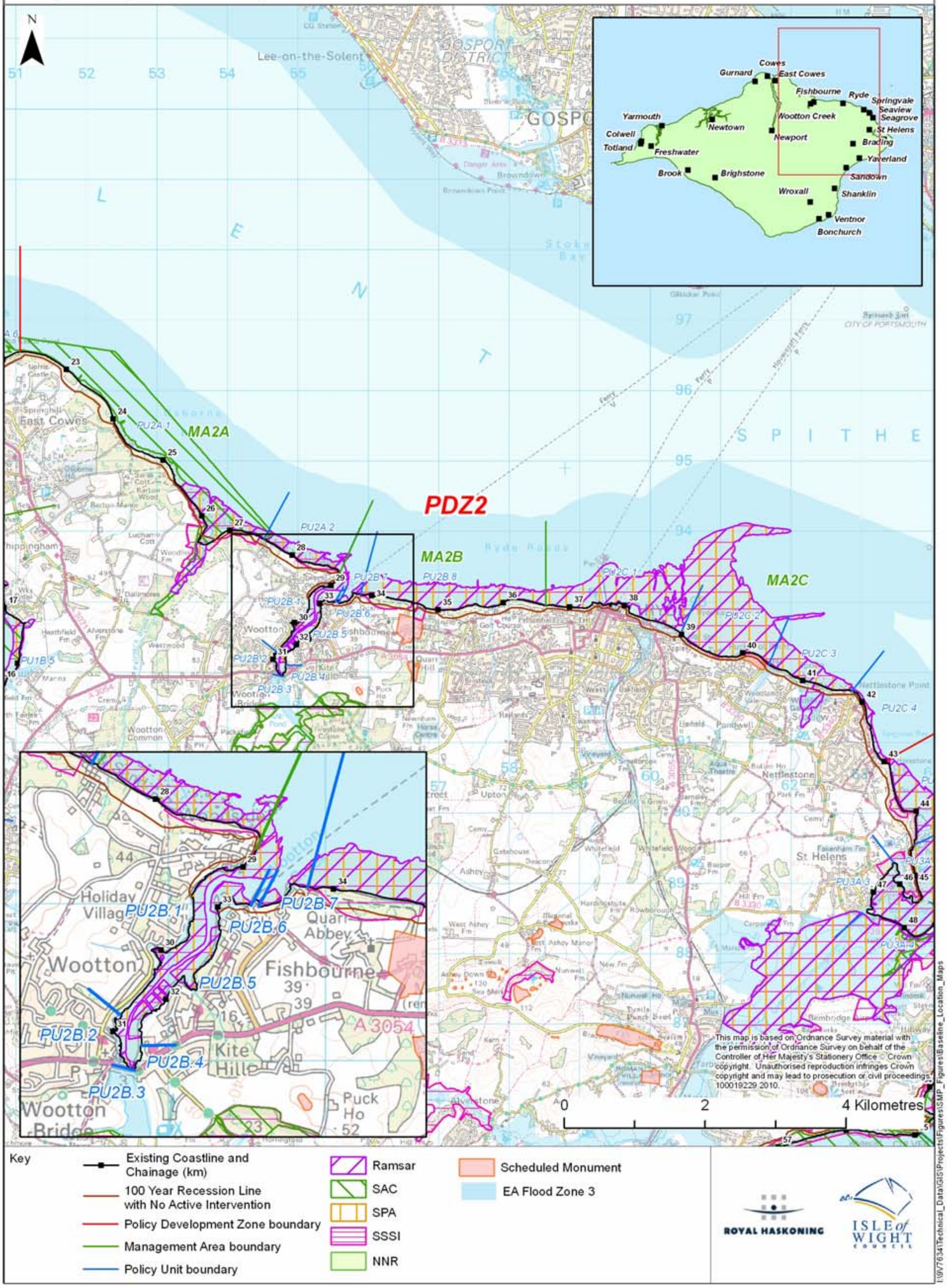
Shoreline Management Plan Sub Cell 5D + E - Isle of Wight
Baseline Location Map
Policy Development Zone 2 - Ryde and the North-east Coastline



1. Overview & Description

1.1 Principal Features (further details are provided in Appendix D & E)

Built Environment: There is a contrast between the western and eastern stretches of PDZ2. In the west there are gentle wooded coastal slopes with scattered residential developments at Osborne, Woodside and Quarr. The main Newport-Ryde road (A3054) is located on a bridge separating Wootton Creek from the Old Mill Pond and controlling tidal flows. The coastline from Norris Castle through to the Wootton Estuary has little vehicular access although public footpaths do run the frontage in several places. The villages of Fishbourne and Wootton surround Wootton Creek. Further east is the main coastal town of Ryde and smaller communities of Seaview and Nettlestone. The A3055 road runs along the promenade of central Ryde. Road and footpath access lines the developed coast from Ryde to Seaview and within Seagrove Bay. Transport links on and off of the Island are key within this PDZ with a vehicle and passenger ferry running from Fishbourne to Portsmouth, a passenger ferry service running from Ryde Pier Head and a Hovercraft passenger service from Ryde seafront. The Island's only commercial train service runs from Ryde Pier Head through Ryde seafront and on to Brading, Sandown and Shanklin.
Heritage and Amenity: *Heritage:* The coastal and intertidal zones within this PDZ have been intensively investigated and contain many areas of national and international historical importance. There are two Scheduled Monuments, 63 Grade II listed buildings, one Grade II* listed buildings, one Grade I Listed Building, one Grade II and one Grade II* Registered Park and Garden and 126 monument records all within the coastal and intertidal areas. In the marine area there are 44 recorded shipwrecks and five Military Remains Protected Places. There are Conservation Areas in Ryde and Seaview. The foreshore in much of this PDZ contains significant numbers of archaeological and palaeoenvironmental sites of national or international importance. Barton Bay, Kings Quay, Wootton Creek, Fishbourne and especially Quarr are all key sites where intensive investigations have been undertaken. Along the western coastal frontage are the private estates of Osborne (Grade II*) and Norris Castle (Grade II), both Registered Parks and Gardens. East of Fishbourne is Quarr Abbey, a grade I listed building, and the remains of its Cistercian predecessor, now a Scheduled Monument. This area is being considered as part of an application for the East Solent to become a UNESCO Seascape World Heritage Site. In the Ryde Sands area there are numerous shipwrecks due to the shallow waters and both historical and present busy shipping routes. There is also a WWII air wreck situated off of Ryde and a Palmerston fort 'No Mans Land' in the Marine area. Further east is the 19th century Puckpool Battery, a Scheduled Monument. At Seaview there is a WWII submarine barrier. *Amenity:* The Osborne and Norris estates provide important heritage tourism amenity and the shoreline is popular with recreational anglers. In the village of Woodside there is tourist accommodation and a holiday park. The predominantly residential villages of Wootton and Fishbourne have pocket areas of tourist accommodation, industrial/marine industry units (mainly boatyards), several pubs, sailing club and a residential outdoor education centre that fronts the Creek to the west. Access to the Creek shore is limited due to private frontages but there are several footpaths that lead to the coast and several slipways. There are numerous recreational moorings, pontoons and residential houseboats along the Creek.

Ryde is the Island's largest town and a popular seaside resort. It is characterised by Victorian housing with shops and entertainment facilities and by its sandy beaches with a long Esplanade and promenade. Along the frontage there is a marina, ice rink and a bowling alley; as well there is a golf course to the west of Ryde.

To the east is Appley Park; a frontage that is generally recreational with little residential or industrial presence. It is popular with tourists and residents with facilities including car parking, a pitch and put golf course, café and a wide, sandy beach. There are a number of beach huts along the Puckpool frontage and several beachside cafés, toilets, car parking and other facilities.

At Seaview Duver there is a managed inlet which forms a brackish lagoon of conservation interest. There are areas of woodland and agricultural land around Springvale, along with the Seaview Wildlife Encounter Park. Access to the beach is via the road running behind the seawall. Nettlestone Point is relatively low lying, a sailing club, pub and café are all positioned along the seafront and there are several slipways and a dingy park. Within this area the coast aligns itself from the east to the south into Seagrove Bay, where it is backed by the residential village of Nettlestone. Facilities at Seagrove Bay include toilets and a small café.

Nature Conservation:

The westerly stretch of the PDZ (East Cowes to Wootton) is almost entirely backed by semi-natural ancient woodland and plantation woodland, whilst the eastern end of the PDZ is built-up. The intertidal areas along this stretch of coastline are dominated by intertidal sand and mudflats, interspersed with areas of rocky foreshores and shingle spits, with a few small areas of coastal grazing marsh (e.g. Seaview). Subtidal seagrass beds can be found in Osbourne Bay and Ryde. There are two creeks (King's Quay Shore SSSI and Wootton Creek) that consist of estuarine habitats ranging from freshwater swamp, brackish reedbeds, saltmarshes, shingle spits and intertidal mudflats and that are used as feeding grounds for Brent geese and other water birds and waders. The offshore areas are used regularly as winter feeding grounds for grebes, sea duck and divers and for terns during the summer.

There are two internationally designated areas along the coastline from East Cowes to Seagrove Bay, which cover the entire length of the PDZ between them. The western end (Osborne Bay) of the PDZ sits within part of the Solent Maritime SAC, designated primarily for its estuaries and saltmarsh (*Spartina* swards and Atlantic salt meadows). Other qualifying features include vegetated shingle habitats, coastal lagoons, mudflats and sandflats, sandbanks and sand dunes. The central and eastern frontage of the PDZ (Wootton to Seagrove Bay) sits within the Solent and Southampton Water Ramsar and SPA, primarily designated for a number of birds including common tern, little tern, Mediterranean gull, sandwich tern, dark-bellied Brent geese and ringed plover. There are two component SSSIs that cover the same area, King's Quay Shore SSSI and Ryde Sands and Wootton Creek SSSI. In addition, inland of Wootton Creek there are broadleaved woodland areas, Briddlesford Copse, which is designated as a SAC for its provision of habitat for Bechstein's bat.

1.2 Key Values

The residential communities, amenity/tourism, and transport links are the key drivers in this area. Both Ryde and the surrounding seafront villages are at risk from tidal flooding and coastal erosion which would lead to a significant impact on the functionality of the east side of the Isle of Wight. In particular the vital transport infrastructure at Ryde and Fishbourne will be affected (ferries, rail and road). Of some importance are the quiet wooded coastal landscapes in the western section of the PDZ; however there are other parts of the Island that hold a much greater nature conservation interest.

1.3 Objectives

Overarching objectives for PDZ2:

- To sustain and adapt the important centres of economic activity including Ryde and surrounding waterfronts and the transportation gateways to the Island at Fishbourne and Ryde.
- To support adaptation of the communities of East Wight to reduce flood and erosion risks.
- To maintain important access along the seafront and shoreline use of the area.
- To support opportunity for adaptation supporting and enhancing the nature conservation value of the area.
- To sustain the historic landscape and environment where practical.
- To maintain the important landscape subject to natural change.

Right: Wootton Creek

1.4 Description

The western section of this PDZ from East Cowes to Pelhamfield is relatively inaccessible with scattered development amongst wooded coastal slopes with potential for slope failure and retreat. At Woodside, Quarr and Pelhamfield small communities are located near the coastline. Acceleration in erosion is likely in areas where no defences currently exist, as steep slopes are suffering from undercutting. A small tidal inlet is located at Kings Quay, inaccessible by public road or footpath, where migration of the spits into the estuary is likely. Further east, Wootton Creek is a larger 2km tidal inlet backed by the villages of Fishbourne and Wootton, where the majority of waterfront properties have constructed private defences or waterside access. Mainly residential, there are a few commercial properties including Little Canada education centre. At Wootton-Quarr, numerous archaeological features preserved in the intertidal muds (such as peat beds, wooden trackways and an ancient submerged oak forest) are being revealed and uncovered in the foreshore.

The centre of this PDZ is dominated by the large seafront town of Ryde, an important centre for transport links (including the Ryde to Shanklin rail link) and tourism. Victorian development in Ryde included sealing off the inlet of Monktonmead stream and construction of houses in the floodplain behind (which have a history of flooding). There is now 7km of continuous defences from Ryde to Seagrove Bay, and a pumping station on the promenade to help manage the flood risk. These defences also form the popular sea front promenade walk from Ryde to Seaview

Ryde Sands is a wide, accessible sandy beach and a regionally significant sediment sink, the largest on the Isle of Wight. At its widest point, near Appley, the sand banks extend up to 2km in width. It remains uncertain whether Ryde Sands continues to accrete, or whether it may become subject to the foreshore erosion that is common to much of the Solent. Local amenity management of the upper beach sands occurs to enhance the use of the beach.

Above: Ryde Sands are backed by seawalls, Ryde marina and the town of Ryde, view at relatively high tide (Isle of Wight Council).

Right: Ryde Sands, view east from Appley at low tide, towards Ryde Pier in the distance, February 2009.

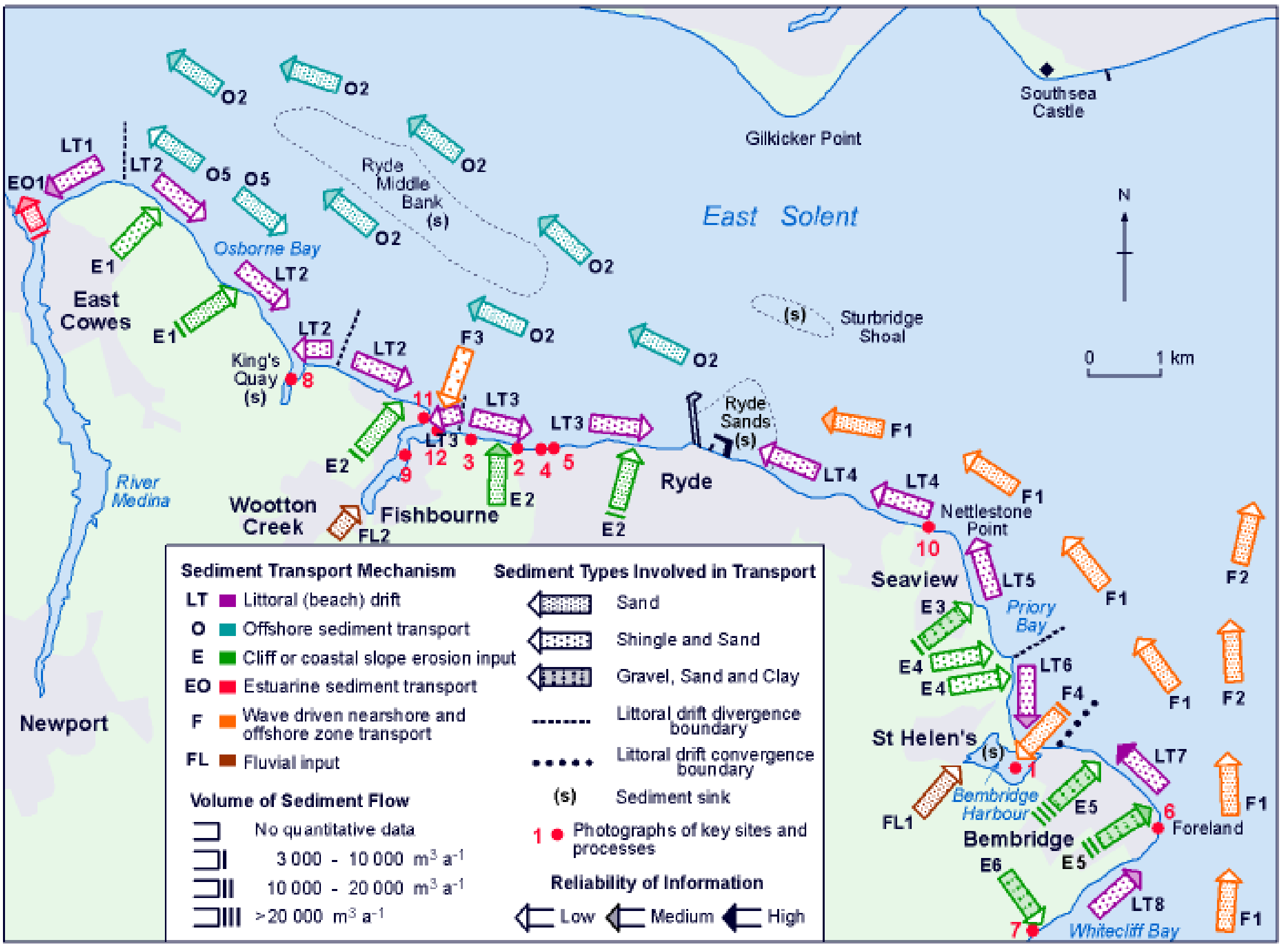
Moving east from Ryde are the seafront communities of Springvale, Seaview and Seagrove Bay which back the hard defence line. These areas are principally residential communities with several hotels and a quieter character. Nettlestone Point (in Seaview) marks the change in coastline orientation from west-east to north-south along this frontage, and from this point south the shore is generally lined by private properties rather than continuous seafront esplanade.

1.5 Physical Processes

1.5.1 Coastal Processes (further details are provided in Appendix C1).

This PDZ includes the coastline between East Cowes and Nettlestone Point, including the communities of Ryde, Wootton, Binstead and Seaview. The following summary outlines the wave climate, tidal flows, geomorphological controls, sediment supplies and coastal processes characterising PDZ2. The general pattern is sediment movement is summarised in the following diagram from the SCOPAC Sediment Transport Study.

NE Isle of Wight (Old Castle Point to Culver Cliff: Sediment Transport Sources, Pathways and Sinks



Sediment transport sources, pathways and sinks on the north east coast, from SCOPAC Sediment Transport Study, 2004.

The north-east coast of the Isle of Wight forms the southern margin of the Eastern Solent and borders the busy shipping lanes. The coast is mostly low-lying, or only of moderate relief. Erosion predominates, resulting in the development of varied cliff forms. The PDZ2 coast includes the inlet of Wootton Creek, and is described from west to east below.

The foreshore at Norris Castle some 1.5km to the east of the Shrape Breakwater is extremely narrow and depleted of sediment. This location is typical of a zone of littoral drift divergence. Various remnant sea-walls, breastwork and groyne structures are in poor repair or breached and allowing erosion to occur in embayments, particularly below Norris Castle. The mean high water mark has been static or slowly retreating, controlled by coastal defences, coastal slopes, or sea cliffs, resulting in foreshore narrowing throughout this frontage. Moving eastwards, re-activations of the lower portions of coastal slopes are in progress behind failures in defences around Osborne Bay. Several minor headlands (narrow depleted foreshore) and bays (sand and shingle beach accumulations) are developed within Osborne Bay. Littoral drift is generally recognised in a net south eastward direction along this segment. Sediment accumulations against the western side of various groyne structures support the notion of south-eastward drift. Further east the spits at King’s Quay have migrated and recurved into the estuary. The westward trending spit at the King's Quay inlet suggests the presence of a local drift reversal, possibly associated with the inlet. Rates of littoral drift are believed to be slow due to the low energy inputs and limited sediment availability. Moving east, the north-facing cliffs rise to 15m near Woodside Point.

Wootton Creek Estuary is a sheltered inlet extending inland 2km south-west to the village of Wootton, where an old tidal mill-pond still operates, controlled by a sluice upstream of the roadbridge. There is a small spit on the east side of the mouth of Wootton Creek, and Wootton

Hard on the western side. The spits represent the inner limit of wave action. The estuary tidal limit is at the former mill pond. Although there are extensive sand areas offshore, the beaches on either side of the Creek mouth are narrow and discontinuous. The shoreline to the east of the Creek mouth is set-back compared to the shoreline to the west of the Creek mouth. Tidal flow through narrow entrance to the inlet generates currents which interrupt littoral sediment transport causing local circulation effects and associated changes in coastal configuration. The location is sensitive to variations in sediment supply. Inside Wootton Creek there is a narrow low-angle backshore of clastic material, succeeded seawards by a muddy clay foreshore. At Wootton Creek mouth a baseline survey of the beach and intertidal zone has been conducted as part of the Regional Strategic Monitoring Programme, with profiles commencing in 2007. From 2007 to 2010 the majority of profiles show no significant change. However, there is currently not enough data at this location to provide adequate analysis of coastal processes in the mid to long term. To the east of Wootton Creek the undefended low cliffs exhibit past and currently active basal undercutting fronted by small debris stores of clay and limestone boulders.

West of Ryde, slow eastward net drift predominates on small sand/shingle beaches that are fronted by wide muddy foreshores occupied by occasional limestone reefs, shingle structures, ancient peat beds and eroding clay shore platforms. Wave exposure increases to the east of Ryde and the foreshore is dominated increasingly by sandy sediments that drift in a dominant north-west direction. Two littoral sediment transport pathways thus converge upon Ryde Sands where a major accumulation of sand flats has developed forming a sediment sink extending up to 2km seaward and 3km along the shore. Ryde Sands is a substantial nearshore bank that affords some protection to Ryde from wave attack. The coast to the east of Ryde Sands is open to waves generated in Hayling Bay and also diffracted waves from the English Channel. Wave energy is therefore moderate and approaches from a predominantly east or south-east direction. By contrast, the foreshore at Ryde and to the west is largely protected from incoming south eastward waves by Ryde Sands. The prevailing waves are therefore generated in Southampton Water and the East Solent and are fetch-limited. This coast is therefore subject to low-energy wave action from a dominant north-west direction. Construction of the small harbour at Ryde Marina has led to a build-up of sand to the east, which has resulted in the need to extend the Monktonmead outfall.

East of Ryde Sands the coast has no direct sources of sediment supply and is reliant on the westwards littoral drift system. A relatively sheltered and low energy shore unit extends along the heavily protected coast from Ryde to Nettlestone Point. Accretion on the eastern sides of groynes and outfalls at Springvale indicates net westward drift. This transport pattern is attributable to dominant waves from the east and southeast and to diffracted southerly and south-westerly waves from the English Channel. The hinterland comprises moderately steep coastal slopes between Ryde and Puckpool Point rising to 20m. Between Puckpool Point and Nettlestone Point there is a low-lying marshy infilled valley with lagoons protected by a narrow stabilised barrier beach of sand and shingle (Seaview Duver). Nettlestone Point is a relatively resistant controlling feature formed of Bembridge Limestone. Nettlestone Point itself suffers from sediment depletion and operates as a partial transport barrier within the littoral pathway.

The embayment of Seagrove Bay has been formed by erosion of soft clay strata between rocky (Bembridge Limestone) headlands. The shape of the bay is characteristic of a north westward net drift. The coastal slopes of Seagrove Bay are vulnerable to localised ground movement and slope reactivation due to coastal erosion but the coastal slopes are presently inactive having been protected at their toes by seawalls. There is continuous seawall protection from Ryde around Nettlestone Point and along Seagrove Bay and a coast protection and slope stabilisation scheme was undertaken in 2000 in southern Seagrove Bay. There exists a northward nearshore drift pathway that has the potential to contribute material from this frontage to Ryde Sands.

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.

In Osborne Bay, continuing erosion of the narrow depleted foreshores and coastal slope toes would be likely to remove basal support and re-activate shallow landslides on the steepest sections of the coastal slopes, generating significant recession of cliff scarps within several embayments that could develop as landslide complexes. Wave energy is low so that landslide debris could remain protecting the slope toe for lengthy periods following initial failures. Most recession would therefore result from "one off" re-activations of up to 130m inland, rather than from rapid ongoing processes.

The North East Coastal Defence Strategy Study (2004) anticipates that over the next 100 years the mouth of Wootton Creek and coastal frontage will be at risk from coastal erosion. Spit migration and foreshore lowering may cause variation in the coastal erosion rates. Within the estuary the western shore of Wootton Creek has the potential for recession as landward erosion or innundation of the shoreline occurs, Some of the land near Wootton Bridge is currently prone to limited flooding every few years. With sea-level rise and possible increased wave energy within the estuary due to possible change of geomorphological form at the mouth of the estuary, the probability of flooding here is likely to increase with time.

Without defences, continued cliff erosion is likely at Quarr and continuing re-activations are likely at Binstead. In addition, small areas of the narrow low-lying valleys at Quarr and Binstead could become inundated as sea-levels rise because they possess very little natural upper beach protection and rely upon defences. Their tidal prisms would probably be too small to maintain permanent inlets so brackish lagoons or marshes subject to periodic inundation would be most likely to form.

Under an eroding regime at Ryde Sands, as sea level rises the upper foreshore would be relatively exposed and wave action may begin to cut through the reclaimed land of Ryde Esplanade and back into the steep slopes in front of St Cecilia's Abbey and Appley Park to eventually activate new eroding cliffs. Under an accreting regime at Ryde Sands there could be some initial erosion of the reclaimed areas, but over the medium term, the upper beach would be likely to build up providing some natural protection against storm wave action and the effects of sea-level rise. A thin strip of dunes could form in the medium to long term.

To the east of Puckpool Point, foreshore narrowing is likely to be exacerbated by rising sea levels. Puckpool Point itself would no longer be maintained as a minor headland by its defences and would begin to be eroded. In the longer term Seaview Duver would be likely to become increasingly susceptible to overwashing and breaching and an intertidal lagoon could form. The currents generated at the new inlet could disrupt shoreline sediment transport and generate a small ebb tidal delta of sediment on the lower foreshore, although the tidal exchange is likely to be quite small. Consequently, the inlet could be unstable and periodically re-seal and breach, perhaps seasonally.

There is also potential for the coastal slopes of Seagrove Bay to become re-activated within 30 years by toe erosion occurring in the absence of defences. Rotational failures in southern parts of the bay are likely to resume almost immediately. Sediments yielded by cliff erosion are likely to contribute to local foreshores and contribute towards drift inputs to Ryde Sands.

1.5.2. Existing Defences

The following description of coastal defences outlines the current condition and expected remaining effective life of the defences in the area, if no further maintenance is carried out. In addition to the following summary, individual defences are described in Appendix C2 -Defence Appraisal (areas IW2 to IW12).

From Old Castle Point towards Osborne Bay defences are in varying stages of disrepair and failure. This has resulted in localised erosion of the coastal slope. Along the entirety of the frontage there are the remains of abandoned rock and masonry groynes, some of which are partly submerged.

The coastline at Kings Quay is undefended with a temporary structure constructed at the entrance to prevent marine vessels from entering the brook. At West Woodside a mixture of ad-hoc private defences and timber landing stages are present. From West Woodside to Chapel Corner Copse the frontage is undefended, with the remains of a concrete slipway.

Around Wootton Creek defences are principally private, of various types and condition including lengths of timber breastwork and some concrete and masonry walls. These structures often provide access to the water rather than significant coastal defence. Some short sections are undefended. The only formal defences are at Wootton Bridge and Fishbourne Green. Near the mouth of the estuary there is a shingle spit that narrows the mouth of the Creek from east and west along with the infrastructure associated with the Fishbourne Car Terminal. Fishbourne Green is suffering from low sediment levels undermining defences and the amenity slipway. The A3054 road crosses Wootton Bridge which incorporates sluices that control the water level of the Old Mill Pond inland of the bridge.

Undefended wooded slope with various rock outcrops extend to Quarr. A large shingle bank is visible accumulating at low mean water. A small number of private isolated localised defences interrupt the undefended wooded slope extending east towards Pelhamfield.

The remaining shoreline of the PDZ is defended with continuous seawalls, rock revetment and private defences (with some areas of disrepair and undermining) from Ryde to Horestone Point. At Seaview Duver the recently completed seawall and defences incorporate the outfall and saline inlets for the Hersey Nature Reserve.

1.5.3 Potential Baseline Erosion Rates

The SMP reviewed a wide range of data to define the current and potential rates of coastal erosion and cliff retreat along the Isle of Wight coast using the best available information. Full details can be found in Appendix C3. Future erosion rates are predicted using Walkden & Dickson formula (2008) and allow for future sea level rise –the full methodology is explained in the Appendix. Predicted sea level rise rates of 4mm/yr (to 2025), 8.5mm/yr (to 2055), 12mm/yr (to 2085) then 15mm/yr (to 2105) have been used, in accordance with SMP national guidance by Defra. These rates equate to 7cm of sea level rise (above the 2009 baseline) by 2025, 32cm by 2055 and 98cm by 2105. The IW numbering units refer to lengths of coast for which future behaviour is described and mapped in Appendix C (based on SMP1 and Strategies). These are not SMP2 policy units which are developed in section 3 below.

Potential total erosion over the next 100 years is shown, however it is important to note that this is an estimate that is based on an undefended coastline. Within Appendix C3, these erosion rates are only applied following the predicted failure date of each individual element of the defences within the unit; therefore the resulting erosion amounts shown in the Appendix C3 tables and maps (and used in the development of this SMP) will show smaller erosion totals than the overview provided below.

Potential coastal erosion rates (all figures in metres/year):-

Numbering in SMP2 Appendices (2010) ***(area and name, clockwise)***		**NE Strategy Morphodynamic Unit No.**	**Current to 2055**	**2055 to 2085**	**2085 to 2105**	**Potential 100 year erosion (if undefended) -total in metres**	**Plus potential slope reactivation, triggered by coastal erosion** (see North-East Coastal Defence Strategy)
IW2	**Osborne Bay**	3	0.12	0.14	0.15	13	Plus up to 30m reactivation near end of epoch 1
		4	0.9	1.06	1.16	100	Plus up to 65m reactivation in epoch 1
		5	0.9	1.06	1.16	100	n/a
		6	0.32	0.38	0.41	36	Plus up to 125m reactivation in epoch 1
		7	0.2	0.24	0.26	22	n/a
		8	0.2	0.24	0.26	22	Plus up to 60m reactivation in epoch 1
		9	0.24	0.28	0.31	27	n/a
IW3	**King's Quay**	9	0.24	0.28	0.31	27	n/a
		10	0.24	0.28	0.31	27	Plus up to 53m reactivation in epoch 1
		11	1	1.18	1.29	111	n/a
		12	0.28	0.33	0.36	31	n/a
		13	0.28	0.33	0.36	31	Plus up to 50m reactivation epoch 1
IW4	**Woodside**	13	0.28	0.33	0.36	31	Plus up to 50m reactivation epoch 1
		14	1	1.18	1.29	111	n/a
		15	0.3	0.35	0.39	33	Plus up to 40m reactivation in epoch 1
IW5	**Wootton Creek**	16	0.15	0.18	0.19	17	n/a
		17	0.4	0.47	0.52	44	n/a
		18	0	0.00	0.00	0	n/a
		19	0.4	0.47	0.52	44	n/a
		20	0.4	0.47	0.52	44	n/a
IW6	**Quarr & Binstead**	21	1	1.18	1.29	111	n/a
		22	0.4	0.47	0.52	44	n/a
		23	0.4	0.47	0.52	44	Plus up to 70m reactivation in epoch 1
IW7	**Ryde**	24a	0.4	0.47	0.52	44	n/a
		24b	0.4	0.47	0.52	44	n/a
		25	0.4	0.47	0.52	44	n/a
		26	0.4	0.47	0.52	44	Plus up to 80m reactivation at end of epoch 1
IW8	**Appley & Puckpool**	27	0.5	0.59	0.65	56	n/a
		28	0.5	0.59	0.65	56	n/a
IW9	**Springvale**	29	1	1.18	1.29	111	n/a
IW10	**Seaview Duver**	30	1	1.18	1.29	111	n/a
IW11	**Seaview**	31	0.6	0.71	0.77	67	n/a
IW12	**Seagrove Bay**	31	0.3	0.35	0.39	33	n/a
		32a	0.3	0.35	0.39	33	n/a
		32b	0.3	0.35	0.39	33	Erosion at 0.3m/yr. Then within a few years of failure reactivation of failure planes leading to landslips of 15 to 100m. 100m max. landslide area shown.
		32c	0.3	0.35	0.39	33	
		32d	0.3	0.35	0.39	33	
		33	0.3	0.35	0.39	33	

Notes:
i) Erosion rates have been determined from monitoring data and examination of historical records and have been calculated to take account of sea level rise. –see Appendix C3 for details.
ii) The IW numbering units refer to lengths of coast described in Appendix C. These are not SMP2 policy units.
iii) Epoch 1 is 0-20 years; Epoch 2 is 20-50 years; Epoch 3 is 50-100 years.

2. Baseline management scenarios

2.1 Present Management

Present management of the shoreline is taken as the policy defined by SMP1, modified by subsequent Strategies or studies. It should be noted that in the case of SMP1 the period over which the assessment was carried out was 50 years. SMP2 extends this to an assessment period of 100 years. The table below sets of the current shoreline management policies for Policy Development Zone 2. This SMP2 will assess all the available evidence and update these previous management policies.

The key documents outlining the present management of the shoreline in this PDZ are:-

Isle of Wight Shoreline Management Plan 1 (1997)
The first Shoreline Management Plan (SMP1) for the Isle of Wight 's coast was published in 1997. It consists of two volumes.

- Volume 1 is the 'Data Collection and Objective Setting', which presents information on a range of topics including coastal processes, natural environment, etc.
- Volume 2 is the 'Management Strategy', which presents information for each Management Unit around the Island's coast and sets a management Policy for each unit.

Coastal Defence Strategy Studies, Isle of Wight:
Whilst the Shoreline Management Plan provides the risk framework for management of the coast, Coastal Defence Strategy Studies provide a more detailed assessment of particular frontages in order to identify the most suitable type of coastal defence schemes that may be required to fulfil the agreed shoreline management policy and to plan a programme of future works.

North East Coastal Defence Strategy Study, Isle of Wight (2004)
The North-East Coastal Defence Strategy Study, which extends from the Shrape Breakwater at East Cowes to Culver Cliff, was completed and adopted in 2005. The Plan includes a works programme along the north-east coast frontage for five years including details on costings. The North-East Strategy consists of a summary report and detailed Appendices.

Catchment Flood Management Plan
The Environment Agency has undertaken a programme of Catchment Flood Management Plans (CFMPs) for the major river catchments in the Southern Region. A CFMP is a large scale plan that covers an entire river catchment or group of catchments that identifies long-term, sustainable policies to manage flood risk within the catchment. These policies form the basis for development of Strategy Plans, covering all or part of the overall catchment area, which will identify in more detail appropriate flood defence measures.

Whilst CFMPs principally address fluvial (river) flooding, SMPs address tidal (sea) flooding, alongside coastal erosion. The boundary between the CFMP and the SMP in this area is the bridge between Wootton Mill Pond and Wootton Creek. The Isle of Wight Catchment Flood Management Plan (Summary Report) was published in December 2009.

- Sub Area 4: Palmers Brook, Wootton Creek and Monktonmead Brook:

  "*The issues in this sub-area: This sub-area covers the Palmers Brook, Wootton Creek and Monktonmead Brook catchments and the smaller streams in the north west of the Isle of Wight. This area is largely rural in nature, but notably contains the town of Ryde, the largest urban centre on the Island. Flood flows in the sub-area largely occur on Monktonmead Brook and the risk of flooding elsewhere is limited. These flows can result in relatively fast rises in river discharge and flood events that pass relatively quickly. Flooding in Ryde results from rainfall run-off over predominantly impermeable surfaces combined with tide locked fluvial flows. The* *pumping station in Ryde helps to evacuate flows during tide locked periods and provides the town a 1% probability standard of protection."*

Policy Option 4: Areas of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change.

The previous shoreline management policies set for this PDZ are listed in the table below:

The IW numbering units refer to lengths of coast for which previous shoreline management policies have been set in SMP1, modified by subsequent Strategy Studies. These are not SMP2 policy units which are developed in section 3 below.

Numbering in SMP2 Appendices (2010)		**SMP1 (1997)**		**North East Coastal Defence Strategy Study (2004)** *Nb. Trigger governing change in generic policy option: Economic viability of maintaining existing defences.*	
Area *(clockwise)*	**Name**	**Unit**	**Policy**	**Strategic Management Unit**	**Preferred Generic Policy Option**
IW2	**Osborne Bay**	RYD1	Do nothing or Retreat the existing defence line	SMU2	No Active Intervention, but Monitor
IW3	**King's Quay**			SMU3	No Active Intervention, but Monitor
IW4	**Woodside**	RYD2	Retreat the existing defence line	SMU4	No Active Intervention, but Monitor
IW5	**Wootton Creek**	RYD3	Hold the existing line	SMU5	Hold the Line, by Seawall Encasement with Revetment, Floodwalls and Rip-Rap
IW6	**Quarr & Binstead**	RYD4	Retreat the existing defence line	SMU6	No Active Intervention, but Monitor
IW7	**Ryde**	RYD5	Hold the existing defence line	SMU7	Hold the Line by Seawall Encasement and Revetment
IW8	**Appley & Puckpool**			SMU8a	Hold the Line followed by No Active Intervention, but Monitor (trigger governing change of policy option: economic or technical viability of maintaining existing defences)
IW9	**Springvale**	RYD6	Hold the existing defence line	SMU8b	Hold the Line by Seawall Encasement and Revetment
IW10	**Seaview Duver**			SMU8c	Hold the Line by Seawall Encasement and Revetment
IW11	**Seaview**	RYD7	Hold the existing defence line	SMU8d	Hold the Line by Seawall Encasement and Revetment
IW12	**Seagrove Bay**	RYD8	Hold the existing defence line	SMU9	Northern - GE 31- 32a - Hold the Line by Seawall Encasement and Rock Revetment Central - GE 32b and c - Hold the Line by Seawall Encasement and Rock Revetment Central - GE 32d - Hold the Line by Offshore Breakwaters Southern - GE 33 - Hold the Line by Seawall Encasement and Rock Revetment

2.2 Baseline Scenarios for the Policy Development Zone

Summary of future coastal risks in PDZ2:
Along the western half of PDZ2, continuing erosion will occur with significant potential for erosion triggering slumping of the coastal slopes and reactivating shallow landslides. These failures would only threaten a limited number of properties. Sea level rise around Wootton Creek and near Wootton Bridge will increase the frequency of tidal inundation and overtopping to the local properties behind the current defence line. The key asset losses would include the ferry terminal and the Wootton Road Bridge.

In the eastern half of PDZ2 the low-lying sections of Ryde (which include areas of the main commercial and tourism centres along with some residential properties) are at risk from tidal inundation. The seafront assets in the coastal communities to the east are at risk from both erosion and tidal flooding. Ongoing erosion at Seagrove Bay could lead to the reactivation of landsliding and loss of a large number of residential properties and infrastructure over a 100 year period.

2.2.1 No Active Intervention (Scenario 1, NAI)

Under this scenario no further work would be undertaken to maintain defences. Where defences fail they would not be repaired. The principal difference between this scenario and the unconstrained scenario discussed earlier is the residual impact existing defences would have on the behaviour of the coast. A detailed description of this NAI scenario is given in Appendix C3, area by area. The following discussion provides a summary, drawing together an overview with particular focus on how the use of the coast would be affected. In particular, this baseline scenario is discussed with respect to the overarching objectives set out previously in sub-section 1.3 of this PDZ2.

Old Castle Point to King's Quay
From Old Castle Point to King's Quay (the coast around Osborne Bay) the coastal frontage is mostly undeveloped woodland with pockets of agricultural land. The historic estates of Norris Castle and Osborne House adjoin this frontage. Sea defences along here would fail by the end of the first epoch and would promote coastal slope undercutting. Erosion would lead to possible reactivation of inactive shallow landslides and ultimately generate significant recession of the coast within several embayments. The woodland vegetation of these slopes, however, may bind the superficial layers and delay the onset of these reactivations. In the medium to long term erosion and cliff retreat will continue at increased rates due to the impacts of sea level rise and increased wave attack. Sediments yielded would naturally distribute along frontage. Most recession may result from the 'one-off' reactivations rather than from ongoing processes. This erosion and retreat will impact on the parkland and woodland of Norris Castle and Osborne House and affect localised access to the shoreline below Osborne House. This unit is part of the Solent Maritime SAC, and supports a number of designated features including intertidal mud and sandflats, coastal saltmarsh and vegetated shingle, and seagrass beds immediately offshore. The intertidal flats are used as feeding grounds by Brent geese and other water birds and waders and the seagrass beds are known to support particularly rich communities. As defences fail the coast will roll back naturally, creating an opportunity for the expansion of intertidal and coastal habitats.

The woodland comprises both semi-natural ancient woodland and plantation woodland. An area of vegetated shingle is located in Osborne Bay. The intertidal mudflats are used as feeding grounds for Brent geese and other water birds and waders. Seagrass beds extend all along this stretch of coastline. Those within Osborne Bay have extremely rich associated communities together with interesting interstitial communities in the adjoining sand.

King's Quay is surrounded by low wooded cliffs and coastal slopes which will continue to erode, and possibly trigger cliff reactivation at increasing rates due to the impact of sea level rise. The inlet is protected by narrow sand and gravel spits that are vulnerable to overwashing, recession and breaching. The spits may become naturally maintained by increases in sand and gravel supply following local cliff reactivations updrift. The most likely future evolution is for continued landward migration of the spits. The coast is undefended, although a masonry wall and earth embankment forms a causeway across the estuary which may fail early in the first epoch if unmaintained. This area is not easily accessible, with only a private road with restricted access leading to the foreshore. Limited tidal flooding may occur up to Palmers Brook and near Woodhouse Copse in all epochs and is not expected to adversely affect property or access in the area. NAI will allow King's Quay to evolve naturally; it is expected that a wider creek mouth will develop and spits at the entrance will turn in. This policy will support ongoing estuarine processes and ensure that important SAC and SPA/Ramsar habitats are retained, with opportunities for the creation of further saltmarsh and intertidal flats towards the head of the creek.

Woodside
The coastal frontage of Woodside is developed on a low slope and interspersed with areas of woodland. The frontage is mainly undefended but includes approximately 180m of ad hoc concrete defences which will fail in epoch 1 with no future maintenance. No Active Intervention will result in erosion of the frontage, leading to reactivation of slip planes in the coastal slope as the stabilising toe weighting is eroded away by wave action. This will place seafront properties around the caravan park and holiday village at risk. The increasing cliff recession will supply sediments to the beach and eastwards which may impact significantly upon Wootton Creek and the ferry channel. Allowing the coast to roll back would support the natural evolution of SAC and SPA/Ramsar habitats (principally intertidal sand and mudflats) and the bird life that they support, and offer opportunities for the expansion of these habitats over time. NAI would also support ongoing natural processes at Chapel Corner which is a geologically unique site, protected as part of the Kings Quay SSSI.

Wootton and Fishbourne
The predominantly residential villages of Wootton and Fishbourne are located along the banks of Wootton Creek. Access to the creek is limited due to private land ownership and there are numerous recreational moorings and pontoons in the Creek as well as an assortment of private defences of varying condition. Under this scenario by the end of the first epoch the vast majority of the Creek banks will be undefended, and the low shoreline will be exposed to tidal inundation and overtopping leading to some potential erosion and slope destabilision. The twin spits at Wootton Creek have migrated into the estuary and this trend is likely to continue, and could allow wave penetration further into the Creek.

This area is part of the Solent and Southampton Water Ramsar Site and Solent and Southampton Water SPA and SSSI with the partly reclaimed freshwater pond (Old Mill Pond) at the landward extremity. Historically, saltmarsh has disappeared from the Wootton Estuary owing to a combination of hydrological change and development but small pockets remain. No active intervention may progressively increase the amount of unmodified water frontage, helping support the development of saltmarsh and intertidal mudflats, but will have significant impacts for the residential properties and businesses lining the Creek. The scope for significant intertidal and saltmarsh habitat gain is limited principally by the relatively steep slopes of the valley. Habitat gain would be focused therefore in low-lying pockets, near the holiday village just south of Lambsleaze Copse, at Wootton Bridge village and up the valley beyond the bridge, and in the area just south of the Ferry Terminal. Under NAI, saline intrusion would increasingly influence Old Mill Pond, with resultant changes in habitats.

East of Fishbourne the coastline is largely undefended and naturally evolving with scattered remains of historic sites. The shoreline of the Wootton-Quarr area has been the subject of an intensive archaeological survey funded by English Heritage with exceptionally rich intertidal resource, preserved by, and in recent decades revealed within, intertidal muds. In the centre of the area there are some privately owned short sections of defence generally in the form of walls, slipways and timber structures providing access to the shore. The natural recession of the shoreline will resume when the limited areas of existing defences collapse during the first epoch. No Active Intervention will result in ongoing erosion of this sparsely developed frontage and may result in shallow landslides and slumping of the coastal slopes as the coast adjusts naturally to sea level rise. Coastal retreat may place several properties on the outskirts of Pelhamfield at risk as well as the flooding of a small lagoon near Quarr Abbey Farm.

The area is designated of international importance (Solent and Southampton Water SPA/Ramsar) for nature conservation as a result of the bird life that intertidal sand and mudflat habitats support. NAI would for the most part benefit these international designations, with the roll back of the coast enabling the extension of intertidal flats. However, on the coastline in front of Quarr Abbey, existing coastal grazing marsh and vegetated shingle habitats may be lost to erosion and tidal inundation with time.

Along the western section of the PDZ, under this scenario two of the overarching objectives; to maintain transportation links to the Island and to support the historic landscape; are not achieved. However, the important natural landscape would be supported and allow development of the natural environment. There would be a gradual increase in flood risk to Wootton Bridge affecting the coastal properties and access (although this is already limited), but given the timeframes there would be scope for community adaptation.

Ryde to Seagrove Bay

The developed coast behind Ryde, Appley and Puckpool forms one of the largest settlements on the Isle of Wight. The entire coastline is defended, with stone masonry and concrete seawalls lining frontage with residual lives of generally 10-15 years, with sections of wall fronting parts of Pelhamfield in the east and Puckpool in the west lasting 15-25 years and the walls and revetments surrounding Ryde Harbour are expected to last at least 25 years. Several short curvilinear breakwaters and straight groynes fronting the boating lake in the east will assist in retaining beach sands for 5-10 years.

Defences along the majority of the frontage of Ryde town will fail towards the end of the first epoch, allowing wave attack to promote erosion of the exposed shoreline, despite the sediment accumulation forming Ryde Sands. During the 19th century, reclamation of the Ryde backshore occurred, isolating the former cliff line from wave attack. Subsequently, the cliff/coastal slope was partly re-graded and incorporated into the urban area of Ryde. This is a difficult area to evaluate, for much of the esplanade is built forward onto the beach and Ryde Sands. The esplanade, a section of the railway line (including tunnel) and the coastal road will be affected by ongoing erosion and should the coast erode in a similar manner to that of adjacent frontages, once exposed slip planes in the coastal slope may be reactivated.

A significant risk increasing through the first epoch and beyond is potential for tidal overtopping affecting the esplanade properties, and extending inland following failure of the coastal defences. Large numbers of residential properties and businesses are at risk along the lower reaches of St. Thomas Street, extending eastwards along the Esplanade and Strand as far east as the boating lake. Flooding could also extend inland along Monktonmead Brook to Ryde St. Johns Station and include lower Monkton Street, Marymead Close, West Hill Road, across Rink Road and Park Road and affect the northern end of St. Johns Wood Road. No Active Intervention will severely affect the functioning of Ryde as a key transport link and tourist resort for the Island.

Ryde Sands is a regional sediment sink, and with the exception of periodic channel dredging to provide access to Ryde Marina, has very little human intervention. The future contribution of Ryde Sands as a control on shoreline behaviour under a No Active Intervention scenario is unclear. Ryde Sands is sensitive to wave climate and will be vulnerable to the rising sea level and increased storminess. Erosion and loss of the foreshore sands would lower beach levels and increase rates of erosion of the stabilised sediments underlying Ryde Esplanade and the coastal slopes. Sediment input by littoral drift from the south-east and west is likely to increase if adjacent shorelines erode and reactivate under this scenario, but the balance of sediment supply and movement is unclear. NAI would be expected to have consequences for important coastal habitats associated with the Solent and Southampton Water SPA/Ramsar designations; the extent of the intertidal sandflats and offshore seagrass beds is likely to be altered as a result of erosion, with some opportunity for extension of intertidal flats near Ryde Pier. Construction of the small harbour at Ryde Marina led to a build-up of sand to the east and resulted in the need to extend the Monktonmead outfall. Further accumulation of sand in this area whilst the defences slowly deteriorate may cause further disruption to land drainage arrangements.

Appley Park, Puckpool Point and the wide sandy beaches adjoining the esplanade along these frontages are popular recreational areas for both tourists and residents. In this scenario, from Appley to Puckpool**,** wave attack and erosion will begin at breaches in the seawall towards the end of the first epoch, particularly where the concrete seawall is exposed to undermining by low beach levels, leading to voids under the promenade. The pedestrian seafront promenade will be severed. Erosion would result in the loss of land and recreational amenities along the promenade and in Appley Park, the loss of the trunk sewer, Appley Tower, St Clare's Cottage and Puckpool Battery. In the longer term the potential for reactivation of the Appley Park coastal slope increases as erosion cuts back further into the steep slopes undercutting and destabilising them. Erosion will threaten the operation of the important and newly-renovated Sewage Treatment Works for Ryde. At Puckpool Point, the Fort embankment and structure (a Scheduled Monument) would be undermined and lost to erosion, diminishing this minor headland. Any accretion at Ryde Sands may reduce the potential rate of erosion. The main environmental value in this area and to the east are the sandflats, designated as part of the Solent and Southampton Water SPA/Ramsar sites, which provide important feeding grounds for waders and waterfowl. As a result of erosion and inundation the coastline here would roll back, allowing for the natural development of further intertidal habitat.

The coastal defences at Springvale and Seaview Duver will remain through the first epoch protecting the rows of seafront properties from erosion risk. Into the second epoch under the No Active Intervention scenario there will be the loss of seafront assets including the seafront public highway, residential and commercial properties and a pumping station. Potentially the defences at Seaview Duver built in 2004 to protect properties and the low-lying intertidal brackish lagoon at Seaview Duver could survive until the third epoch, at which point overtopping, erosion and breaching of the barrier may form an open tidal inlet, with the potential for beach depletion downdrift at Springvale, Appley and Ryde. However, significantly prior to this, lack of maintenance of the outfall and inlet for the lagoon would significantly alter the functioning of Hersey Nature Reserve. Under NAI the lagoons and coastal grazing marsh at The Duver, which form part of Ryde Sands and Wootton Creek SSSI, would ulitmately be lost. Properties on the seafront and the edges of the inlet would be at risk from tidal flooding without tidal flows controlled by the barrier.

Seaview village is developed around Nettlestone Point, which is relatively low lying, positioned between Seaview Duver to the west and higher land around Seagrove Bay to the south. Along the Seaview seafront, privately owned defences provide a coast protection function and take a different form, with the narrow, low walkway (footpath) backed by property boundary walls that, despite frequent gate openings, provide additional protection against overtopping. The densely developed village of Seaview is behind. The stone masonry wall is in significantly poorer condition than the Springvale and Seaview Duver frontages and is expected to fail in 10-15 years. There are a number of slipways and landing stages, allowing recreational access for watercraft. In common with those frontages to the west, this area is low–lying with seafront properties at tidal flood risk. No Active Intervention will result in the deterioration and failure of the existing defences in the first epoch and residential properties will be affected by erosion. By the second epoch the seafront properties and the western section of Bluett Avenue behind will also be at risk of tidal flooding, alongside Saltern's Road. In the longer term, erosion of the Bembridge limestone headland will continue, although it is likely to remain a defined headland. The tidal flood risk zone will expand eastwards into the edge of Seaview, potentially affecting additional properties at the western ends of Bluett Avenue and Fairy Road. The varying height and design of existing defence structures alongside progressive failure of the defences in the coming decades (under a scenario of No Active Intervention) place a number of properties at tidal food and erosion risk and will affect access roads and footpaths in the area.

South of Nettlestone Point rows of large properties line the coast, which will be at risk of erosion following failure of defences towards the end of the first epoch. The shallow Seagrove Bay is backed by a largely developed coastal slope, part of the village of Nettlestone. In these areas several roads and footpaths lead to the coast and provide access to properties. The coastal slope at Seagrove Bay has a long history of land slippage with significant ground movements observed in 2002/03. Once the defences fail, it is likely that the coastal slope will erode and begin to form low cliffs in most of the bay area. Within a few years of failure of the defences the increasing toe erosion of the slopes and antecedent winter rainfall will reactivate the failure planes causing landslips, which could occur in epoch 2 or epoch 3, especially in the southern and central parts of the bay. Over a 100 year period, a large number of residential properties will be lost, along with infrastructure assets. Sediments yielded by the commencement of cliff erosion are likely to contribute to local foreshores, before contributing to drift inputs north-west towards Ryde Sands. Under a No Active Intervention scenario temporary stabilisation of the slope will occur following slope failure/breach of the seawall due to the slump material from the failure acting as toe weighting. A failure cycle will be established as, in time, erosion of the slump material will occur and remove the toe weighting and thus reduce the slope stability causing further failures to occur. No Active Intervention will therefore have serious consequences for the lower parts of the village of Nettlestone surrounding Seagrove Bay, principally due to erosion triggering slope failures. At the southern margin of Seagrove Bay is the transition from the defended shoreline (extending from Ryde) to the naturally evolving and eroding wooded coast at Horestone Point.

In summary, over this section the obvious and dominant impact of this scenario would be on the built environment. The centre of Ryde would be abandoned to tidal flooding, the use of the shoreline would be severely compromised and transportation to and around the Island via the ferry and railway would be disrupted. There would be considerable loss of properties, the ramifications of which for smaller coastal villages are likely to non-recoverable. There could be marginal gains in terms of nature conservation interests within the Solent Maritime SAC, and Solent and Southampton Water SPA/Ramsar sites, with the restoration of intertidal habitats and associated benefits to feeding birds in the various creeks and larger valleys. As a result of the sediment rich shoreline there is also potential for development of saline lagoons within such areas. The landscape would totally change from that of the typical Georgian seafront to a more natural seascape. There would however be the issue of dilapidation of existing properties under continuing threat of loss and flood risk and there would be significant loss of the historical landscape.

The economic damages due to flooding and erosion are summarised in Table 1, at the end of this sub-section and a summary of impacts with respect to the overarching objectives are set out in Table 2, in comparison with the assessment made for the following 'With Present Management' scenario.

2.2.2. With Present Management (Scenario 2, WPM)

This scenario is defined by current management practice as set out by policy defined in SMP1 and in some areas modified by more detailed examination through subsequent strategies. The various policies and approaches that are in place are summarised in the table at the start of this section 2. In practice, continuing 'with present management' practices means assessing the consequences of maintaining and continuing the presence of existing defence structures.

Overall, the current approach to management in this scenario may be defined as the intent to:

- Retain the natural evolution of the relatively undeveloped and wooded coast from the outskirts of East Cowes along to Ryde, (with the policy of No Active Intervention but monitor) with the exception of Wootton Creek. Local areas of properties will be affected by coastal retreat. The landscape and nature conservation interest of the area will be allowed to adapt naturally to sea level rise.
- At Wootton Creek the existing patchwork of defences would be maintained by a policy of Hold the Line by seawall encasement, although flood risk remains dependent on the levels of individual defences maintained. The ongoing maintenance of these defences would be undertaken by private funds.
- The continuous defences stretching from Ryde to Seagrove Bay would be maintained through a policy of hold the line by seawall encasement and revetment. There is risk of significant tidal flooding extending inland along Monktonmead Brook in central Ryde and at Seaview, which would be dependent of the height and standard of the weakest point of the maintained defence line to minimise this risk. At Seagrove Bay offshore breakwaters have been considered to provide additional protection, but are not current management practice so are not considered in this scenario prediction.

In Osborne Bay management of this largely undeveloped section of coast has been 'No Active Intervention but monitor', under which the consequences of future change would be the same as outlined earlier in the section. However, remnant defences are present in several locations, which if maintained, would produce a patchwork of slope recession scarps but in the long term the outflanking is likely to render remnant defences ineffective. Maintenance of the defended sections would reduce sediment supply to the system and result in increasing foreshore narrowing. Similarly, erosion will continue to cause reactivation and retreat of the low wooded cliffs and coastal slopes surrounding King's Quay, alongside potential landward migration of the entrance spits dependent on availability of sediment supply and localised flood risk. Sections of defences in adjoining frontages would be increasingly outflanked if maintained. At Woodside maintenance of the defence structures will prevent erosion in front of the developed area at the west of the frontage, but the rest of the unit will continue to erode and reactivate in line with the No Active Intervention scenario outlined above. Maintenance of the existing defence structures along this eroding frontage is unlikely to be sufficient to prevent slope failure, as they will be more frequently overtopped, subject to wave attack and higher sea levels, and increasingly outflanked.

At Wootton Creek, erosion of the majority of the shores of the outer and inner Creek would be prevented by maintaining existing defences, although overtopping is still likely to occur if the levels of defences are not raised Erosion of the small currently undefended frontages within the Creek would outflank adjacent defences. Tidal flooding already affects properties near Wootton Bridge and would occur increasingly frequently if defences are maintained solely at their current levels. Maintenance of existing private defences around the Creek shoreline would impact on the ability of the estuary to adapt naturally to sea level rise and there would be continued loss of saltmarsh and intertidal flats as a result of coastal squeeze in a number of locations on both the east and west shores. The sluices at Wootton Bridge will require maintenance to continue to control tidal flows between the Creek and the Old Mill Pond, which will gradually return to more natural conditions. The tidal limit is at the top of the Mill Pond.

Along the Quarr and Binstead frontage cliff erosion and retreat will result in localised reactivation of the coastal slope in line with the No Active Intervention scenario outlined above, although if existing limited sections of local defences are maintained, significant outflanking of the defences will rapidly occur, especially following erosion reactivation of the coastal slopes in the east of the frontage. At current levels the defences will also be increasingly destabilised by overtopping and wave attack, which may trigger failures in the slopes behind. Important coastal habitats, designated as part of the Solent and Southampton Water SPA/Ramsar, will be largely allowed to evolve naturally with the erosion and succession of the coastline.

In assessing this scenario along the western section of the PDZ against the objectives, individual properties would be defended and protected against flooding and erosion. This would however become increasingly difficult to manage in the long term. The prominence of defence would start to impact on the important natural landscape and would do little and may even cause increased erosion of the foreshore platform to the detriment of important historical features. There would be loss of intertidal flats and saltmarsh habitat within Wootton Creek as a result of coastal squeeze along the majority of the shoreline.

Along the developed frontage of Ryde, Appley and Puckpool if present seawalls and defences are maintained then this, along with the wide dissipative intertidal sand banks, will stabilise the shoreline and prevent erosion from commencing, protect key infrastructure and transport links, and theoretically maintaining amenity use of the area. If the level of the defences were raised, this could affect the access to the shoreline from the coastal road and footpath, as the defences could potentially form a barrier affecting the amenity use of the area. In the longer term, the risk of significant tidal flooding extending inland along Monktonmead Brook in central Ryde remains and would be dependent on the height and standard of the defence line being raised to minimise this risk. As defences along the coastline to the south-east are also maintained, Ryde Sands may suffer sediment starvation and potential erosion, as there would continue to be no direct sediment input to the frontage. However, the quantity of sediment stored at Ryde Sands is testament to significant sediment supplies to this drift convergence zone and relative stability in recent decades, so littoral drift may compensate for lack of local sediment input under a regime of the present a hard defence line being maintained. This area of accretion is also seen as being driven by a broader interaction between the open coast and the Solent. Longshore sediment supply is therefore not necessarily critical to the existence of Ryde sands. It seems probable that the larger scale supply of nearshore sediment would continue. While this remains an uncertainty and while there would be the need for continuing monitoring, the suggested processes support the conclusion that this area would continue to have significant sediment resource. This is further supported by the fact there has been a long history of defence to the east and that this has not diminished the sediment accretion at Ryde.

In Appley and Puckpool the policy outlined in the North-East Strategy Study was Hold the Line followed by potential transfer to No Active Intervention but monitor if there was not sufficient economic viability to maintain the defences. It is believed that the existing defences were originally constructed in order to protect the amenity assets along this frontage from erosion. The fixed defences mean that the coastline currently can not erode naturally or realign to another orientation. If the defences are allowed to fail, Appley Tower, St Clare’s Cottage, Puckpool Battery, promenade shelters, a holiday park and its associated properties, a trunk sewer and Sewage Treatment Works for Ryde will be at risk from erosion over the next 100 years. There are also various recreational and amenity areas and activities carried out behind the defences which would be affected if No Active Intervention was adopted as under this with present management approach. Should erosion recommence after failure of the defences the coastal slope would be at a greater risk of slip failure. This hybrid option was been considered as the current defences are in reasonable condition. Intertidal sand and mudflats and nearshore seagrass beds, which are of nature conservation importance, may be altered or lost as a result of coastal squeeze.

Along the low-lying frontage of Springvale, Seaview, Duver and Seaview maintenance of the seawalls will continue to prevent shoreline erosion and retreat, and will protect properties and seafront roads and access. The level of the defences would need to be raised to counteract increasing sea levels and adverse consequences of overtopping and tidal flooding in some areas. Lowering foreshore levels will expose the defences to wave attack. There will be no direct sediment input into this unit, which will be dependent on littoral drift from the south-east, where defences will also be maintained under this scenario. The defences fronting parts of Nettlestone Point and Seaview are narrow and may not have the space to easily raise defence levels. Maintaining defences here will protect areas of grazing marsh and lagoons which are of nature conservation interest (part of Ryde Sands and Wootton Creek SSSI).

In Seagrove Bay, with present management practices continuing and defences maintained, the coastal slopes behind Seagrove Bay are likely to remain inactive. Gradual narrowing of the foreshore is likely to occur with loss of amenity and increasing the exposure of defences to wave attack. Importantly, whilst maintaining seawalls to prevent toe erosion will effectively minimise the risk of slope reactivation, the predicted increase in winter rainfall could also trigger slope failures in the longer term, which could breach or collapse the seawall and expose the ground behind it to erosion.

Maintaining and raising the defence line from Ryde to Seagrove Bay has the potential to protect the communities from flood and erosion risk. However, raising defences may impede access to the shoreline and the landscape views in the medium term. Tidal flood risk will remain for areas of the communities of Ryde and Seaview and the communities will need to adapt to these future risks in the long term.

Table 1a. Economic Assessment – Erosion damages

The following table provides a brief summary of damages determined by the SMP2 MDSF analysis for the whole PDZ. Further details are provided in Appendix H. Where further, more detailed information is provided by studies, this is highlighted. The table aims to provide an initial high level assessment of potential damages occurring under the two baseline scenarios.

ASSESSMENT OF EROSION DAMAGES

Epoch	0 -20 year			20 – 50 years			50 – 100 years			
No Active Intervention	**Number of properties:**		**Value**	**Number of properties:**		**Value**	**Number of properties:**		**Value**	**PV Damages**
Location	*Residential*	*Commercial*	**x £1000**	*Residential*	*Commercial*	**x £1000**	*Residential*	*Commercial*	**x £1000**	**(£x1000)**
Osborne Bay	0	1	0	0	1	0	3	2	567	61
Woodside	4	6	784	2	2	410	3	10	881	1,056
Wootton Creek mouth	0	10	0	0	9	150	11	7	2,276	266
Quarr & Binstead	1	7	249	3	3	596	4	10	934	538
Ryde	3	33	1,633	21	10	4,220	67	20	13,614	3,946
Appley & Puckpool	0	0	0	1	16	257	0	12	329	140
Springvale & Seaview Duver	0	0	0	10	3	1,915	52	50	11,042	2,311
Seaview & Seagrove Bay	0	4	0	20	2	3,783	123	30	23,457	4,248
									Total for PDZ2	12,566
With Present Management	**Number of properties**		**Value**	**Number of properties**		**Value**	**Number of properties**		**Value**	**PV Damages**
Location	*Residential*	*Commercial*	**x £1000**	*Residential*	*Commercial*	**x £1000**	*Residential*	*Commercial*	**x £1000**	**(£x1000)**
Osborne Bay	0	0	0	0	0	0	3	0	566	61
Woodside	0	3	0	0	2	33	0	7	180	37
Wootton Creek mouth	0	0	0	0	0	0	0	0	0	0
Quarr & Binstead	0	3	0	3	3	596	3	7	686	264
Ryde	0	0	0	0	0	0	0	0	0	0
Appley & Puckpool	0	0	0	0	0	0	0	0	0	0
Springvale & Seaview Duver	0	0	0	0	0	0	0	0	0	0
Seaview & Seagrove Bay	0	0	0	0	0	0	0	0	0	0
									Total for PDZ2	362
Notes										
SMP.										

Table 1b. Economic Assessment – Flood damages

The following flood damages have been determined through use of MDSF. These figures are aimed to indicate the level and impact of flood risk rather than being a detailed economic appraisal. In many areas substantial numbers of properties would be liable to flooding on the more frequent events both under NAI and WPM, a nominal write off value has been allowed in the table for properties at frequent risk; this generally excludes values at risk at present on a 1:1 year event, in 50 years time for the 1:10 year event and in 100 year time the 1:50 year event.

ASSESSMENT OF POTENTIAL FLOOD RISK

	Flood risk tidal 2010			Flood risk tidal 2060			Flood risk tidal 2110			
No Active Intervention	**No. of properties**		**AAD**	**No. of properties**		**AAD**	**Number of properties**		**AAD**	**PVD**
Location	< 1:100yr	>1:100yr	**x £1000**	< 1:100yr	>1:100yr	**x £1000**	< 1:100yr	>1:100yr	**x £1000**	**(£x1000)**
Kings Quay (F)	1	0	0	1	0	0	1	0	0	0
Wootton Creek (G1, 2 & 3)	109	11	900	122	14	1,726	146	6	3,137	41,196
Ryde (H)	326	186	930	521	87	1,576	699	49	2,854	39,559
Seaview (I)	226	16	3,958	244	11	6,372	271	18	9,834	158,108
Seagrove Bay (J)	0	1	3	1	3	14	15	1	80	420
Agricultural Total			20			22			24	628
									Total for PDZ2	239,911

With Present Management	**No. of properties**		**AAD**	**No. of properties**		**AAD**	**No. of properties**		**AAD**	**PVD**
Location	< 1:100yr	>1:100yr	**x £1000**	< 1:100yr	>1:100yr	**x £1000**	< 1:100yr	>1:100yr	**x £1000**	**(£x1000)**
Kings Quay (F)	1	0	1	1	0	1	1	0	1	0
Wootton Creek (G1, 2 & 3)	109	11	146	122	14	218	146	6	78	4,786
Ryde (H)	0	186	118	0	87	184	0	49	293	4,654
Seaview (I)	0	16	63	0	11	81	0	18	109	2,187
Seagrove Bay (J)	0	1	5.26	1	3	3	15	1	5	91
Agricultural Total			10			11			12	320
									Total for PDZ2	12,038

Table 2. General Assessment of Objectives

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

STAKEHOLDER OBJECTIVE	NAI			WPM		
	Fails	Neutral	Acceptable	Fails	Neutral	Acceptable
To sustain and adapt the important centres of economic activity including Ryde and surrounding waterfronts and the gateways to the island at Fishbourne and Ryde.						
To support adaptation of the communities of East Wight to reduce flood and erosion risks.						
To maintain important access along the seafront and shoreline use of the area.						
To support opportunity for adaptation supporting and enhancing the nature conservation value of the area.						
To sustain the historic landscape and environment where practicable.						
To maintain the important landscape subject to natural change.						

3. Discussion and detailed policy development

The discussion provided above of the two baseline scenarios highlights, foremost, the very large regional economic risk to the area that continued management of flooding and erosion aims to address. In economic terms, the value of assets at risk and the socio-economic impact of No Active Intervention on sustaining the area, the largest developed area on the Island, would justify continued defence of the frontage. This is quite clearly a major driver for policy development over the eastern half of the PDZ.

However, it also highlights the important interaction and dependency, in meeting these social objectives, of balancing this with sustaining and enhancing the natural environmental values. The importance of this not only relates to the essential inherent value of the natural environment, as recognised through the various environmental designations, but also in achieving the aims for an integrated and diverse setting within which social objectives are delivered.

The overall conclusions that may be drawn are that a policy scenario of No Active Intervention fails to address the substantial threat to the economic, social and heritage value of the area. While this management intent could deliver some significant ecological benefits, it fails to deliver a balanced sustainability of values. The identified economic benefits of the With Present Management scenario demonstrates the benefit of maintaining defences to large areas of the coastline and Wootton Estuary - but in specific detail potentially fails to take account of the need to improve the defences to a higher standard against sea level rise and sustain nature conservation/landscape values. Therefore, it is the delivery detail of the existing With Present Management approach that needs to be considered rather than a major change from current practice.

Old Castle Point to Woodside

The previous management of the open coastline between Old Castle Point and the entrance to Wootton Creek had suggested an approach of doing nothing and/or retreating the existing line. Given the limited risk to infrastructure along this frontage it is sensible to continue this. When considering the village of Woodside and the value of the community, it is reasonable, that short term maintenance of the existing defences continue but that in the longer term with increased sea level rise and erosion, it becomes unsustainable to do so. The implications are the threat of longer term impacts on the functioning of Wootton Estuary through increased sediment supply and the loss of property over the 100 year period at Woodside.

Wootton Creek and Quarr

The No Active Intervention scenario for most of the estuary would be desirable; however given the location of the important transport links to the mainland and areas of flood and erosion risk this would be unacceptable for the whole of the Creek. To the east at Quarr and Binstead the coastline should be left to evolve naturally with ongoing monitoring. The proposed overall approach for Wootton Creek is based on transferring from the 'With Present Management' approach to more sustainable long-term adaptation to rising sea levels and future risks. Within the majority of the Creek properties are generally set back from the coast and not in the flood risk zone. A policy of No Active Intervention is therefore appropriate here, although this will not preclude the maintenance of existing private defences, which often provide waterside access. There would be a presumption against allowing new areas of defences and significantly raising defence levels. This will allow natural realignment to occur wherever possible to avoid increasing future assets within the flood risk zone, encourage planned retreat and allow habitat adaptation as sea level rises. At the ferry terminal, with increasing sea level rise, there may be a need for further defences towards the end of the first epoch to maintain this critical infrastructure for the Island in the long term. In the outer eastern section of the Creek there are a number of properties at risk from erosion over the next 100 years (in contrast to the flood risk along the margins of the inner and central Creek). This area is currently defended and the SMP proposes allowing the maintenance of private and public defences in the short to medium term, on the basis that in the long term risk levels will continue to increase and planning managed realignment and adaptation to coastal change will be necessary. This defended coast also assists protection of the adjacent ferry terminal. Moving to the inner end of Wootton Creek, the margins of Wootton and Fishbourne villages reach down to the waterside near Wootton Bridge, with properties at increasing risk of tidal flooding in the south-east corner of the Creek (near the public house, near Pump Lane and in places below Barge Lane). A policy of hold the line is proposed for this area to allow measures to reduce flood risk when required and where economically viable, including the maintenance of private defences. The policy of hold the line is also intended to maintain the functioning of the important Wootton Bridge road link.

Wootton Old Mill Pond

The Old Mill Pond is situated at the head of Wootton Creek. The pond covers an area of approximately 14ha upstream of Wootton Creek and Wootton road bridge. A mill has existed at Wootton Bridge since the 11th century. Water levels in the pond are currently managed through a series of structures at Wootton Bridge. Throughout the 20th century and until the present day, water levels have been controlled in the Mill Pond even though the mill has ceased to be operational. Past management of the pond and the duration of water retention has varied considerably over the past 30 years. The Environment Agency maintains the control structure at Wootton Bridge to prevent flood risk. The pond is an essential element in the character of Wootton Bridge and a valued amenity to the community. People travelling along the A3054, the main road from Ryde to Newport, view it daily. The objectives of management of the Mill Pond stated in the Water Level Management Plan (2008) are: to preserve and enhance the fringe saltmarsh marshland and mudflats towards the southern end of the pond together with the flora and fauna in general by positive control of water levels; preserve the Tentacled Lagoon Worm, by ensuring the right brackish conditions found in saline lagoon habitat; some of the time, maintain water levels for aesthetic purposes within the vicinity of the bridge; protect people and property from flooding; and prevent adverse silting of the pond.

Returning the pond to tidal estuary with inter tidal mud flats in the long term would offer an opportunity to maintain the interests of the adjacent Solent and Southampton Water SPA. It is a clear aspiration of Natural England, Isle of Wight Council and the Environment Agency to return the Mill Pond to estuarine conditions, however there are a number of constraints to this including the potential effect on velocities and geomorphology downstream of the bridge, the visual effect of low tide conditions upstream of the bridge and the concerns of local businesses. This SMP supports this gradual planned adaptation through a policy of managed realignment for the sluices and the Millpond, with the following intentions. The important road link should be maintained (via defence or bridge). In the short term, Briddlesford Copse SSSI (upstream of the Mill Pond) depends on maintaining a minimum of saline conditions and management proposes a water level regime which delivers the minimum saline requirements to Briddlesford Copse SSSI, also designated as a SAC for its provision of habitat for Bechstein's bat; further WLMP objectives are provided above. It is not anticipated that the policy would result in any adverse effects on the SSSI. The intention of management in the medium term is to move towards a more 'natural system' within the practicalities of the structure manipulation and local management constraints. This needs to be gradual change, increasing the salinity level at the upper reaches of the Mill pond to help redevelop the transitional habitats on these upper reaches near to Blackbridge Brook. However these changes in salinity may affect the woodland and this will need to be investigated. In the long term, the aspiration is to re-instate tidal conditions, although this will need careful consideration of whether reducing management would impact upon erosion, damage to property or cause foam downstream in the medium to long term.

Ryde to Seagrove Bay

The final section of coast within this zone is the main frontage between Ryde extending through to Seagrove Bay. The large scale of damages arising from the No Active Intervention scenario along this section would be unacceptable, having significant regional consequences. The key features of management in this area are associated with maintaining the transport links to the mainland and the economically important use of the foreshore and backshore width. This would provide protection from erosion to the properties along the frontage behind. In the past this has achieved through sea defences and groynes alongside minor amenity maintenance of the upper beach. With anticipated sea level rise, there is likely to be increased pressure on maintaining the present defences. Alongside seawall maintenance or improvement, typically, the response to increased water levels and potential increased wave energy would be to consider recharge (moving towards recharge or recycling as a defence function alongside amenity value) and increasing the length and height of control structures. Other options would be to construct offshore breakwaters to hold the existing line. These actions would potentially impact on the internationally important nature conservation value of the Ryde Sands area. It is difficult to fully state the influence Ryde Sands has on the long term management of this area, even through it is currently a large accretion zone. The concern, however, is anticipated to be how the accumulated sand would adapt to sea level rise rather than as to whether the sands would be lost in their entirety.

Although the policy advice will be updated as better information becomes available through climate change research, this does suggests that in the future there may be a need to re-examine how the use and defence of the frontage is sustained, both in terms of engineering and possibly funding. The attitude of the Isle of Wight Council has been to carefully examine, through development of such documents as the North East Coastal Defence Strategy, how best use can be made of its shoreline while maintaining existing overall values.

Overall, the recommendations from the SMP2 for the Ryde to Seagrove Bay frontage would be for Hold the Line over the three epochs in all areas. The intent for management from is to maintain protection through hard engineering and sediment movement control, thereby sustaining the essential recreational, amenity and access benefits along with defence of important infrastructure and properties. The SMP, however, recognises the possible difficulties in terms of the potential increased effort required to maintain the existing practice of sea defences and groynes in the long term and access through or alongside a raised defence line. As such, a potential policy within possibly the third epoch could be to advance the line. This approach would intend to constrain sediment drift so as to retain areas of beach between areas of reclamation. This possible policy would need to be taken forward in partnership within a strong integrated framework for development of the whole frontage. Furthermore, this framework would need to define acceptable influence or mitigation with respect to maintaining underlying coastal processes and management of the adjacent areas of coast, and would be constrained by the nature conservation interest of the area.

Within this area, the Appley and Puckpool section of this frontage requires further explanation. Here the Strategy raised the possibility of reducing management following the end of the life of the current defences, based on the economic or technical viability of maintaining defences in the longer term. However, there are additional factors of importance in this decision. Erosion will result in the loss of the trunk sewer and threaten the important and newly-renovated Sewage Treatment Works serving Ryde, located in Appley Park. Alongside the popularity of amenity use of the seawall promenade as part of the continuous defence line to the east and west, the SMP supports maintaining this section of defences in the long term. This will maintain the overall coastal alignment and avoid localised slope failure and erosion cutting back behind or undermining the neighbouring sections of seawall.

PDZ2
Management Area Statements

- **Old Castle Point to Woodside (MA 2A)** includes two policy units.
- **Wootton Creek and Quarr (MA 2B)** includes three policy units.
- **Ryde to Seagrove Bay (MA 2C)** includes four policy units.

Within these areas a summary of policy is provided below. Management Areas statements are provided in the following sheets, with maps showing each area.

Location reference	**Old Castle Point to Woodside**
Management Area reference	**MA 2A**
Policy Development Zone	**PDZ 2**

The following descriptions are provided to assist interpretation of the maps shown of each Management Area.

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical rates and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change, these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan, reference should be made to the baseline data (see Appendix C3).

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

In some areas the preferred policy does not change from that under the existing management approach. In some areas where there are hard defences this can be accurately identified. In other areas there is greater uncertainty. Even so, where the shoreline is likely to be quite clearly defined by a change such as the crest of a cliff the estimated position is shown as a single line.

- Where there is a difference between With Present Management and the Preferred Policy this distinction is made in showing two different lines:

With Present Management.
Preferred Policy.

- In some areas, the Preferred Policy either promotes a more adaptive approach to management or recognises that the shoreline is better considered as a width rather than a narrow line. This is represented on the map by a broader zone of management:

Flood Risk Zones:
All flood risk zones are based upon the current tidal EA Flood Zone 2. This is an extreme flood event (1:1000 year at current levels) meaning that it has 0.1% chance of occurring each year.

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

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

Note: This Management Area corresponds to IW2 to IW4 in selected Appendices.


Policy Development Zone 2 - Ryde and the North-east Coastline
Management Area 2A - East Cowes to Wootton (Ch 22 to 29)
Key
Policy Development Zone boundary
Management Area boundary
Policy Unit boundary
Existing Coastline and Chainage (km)
Scheduled Monument
N
Cowes
Gurnard
East Cowes
Fishbourne
Ryde
Springvale
Seaview
Seagrove
Yarmouth
Newtown
Wootton Creek
St Helens
Colwell
Newport
Brading
Totland
Freshwater
Yaverland
Brook
Brighstone
Sandown
Wroxall
Shanklin
Ventnor
Bonchurch
23
24
25
26
27
28
29
30
33
East Cowes
EAST COWES CP
Whippingham
MA2A
PU2A.1
PU2A.2
This map is based on Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. 100019229 2010.
0
0.5
1 Kilometres
Key
100 Year Shoreline Position:
Preferred Policy would be the same as With Present Management
With Present Management where this differs from the Preferred Policy
Preferred Policy where this differs from the With Present Management
Indicative shoreline zone under Preferred Policy
Existing Indicative EA Flood Risk Zone 2
EA Flood Risk Zone 2 where SMP policy is for continued management of defence
EA Flood Risk Zone 2 where under SMP policy there would be increased probability of flooding
ROYAL HASKONING
ISLE of WIGHT COUNCIL

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN:

The overriding intent of the plan is to maintain the important nature conservation, geological and exceptional landscape quality of the area. The policy for the frontage is for No Active Intervention. At Woodside, a number of properties are at risk from coastal retreat over 100 years and it is reasonable that short term maintenance of the existing defences continue (NAI would not preclude this) but in the longer term with increased sea level rise and erosion, it becomes unsustainable to do so. The area is unlikely to qualify for national funding of coastal defences, particularly as the majority of the coast is undefended, therefore adaptation to coastal change should be anticipated.

PREFERRED POLICY TO IMPLEMENT PLAN:	
From present day	No Active Intervention
Medium term	No Active Intervention
Long term	No Active Intervention

SUMMARY OF SPECIFIC POLICIES

Policy Unit (& length)		**Policy Plan**			
		to 2025	**to 2055**	**to 2105**	**Comment**
PU2A.1	**Osborne Bay** (5,240m)	NAI	NAI	NAI	
PU2A.2	**Woodside** (1,297m)	NAI	NAI	NAI	
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention MR – Managed Realignment					

CHANGES FROM PRESENT MANAGEMENT

No change.

IMPLICATION WITH RESPECT TO BUILT ENVIRONMENT

Economics		**by 2025**	**by 2055**	**by 2105**	**Total £k PV**
Property	Potential NAI Damages/ Cost £k PV	772	193	152	1,117
	Preferred Plan Damages £k PV	772	193	152	1,117
	Benefits £k PV	-	-	-	-
	Costs of Implementing plan £k PV	0	0	0	0

The economic viability of the preferred plan for this management area is not applicable since the benefits and costs of implementation are both zero. There will be no need to justify any flood and coastal erosion risk management expenditure.

Location reference	**Wootton Creek and Quarr**
Management Area reference	**MA 2B**
Policy Development Zone	**PDZ 2**

The following descriptions are provided to assist interpretation of the maps shown of each Management Area.

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical rates and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change, these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan, reference should be made to the baseline data (see Appendix C3).

100 year shoreline position:

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

In some areas the preferred policy does not change from that under the existing management approach. In some areas where there are hard defences this can be accurately identified. In other areas there is greater uncertainty. Even so, where the shoreline is likely to be quite clearly defined by a change such as the crest of a cliff the estimated position is shown as a single line.

- Where there is a difference between With Present Management and the Preferred Policy this distinction is made in showing two different lines:

With Present Management.
Preferred Policy.

- In some areas, the Preferred Policy either promotes a more adaptive approach to management or recognises that the shoreline is better considered as a width rather than a narrow line. This is represented on the map by a broader zone of management:

Flood Risk Zones:

All flood risk zones are based upon the current tidal EA Flood Zone 2. This is an extreme flood event (1:1000 year at current levels) meaning that it has 0.1% chance of occurring each year.

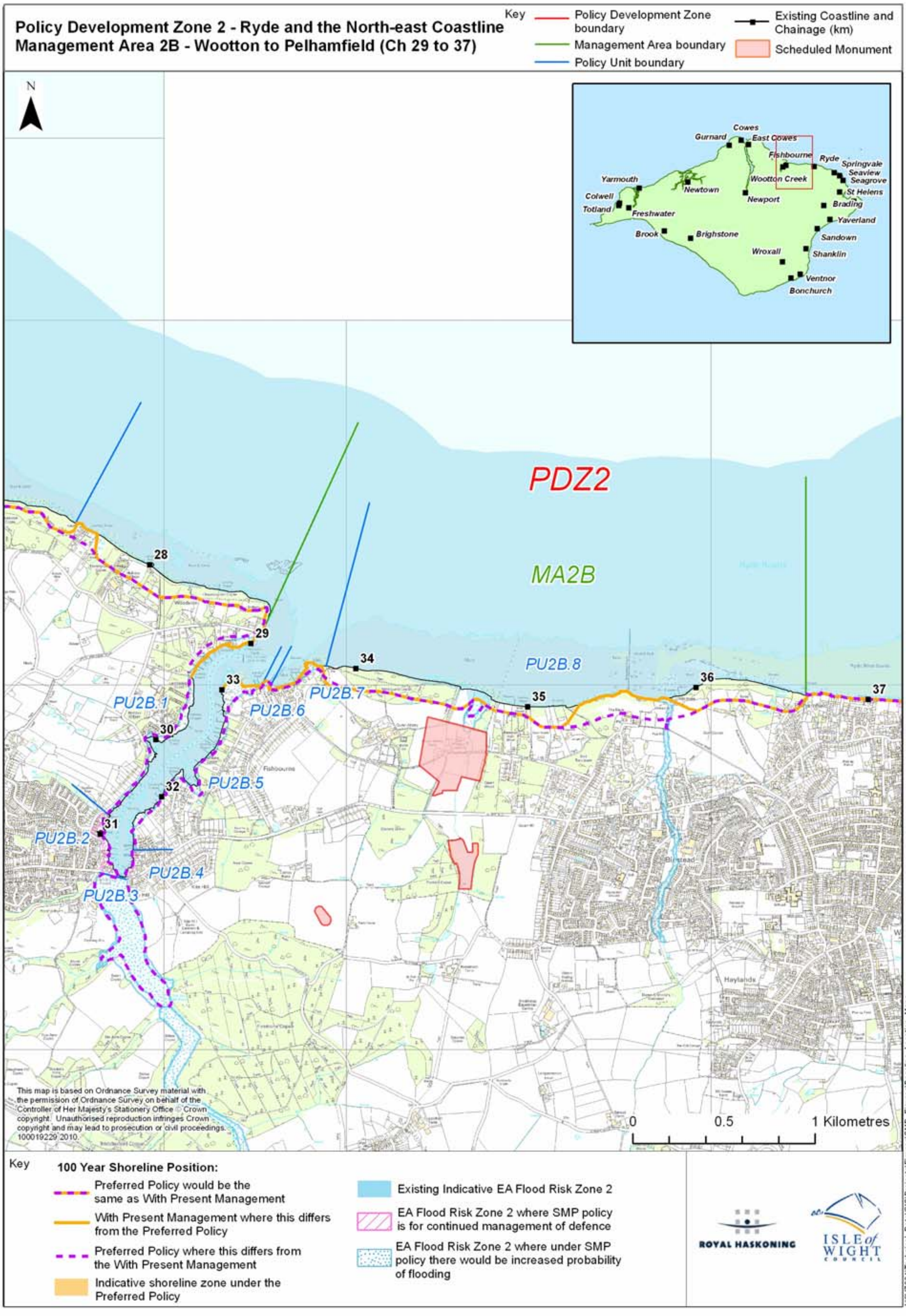
General Flood Risk Zones. The explanation of these zones is provided on the Environment Agency's web site www.environment-agency.gov.uk. The maps within this SMP document show where SMP policy might influence the management of flood risk.

Indicate areas where the intent of the SMP policy is to continue to manage this risk.

Indicate where over the 100 years the policy would allow increased risk of flooding.

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

Note: This Management Area corresponds to IW5 and IW6 in selected Appendices.



Policy Development Zone 2 - Ryde and the North-east Coastline
Management Area 2B - Wootton to Pelhamfield (Ch 29 to 37)
Key
Policy Development Zone boundary
Management Area boundary
Policy Unit boundary
Existing Coastline and Chainage (km)
Scheduled Monument
PDZ2
MA2B
PU2B.1
PU2B.2
PU2B.3
PU2B.4
PU2B.5
PU2B.6
PU2B.7
PU2B.8
28
29
30
31
32
33
34
35
36
37
Cowes
East Cowes
Gurnard
Fishbourne
Ryde
Springvale
Seaview
Seagrove
St Helens
Bading
Yaverland
Sandown
Shanklin
Ventnor
Bonchurch
Wroxall
Brighstone
Brook
Freshwater
Totland
Colwell
Yarmouth
Newtown
Newport
Wootton Creek
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0
0.5
1 Kilometres
Key
100 Year Shoreline Position:
Preferred Policy would be the same as With Present Management
With Present Management where this differs from the Preferred Policy
Preferred Policy where this differs from the With Present Management
Indicative shoreline zone under the Preferred Policy
Existing Indicative EA Flood Risk Zone 2
EA Flood Risk Zone 2 where SMP policy is for continued management of defence
EA Flood Risk Zone 2 where under SMP policy there would be increased probability of flooding
ROYAL HASKONING
ISLE of WIGHT COUNCIL

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN:

This area includes the Fishbourne Ferry Terminal and the communities of Wootton, Wootton Bridge and Fishbourne. Along the western and eastern banks inside Wootton Creek the majority of properties are not in the flood risk zone, which provides opportunities for the coast to function in line with natural processes. Policies of NAI along these frontages will not preclude maintenance of existing private defences, often providing waterside access. Along the southern section of the Creek, properties are at flood risk and there is a management intent to protect the community where economically viable to do so and to maintain the road link from Newport to Ryde at Wootton Bridge. There is also the intent to gradually adapt the sluice at the Old Mill Pond to allow greater saline intrusion, which supports the nature conservation interest of the area.

At the mouth of the Creek at the Fishbourne Ferry Terminal and the area to the east the intent is to hold the line and protect the mouth of the estuary from coastal erosion and retreat, allowing maintenance of the existing public and private defences where economic to do so, securing the location of the ferry terminal. In the third epoch we recommend looking at opportunities to realign the coast to the east of the terminal to adapt to the ongoing coastal erosion processes. This would provide an ideal transitional zone into Quarr and Binstead where the proposed policy is to not undertake any management along this undefended frontage, fully supporting the nature conservation interests. The principal aim over the whole area is to maintain the important regional and national economic viability of the area. As such the policy throughout the area is to continue to defend the key built and recreational assets, but to allow and encourage natural adaptation to sea level rise along the remainder of the coast and estuary.

PREFERRED POLICY TO IMPLEMENT PLAN:	
From present day	Maintain existing defences but encourage Wootton Creek residents to adapt their private defences and gradually remove the influence of management. Continue NAI on the Quarr shoreline.
Medium term	Maintain and raise existing defences, but working locally to allow scope of some readjustment of defences.
Long term	Maintain and raise existing defences, but working locally to allow scope of some readjustment of defences.

SUMMARY OF SPECIFIC POLICIES

Policy Unit (& length)		**Policy Plan**			
		to 2025	**to 2055**	**to 2105**	**Comment**
PU2B.1	**Western Wootton Creek** (1,911m)	NAI	NAI	NAI	Built properties are generally set back from the shoreline and not in the risk zone, and therefore adaptation to gradual change is encouraged. The SMP recognises the numerous privately managed structures along the shoreline of the Creek, fronting the narrow individual properties and gardens; NAI would not preclude the continuation of existing privately funded, low-key defences sympathetic to the landscape and of low ecological impact, potentially including filling-in short gaps in the current structures, subject to normal approvals and site specific circumstances. This intention will be further defined in a multi-agency advisory note in 2011
PU2B.2	**South-west Wootton Creek** (550m)	HTL	HTL	HTL	Continue defence to properties from flood risk by HTL with private and public defences.
PU2B.3	**Old Mill Pond** (upstream of Wootton bridge)	MR	MR	MR	Undertake no specific defence within the Mill Pond and accept gradual increased saline intrusion. Continue to maintain use of the road.
PU2B.4	**South-east Wootton Creek** (200m)	HTL	HTL	HTL	Continue defence to properties from flood risk by HTL with private and public defences.

PU2B.5	**Eastern Wootton Creek** (1,738m)	NAI	NAI	NAI	Built properties are generally set back from the shoreline and not in the risk zone, and therefore adaptation to gradual change is encouraged. The SMP recognises the numerous privately managed structures along the shoreline of the Creek, fronting the narrow individual properties and gardens; NAI would not preclude the continuation of existing privately funded, low-key defences sympathetic to the landscape and of low ecological impact, potentially including filling-in short gaps in the current structures, subject to normal approvals and site specific circumstances. This intention will be further defined in a multi-agency advisory note in 2011.
PU2B.6	**Fishbourne Ferry Terminal** (135m)	HTL	HTL	HTL	HTL with private defences.
PU2B.7	**Outer Eastern Creek** (397m)	HTL	HTL	MR	Continue defence to properties by HTL with private and public defences; Assist protection of the ferry terminal at the mouth of Wootton Creek; Gradually realigning in the third epoch.
PU2B.8	**Quarr and Binstead** (2,805m)	NAI	NAI	NAI	
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention MR – Managed Realignment					

CHANGES FROM PRESENT MANAGEMENT

There are key changes along Wootton Creek where the previous Strategy proposed to hold the line. We have suggested a management intent to protect the key areas; but wherever possible allow the estuary to function naturally (specifically where there is no risk to properties).

IMPLICATION WITH RESPECT TO BUILT ENVIRONMENT

Economics		**by 2025**	**by 2055**	**by 2105**	**Total £k PV**
Property	Potential NAI Damages/ Cost £k PV	11,512	14,878	15,611	42,001
	Preferred Plan Damages £k PV	1,830	2,226	994	5,050
	Benefits £k PV	9,682	12,652	14,617	36,951
	Costs of Implementing plan £k PV	633	284	356	1,272

The preferred plan for this Management Area is economically viable overall. Individual schemes will need to be investigated in further detail to assess their economic viability and affordability.

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Location reference	**Ryde to Seagrove Bay**
Management Area reference	**MA 2C**
Policy Development Zone	**PDZ 2**

The following descriptions are provided to assist interpretation of the maps shown of each Management Area.

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical rates and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change, these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan, reference should be made to the baseline data (see Appendix C3).

100 year shoreline position:

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

In some areas the preferred policy does not change from that under the existing management approach. In some areas where there are hard defences this can be accurately identified. In other areas there is greater uncertainty. Even so, where the shoreline is likely to be quite clearly defined by a change such as the crest of a cliff the estimated position is shown as a single line.

- Where there is a difference between With Present Management and the Preferred Policy this distinction is made in showing two different lines:

With Present Management.
Preferred Policy.

- In some areas, the Preferred Policy either promotes a more adaptive approach to management or recognises that the shoreline is better considered as a width rather than a narrow line. This is represented on the map by a broader zone of management:

Flood Risk Zones:

All flood risk zones are based upon the current tidal EA Flood Zone 2. This is an extreme flood event (1:1000 year at current levels) meaning that it has 0.1% chance of occurring each year.

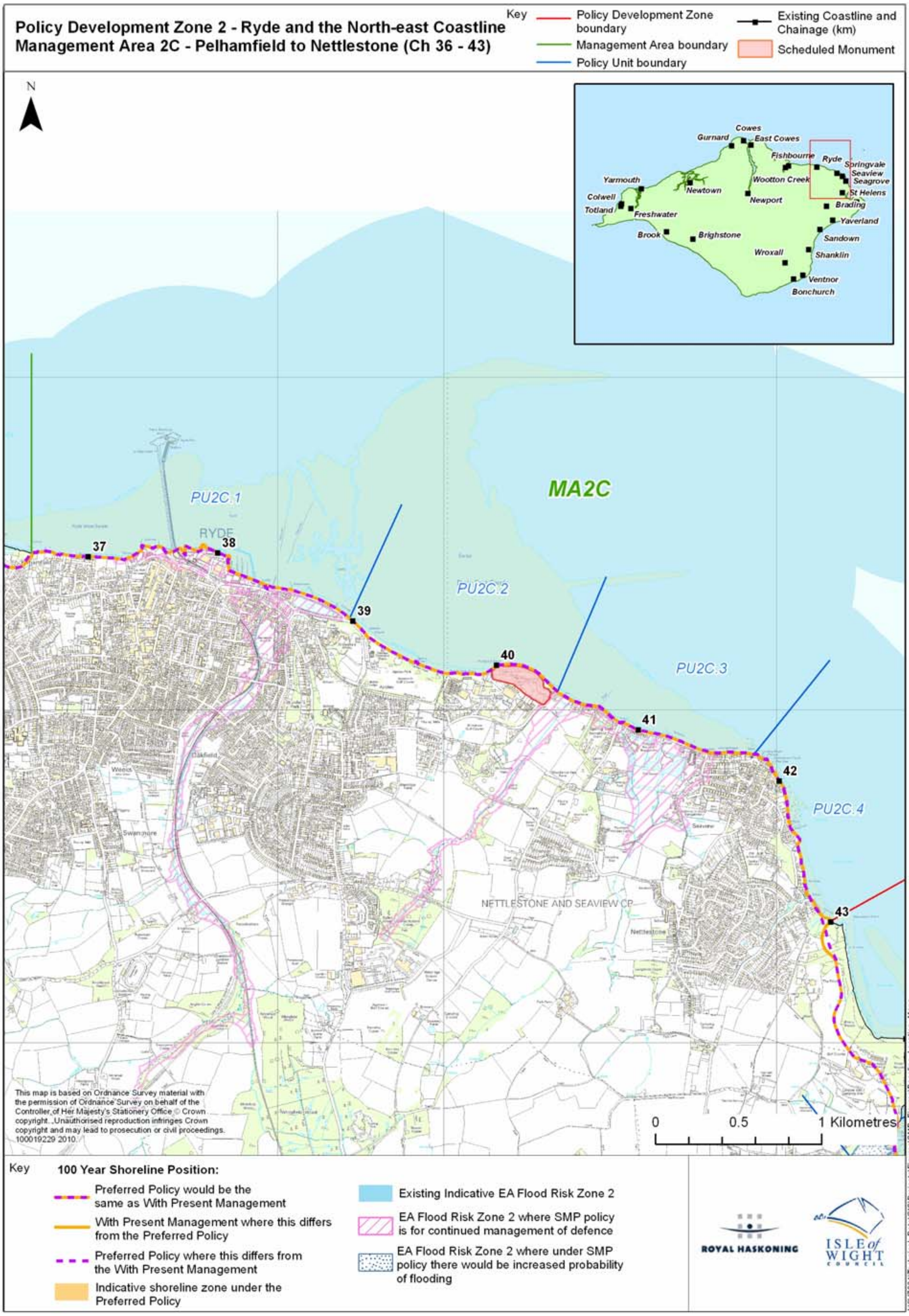
General Flood Risk Zones. The explanation of these zones is provided on the Environment Agency's web site www.environment-agency.gov.uk. The maps within this SMP document show where SMP policy might influence the management of flood risk.

Indicate areas where the intent of the SMP policy is to continue to manage this risk.

Indicate where over the 100 years the policy would allow increased risk of flooding.

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

Note: This Management Area corresponds to IW7 to IW12 in selected Appendices


Policy Development Zone 2 - Ryde and the North-east Coastline
Management Area 2C - Pelhamfield to Nettlestone (Ch 36 - 43)
Key
Policy Development Zone boundary
Management Area boundary
Policy Unit boundary
Existing Coastline and Chainage (km)
Scheduled Monument
Cowes
Gurnard
East Cowes
Fishbourne
Ryde
Springvale
Seaview
Seagrove
St Helens
Brading
Yaverland
Sandown
Shanklin
Ventnor
Bonchurch
Wroxall
Brighstone
Brook
Freshwater
Totland
Colwell
Yarmouth
Newtown
Wootton Creek
Newport
MA2C
PU2C.1
PU2C.2
PU2C.3
PU2C.4
RYDE
NETTLESTONE AND SEAVIEW CP
37
38
39
40
41
42
43
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0
0.5
1 Kilometres
Key
100 Year Shoreline Position:
Preferred Policy would be the same as With Present Management
With Present Management where this differs from the Preferred Policy
Preferred Policy where this differs from the With Present Management
Indicative shoreline zone under the Preferred Policy
Existing Indicative EA Flood Risk Zone 2
EA Flood Risk Zone 2 where SMP policy is for continued management of defence
EA Flood Risk Zone 2 where under SMP policy there would be increased probability of flooding
ROYAL HASKONING
ISLE of WIGHT COUNCIL

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN:

This area includes the core residential, commercial and heritage centre of Ryde and the surrounding communities. The principal aim over the whole area is to maintain the important regional and national economic viability of the area, including transport links. As such the policy throughout the area is to continue to defend the built and recreational assets. However, this has to recognise the important landscape setting of the town and seafront and the important conservation value of the coast. Also there are important broader issues in this section due to the potential squeeze of habitats and the inability for the shoreline to respond to sea level rise without loss of important nature conservation interest.

The intent for management is to maintain protection through hard engineering and sediment movement control, thereby sustaining the essential recreational and amenity benefits along with defence of important infrastructure and properties along the coast. The SMP, however, recognises the possible difficulties in terms of the potential increased effort required to maintain the existing practice of sea defences and groynes in the long term and access through or alongside a raised defence line. Importantly, however, future defence requirements in this area depend on the evolution of the significant sediment sink of Ryde Sands as sea level rises. It is currently a large accretion zone, and contributes to the protection of the majority of the frontage. The future behaviour of the accumulated sands and drift supply will determine the amount of effort required to assist retention of sands in this management unit. In the east of the unit, at Seaview and Seagrove Bay, the intent of management is to allow continued protection of these communities from flooding and erosion and prevent erosion triggering slope reactivation.

While the need to defend the existing shoreline is well established, there needs to be an underlying aim to consider any opportunity, locally, to allow adjustment of the specific line or design of these defences. Specific areas that would need further consideration include Appley and Puckpool, and in the east of the area there may be smaller scale opportunity in the manner in which private defences are managed.

PREFERRED POLICY TO IMPLEMENT PLAN:	
From present day	Maintain existing defences.
Medium term	Maintain and raise existing defences, but working locally to allow scope of some readjustment of defences.
Long term	Maintain and raise existing defences, but working locally to allow scope of some readjustment of defences.

SUMMARY OF SPECIFIC POLICIES

Policy Unit (& length)		**Policy Plan**			
		to 2025	**to 2055**	**to 2105**	**Comment**
PU2C.1	**Ryde** (2,353m)	HTL	HTL	HTL	HTL by seawall encasement and revetment
PU2C.2	**Appley and Puckpool** (1,436m)	HTL	HTL	HTL	HTL subject to the economic and technical viability of the maintaining existing defences.
PU2C.3	**Springvale to Seaview (including the Duver)** (1,314m)	HTL	HTL	HTL	HTL with public and private defences, including HTL by seawall encasement and revetment.
PU2C.4	**Seagrove Bay** (1,252m)	HTL	HTL	HTL	HTL with public and private defences. Along the majority of frontage HTL by seawall encasement and revetment. Opportunity along the central section to investigate offshore breakwaters.
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention MR – Managed Realignment					

CHANGES FROM PRESENT MANAGEMENT

No significant change to the 'hold the line' intent of previous management of the area, although the SMP supports maintaining the existing defence alignment at Appley and Puckpool in the medium to long term due to the risk to important sewerage assets for Ryde and amenity value of the continuous promenade link.

IMPLICATION WITH RESPECT TO BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	62,628	74,683	71,423	208,734
	Preferred Plan Damages £k PV	2,297	2,512	2,123	6,932
	Benefits £k PV	60,331	72,171	69,300	201,802
	Costs of Implementing plan £k PV	598	913	3,228	4,739

The preferred plan for this Management Area is clearly economically viable overall. Individual schemes will need to be investigated in further detail to assess their economic viability and affordability.

4.4 Policy Development Zone 3 - Bembridge and Sandown Bay (PDZ3)

Left to right: Sandown Bay from Culver Down, Sandown seafront, Bembridge Harbour (© Isle of Wight Council)

4.4 Policy Development Zone 3 - Bembridge and Sandown Bay (PDZ3)

Contents

Key facts:

Policy Development Zone 3: includes the communities of St. Helens, Bembridge, Forelands, Whitecliff Bay, Yaverland, Sandown, Lake, Shanklin and Luccombe.

PDZ3 frontage = approximately. 23km in length (including Bembridge Harbour)

PDZ3 boundaries = from Horestone Point (Nettlestone) to Luccombe.

As listed in SMP2 Appendices: areas IW13 to IW19

Old policies from SMP1 in 1997, reviewed in this chapter:

Unit	**Location**	**Length**	**Policy**
RYD9	Horestone Point to St Helens Tower	1526m	Retreat the existing defence line
RYD10	The Duver, St Helens	790m	Hold the existing defence line
RYD 11	Bembridge Harbour	3064m	Hold the existing defence line
RYD12	Bembridge Point to Foreland Fields	2960m	Hold the existing defence line
RYD13	Foreland Fields to Culver Cliff	2448m	Do nothing
SAN1	Culver Cliff	1740m	Do nothing
SAN2	Culver Cliff to Yaverland	1248m	Do nothing
SAN3	Yaverland	540m	Hold the existing defence line
SAN4	Sandown Zoo to Fort Street, Sandown	500m	Hold the existing defence line
SAN5	Fort Street to Ferncliff Road, Sandown	1061m	Hold the existing defence line
SAN6	Ferncliff Road to Hope Beach	2170m	Hold the existing defence line
SAN7	Hope Beach to Shanklin Chine	1195m	Hold the existing defence line
SAN8	Shanklin Chine to Horse Ledge	896m	Hold the existing defence line

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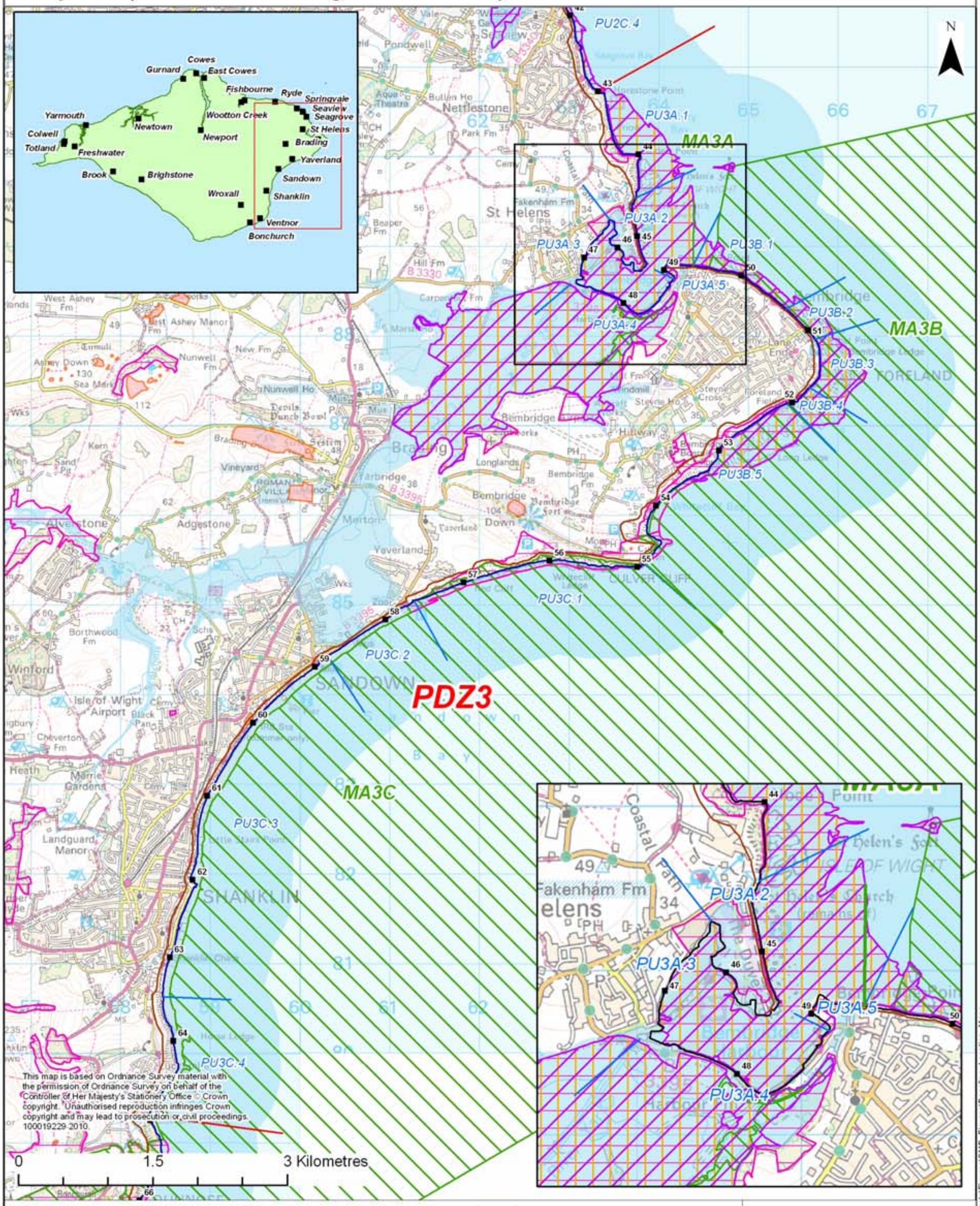
Shoreline Management Plan Sub Cell 5D + E - Isle of Wight
Baseline Location Map
Policy Development Zone 3 - Bembridge and Sandown Bay



1. Overview & Description

1.1 Principal Features (further details are provided in Appendix D)

Built Environment:

The East Wight headland includes the seafront or harbourside communities of Bembridge, St. Helens, Forelands and Whitecliff Bay. The coastal villages are generally characterised by historic buildings, narrow streets, detached cliff top properties and estates above generally gently sloping coastlines. At Bembridge is the RNLI Lifeboat station pier, extending over the Bembridge limestone ledges. There are scattered hotels and holiday parks.

To the south (and separated by the 104m high distinctive Chalk headland of Culver Cliff) is the long sweep of Sandown Bay with seafront and cliff-top communities at Yaverland, Sandown, Lake, Shanklin and Luccombe. The built environment in Sandown Bay is predominately Victorian and reflects the typical characteristics of a British seaside holiday resort, with esplanades, seafront and cliff top hotels, beach huts, wide sandy beaches and a multitude of seafront concessions and small businesses. Footpaths follow the 40m high cliff top and cliff foot, and a series of access steps and a cliff lift at Shanklin provide additional access to the promenade and seafront.

The two frontages along this PDZ are intrinsically linked by the low-lying fluvial (and potential tidal) floodplain of the East Yar valley. This covers the area from behind the sea defences on Culver Parade in Sandown through past Brading to an outlet through Embankment Road into Bembridge Harbour. If the defences fail at either end of the floodplain, areas of Sandown, Brading and St. Helens will be at risk from tidal flooding events (particularly in combination with fluvial flooding). Potentially, in the long term, all key access routes across the valley floor to the communities of Bembridge and Forelands will be affected by breaches or increasingly regular tidal inundation.

Local roads run the length of Sandown seafront, Shanklin esplanade and also provide access to seafront properties at a number of points in east Wight. Also lying within the Eastern Yar valley behind the defences at Sandown Bay is the Southern Water waste water treatment works for the Isle of Wight.

Heritage and Amenity:

Heritage:

This PDZ encompasses a variety of sites, finds and palaeoenvironmental deposits documenting human and environmental history, with 320 monument records and 3 scheduled monuments (SMs). The most prolific Palaeolithic site on the Island is on the cliff top at Priory Bay and preliminary investigations suggest that it is potentially of national importance. Other Palaeolithic finds related to the Bembridge Raised Beach deposits are eroding from the cliffs between Forelands Point and Whitecliff Bay. The East Yar valley preserves palaeoenvironmental deposits. The marsh between Yaverland and Bembridge has been progressively reclaimed. A wall is believed to have existed at Yaverland since the 1200's, a major reclamation to "Great and Little Sluice" in the 1500's and the present reclamation to the sluice between Bembridge and St Helens when the railway was built in the late 1800's. As the coastline rises up to the Chalk headland, there is much evidence of Bronze Age Activity, including a Barrow which is a Scheduled Monument (SM) at the top of Culver Cliff. Along the cliff line at Culver moving toward Yaverland pre-historic and Roman occupation and salt-making has been identified. Military defences become a predominant historical feature from Culver Cliff south to Shanklin, with abundant military marker stones. Of significance are St Helens Fort, Yaverland Battery and Sandown Barrack Battery, all SMs and two air wreck sites in the marine zone. The built environment contains 21 Grade II listed buildings and 4 conservation areas as well as three items of the local list of sites of Historic Interest. Offshore 44 shipwrecks have been recorded.

Amenity:

The amenity value of the PDZ is vital to the local economy which relies on recreational and tourism use by both residents and visitors.

The east Wight headland is less developed with quieter beaches, small cafes and beach huts with access through footpaths, limited local roads and car parks. Bembridge Harbour is significant for its recreational moorings and marine businesses. There are two holiday camps located between Forelands and Whitecliff Bay. Culver Down headland is popular with walkers for its beautiful views and natural environment. A small pub and café are located near the end of the ridge. Within Sandown Bay the frontage rapidly changes to a developed and popular tourist destination with large Victorian hotels and residences. Both Sandown and Shanklin are Blue Flag beaches and are widely used by swimmers, recreational fishermen and watersports enthusiasts. There are two sailing clubs, one at either end of the bay, and many hotels, pubs, nightclubs, amusements and a popular promenade seawall that runs continuously from Yaverland south to Shanklin Chine (approximately. 5km). Sandown Pier houses amusements and funfair rides and provides access to views of the coast and seascape. Landscape provides an important aspect of the recreational and tourism values, with coastal headlands and coastal cliffs flanking the towns and villages.
Nature Conservation: There are a variety of coastal habitats within this PDZ from intertidal rocky shores to long stretches of sandy beaches. The frontage along Priory Bay consists of rocky shores, whilst the Bembridge Harbour mouth is two sand and shingle spits backed by sand dunes. Within the harbour and beyond (up the flood plain of the River Yar to Brading) are a variety of habitats, including vegetated shingle, saltmarsh, mudflats, saline lagoons and reedbeds. This area supports large numbers of over wintering wildfowl and waders. Bembridge Point to Whitecliff Bay comprises diverse Chalk and limestone rocky intertidal ledges, with a number of large lagoons supporting seagrass beds, kelps and red algae communities. The eroding maritime cliffs from Bembridge to Yaverland are of geological importance for their exposed rock sequences and range of species they support. The coastline from Yaverland to Luccombe Chine comprises protected sandy beaches, with the subtidal clay exposures and mudstone reefs that support faunal turf communities. The coastline sits within two internationally designated sites that cover the entire length of the coastline, as well as a third area inland within Bembridge Harbour. Within this PDZ, the most easterly extent of the Solent and Southampton Water Ramsar and SPA runs from Horestone Point to the middle of Whitecliff Bay. Within Bembridge Harbour there is also the Solent and Isle of Wight Lagoons SAC, which is designated for it coastal lagoons which are regarded as a priority feature. The designated SPA and Ramsar area includes Bembridge Harbour and Brading Marshes that sit within the flood zone of the River Yar up to Brading. There are two component SSSI's for the SPA within the PDZ. The first is Brading Marshes to St Helens Ledges SSSI that protects a wide range of coastal habitats, including Biodiversity Action Plan (BAP) priority habitats, and which support important bird species. The habitats include boulder and cobble shores, seagrass beds, intertidal mudflats, saltmarsh, reedbeds, saline lagoons and coastal grazing marsh, and include areas for high tide roosts. Whitecliff Bay and Bembridge Ledges SSSI protects BAP priority habitats including rocky shores, seagrass beds, intertidal Chalk maritime cliffs and slopes and calcareous grassland. In addition there are two other coastal SSSI's within the PDZ that do not comprise part of the SPA. The first is Bembridge School and Cliffs SSSI, which sits above Whitecliff Bay, and is of geological importance for quaternary succession. The second is Bembridge Down SSSI, which runs from Culver Down along Whitecliff Ledge to near Sandown Zoo, and which is designated for the biological importance of the soft Chalk cliffs, grassland, vegetated shingle and boulder and cobble shores, as well as the geological interest features of the Wealden Group. The second international designation within PDZ 3 is the South Wight Maritime SAC, which covers much of this PDZ, since it begins at Bembridge Point and runs round the south side of the Island to Hatherwood Point north of the Needles in PDZ 6 (covering an area of 19,863ha). The SAC covers both the coastline and subtidal areas offshore, and include Annex 1 habitats such as reefs, vegetated sea cliffs and submerged and partially submerged sea caves.

1.2 Key Values

Residential communities are present along much of the coastline and rely heavily on the tourism industry and amenity infrastructure, especially in Sandown Bay. The natural environment is a key driver in terms of the open and evolving coastal cliffs at Whitecliff Bay, Culver and Luccombe, the ledges at Bembridge, and also the internationally important habitats of the Eastern Yar Valley and around Bembridge Harbour.

The character of the area can be considered in three sections. The character of the northern section the character is distinctly rural with the communities of Bembridge and those surrounding Bembridge Harbour and the Eastern Yar Valley. The central section comprises Culver Cliff, Bembridge Down and the adjacent Whitecliff Bay and the northern section of Sandown Bay. The southern section comprises the seafront of Sandown.

In the northern section, while there is significant local development and important local commercial activity associated with the harbour, the key driver is seen as to maintain the essential rural characteristics. An essential part of this is maintaining and enhancing the high nature conservation status of the area. Local but strategic transport routes are an important value to the East Wight communities. The principal driver for the central section of the frontage is its natural landscape, although locally there is significant Heritage value associated with the area. Sandown, in contrast to the rest of PDZ area is an important developed economic hub for the Isle of Wight, with essential economic infrastructure based significantly upon tourism. This tourism is based principally around its coastal use, the important access to and use of the beach, supporting and supported by the promenade and seafront development. These key drivers for management are summarised by the large scale objectives outlined below.

At the local scale, particularly with respect to the northern section, there is important recreational and tourism use of the shoreline around Bembridge Harbour and along the Bembridge sea front.

1.3 Objectives

Overarching objectives for PDZ3:

- To sustain and adapt important centres of economic activity including Sandown Bay.
- To sustain and adapt the communities of East Wight to reduce flood and erosion risks.
- To address the risk of tidal inundation of the Eastern Yar Valley and access to East Wight communities.
- To maintain important access along the seafront and shoreline use of the area.
- To maintain the habitat within Brading Marshes, in accordance with the Habitat Regulations (European designated freshwater habitat)
- To support opportunity for adaptation supporting and enhancing the nature conservation value of the area subject to natural processes.
- To maintain the important landscape.
- To sustain the historic landscape and environment where practical.

1.4 Description

PDZ3 is a mixed frontage of defended and undefended coastline with two distinctive areas that require a co-ordinated approach to shoreline management. The low-lying East Yar valley links the area surrounding Bembridge Harbour and the northern coastline of Sandown Bay. If the sea defences fail or breach at either side of the floodplain, the valley is at increasing risk of tidal flooding, putting at risk properties and businesses in Sandown, Brading, St. Helens and Bembridge and transforming the natural environment. The communities of Bembridge and Forelands are also accessed by transport links crossing this potential tidal floodplain.

Left: Erosion at Horestone Point undermining the wooded slopes, February 2009.

In the north of this area the relatively steep wooded coastal slopes at Horestone Point and Priory Bay are weak, often saturated and have potential for slope failure and reactivation triggered by coastal erosion. Horestone Point is eroding and in the longer term is expected to reduce as a headland. Coastal slope reactivation backing the quiet shore of Priory Bay will encroach back towards nearby hotel and holiday park assets above the bay.

Right: Bembridge Harbour looking towards the east Wight headland of Bembridge and Foreland.

At the mouth of Bembridge Harbour the two sand spits of St. Helens Duver and Bembridge Point provide localised areas of sediment accumulation and provide shelter from surface waves. The Duver is attached to the land at its northern end, with a small number of residential properties, car park, café and beach huts located on the seaward face of the spit along a promenade protected by a seawall (and groyne field). Some marine industry is located near the tip of the spit, linked by an access road. Bembridge Harbour is the remnant of a much larger Estuary truncated and drained in the 1880s, protected by Embankment Road. At low tide the harbour almost dries. Outside the harbour entrance the low-tide channel of the Eastern Yar extends north then east towards St. Helens Fort. The harbour is bordered by residential properties, houseboats, marinas and some marine industry.

Below: Cliff erosion near Foreland Point

Moving south, the Bembridge coastline is partially developed with residential properties generally set some distance back from the shoreline. At Bembridge Foreland there is a small width of recreational frontage, behind which exists denser tourist and residential accommodation. Around the headland the low cliff line is generally eroding, although ledges of relatively resistant Bembridge Limestone form wide shore platforms of up to 500m width at low tide, providing protection from high energy waves. From Foreland to Whitecliff Bay the cliffs rise in height and the coastline is largely undefended and naturally evolving, supplying quantities of sandy shoreline sediments downdrift to the north. Cliff recession rates are likely to increase as sea level rises, increasing the vulnerability of the cliff to wave attack. The coastal path runs along the cliff tops of this scenic bay of geological importance and a large holiday park and a number of chalets front the coastline. The shoreline of Whitecliff Bay is set back 300m from the resistant Chalk headland of Culver Cliff to the south, which will continue to be slowly eroded but is sufficiently large to continue to exert a major control on shoreline evolution to the north and south.

Left: View from Culver Down towards Yaverland and Sandown

The headland of eroding Chalk, sandstone and weak clay cliffs from Culver to Yaverland is of geological and environmental importance, and the retreating shoreline is already set back from the seawall to the south. There is a well developed sand beach and wide intertidal area in front of the eroding cliffs in this area.

To the south, the seawalls lining the frontage of Yaverland, Sandown and Shanklin provide protection along the whole length of the central part of the bay. At Yaverland the defended shoreline is approximately 10m in advance of the eroding cliff line to the north. The upper beach in this area is significantly less effective and is held in place by groynes. At Culver Parade the seawall acts as both coast protection and sea defence, protecting the natural barrier to the low lying area of the Eastern Yar valley bordering Sandown, Brading and Bembridge Harbour.

Below: Wave spray over the Culver Parade seawall near Dinosaur Isle museum, Sandown, October 2004.

If the Eastern Yar Valley is also breached at Bembridge Harbour, the interaction of the twin breaches would affect the long-term evolution of the system. This would be compounded by fluvial flooding and have serious consequences for access to the communities living on the eastern side of the inundated valley floodplain.

Right: Sandown seafront and pier.

The beach in front of Sandown, in the area of the Pier, is relatively wide with a drying upper beach along the frontage. The beach is held at its northern point by a short breakwater, separating the central beach from the much diminished beach to the north. This provides an important amenity feature of the frontage.

From Sandown to Shanklin continuous seawalls front steep sandstone cliffs protecting the continuous cliff-top development of the towns of Sandown, Lake and Shanklin. It also protects access paths and some cliff-foot businesses located on the seawall. This area is currently vulnerable to cliff-falls from the former seacliffs, which would fully reactivate and erode following deterioration and failure of the seawalls. The continuous seawall promenade and cliff top footpath are popular amenity routes.

Left: Lake cliffs and the seafront promenade linking Sandown and Shanklin.

At Shanklin, Hope Groyne plays an important role in controlling Shanklin Esplanade beach and road access. The coastline steps forward approximately 80m due to previous beach movement and then subsequent infill development (which includes the Southern Water pumping station and car parking adjacent to the groyne, which also protects the only access road cutting down through the cliffline to Shanklin Esplanade). The key industry in the area is tourism led by the long sandy beaches, amenity access and attractions, hotels and residential properties, and scenic coastal cliffs.

Moving south from Shanklin Esplanade towards Luccombe village there is a transition from defended to undefended coast. There is a row of cliff top development along this exposed frontage (rows of large properties and blocks of flats etc.), leading towards Luccombe village. Recession of the cliffs within this frontage will continue or accelerate as the cliffs are sensitive to winter rainfall with increasing potential for landslide reactivation in the south resulting from erosion as well as water in the ground.

1.5 Physical Processes

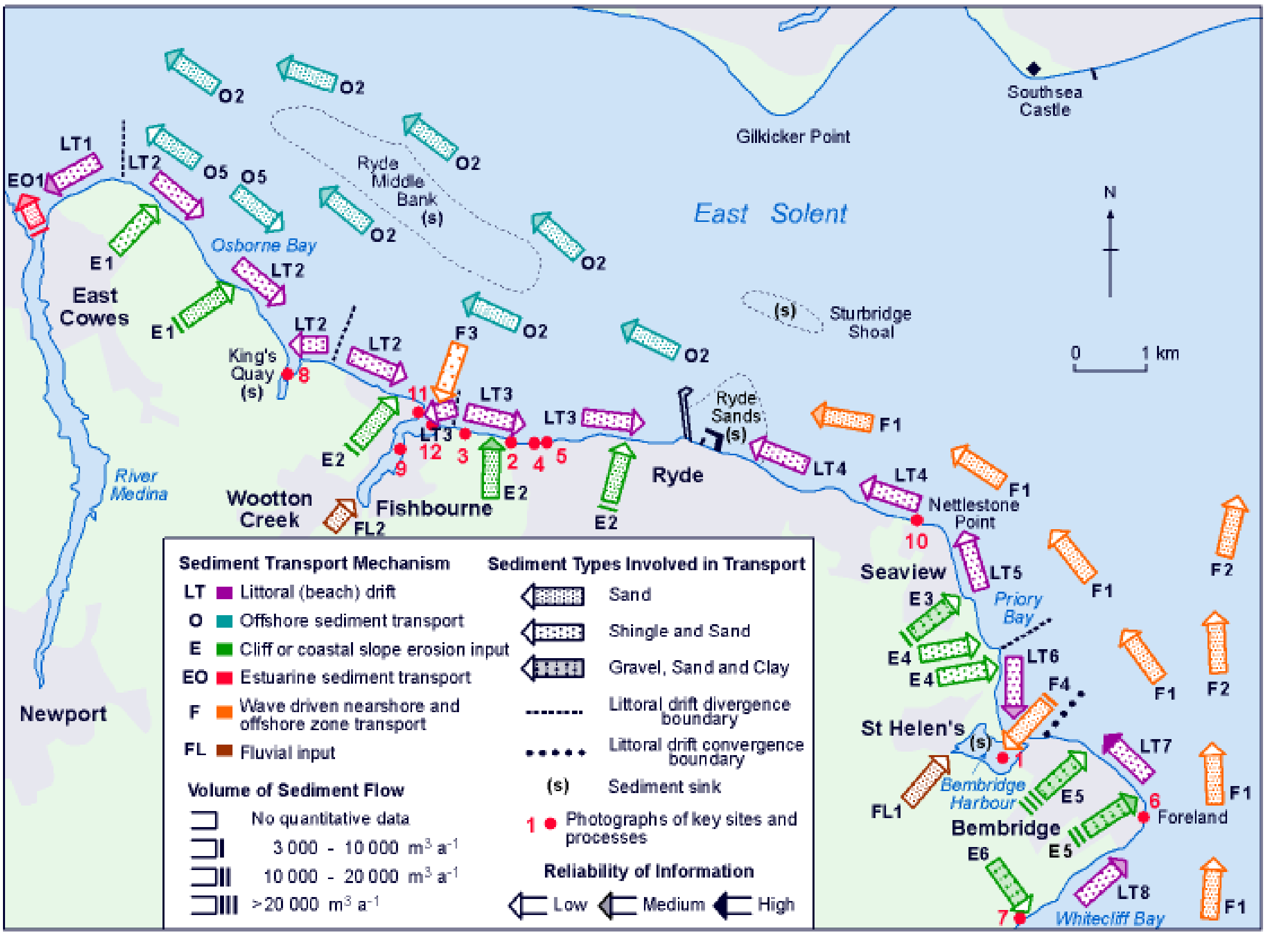
1.5.1 Coastal Processes (further details are provided in Appendix C1).

This PDZ includes the eastern headland of the Isle of Wight, the inlet of Bembridge Harbour and the broad sweep of south-east facing Sandown Bay. The low-lying reclaimed Eastern Yar valley links both coastlines inland of the headland. The following summary outlines the wave climate, tidal flows, geomorphological controls, sediment supplies and coastal processes characterising PDZ3.

1.5.1.1 Horestone Point to Culver Cliff including the Eastern Yar Valley

The north-east shore of the Isle of Wight coast forms the southern margin of the Eastern Solent. The general pattern is sediment movement is summarised in the following diagram from the SCOPAC Sediment transport study.

NE Isle of Wight (Old Castle Point to Culver Cliff: Sediment Transport Sources, Pathways and Sinks



Sediment transport sources, pathways and sinks on the north east coast, from SCOPAC Sediment Transport Study, 2004.

The coast is mostly low-lying, or only of moderate relief. The coast around the eastern tip of the Isle of Wight is open to waves generated in Hayling Bay and also diffracted waves from the English Channel. Wave energy is therefore moderate and approaches from a predominantly east or south-east direction. Offshore gradients are relatively gentle and the shoreline is generally not greatly affected by tidal currents. At the small inlet of Bembridge Harbour tidal flow through the narrow entrance generates rapid currents which interrupt littoral sediment transport causing local circulation effects and associated changes in coastal configuration. With the exception of raised beach deposits at Bembridge and Forelands, the local geological types of the cliffs yield mostly fine sediments as they erode and tend to contribute to the suspended sediment load of the Solent waters rather than to local beaches. Much of this coast is of moderate to low wave energy, so there are opportunities to ameliorate coastal problems by more widespread applications of modest replenishment or recycling schemes.

The embayment of Priory Bay has been formed by erosion of soft clay strata between rocky (Bembridge Limestone) headlands. The shape of the bay is characteristic of a general north-westward net drift. The headlands partly intercept littoral sediments thus accounting for the moderately wide sandy beach in northern and central parts and depletion in the south of the bay. Remnants of sea-wall and defence structures, which protect the toe of the coastal slope have been undermined following falling beach levels and landslides that have surged over and through the walls. Major extension and intensification of the activity of these cliffs are anticipated due to sea-level rise and increased winter rainfall. Some sands and limestones would be yielded although the majority of supply will be clays. The coastal slope failures will at first accentuate the two headlands bounding Priory Bay as landslide toes extend seaward, but later will reduce their definition as debris is eroded and transported and the headlands are eroded back. There exists a northward nearshore drift pathway that has the potential to contribute material from this frontage to Ryde Sands. Material released from Nodes Bay, however, is likely to be supplied to St Helens Duver.

There is local drift divergence at Nodes Point near the northern margin of this PDZ, historically forming St. Helens Duver spit. The short sediment supply pathway to St. Helens Duver (reversed from the general northwards trend) means the stabilised spit is susceptible to sediment starvation and local beaches are especially sensitive to variations in sediment supply. Beach sediments drift to the southern tip of the spit where they are intercepted by tidal currents within the Bembridge Harbour entrance and flushed offshore by dominant ebb currents. Beach levels fell significantly along the Duver in the late 1980s so that improvements to the existing groyne system were necessary so as to minimise further beach losses to the tidal channel. The contribution of harbour channel dredging to these erosion problems is difficult to establish due to lack of information.

Bembridge Harbour is a small, enclosed estuary sheltered by double sandy spits. It currently covers an area approximately. 600m by 1km wide. The former estuary to the south-west was drastically truncated in the 1880s, when over 80% of its area was reclaimed. It used to run nearly 4km inland to the town of Brading. At the current Harbour entrance, the largest spit is that extending from the north-west direction, which is composed mainly of stabilised sand, known as St. Helens Duver. At low tide the harbour almost dries, apart from a channel into the River Yar behind. There are residential houseboats, marinas and sailing clubs. River flow into the estuary is small. The Harbour is open to the sea at all states of the tide and therefore exposed to tidal surges and storm surges. St. Helens Duver and Bembridge Point spits form a local sediment sink and shelter Bembridge Harbour from swell waves, with the waves experienced within the Harbour being locally generated wind waves which are expected to have significant wave heights of less than 0.3m. Tidal flow through the narrow entrance to the inlet can generate rapid currents which interrupt littoral sediment transport causing local circulation effects and associated changes in coastal configuration. Tidal currents are insufficient to remove all littoral drift material from the entrance channel. Beach extraction has been practised near Bembridge Point, linked to the navigation channel to Bembridge Harbour. The Eastern Yar valley is presently defended from inundation by embankments around the margins of Bembridge Harbour and by seawall stabilisation of the vulnerable barrier at Yaverland in Sandown Bay. The Eastern Yar river behind Embankment Road (and extending upstream to Sandown) exhibits a degree of flashy behaviour, quickly responding to rainfall events particularly in the upper reaches. Summer flows are generally low. Significant flows occur and inundate the flood plain in the lower reaches following 3 to 4 days of rainfall. The water level of the marshland is close to low tide neaps, so an increase in this will reduce drainage through the outlet at Bembridge sluice at Embankment Road.
With the continued siltation within the harbour, it would be anticipated that the harbour entrance is in a continuous process of change. The processes of siltation and the knock on effect at the harbour mouth may well still be part of the adjustment of the estuary system following the closing off of significant tidal prism. This adjustment of the entrance may have resulted in the southerly extension of the St Helens Duver and the extension of Bembridge Point outer spit northwards.

Left: The village of Bembridge, looking north-west towards Bembridge Harbour (Isle of Wight Council).

From Bembridge to Forelands the coast is characterised by low active and relic cliffs (5-15m height) formed of Bembridge Marls capped by variable thicknesses of shingle-rich raised beach deposits. Some frontages are undefended and erosion contributes quantities of beach-forming shingle and sand. The relic cliffs are primarily located to the north-west of the Bembridge lifeboat slipway, whereas active cliffs are located to the south-east of this point. Bembridge limestone outcrops on the foreshore to form an extensive series of ledges and reefs that provide protection to the cliffs against wave attack at low and mid tide. Narrow upper beaches are formed of mixed sand and shingle derived from local cliff sources. Dominant north-westward littoral drift is indicated by some sediment accumulations on the south east side of groynes, outfalls and the substantial accumulation forming the sand spit of Bembridge Point.

From Forelands to Whitecliff Bay, rapid erosion of the high, mostly fine grained cliffs has yielded a plentiful supply of well-sorted, mobile sand for the construction of a wide, flat beach at Whitecliff Bay. There is a small backshore fringe of Chalk and flint coarse gravel and cobbles, and the progressive southwards increase in the size and frequency of the Chalk pebbles gives a clear indication of net northwards longshore transport. A significant proportion of the beach shingle is derived from the long-term erosion of the thick overburden raised beach of gravels at the cliff crest. A set of curvilinear limestone ledges forms a nearshore-offshore reef and provides some protection to the coastal cliffs. The wide reefs and ledges of Bembridge Ledges provide an effective buffer to wave energy (except when waves are propagated from the south-east or east). Each ledge represents the outcrop of a distinct litho-stratigraphic horizon in the Bembridge Limestone sequence; they are virtually horizontal, but have a local relief of up to 2m. Several centimetres of sand may blanket the upper ledges after the incidence of storm waves suggesting that significant quantities may be transported. The tidal streams flow approximately parallel to the coastline, and may operate in conjunction with wave action to promote longshore transport of sand around the Foreland. The cliffs, cut into the soft Eocene and Oligocene sands, clays and limestones, are unprotected along most of this frontage. They are subject to failure creating complex landslide morphologies of scarps and degradation terraces. Cliff behaviour is controlled by lithology with complex cliffs developed in interbedded sequences around Black Rock Point, simple rock fall and gully dominated cliffs in sandy strata in the steep central parts of the bay and mudslides forming deep embayments cutting the clayey southern cliff tops.

Southward of Foreland Fields the coastal relief rises to 40m at Black Rock Point and the cliffs formed in gently northward dipping Bembridge Marls exhibit an increasing degree of landsliding. In the north a partly inactive simple cliff form occurs towards Black Rock Point where a fully active stepped profile is developed, evident with benches being controlled lithologically by thin limestones occurring within the predominantly clayey strata.

The cliffs in Whitecliff Bay comprise a steeply northward dipping sequence of soft sand and clay Palaeocene, Eocene and Oligocene strata. Mudslides are developed in the steeply dipping Reading and London Clay strata in Whitecliff Bay.

Left: View from Culver Cliff headland, looking north-west over Bembridge Ledges towards Forelands, July 2009.

The small lengths of informal defences in Whitecliff Bay are of marginal significance in restraining sediment yield. Much of the clay and silt sized sediment mobilised by periodic slope failures and other mass movement processes is probably transferred offshore in suspension. The sand fraction contributes to the wide intertidal zone between Culver Cliff and Long Ledge. This frontage supplies significant quantities of sandy shoreline sediments downdrift so variations in behaviour that affect cliff erosion, sediment inputs and shoreline sediment transport can have impacts on other frontages to the north.

The shoreline is set back up to 300m from the Chalk headland of Culver Cliff, illustrating the effects of differential erosion according to rock structure and lithology. The effect of the intertidal Bembridge ridge may also be seen both in controlling cliff erosion over the Foreland Field area and in acting as a control point in the crenulate development of Whitecliff Bay.

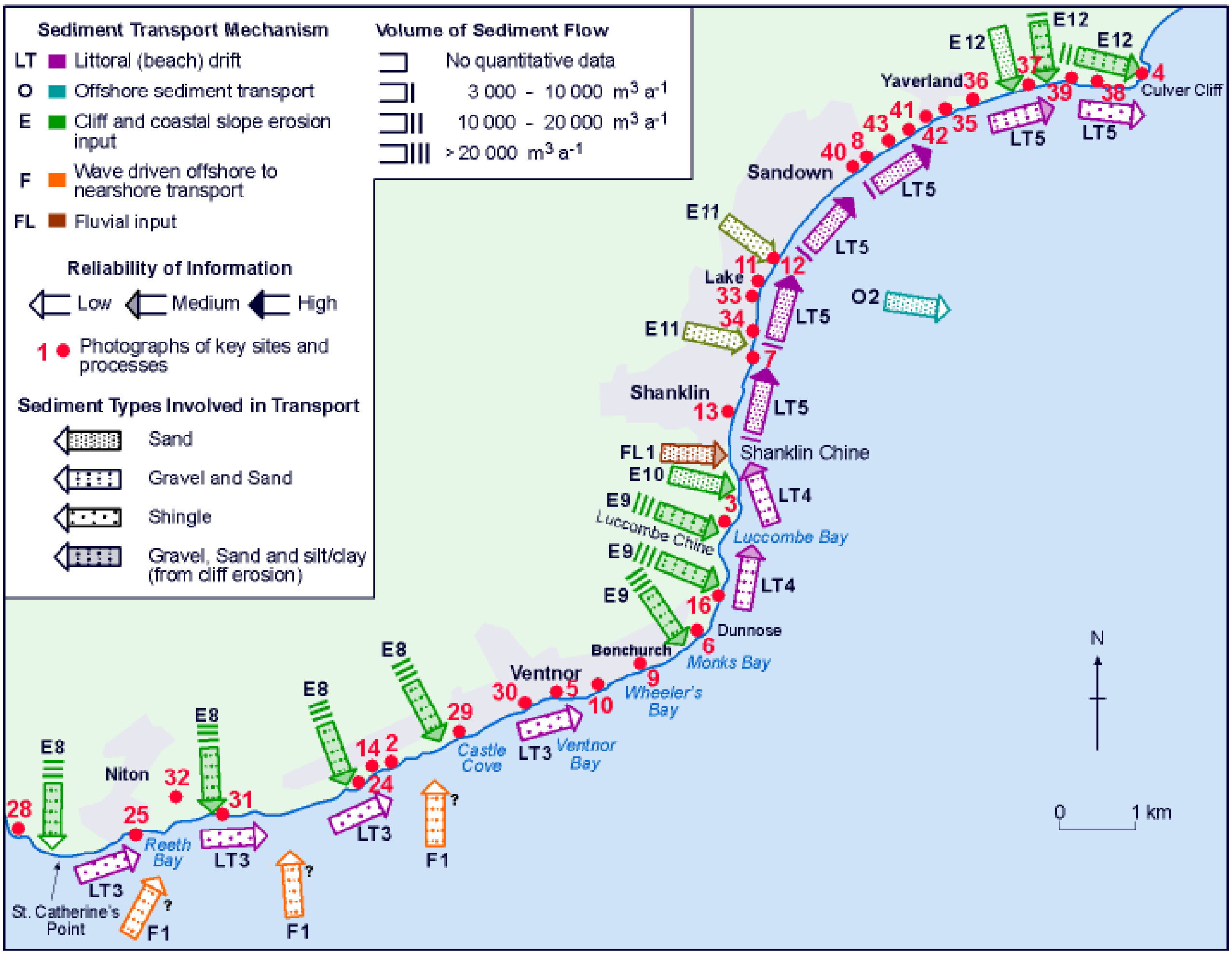
Culver Cliff is a prominent, slightly oversteepened, Chalk headland fronted by a boulder-strewn platform. The Chalk headland rises to over 100m in height and separates Whitecliff Bay to the north and Sandown Bay to the south.

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. Without defences, there is the potential for a general re-activation and intensification of ground movement within the coastal slopes and cliffs around Priory Bay and Node's Point over the next century. Cliff landslides and coastal retreat could at first accentuate the minor headlands, but thereafter reduce their definition as debris is eroded and transported. Sediments yielded by cliff erosion are likely to contribute to local foreshores and counter previous narrowing trends, eventually contributing towards drift inputs to both Ryde Sands and St Helens Duver. St Helens Duver is extremely sensitive to erosion without defences, comprised of loose dune sands stabilised only by a thin vegetation cover. Sediments would be likely to become entrained and transported southward by the dominant littoral drift and become deposited within the Bembridge Harbour channel. Without defences, the Duver is likely to remain in some form as its natural behaviour is re-established. Bembridge Point would be likely to accrete more rapidly in future as cliffs updrift re-activate and contribute additional sediments to the northward drift pathway. A large portion of the Eastern Yar valley would be inundated by tidal flooding without defences forming Embankment Road in Bembridge and Culver Parade in Yaverland. Tidal inundation would impact upon the current European designated freshwater habitat. Opening up the Eastern Yar estuary would, at least initially, substantially increase the tidal prism at Bembridge Harbour. This is likely to increase and reshape the entrance with the potential for sediment to be retained on the St Helens Duver, although this spit could tend to shorten as the entrance widened. There remains the uncertainty as to whether accretion would continue within the estuary, reversing this process. From Bembridge to Foreland Fields general re-activation and intensification of the relic and active cliffs is anticipated throughout the frontage due to the present depleted state of beaches together with the effects of future sea level rise. The low cliffs are relatively exposed and would once again contribute material from the raised beach deposits to local beaches and may enhance their capacity to dissipate wave action. The cliffs immediately to the south of Foreland Fields would be likely to experience erosion at their toes, eventually triggering new failures and conversion to fully active retreating profiles. The cliffs of Whitecliff Bay will continue to retreat rapidly and contribute increasing sediments to the northwards littoral drift system. This process of erosion would be exacerbated by the increased water depth over the Bembridge Ridge, increasing wave action and erosion of the toe of the cliff.

1.5.1.2 Sandown Bay

The coast of Sandown Bay has developed through marine erosion of the predominantly soft clays and sands. 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 into Sandown Bay.

South and East Isle of Wight (St Catherine's Point to Culver Cliff): Sediment Transport



Sediment transport sources, pathways and sinks on the south east coast, from SCOPAC Sediment Transport Study, 2004.

The key headland of Culver Cliff is undefended in the centre of the PDZ and is sufficiently large to retain geomorphological control over the adjacent shorelines. To the south, the regular plan-form of Sandown Bay is maintained by the presence of continuous defence structures through the centre of the Bay preventing cliff erosion and tidal breach, although the northern and southern margins of the Bay are undefended.

In the south of the bay 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 acute 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. In the north of the Bay the shoreline is less sheltered as it faces south-south-east and is vulnerable to southerly winds associated with surges.

Almost the entire length of Sandown Bay is characterised by active cliff development, with adjoining sandy beaches and shore platforms of variable length, height and width. Between Shanklin Chine and Culver Cliff there are clearly defined offsets in beach width associated with the numerous groynes, which indicate that the dominant longshore transport is from south to north. Long term maintenance of the beaches of Sandown Bay is dependent upon continuation of cliff erosion inputs. Whilst some sandy sediments have remained within the bay, most have been transported elsewhere. It has been suggested that this material could have contributed to Ryde Sands although other areas of potential accumulation also exist to the east of the bay.

The natural behaviour of parts of this coastline have been largely influenced and constrained by past management practices and the presence of coastal defences. With the emergence of the twin resorts of Shanklin and Sandown in the 19th century, installation of substantial sea walls and promenades has removed the former cliffline 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. The groyne system between Shanklin and Sandown has succeeded in retaining substantial quantities of sand, transported from south to north by the net direction of littoral drift, retaining a sandy amenity beach. This has resulted in part in the paucity of sediment along the Yaverland frontage. Supply deficit is also a consequence of the removal of sediment supply from cliff erosion as a direct result of seawall/esplanade construction. Although isolated from wave activity by sea defences, the 40m high former high sea cliffs behind the seawall promenade from Sandown to Shanklin remain geomorphologically active, due to sub-aerial weathering and 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 at Shanklin. At Shanklin Esplanade the Hope Groyne is key to retaining an effective Esplanade and beach along Shanklin seafront.

Left: View north-west from Shanklin across Sandown Bay, towards Culver Cliff (Chalk headland) in the distance. The former sea cliffs are stabilised in the centre of the bay and sediment transport is from south to north-west, forming important amenity beaches (Isle of Wight Council).

Although the centre of Sandown Bay is currently defended, there are high, actively-eroding cliffs in the north and south of the Bay which may increasingly outflank the defences. In the north, immediately north-east of Yaverland the seawall terminates and mudstone, clay, sandstone and Chalk cliffs at Yaverland and Culver are actively eroding and retreating, supplying sediments to the northwards littoral drift system. Along the undefended sections of this coastline there is evidence of substantial retreat. For example, at Yaverland the foundations of early nineteenth century buildings at Yaverland Fort, now exposed on the foreshore, indicate approximately 0.5km of cliffline retreat, over the past century. Repeated semi-rotational slides, and their rapid removal by wave action, have resulted in as much as 20m of cliff top retreat in less than one year at specific sites with slope instability evident up to 70m inland.

Importantly, coastal recession has truncated a tributary of the Eastern Yar Valley at Yaverland along Culver Parade, linking Sandown Bay to Bembridge Harbour along the low-lying river valley.

Sediments migrated into this channel mouth in the form of a former barrier beach have been stabilised with a seawall that prevents marine inundation and preserves artificially the regular plan-form of Sandown Bay. If the sea defence wall and embankment along Culver Parade fails the beach barrier would rapidly be subject to overwashing, landward migration and breaching. A large hinterland extending into the valley of the Eastern Yar could be inundated and generate a large tidal prism that could maintain a permanent tidal inlet with an ebb-tidal delta, which may support beaches to the south but could expose the downdrift Yaverland cliffs (to the north) to additional toe erosion.

At the southern end of this section of coast, from Shanklin towards the cliff-top village of Luccombe, there are few defences, with undefended cliffs in the south of the PDZ. It is likely that active cliff erosion from Monk's Bay to Shanklin is the chief source of sand contributing to the beaches in Sandown Bay, were net littoral drift is from south to north.

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. If the shoreline of Sandown Bay was unconstrained by seawalls or defences in the future, cliffs in central parts of the Bay would re-activate immediately, retreat at moderate to high rates and resume their inputs of sandy sediments to the foreshore. The relatively resistant headlands of Dunnose and Culver Cliff would continue to be slowly eroded, but are sufficiently large to continue to exert a control over shoreline evolution. There would be a breach through toe the southern extent of the Eastern Yar valley. It is uncertain whether this would act as a new estuary mouth or would merely result in increased flood potential within the Yar system. If the former, there is potential for a natural ebb delta developing which would influence the plan shape of the bay.

1.5.2. Existing Defences

The following description of coastal defences outlines the current condition and expected remaining effective life of the defences in the area, if no further maintenance is carried out. In addition to the following summary, individual defences are described in Appendix C2_Defence Appraisal areas IW13 to IW29

This PDZ is characterised by a series of man-made defences (assisted by natural limestone ledges) defending the eastern headland of the Isle of Wight around the community of Bembridge and maintaining the plan-form of Sandown Bay. The defended frontages are separated by eroding geologically important cliff lines and embayments.

From Priory Bay to St. Helens Duver some limited lengths of defence structures have been installed to protect the toe of the coastal slope, but these now remain as relic defences.

Defences extend along St Helens Duver frontage to Bembridge Groyne at the southern tip of the stabilised sand spit, which. Steel piling is in poor condition and suffering from excessive corrosion. The deteriorating seawall fronting the Duver is expected to fail in 10-25 years time, and has been further weakened by recent cavities.

Within Bembridge Harbour the protection is a combination of both formal defences and defences that are part of private, leisure, and industrial related infrastructure. The area south of St Helens Duver is undefended and managed by The National Trust while concrete and masonry walls protect the harbour front section of St. Helens. The key flood defence is Embankment Road, a former railway embankment forming the back of the Harbour now supporting the coastal road and coastal infrastructure with sluice gates through the embankment. The embankment is approximately 10m wide at its narrowest point and approximately 1,500m long. Within the embankment are critical services including gas pipes, telephone and electric cables. The seaward face of the embankment and the margins of Bembridge Harbour are strengthened by some localised protection works such as concrete and masonry seawalls and sections of timber and rock revetment, with residual lives of generally 10-25 years.

Along the wooded slope from Bembridge Point to Foreland a piecemeal revetment and groyne defences have been constructed. These defences have stabilised some sections of the eroding cliffs. In addition several beach recharges fronting Bembridge Hotel have been completed. South of Forelands an undefended frontage extends to Whitecliff Bay with the exception of a short section of revetment and gabion defences in poor condition. These largely have been ineffective in stabilising the cliff.

South of the undefended Culver headland, Sandown Bay is controlled by defence structures (sea walls, revetments and groynes) through the centre of the Bay that have been subject to both renewal and extension for more than a century. The groyne system between Shanklin and Sandown has succeeded in retaining substantial quantities of sand, though the groyne field is deteriorating; and the groynes located along Culver Parade and Lake Revetment are in poor condition. In Shanklin, the concrete Hope Groyne promontory plays an essential role in maintaining Shanklin Esplanade beach and road access to the remainder of this frontage to the south. South of Shanklin the cliff line is undefended, although from Shanklin to Luccombe Bay gaps exist between several ineffective deteriorated steel planked permeable groynes and the undefended cliff base. The seawall at Culver Parade in Yaverland is important to maintain the current form of the bay, preventing tidal beach into the low-lying valley behind. The seawall is structurally in good condition, but has a poor seaward profile. The groynes in front are in poor condition and hence the beach is low, increasing potential damage to the wall by undermining and overtopping. A recent assessment by the Eastern Yar Flood and Erosion Risk Management Strategy estimates that, with maintenance, the seawall can provide adequate protection until 2085.

In summary, without maintenance the majority of the defences throughout the PDZ will deteriorate and fail towards the end of the first epoch (in approximately 20 years) and expose the coastline to active erosion and retreat.

1.5.3 Potential Baseline Erosion Rates

The SMP reviewed a wide range of data to define the current and potential rates of coastal erosion and cliff retreat along the Isle of Wight coast using the best available information. Full details can be found in Appendix C3. Future erosion rates are predicted using Walkden & Dickson formula (2008) and allow for future sea level rise –the full methodology is explained in the Appendix. Predicted sea level rise rates of 4mm/yr (to 2025), 8.5mm/yr (to 2055), 12mm/yr (to 2085) then 15mm/yr (to 2105) have been used, in accordance with SMP national guidance by Defra. These rates equate to 7cm of sea level rise (above the 2009 baseline) by 2025, 32cm by 2055 and 98cm by 2105. The IW numbering units refer to lengths of coast for which future behaviour is described and mapped in Appendix C based on SMP1 and Strategies. These are not SMP2 policy units which are developed in section 3 below.

Potential total erosion over the next 100 years is shown, however it is important to note that this is an estimate that is based on an undefended coastline. Within Appendix C3, these erosion rates are only applied following the predicted failure date of each individual element of the defences within the unit; therefore the resulting erosion amounts shown in the Appendix C3 tables and maps (and used in the development of this SMP) will show smaller erosion totals than the overview provided below.

Potential coastal erosion rates (all figures in metres/year):-

Numbering in SMP2 Appendices (2010) *(area and name, clockwise)*		NE Strategy Study Morphodynamic Unit No.	Current to 2055	2055 to 2085	2085 to 2105	Potential 100 year erosion (if undefended) -total in metres	Plus potential slope reactivation triggered by erosion	Notes
IW13	Priory Bay	33	0.30	0.35	0.39	33	100m	Remnants of defences
		34	0.30	0.35	0.39	33	40m	
		35	0.40	0.47	0.52	44	130m	
IW14	St. Helens Duver	36	0.23	0.27	0.29	25		Erosion resisted by defences
IW15	Bembridge Harbour	37	0.00	0.00	0.00	0		Tidal flood risk
IW16	Bembridge Point	38	0.00	0.00	0.00	0		Stable sand spit
		39	0.15	0.18	0.19	17		Erosion partially resisted by defences
IW17	Bembridge	39 (13a)	0.15	0.18	0.19	17		
IW18	Foreland	Northern - 40	0.20	0.24	0.26	22		
		Central - 40	0.50	0.59	0.65	56		
		Southern - 40	0.30	0.35	0.39	33		
IW19	Whitecliff Bay	41	0.50	0.59	0.65	56		Generally undefended, minor defences in centre of bay
		42	0.66	0.78	0.85	73		
		43	0.5	0.59	0.65	56		
		44	1.4	1.65	1.81	156		
		45	0.2	0.24	0.26	22		

Numbering in SMP2 Appendices (2010) *(area and name, clockwise)*		Historical Rate	Current to 2025	2025 to 2055	2055 to 2085	2085 to 2105	Potential 100 year erosion (if undefended)	Notes
IW20	Culver Cliff	0.20	0.23	0.30	0.35	0.38	32	Undefended
IW21	Yaverland Cliffs	0.40	0.46	0.61	0.71	0.77	64	
IW22	Yaverland Car park	0.30	0.35	0.46	0.53	0.58	48	Erosion resisted by defences
IW23	Yaverland Zoo	0.30	0.35	0.46	0.53	0.58	48	
IW24	Culver Parade	0.30	0.35	0.46	0.53	0.58	48	
IW25	Sandown Esplanade	0.30	0.35	0.46	0.53	0.58	48	
IW26	Lake Cliffs	0.30	0.35	0.46	0.53	0.58	48	
IW27	Shanklin Esplanade	0.40	0.46	0.61	0.71	0.77	64	
IW28	Luccombe Road, Shanklin	0.30	0.35	0.46	0.53	0.58	48	Erosion partially resisted by defences
IW29	Luccombe	0.40	0.46	0.61	0.71	0.77	64	Undefended

Note:
i) Erosion rates have been determined from monitoring data and examination of historical records and have been calculated to take account of sea level rise –see Appendix C3 for details.
ii) The IW numbering units refer to lengths of coast described in Appendix C. These are not SMP2 policy units.

2. Baseline management scenarios

2.1 Present Management

Present management of the shoreline is taken as the policy defined by SMP1, modified by subsequent strategies or studies. It should be noted that in the case of SMP1 the period over which the assessment was carried out was 50 years. SMP2 extends this to an assessment period of 100 years. The table below sets of the current shoreline management policies for PDZ3. This SMP2 will assess all the available evidence and update these previous management policies.

The key documents outlining the present management of the shoreline in this PDZ are:-

Isle of Wight Shoreline Management Plan 1 (1997)
The first Shoreline Management Plan (SMP1) for the Isle of Wight's coast was published in 1997. It consists of two volumes.

- Volume 1 is the 'Data Collection and Objective Setting', which presents information on a range of topics including coastal processes, natural environment, etc.
- Volume 2 is the 'Management Strategy', which presents information for each Management Unit around the Island's coast and sets a management Policy for each unit.

Coastal Defence Strategy Studies, Isle of Wight
Whilst the Shoreline Management Plan provides the risk framework for management of the coast, Coastal Defence Strategy Studies provide a more detailed assessment of particular frontages in order to identify the most suitable type of coastal defence schemes that may be required to fulfil the agreed shoreline management policy and to plan a programme of future works.

North East Coastal Defence Strategy Study, Isle of Wight (2004)
The North-East Coastal Defence Strategy Study, which extends from the Shrape Breakwater at East Cowes to Culver Cliff, was completed in 2005. The Plan sets out the works programme along the north-east coast frontage for the next five years including details on costings. The North-East Strategy consists of a summary report and detailed Appendices.

Sandown & Undercliff Coastal Defence Strategy Study
A Coastal Defence Strategy Study for the Sandown and Undercliff coastlines will be completed following the publication of SMP2.

Eastern Yar Flood and Erosion Risk Management Strategy (2010)
The Environment Agency and the Isle of Wight Council have produced the Eastern Yar Flood and Erosion Risk Management Strategy. The Strategy sets out how flooding and erosion risks in the east Yar catchment and around Bembridge harbour will be managed.

Catchment Flood Management Plan:
The Environment Agency has undertaken a programme of Catchment Flood Management Plans (CFMPs) for the major river catchments in the Southern Region. A CFMP is a large scale plan that covers an entire river catchment or group of catchments that identifies long-term, sustainable policies to manage flood risk within the catchment. These policies form the basis for development of Strategy Plans, covering all or part of the overall catchment area, which will identify in more detail appropriate flood defence measures.

Whilst CFMPs principally address fluvial (river) flooding, SMPs address tidal (sea) flooding, alongside coastal erosion. The boundary between the CFMP and the SMP in this area is the A3020 road crossing Newport Harbour, marking the main transition from tidal to fluvial issues. The Isle of Wight Catchment Flood Management Plan (Summary Report) was published in December 2009.

- Sub Area 5: Lower Eastern Yar

"The issues in this sub-area: This sub-area covers the lower section of the Eastern Yar catchment from Alverstone to its mouth at the tidal sluice at St. Helens. The tidal defence at Embankment Road stops seawater from travelling up the river and allows a freshwater habitat upstream. The subject of the coastal defence line is being considered under the ongoing Eastern Yar fluvial and coastal strategy. Flood flows in the policy unit largely result from overbank flooding of fluvial flows which spill out onto the floodplain. The downstream end of the catchment is protected from tidal ingress by a tide locked sluice, however this can lead to tide locked fluvial flooding. In addition there have also been incidents of surface water drainage flooding and a very limited amount of groundwater flooding."

Policy Option 6 – areas of low to moderate flood risk where we will take action with others to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits.

The previous shoreline management policies set for this PDZ are listed in the table below:

Due to the variety of numbering systems used in the management documents, a consistent set of numbers IW1 to IW59 have been used clockwise around the IW coast to present information in the SMP2 Appendices and organise information in the table below. These are not SMP2 policy units which are developed in section 3 below.

<table>
<tr><th colspan="2">Numbering in SMP2 Appendices (2010)</th><th colspan="2">SMP1 (1997)</th><th colspan="2">North East Coastal Defence Strategy Study (2004)</th><th colspan="2">Eastern Yar Flood and Erosion Risk Management Strategy (2010)</th></tr>
<tr><th>IW Unit</th><th>Name</th><th>Unit</th><th>Policy</th><th>Unit</th><th>Policy</th><th>Unit</th><th>Policy</th></tr>
<tr><td>IW13</td><td>PRIORY BAY</td><td>RYD9 - Horestone Point to St Helens Tower</td><td>Retreat the existing defence line</td><td>sMU 10 - Horestone Point to St Helens Point</td><td>No Active Intervention, but Monitor</td><td colspan="2"></td></tr>
<tr><td>IW14</td><td>ST HELENS DUVER</td><td>RYD10 - The Duver, St Helens</td><td>Hold the existing line</td><td>SMU11 - St Helens Point to Ducie Avenue</td><td>Hold the Line by Maintenance. Carry out further studies. Review generic option based upon the results.</td><td rowspan="2">Frontage 3: The Duver (including the inner face of the spit)</td><td rowspan="2">Maintain the seawall for 50 years</td></tr>
<tr><td rowspan="5">IW15</td><td rowspan="5">BEMBRIDGE HARBOUR</td><td rowspan="5">RYD 11 - Bembridge Harbour</td><td rowspan="5">Hold the existing line</td><td rowspan="5">SMU12 - Bembridge Harbour (inner harbour)</td><td rowspan="5">Hold the Line by Maintenance. Carry out further studies. Review generic option based upon the results.</td></tr>
<tr><td>Frontage 2: St Helens</td><td>Hold the line - maintain</td></tr>
<tr><td>Frontage 1: Embankment Road</td><td>Hold the line -sustain</td></tr>
<tr><td>Frontage 5: Eastern Yar River</td><td>Do minimum</td></tr>
<tr><td rowspan="2">Frontage 4: Bembridge Point (including the inner face of the spit)</td><td rowspan="2">Do nothing but monitor</td></tr>
<tr><td>IW16</td><td>BEMBRIDGE POINT</td><td rowspan="4">RYD12 - Bembridge Point to Foreland Fields</td><td rowspan="4">Hold the existing defence line</td><td>SMU11 - St Helens Point to Ducie Avenue</td><td>Hold the Line by Maintenance. Carry out further studies. Review generic option based upon the results.</td></tr>
<tr><td>IW17</td><td>BEMBRIDGE</td><td>SMU13a - Ducie Avenue to Lifeboat Station</td><td>Managed Realignment, by slowing the rate of erosion</td><td colspan="2" rowspan="3"></td></tr>
<tr><td rowspan="2">IW18</td><td rowspan="2">FORELAND</td><td>SMU13b – Northern: Lifeboat Station to Fisherman’s Walk</td><td>Hold the Line by Seawall Encasement</td></tr>
<tr><td>SMU13b – Central: Fisherman’s Walk to</td><td>Managed Realignment by Beach Management</td></tr>
</table>

				Paddock Drive		
				SMU13b – Southern: Paddock Drive to Foreland Fields	Hold the Line by Seawall Encasement	
IW19	WHITECLIFF BAY	RYD13 - Foreland Fields to Culver Cliff	Do nothing	SMU 14 - Foreland Fields to Culver Cliff	No Active Intervention, but Monitor	
IW20	CULVER CLIFF	SAN1 - Culver Cliff	Do nothing	*Strategy level examination of this frontage will be completed following publication of SMP2.*		
IW21	YAVERLAND CLIFFS	SAN2 - Culver Cliff to Yaverland	Do nothing			
IW22	YAVERLAND CAR PARK	SAN3 - Yaverland	Hold the existing defence line			
IW23	YAVERLAND, ISLE OF WIGHT ZOO					
IW24	CULVER PARADE	SAN4 - Sandown Zoo to Fort Street, Sandown	Hold the existing line			
IW25	SANDOWN ESPLANADE	SAN5 - Fort Street to Ferncliff Road, Sandown	Hold the existing defence line			
IW26	LAKE CLIFFS	SAN6 - Ferncliff Road to Hope Beach	Hold the existing defence line			
IW27	SHANKLIN ESPLANADE	SAN7 - Hope Beach to Shanklin Chine	Hold the existing defence line			
IW28	LUCCOMBE ROAD, SHANKLIN	SAN8 - Shanklin Chine to Horse Ledge	Hold the existing defence line			

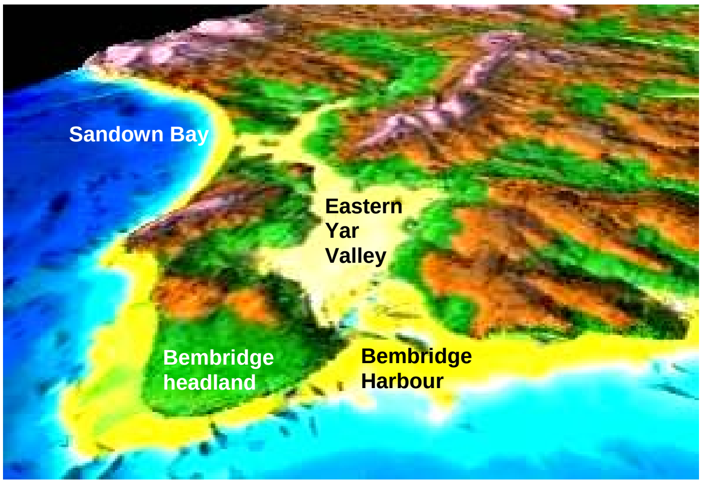
2.2 Baseline Scenarios for the Policy Development Zone

Summary of future coastal risks in PDZ3

At Horestone Point and Priory Bay there is potential for coastal slope retreat extending some distance inland. At St Helens Duver a number of properties are at risk from tidal flooding, with the main risk wave overtopping and loss of the Duver seawall, although tidal flooding encroaching from the rear of the Duver (Bembridge Harbour) will increasingly affect the area over the next 20-100 years. Deterioration or loss of St Helens Duver due to erosion and flooding would impact upon local properties and businesses in the area and also could have significant impacts on the adjacent frontages of Bembridge Harbour to the west and Bembridge Point to the south. The standard of protection of the Embankment Road defence (backing Bembridge Harbour) will decrease over time, increasing the risk that the Embankment will be overtopped, resulting in increasing numbers of commercial and residential properties at tidal flood risk and also the inundation of Brading Marshes with saline water (the largest freshwater habitat in the Solent and Southampton Water SPA). From Forelands to Whitecliff Bay, a line of assets and properties along the shoreline and cliff top will be effected by cliff erosion and retreat. All along the former sea cliffs of Sandown Bay, significant cliff foot amenities and infrastructure and cliff top properties will be increasingly at risk from coastal erosion and cliff retreat over the next 100 years. A tidal breach near Yaverland into the Eastern Yar Valley will place large numbers of residential and commercial properties and significant infrastructure at risk of tidal flooding.

2.2.1 No Active Intervention (Scenario 1, NAI)

Under this scenario no further work would be undertaken to maintain defences. Where defences fail they would not be repaired. The principal difference between this scenario and the unconstrained scenario discussed earlier is the residual impact existing defences would have on the behaviour of the coast. A detailed description of this NAI scenario is given in Appendix C3, area by area. The following discussion provides a summary, drawing together an overview with particular focus on how the use of the coast would be effected. In particular, this baseline scenario is discussed with respect to the overarching objectives set out previously in sub-section 1.3 of this PDZ3.



General topography of the low-lying Eastern Yar Valley, looking south-west.

Shoreline defences around the north section of the zone, in the area either side of Bembridge Harbour, tend to be low concrete and masonry walls at the crest of the beach. Typically these defences have an unmaintained residual life of 10 to 20 years. Many are old and require relatively high levels of maintenance. More substantial defences are in place at the headland by St Helens Old Church, at the northern end of the St Helens Duver, and at Lane End in Bembridge. Both areas are strongly influenced by outcropping rock platforms in the foreshore; the large rock platform forming Nodes Point and Tyne Ledge to Bembridge Ledge respectively. Although the underlying rock outcrops tend to anchor the coast at these points, delimiting the entrance to Bembridge Harbour, the softer overlying headlands in both locations, under this scenario, will tend to erode back.

To the north of and at Nodes Point the old defence has effectively failed and, as this continues, the toe of the slope will continue to erode, increasing the existing instability and failure of the high coastal slope around Priory Bay. This slope failure will result in significant loss to the Nodes Point Holiday Centre, although the main buildings of the Holiday Centre are like to be unaffected over the 100 year period of the SMP2.

The defence at St Helens Old Church has indirectly assisted the development of a relatively healthy beach in front of defences to the northern part of the Duver. Over the main section of the St Helens Duver, the defence is under considerably greater pressure and the entrance channel to Bembridge Harbour, running along the face of the Duver, tends to restrict the width available for a beach protecting the sea wall. This section therefore acts to a degree as a shallow embayment. As defences fail under this scenario, recent work by the Strategy suggests that Duver is likely to remain in some form as its natural behaviour is re-established. There would be sediment lost at the northern end, a deepening of the embayment over the central section of the frontage and potential loss of the southern head of the Duver curving back into the harbour. This process would result in loss of some property along the Duver. There may be potential for breaching of the spit as erosion from the front of the Duver meets increasing extents of tidal inundation from the rear, but the Duver may, however, roll back maintaining its overall integrity, despite sea level rise.

This section of coastline forms part of the Solent and Southampton Water SPA and Ramsar sites. It supports important habitats, including sand and mudflats, vegetated shingle, saltmarsh, and sand dunes on the Duver. These in turn support important bird populations. While NAI is expected to result in only minor changes to habitats on the seaward side of the Duver, more significant changes are expected within Bembridge Harbour.

On the southern shoulder of Bembridge Harbour, the Groyne at Bembridge Point would fail and typically the spit would tend to move landward as the general headland erodes back. However, the beach levels around the groyne are stable although the groyne is in a very poor state of repair; it is regularly submerged and allows sediment to pass through it. Hence the spit is likely to stay in its current position even if the groyne collapses and disappears, based on research undertaken by the East Yar Strategy. The limited width of erosion would only threaten limited numbers of properties on this side of the harbour, but would tend to disrupt use of the harbour entrance and would impact on the water access immediately within the entrance. There is also a continued local flood risk to property just behind Bembridge Point.

The harbour is formed within the much curtailed mouth of the Eastern Yar estuary. The main defence to the back of the harbour is an embankment, along which runs one of the main road links to Bembridge (Embankment Road). The extent of the old estuary is shown by the potential tidal floodplain on the figure below, extending back past Brading and behind Sandown. The figure also shows flood risk along the rear of St. Helens Duver.

Current potential tidal flood risk in the Eastern Yar, if defences were not in place (1:1 year tidal flood area, present day). This image shows the low-lying nature of the valley and that current vulnerability to tidal inundation would already exist without the defences in place at Embankment Road in Bembridge and Culver Parade in Sandown..

The northern part of the old estuary, north of Yarbridge in Brading, is (over virtually all its area) designated at an international level for its nature conservation value. The intertidal and coastal habitats within Bembridge Harbour are designated as part of the Solent and Southampton Water SPA and Ramsar sites, and lagoons which have formed in a depression behind the sea wall near Bembridge are designated as part of the Solent and Isle of Wight Lagoons SAC, as they support particularly high species diversity. The coastal land surrounding the lagoons and to the rear of Bembridge Harbour forms Brading Marshes to St Helen's Ledges SSSI. Principal transport routes also run through the area and there are significant residential and commercial areas, particularly to the south. Under this NAI scenario the embankment behind Bembridge Harbour would be increasingly overtopped with increasing sea level rise (at present the embankment is at a level equivalent to the 1: 25 year surge tide level. In 50 years time, with anticipated sea level rise, this level would be equivalent to a 1:1 year surge tide). Although a limited amount of overtopping can be tolerated within the marsh, the embankment may fail under this scenario, which would open up the old estuary. This would have significant impact on environmental and social values.

The opening up of the estuary would also increase the tidal prism (tidal volume) flowing through the Harbour entrance. There is the possibility that the current process of infill would still occur, gradually warping up the level of land within the valley but, even so, the increase in tidal flow through the mouth of the estuary would significantly alter the behaviour of the shoreline discussed above. The increased flow, while attempting to widen the entrance, could also tend to hold the southern end of the Duver, probably tending to hold the spit head further seaward, although there is the possibility that the old northern channel could be re-established such that the main estuary mouth actually cuts through the Duver at its northern end. There remains significant uncertainty as to future re-established natural estuary behaviour under this scenario. However, the point made is that there would be substantial change to the area, with, if unmanaged, significant impact on the use of the harbour and shoreline management. NAI in this area would not sustain or allow adaptation of the communities and local commercial interests bordering the harbour. It would not maintain access to east Wight communities and, due to the change to saline conditions, would not support some of the key nature conservation values of the area, with areas of saltmarsh, lagoon and coastal marsh habitat altered and lost. Due also to the increased flood risk in the upper valley of the Eastern Yar, there would be disruption to the economic support to the urban areas of Sandown Bay. Arguably the landscape, though changed, would still be much valued, but there would be loss to the historic environment. Access to the shoreline would be affected but most significantly the use of the harbour, without some form of intervention and control, would be difficult.

Moving south from the Bembridge Harbour area is the east Wight headland. Defence around this headland is, as along the coast to the north, relatively ad hoc collection of private and local authority protection works, initially fairly continuous around Bembridge but the tailing out along the Forelands Fields area through to the undefended section of Whitecliff Bay and Culver Cliff. The main controlling feature of the headland is the Bembridge Ledges, with defences protecting the toe of the coastal cliff and slope behind.

Defences along the Bembridge frontage would fail during the first epoch and erosion and exposure of the cliffed backshore would be re-established. There would be little loss to the northern side of Bembridge but as erosion continued there would be loss of properties, the RNLI station and slipway at the end of Land End Road. The erosion of the defended headland at the Forelands would during the second and third epochs, first effect and then result in loss of the hotel and parts of the Holiday Village. Similarly the failure of the wall south of the hotel would result in loss of some properties in the area of Forelands Field, Beachfield roads and Paddock Drive.

Continuing erosion along Forelands Fields and Whitecliff Bay would also result in loss of properties and impact on the holiday park and caravan parks. Erosion would continue to supply sediment both to the beaches in this area and to the frontages further north along the area. This would support beach use (although diminished due to loss of supporting coastal infrastructure). NAI would also support the natural evolution of features of conservation interest along this coastal stretch, which include the nearshore reefs, areas of seagrass, and vegetated sea cliffs that form part of the South Wight Maritime SAC, and the Solent and Southampton SPA/Ramsar sites. No significant habitat loss or gain is expected with gradual roll back of the coast, though reef systems may be altered as a result of rising sea levels (the relative exposure of rock ridges would change).

In terms of the overarching objectives it is only at Lane End, with the loss of the Pier, RNLI and coast use infrastructure, that there would be a significant loss of broader scale social value. This does not take account of the significant losses to individuals and specific commercial interests.

Culver Cliff would continue to erode slowly but would also continue to act as the dominant geomorphological control to coastal behaviour to the north and south. It is not predicted that there would be loss to identified assets associated with the main headland but there is recognised to be possible archaeological interest in the area which may be identified within the predicted erosion zone. The continued erosion of Red Cliff at the eastern end of Yaverland would result in loss of the old disused gun battery and the sailing club. The main loss to both these features would be in the third epoch. Red Cliff does however, provide important sediment supply to the local beaches and probably more generally to the wider nearshore area of Sandown Bay.

Over the rest of Sandown Bay through to Shanklin Chine the coast is quite heavily defended and the defences are in good condition such that, even without maintenance, they are likely to form a competent defence against erosion over the first epoch. They would, however, fail beyond that. There would be significant loss to infrastructure and properties along the whole length of the bay.

At the northern end of this section, defences are constructed across the southern valley of the Eastern Yar river. Land levels behind the defences are consistently below the level of normal high tides and as such the failure of the defence would probably result in a tidal inlet. It is unclear whether this would be maintained or whether sediment filling the breach would form a new ridge, closing the inlet. As sea level rises, however, the capacity of the inlet would increase and it may well act as a new estuary mouth. Flooding would occur even under present day water levels, having a similar impact to that described earlier in considering the loss of defence behind Bembridge Harbour. It is uncertain whether there would be any preference between the two new entrances to the valley. There is a tidal gradient between water levels on the southern open coast and that at Bembridge. This could result in complex flow patterns.

Potentially the new tidal inlet would create its own ebb delta. This has the potential to change sediment transfer along Sandown Bay. The ebb delta would tend to retain shoreline sediment to the south and west, in addition to providing some increased protection to the Yaverland frontage. The corollary of this would be that the plan form along the Red Cliff frontage would from more as a local separate bay, with, initially some increased erosion as the shoreline adjusts to the change in sediment drift.

Overall the NAI scenario would have major impacts on the identified values of Sandown Bay. The failure of key cross-shore structures controlling upper beach drift, such as the concrete groyne breakwaters at Shanklin and at the northern end of Sandown, would result in a loss of upper beach along much of the area. The cliffs behind the defences would be reactivated and provide some increased sediment to the system. However, this would not be held in front of the cliff, rather being moved to the north and offshore. Erosion would continue beyond the 100 year period of the SMP with little gain in terms of creating a more stable bay line.

In the context of the overarching objectives, there would be substantial and significant loss in terms of sustaining the important economic value of development in Sandown Bay. Indeed, due to the continuing loss that would occur beyond epoch 3, this impact on the viability of this regionally important economic hub would continue to deteriorate. This would be exacerbated by the losses within the valley of the Yar and the loss of access to areas of the towns. Without some form of management, erosion and loss would continue in the area of Yaverland, with little real opportunity for adaptation to maintain the coherence of this community. Access to East Wight communities would be disrupted and access along the sea front would be lost. While in principle allowing this frontage to evolve naturally, in reality the lack of investment in the sea front and eventually the main towns, together with the dilapidation of buildings at continuing risk of loss, would result in very major impacts on the built landscape and the cultural and historical environment. Despite the potential value in creating new saline habitat within the upper Yar valley, there would be significant loss of existing designated freshwater areas in the lower Yar. On the wider coastline running from Culver Cliff to Shanklin, nature conservation interests are focused on small and generally narrow sections of coastal cliffs that lie within the South Wight Maritime SAC. NAI will work with the natural processes of erosion and succession of the cliff line.

The economic damages due to flooding and erosion are summarised in Table 1, at the end of this sub-section and a summary of impacts with respect to the overarching objectives are set out in Table 2, in comparison with the assessment made for the following With Present Management Scenario.

2.2.2. With Present Management (Scenario 2, WPM)

This scenario is defined by current management practice as set out by policy defined in SMP1 and in some areas modified by more detailed examination through subsequent strategies. The various policies and approaches that are in place are summarised in the table at the start of this section 2.

Overall, the approach to management may be defined as the intent to:

- Maintain and improve the standard of defence at the rear of Bembridge Harbour and while maintaining defence at the entrance to the harbour over the first two epochs, changing this to a more adaptive management over the third epoch.
- Remaining fragments of defences to the north of St Helens Duver (Priory Bay and Nodes Point) would continue to fail and natural erosion take place.
- Over the Bembridge frontage, 'with present management' would allow general realignment of the coast, acting to maintain beach levels but with the intent to hold the line at Lane End and along the defended frontage to the east of Foreland Fields.
- There would be no management of defence from this last area through to Culver Cliff or to the west of the Culver headland through to the start of Yaverland.
- Where the defences start at Yaverland and beyond, all the way through to the Shanklin Chine area, defences would be maintained. The defence approach to manage sediment drift along the frontage through maintaining the groynes would continue through to Knock Cliff. Below Luccombe village and to the south of this PDZ the natural recession of the undefended coast will continue.

At the northern end of the frontage, at Priory Bay, the impacts would be similar those discussed in scenario 1 (NAI). Critically at the southern end of this section in front of St Helens Church, the defences would be held but potentially only for the first epoch. This provides scope for maintaining the narrow section of beach to the northern end of the Duver, important for the management of the sea wall and reducing erosion to the properties in the area. The main section of the Duver would be maintained but then allowed to fail and the Duver re-establish its natural behaviour. There would be significant and increasing pressure on this section of wall over the next 50 years. To maintain the wall may in fact need a new or significantly improved defence to be put in place. In addition to creating a new defence asset, such action may engender an expectation of longer term continued defence. It is also noted that despite defence at the front face of the Duver, property on the Duver is at risk from tidal flooding in the medium to long term. There would, under this scenario, be no intent to put in place new defence against this risk encroaching from the low-lying inside of the Duver. Some private defences on the tip of the Duver and surrounding sections of the former millpond and waterside St Helens would be maintained, although the defence line is not continuous.

As identified, the main embankment behind Bembridge Harbour would be maintained and raised in line with sea level rise. This would maintain defence to the Eastern Yar Valley. A significant justification for the maintenance of defences here is the protection of designated freshwater habitats to the rear of the embankment, around Brading Marshes, which also support important bird populations (including Brent Goose). Quite probably, with sea level rise the area would need to be pumped to maintain appropriate water levels both for flood risk management and water level management. In principle maintaining and raising the embankment is not seen as being unsustainable, in that in maintaining this defence the process of infill of the harbour is likely to continue. This will have a knock on effect on the entrance channel, Bembridge Point and the Duver. The Point and spit would be maintained, although the recent Strategy indicates that it would not be necessary to maintain the groyne; the spit would be self-sustaining. To a degree this would depend on continued sediment supply from the east. Under this scenario, the intent would be to allow much of the westerly Bembridge frontage to erode. This would help support the sediment supply to the harbour area. There are flood risk areas around Bembridge Point and the intent would be to include protection of these affected properties as part of a scheme for Embankment Road.

Further around the Bembridge headland, the walls at the Lifeboat Station to Fisherman's Walk would be maintained, but the section of coast to the south would still erode with only minor works to manage sediment loss. This will result in the maintained wall coming under increased pressure as a result of both sea level rise and as a result of potential outflanking. Similarly, further west at Forelands, where the existing defence is maintained, this defence would need to be substantially improved over time.

Over the Whitecliff Bay and Culver headland and cliffs, this scenario is the same as scenario 1; i.e. for no intervention. There would continue to be losses of property, to the holiday park and caravan sites. The frontage to the south of Culver headland through to the northern end of the existing defences at Yaverland would also continue not to be defended.

In defending the northern end of Yaverland and the length of potential breach through to the southern end of the Yar Valley (through Culver Parade), this sea wall, already quite markedly in front of the shoreline to the north, will be further exposed. Future erosion of approximately 64m could occur over 100 years. Maintaining this wall is likely to result in reducing the drift to the north, quite possibly increasing erosion to the cliffs.

Over the rest of the Sandown Bay frontage, the intent is to maintain defences. These structures, overall, will come under increased pressure, as beach levels fall with increased wave action and water depth. Drift rates may well increase although the walls themselves do prevent sediment from entering the system. There remains the potential in some areas, particularly between Sandown and Shanklin, for continued cliff falls. These are relatively local but would continue under this scenario and can be triggered by seasons of heavy rainfall. At the southern end there would continue to be significant recession of the cliff crest, with the potential loss of property and possible loss of the cliff path in front of Luccombe Village. Road access to Luccombe could be threatened. Maintaining defences will prevent the natural erosion and succession of the cliff line here.

Summary:
Considering the overarching objectives this scenario would support; specifically the continued viability and economic activity of Sandown Bay, it should be recognised that there would be substantial loss of beaches in the longer term and this may compromise traditional tourism values to the area. Continued defence at Yaverland would be under greatest pressure. In Bembridge Harbour the various commercial activities would be supported but, with the increased siltation of the harbour and the increasing flood risk to the area behind the Duver and around the harbour, there would be a need for adaptation to new conditions. In other areas there would be loss to properties and the various holiday parks but, while significant in terms of the individuals involved, this would not substantially damage the local economy. In areas of loss, the aim, under this scenario, is to try and slow loss, allowing greater time for adaptation.

In is the intention that policies maintain the freshwater habitats of the Eastern Yar, which are of conservation importance in their own right, and as a result of the bird populations that they support. Maintenance and upgrading of existing defences is required in a number of locations, particularly at the southern end of the Yar Valley, to ensure this outcome. However along other stretches of this coastline, most significantly along the cliffed coastline from Culver to Shanklin, natural processes of coastal erosion and succession will be allowed to continue.

Over much of Sandown Bay and within the Yar Valley historic features would be defended, although there would be loss to the north of Yaverland and potentially around the entrance to Bembridge Harbour.

Table 1a. Economic Assessment – Erosion damages

The following table provides a brief summary of damages determined by the SMP2 MDSF analysis for the whole PDZ. Further details are provided in Appendix H. Where further, more detailed information is provided by studies, this is highlighted. The table aims to provide an initial high level assessment of potential damages occurring under the two baseline scenarios.

ASSESSMENT OF EROSION DAMAGES

Epoch	0 – 20 year			20 – 50 years			50 – 100 years			
No Active Intervention	**Number of properties:**		**Value**	**Number of properties:**		**Value**	**Number of properties:**		**Value**	**PV Damages**
Location	*Residential*	*Commercial*	**x £1000**	*Residential*	*Commercial*	**x £1000**	*Residential*	*Commercial*	**x £1000**	**(£x1000)**
Horestone to Bembridge Hr.	0	35	1,020	0	20	600	3	20	1,202	1,237
Bembridge to Culver Cliff	5	2	1,143	1	11	344	8	13	1,845	1.384
Yaverland and Red Cliff	0	0	0	0	0	0	0	12	453	32
Sandown and Shanklin	0	18	1,419	12	60	3,584	188	130	42,157	7,057
									Total for PDZ3	**9,711**
With Present Management	**Number of properties**		**Value**	**Number of properties**		**Value**	**Number of properties**		**Value**	**PV Damages**
Location	*Residential*	*Commercial*	**x £1000**	*Residential*	*Commercial*	**x £1000**	*Residential*	*Commercial*	**x £1000**	**(£x1000)**
Horestone to Bembridge Hr.	0	34	1,020	0	14	420	0	12	360	1,111
Bembridge to Culver Cliff	5	0	958	1	7	225	5	7	1,138	1,105
Yaverland and Red Cliff	0	0	0	0	0	0	0	5	375	27
Sandown and Shanklin	0	0	0	0	2	30	9	1	1,725	36
									Total for PDZ3	**2,379**
Notes										
SMP.										

Table 1b. Economic Assessment –Flood damages

The following flood damages have been determined through use of MDSF. These figures are aimed to indicate the level and impact of flood risk rather than being a detailed economic appraisal. In many areas substantial numbers of properties would be liable to flooding on the more frequent events both under NAI and WPM, a nominal write off value has been allowed in the table for properties at frequent risk; this generally excludes values at risk at present on a 1:1 year event, in 50 years time for the 1:10 year event and in 100 year time the 1:50 year event.

ASSESSMENT OF POTENTIAL FLOOD RISK

	Flood risk tidal 2010			Flood risk tidal 2060			Flood risk tidal 2110			
No Active Intervention	**No. of properties**		**AAD**	**No. of properties**		**AAD**	**Number of properties**		**AAD**	**PVD**
Location	< 1:100yr	>1:100yr	**x £1000**	< 1:100yr	>1:100yr	**x £1000**	< 1:100yr	>1:100yr	**x £1000**	**(£x1000)**
St Helens Duver (K)	32	5	771	38	4	1,687	49	5	3,198	38,726
Eastern Yar North (L1,2,3)	454	95	5,150	555	45	7,785	616	20	12,005	198,840
Eastern Yar South (L4)	544	74	20,979	624	76	27,922	748	33	40,373	750,073
Upper Eastern Yar (L5)	481	65	1,128	551	50	1,704	635	26	2,758	43,952
Agricultural Total			53			57			65	1,654
									Total for PDZ3	1,033,245

With Present Management	**No. of properties**		**AAD**	**No. of properties**		**AAD**	**No. of properties**		**AAD**	**PVD**
Location	< 1:100yr	>1:100yr	**x £1000**	< 1:100yr	>1:100yr	**x £1000**	< 1:100yr	>1:100yr	**x £1000**	**(£x1000)**
St Helens Duver (K)	32	5	131	38	4	234	49	5	75	4,654
Eastern Yar North (L1,2,3)	454	95	678	555	45	941	616	20	272	21,327
Eastern Yar South (L4)	544	74	543	624	76	678	748	33	888	18,532
Upper Eastern Yar (L5)	481	65	33	551	50	45	635	26	61	1,191
Agricultural Total			4			4			5	129
									Total for PDZ3	45,833

Table 2. General Assessment of Objectives

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

STAKEHOLDER OBJECTIVE	**NAI**			**WPM**		
	Fails	Neutral	Acceptable	Fails	Neutral	Acceptable
To sustain and adapt important centres of economic activity including Sandown Bay.						
To sustain and adapt the communities of East Wight to reduce flood and erosion risks.						
To address the risk of tidal inundation of the Eastern Yar Valley and access to East Wight communities.						
To maintain important access along the seafront and shoreline use of the area.						
To protect Brading Marshes (European designated freshwater habitat)						
To support opportunity for adaptation supporting and enhancing the nature conservation value of the area subject to natural processes						
To maintain the important landscape						
To sustain the historic landscape and environment where practicable						

3. Discussion and detailed policy development

3.1. Comparison of Baseline Scenarios

From the above assessment of the baseline scenarios it may be seen that Scenario 1 (No Active Intervention) is not an option if the key values of the area are to be addressed. The scenario would result in loss of use within the Bembridge Harbour area which supports the local economy and hence communities; without the opportunity to adapt sensibly to this change. More significantly, from a regional scale, Sandown Bay is accepted as a major tourism destination, with the threat of substantial and on-going loss of the towns of Sandown and Shanklin and essentially their seafront amenity. Equally, from a national and international perspective is the change in habitat that would occur with inundation of the Eastern Yar Valley. The lower part of the valley, backing directly on to Bembridge Harbour is designated for its freshwater environment and, based on the discussion and consultation undertaken through the recent Strategy, is not realistically replaceable. The overall conclusion coming from the assessment, therefore, is that the coastal flood and erosion and geomorphological behaviour of the area has to be managed.

Considering the second baseline scenario (With Present Management), in looking at the present approach to management, it can be understood that, while the approach delivers many of the objectives at present, there are concerns that in managing the shoreline there are pressures building within the system. This would result in increased fragility of the system and increasing reliance on defence. In the long term (in some areas beyond the period of the SMP) it might be anticipated that change will be necessary. If this change were not managed, in moving from the current form of management there would be sudden losses, with little opportunity to put in place change of use to accommodate the changes in circumstances. Many of these changes would be driven by sea level rise and the associated risk of erosion, increased or change in sediment transport and the level to which defences would need to be built. This situation is epitomised by the management of the Eastern Yar Valley; not so much at the Bembridge Harbour end of the valley, where the accretion within the harbour and the opportunity to raise defences along the embankment is identified in the Strategy as being sustainable for a long time hence, but at the sea front at Yaverland, where the seawall is already under considerable pressure and vulnerable to overtopping. Other areas of change equally raise concerns:

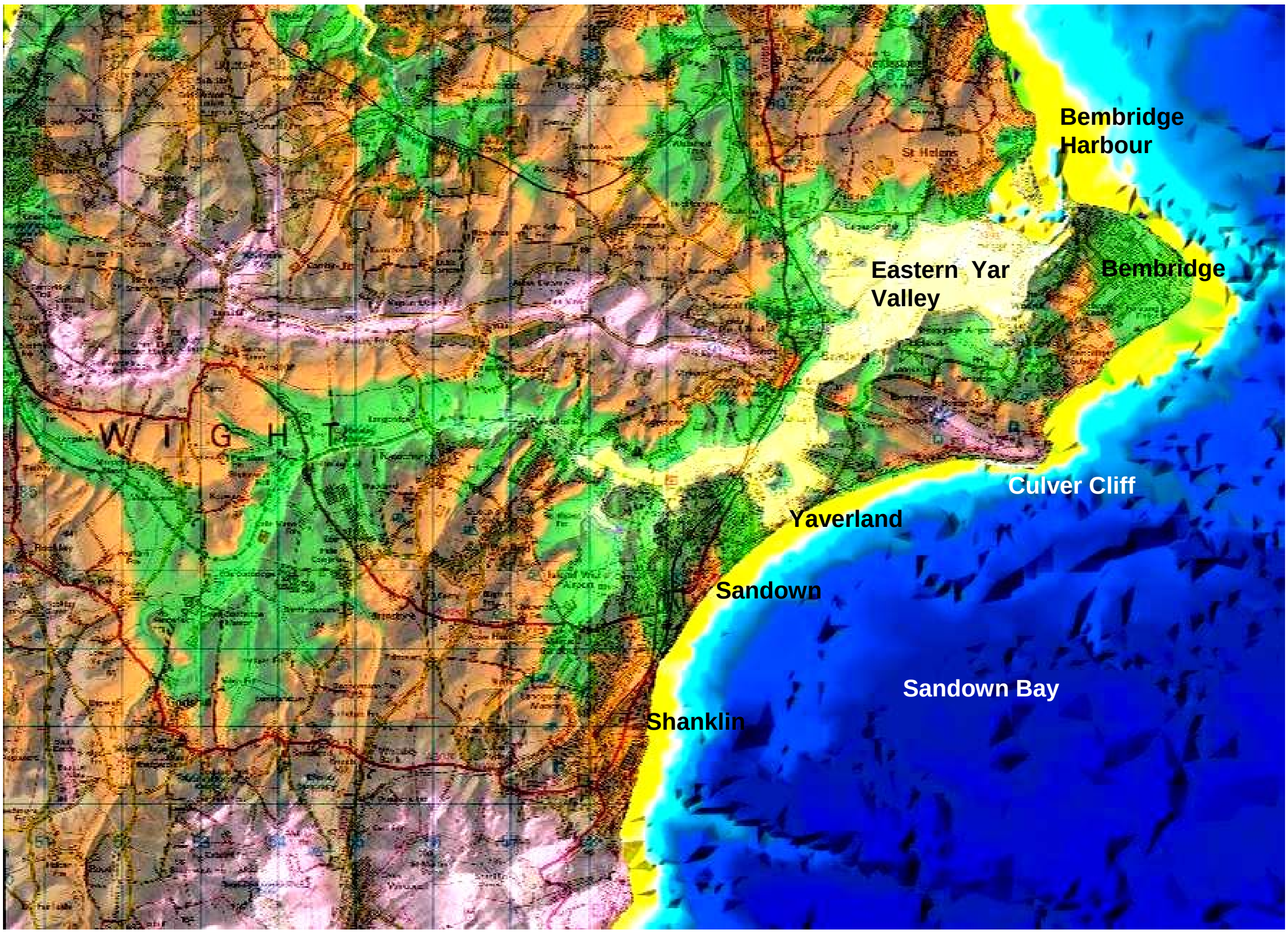
- There may be increasing difficulty in maintaining a reasonable beach width along the main tourism frontages of Sandown and Shanklin. While the broader economic case for continued defence may be made based on the assets at risk, the loss of this beach area would have a significant impact on the economic viability of many of those assets.
- Maintaining local sections of defence around the Bembridge headland run the risk of being outflanked if actions are not co-ordinated with the way in which the undefended sections of coast between defended lengths are managed.
- Adopting the SMP1 policy along the Duver of maintaining defence over fifty years but then potentially abandoning defence of this section beyond that, as suggested by the Strategy, imposes initially considerable constraint on the way in which this frontage may wish to adapt, potentially creating greater fragility within the spit behaviour and leading to sudden change to the use of the area.

Neither baseline, therefore, fully delivers a sustainable approach to management, although Scenario 2 (With Present Management) does set a generally acceptable intent. It is therefore the delivery of that intent within Scenario 2, as to how the coast needs to be managed, that needs to be examined further.

3.2. Discussion of Approach and High Level Policy

The zone might be considered as three units: the Bembridge Harbour area with the associated Eastern Yar Valley, the Bembridge and Culver Headland, and Sandown Bay, again with its association with the Eastern Yar Valley.

Culver Cliff imposes a major control on the southern part of the system. At the large scale Bembridge Forelands equally controls the extent and behaviour of Bembridge Harbour entrance. In either case, regardless of the management approach, the geomorphological presence of these features will continue to dominate the behaviour of the zone. In reality, No Active Intervention would be the approach taken to the Culver Cliff; it is not sensible to attempt to manage the slow erosion in this area. With respect to the Bembridge headland there are issues, in terms of sediment supply and the impact of defence on this, that have to be considered in relation to Bembridge Harbour. However, at the large scale this headland will remain as a controlling feature.



PDZ3: General topography and bathymetry of the zone.

The principal management issue linking Sandown Bay and the Bembridge Harbour area is, therefore, the management of the Eastern Yar Valley. The following discussion, in developing the plan, focuses initially on this aspect of the zone.

The Eastern Yar Flood and Erosion Risk Management Strategy makes a clear and strong case for continued defence to the back of Bembridge Harbour. Although also supported by economics based on risk to assets, the driving feature for defence is maintaining the internationally designated habitat in the lower valley. This area of designation (SPA and Ramsar) covers the whole area of the valley floor extending down to the bridge at Yarbridge. Further upstream there are other regional and national nature conservation designations. The principal economic drivers for defence are divided between the areas to the north and to the south of Yarbridge, with local assets at risk spread around the fringes of the lower valley, with a more intense congregation of assets within the upper valley, to the northern end of Sandown and to the housing estate of Yaverland. Many of the properties and commercial buildings in the upper valley are within the 1:1 year tidal flood plain, based on present sea levels, and indeed much of the valley floor between Sandown and Yaverland would be within the intertidal zone if undefended. The main access routes through to the communities of Eastern Wight are across the embankment at Bembridge Harbour, at Yarbridge, and along the sea front of Sandown Bay. Additionally the principal A-road and railway from Sandown towards Ryde crosses the Yar Valley to the north of Sandown.

The Eastern Yar Strategy assumes the long term protection of the sea front at Yaverland (based on SMP 1 policy). This assumption needs to be considered further given the constraint it imposes on management of the frontage.

If the defence of the sea front were abandoned, this would open the Eastern Yar valley to flooding in the same way as might occur if the embankment at Bembridge Harbour were allowed to fail. However, there would be the realistic opportunity to maintain defence to the lower valley (north of Yarbridge) by embanking the road at Yarbridge. The lower valley would still have a fluvial input from the catchment to the east and west, maintaining freshwater interest. However, a breach at Yaverland may address the issues of extreme runoff from the Yar and the need for pumping to maintain appropriate water levels as the valley becomes increasing tidally locked in the future.

With respect to the upper section of the Eastern Yar, there would be significant flood risk to areas of Sandown and Yaverland and these would need to be considered, together with how best to manage the rail and road access to Sandown. This would require careful examination of the cost-effectiveness of a potential managed breach. There would, however, be real potential in creating new saline habitat within the area of the upper Yar, as well as potential for more adaptive management of the shoreline.

In principle, this option for changing management at Yaverland is not, therefore, ruled out in the longer term. With the potential of maintaining a defence at Yarbridge, this allows the opportunity to consider management of the shorelines of Sandown Bay and Bembridge Harbour separately. In looking at this from the perspective of the Sandown Bay frontage, the issues in terms of increased risk would need to be considered in relation to the sustainability of defence at the shoreline.

Based on this conclusion, it is possible to sub-divide the PDZ further focussing on key issues for management:

- The local management of the Bembridge headland is considered, recognising the need to maintain the sediment supply to Bembridge Harbour area.
- Bembridge Harbour area considers in particular the management of the Duver, the interaction and management practice of dredging near Bembridge Spit and the supply of sediment from the cliffs to the north.
- Sandown Bay and the long term issues of maintaining sustainable defence to key areas of economic and social value.

3.3. Plan and Policy Development

Although not in geographic order, each of the three areas are discussed in the order set out above, recognising the logical implications of broader scale interactions between areas.

Bembridge Headland to Culver Cliff
The current management takes an approach of no active intervention between Forelands Fields and Culver Cliff. The SMP would concur with this policy, despite the potential loss of some 22 properties (mainly associated with the holiday park but also the Old House during the second epoch). These properties and assets are relatively isolated and would remain vulnerable to general

cliff instability even with toe defence in place. Any long term intent to protect areas locally would be outflanked and possibly overtaken by cliff failure. The section of coast provides an important sediment supply to the shoreline and any attempt to provide more wholesale protection would be detrimental to the geological and nature conservation interest in the area.

This policy would continue to provide sediment in support of management further to the east in assisting to support beaches.

In the area of Forelands Fields is a collection of properties at risk under a no active intervention policy. It has been assessed through the NE Coastal Defence Strategy (2004) that the sea wall in this area could be maintained through encasement. While at present this could be economically justified, the very exposed position of this defence makes long term management for the frontage harder to manage. The critical driver of this is sea level rise. As the ledges, which provide a high degree of protection to the foreshore, become more submerged, the effort to defend the frontage would substantially increase. The Strategy recommends that to north of here management should take the form of slowing erosion through beach management. Further north the approach would be to maintain the defence in the area of the Lifeboat Station. This again would be increasingly difficult to sustain with sea level rise. In each case the approach is to sustain some degree of defence while technically sensible. The longer term outcome would be accepting that the sea walls were unsustainable and their replacement could not be fully justified.

An alternative overall approach would be to manage the whole headland in a more complete manner. Typically this would involve construction of headland breakwaters with the intent of retaining significantly greater levels of sediment, establishing a long term intent to stop erosion and retain use of the headland. While such an approach might allow significant lengths of shoreline to remain effectively undefended, it is likely to be considered to have a significant detrimental impact of the designated nature conservation interests.

There are, therefore, two potential approaches which are quite different in their whole attitude to management of the frontage. In the first, the overall intent would be to manage the continuing process of retreat; a process that will continue beyond the 100 years considered by the SMP. In the second, the approach would be one of realigning the coast with the intent to hold the overall line, in effect, indefinitely. This alternative approach could not be recommended within the SMP2 without more detailed examination of the impact on the nature conservation values, potential affect on sediment drift to the north nor without the ability to identify alternative funding sources beyond that justified by coast protection.

The SMP policy is, therefore, based on the first of these approaches. Over the short to medium term the existing defences would be maintained and, in the area between, there would be the aim to manage sediment drift locally to the backshore to manage a retreating foreshore. In the long term, probably within the third epoch, management would change to allowing and managing retreat over the whole length, managing drift along the frontage to slow rates of erosion but without replacement of the sea walls. The change in policy would be triggered by such aspects as the level of overtopping, damage and outflanking of the sea wall. A clear intent would need to be signalled that in this area, that while the existing defences would be maintained and even improved, they would not be replaced or raised. This is in line with the Strategy but provides clearer long term intent. The policy differs substantially from SMP1 due to consideration of a longer timescale and the further understanding of sea level rise. The policy would initially be defined as three units of Hold the Line to the two lengths of defence during epochs 1 and 2 and a policy of managed realignment to the unit between. In epoch three the units would be merged, with one policy covering all three of managed realignment.

Such a policy is unlikely to impact significantly on drift supply to the north and therefore would not impact on sediment supply to Bembridge Harbour.

There is no justification for undertaking defence works along the frontage from Lane End Road through to Ducie Avenue. This would not preclude limited management through control of drift to slow erosion but only to the extent that it did not impact on nature conservation interests and did not impose a constraint on sediment supply to the north. The policy here is for No Active Intervention.

Bembridge Harbour
The Strategy for the area effectively sets the intent of policy. The SMP highlights certain issues that come from a potentially broader remit and longer term perspective of looking at management implications beyond the 100 years; even thought the plan only develops policy over the initial 100 years.

At the northern end of the frontage, while net shoreline drift is to the south, towards the harbour, there is a more northerly biased drift indicated in the nearshore area. This is potentially, in part, fed from the offshore side Bembridge spit and may be fed by sediment flushing from the area of the harbour where the channel eventually cuts through the Bembridge spit. The harbour, therefore, does act principally as a sediment sink but with some anticipated loss to the nearshore system. It is important, therefore, that sediment is still fed to the area of the harbour. This supply comes in part from the Bembridge headland to the south (as discussed above) and from the eroding cliffs of Priory Bay, but also from the nearshore system. For sustainable management of the area, maintaining these supplies is important, not least in maintaining the integrity of St. Helens Duver.

The Duver is a natural feature that has relied for its creation and continued sustainability on good connection with this general mechanism of sediment supply. Its ability to adjust to change in response to the position and pressures created by the harbour channel and connection with sediment supplies in the area is important. The position of the channel is itself a function of the behaviour and development of the Bembridge spit and more recently upon the dredging effort put in to maintain navigation. The hard defence along the Duver has both reduced the capacity of the feature to respond naturally and has as a consequence detached the shoreline of the Duver from its natural nearshore supply of sediment.

In the long term, the intent is that the harbour system would be managed in way that the usage of the harbour is maintained and that flood and coastal erosion risk is reduced. This has to be undertaken in a manner in balance with the natural processes. This requires a co-ordinated approach, moving away from local reaction to change to a position where management and use can adapt to natural change without causing significant knock on effects or imposing unsustainable constraints on the system.

The Eastern Yar Flood and Erosion Risk Management Strategy (led by the Environment Agency, 2010) looks in detail at management of the embankment at the back of the harbour and concludes that this should be maintained and raised in line with sea level rise. The SMP concurs with this finding. The importance of the designated freshwater marsh habitat of Brading Marshes is an essential part of the justification for maintaining the defence line at Embankment Road. Sustaining Embankment Road will primarily meet obligations to protect the internationally protected habitat in and around Brading Marshes (under Article 6 of the habitat regulations). The Eastern Yar Strategy also advises that Embankment Road also protects around 450 properties and the key road between Bembridge and St Helens from flooding to a standard of 1:25 and meets obligations under the Bembridge Harbour railways act. In developing this approach it is taken that the flood risk to properties and commercial activity at the western and eastern ends of the embankment would be considered in detail and the most effective line of improved defence would be considered taking these properties into account. The Strategy recommends that along the St Helens frontage (in the west of the harbour) defences are maintained at their current level for the next 100 years, to allow protection from tidal flooding of the mix of residential, commercial and recreational facilities along the water’s edge at the lower margin of the village. It is anticipated that the existing structures will need to be maintained and the wall may need to be repaired every 10 years. The SMP supports this need and the clarity provided by the Strategy stating that securing central government funding for this frontage will be difficult, therefore homeowners and businesses should be prepared to take action to protect their homes and properties from flooding. The Strategy encourages riparian owners to continue ongoing maintenance of the harbour wall.

The harbour area is at present accreting and monitoring suggests that the system has the capacity to accrete at least in line with sea level rise. This would impact on the area of the wharf in the east of the harbour and assets identified as being at flood risk in this area would need to adapt alongside the need for the defence line to be raised in response to sea level rise as part of a scheme for Embankment Road.

Accretion would be expected to continue behind St. Helens Duver but there would continue to be flood risk to properties along and within the spit, encroaching from the low-lying inner side of the spit. The intent of the SMP is to allow maintenance of the existing limited areas of private and public defences along the St. Helens Duver in the short to medium term, before adapting the change in the long term. In more detail along the inner St. Helens Duver the defence line is not continuous and it is not the intention to provide new defences on the inner spit given the important nature conservation values of this area.

The front face of the St. Helens Duver presents a more difficult management issue, given both the poor condition of the defence and the legal issues understood to apply to this area. The history of defence along this length prevents natural development of the dune behind and reduces the future ability of the frontage to adjust to natural change. It is recommended by the SMP that no new defence is imposed upon this frontage, although recognising that there may be a commitment to maintaining the existing structure while sustainable to do so. The intent would be to manage the alignment of the St. Helens Duver in such a way that it still provides a robust defence against breach and wave overtopping. Continued defence along the existing line reduces this long term capacity of the St. Helens Duver to provide this defence making it increasingly vulnerable to sudden failure under extreme storm conditions. As part of the intent to re-introduce a more natural defence to the harbour behind and properties within the St. Helens Duver, it would be expected that the defence to the northern part of the Duver, in front of St Helens Church is maintained in the short to medium term. Defence in this area clearly provides a degree of protection to the northern end of the St. Helens Duver, establishing a stable base from which to manage the rest of the frontage. This would be considered as part of an overall policy of managed realignment of St. Helens Duver. The southern end of St. Helens Duver might also be managed, principally with the intent of maintaining navigation to the harbour. Control of this point would need to be considered alongside the intent to manage adjustment of the main Duver frontage. Critical to management of St. Helens Duver would be the continued monitoring and regulation of dredging of the harbour entrance channel. As a better understanding is obtained as to the impacts of this dredging, so this could be developed as part of the overall management plan.

Although the Strategy indicates that there is little value in maintaining the deteriorating groyne at Bembridge Point as the spit is likely to remain stable, from a flood and erosion risk perspective, there remains the possibility that this structure influences the hydro-dynamic regime of the harbour entrance and as such its position should be considered in relation to the behaviour of the channel and the influence this has on navigation and the management of the adjacent St. Helens Duver. It is, however, recognised that the main pressure on St. Helens Duver is probably as a result of the flood flows rather the ebb. It would be anticipated that it is on the ebb when the groyne would be most effective.

To the north of the harbour area, there is little economic value for preventing continued erosion and slippage of the cliffs to Priory Bay or Nodes Headland. To intervene would significantly impact on sediment supplies to the harbour area. The policy running north from St Helens Church would continue to be No Active intervention.

The analysis undertaken by the SMP suggests that there is flood risk to some properties behind Bembridge Point, increasing with sea level rise. Given the Strategy's findings that the root of

Bembridge Spit is naturally stable, and that therefore the area is not under pressure from erosion, the intention of shoreline management in this area would be 'no active intervention' along the spit with continuation of natural coastal processes along the shoreline and the sand dunes. This includes the intention to not maintain or repair Bembridge Point Groyne at public expense. The Strategy concluded that Bembridge Point Groyne does not have a flood or erosion risk purpose - ie it does not protect any properties from flooding or erosion. However, it is not causing any problems and does not need to be removed. Coastal monitoring data showed that Bembridge Point has been stable for some time, the groyne forms a core to the point which has aided this stabilisation. There is no proposal to spend public funds to repair the groyne, however, the SMP recognises that the owner may wish to maintain the groyne at his expense, and the IWC, Environment Agency and Natural England would not object to this maintenance in theory, subject to the normal planning permissions. Immediately adjacent to the sand spit the Strategy recognises that properties are at flood risk behind Bembridge Point (between the top of Embankment Road and the open sea to the north) but this risk comes from Embankment Road rather than the open coast at Bembridge Point. It proposes including protection of these properties as part of a comprehensive 'hold the line' defence scheme for the Embankment Road frontage. The SMP supports this assessment and intended management outlined in the Strategy.

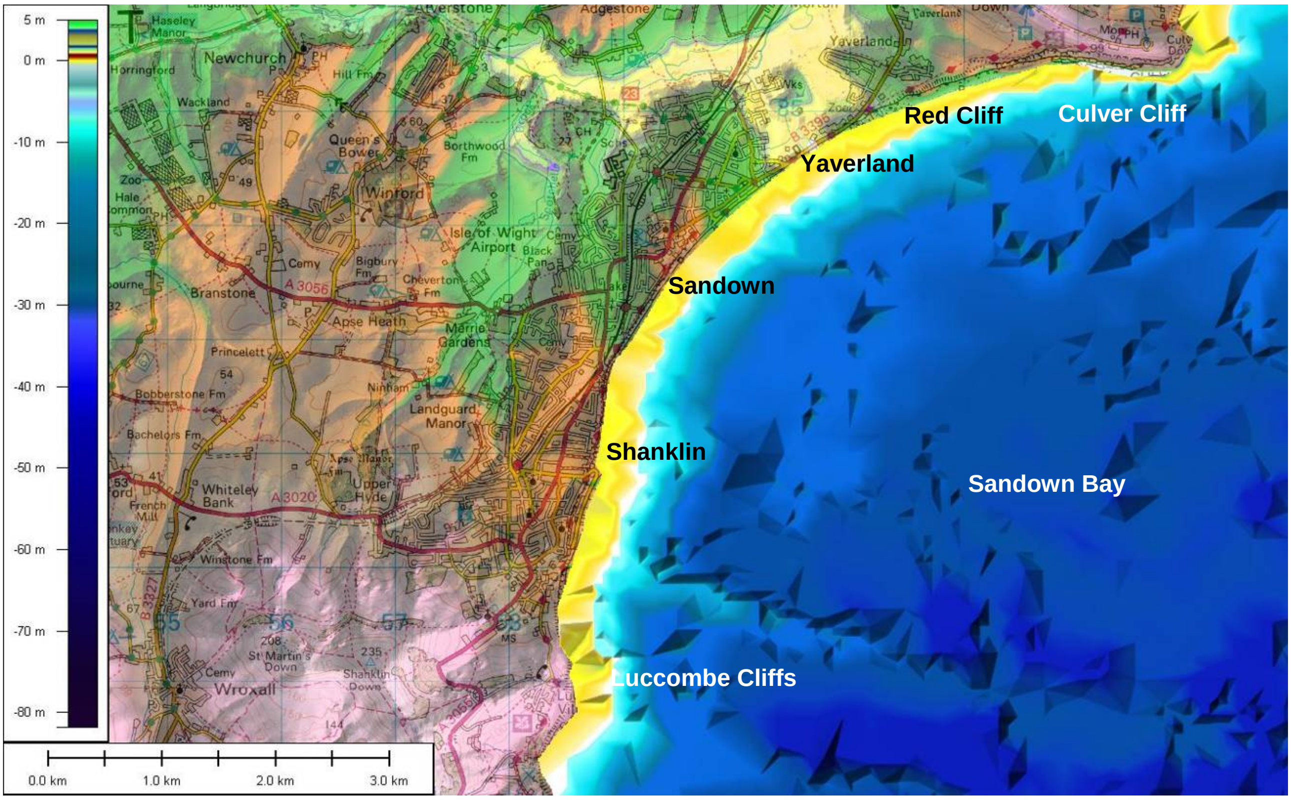
Sandown Bay

Sandown and Shanklin have been identified as important economic hubs in sustaining the economic prosperity of the Isle of Wight. Much of this regional value is associated with tourism, with the sea front, promenade and beaches being an essential feature of the area. This value is within the context of the important historic value of both the developed and the more natural areas of the coastline and the superb landscape provided by Culver and Luccombe cliffs the either end of the Bay. The problem in maintaining defence to the developed frontage is the increasing pressure as a result of anticipated sea level rise. Despite defence remaining technically feasible, a linear approach to defence would result in steepening of the backshore beach and substantial loss of amenity beach area.

The only new supply of sediment to the frontage comes from the erosion of the adjacent cliffs. At the southern end of the frontage, the generally undefended section of coastline between Horse Ledge and the southern end of the Shanklin, the shoreline is both subject to erosion and cliff recession. Material provided by this cliff is important to sustaining sediment along the rest of the Bay. The policy for this section is No Active intervention. Locally some properties would be at risk during epoch 3. Management at the southern end of the Shanklin promenade may provide protection to some of these properties, but the intent would be that defences did not encroach further south than at present, also that changes to the management of the existing defence would not interfere with the important supply of sediment to the main bay.

To the north, the erosion of Red Cliff does provide sediment to the system and, while there is a weak longshore drift to the north, it would be anticipated that this frontage also provides, more generally, sediment to the nearshore area contributing to the reservoir of sediment within the bay. Over this section of the coast the policy would be for No Active Intervention. This would result in loss to commercial amenity assets and the historically important Gun Battery at the northern end of Yaverland. It would neither be economically justifiable nor technically sensible to further extend defences to the north. This policy does highlight the step that is already developing between the defended and undefended section of coast at Yaverland. The nature of this step with a very clear change from the shoreline being held forward by the defence and the immediate cut back in the area undefended, does suggests that this is more a result of the evident backshore strength (concrete walls do not erode, relatively soft cliffs do), rather than an consequence of drift starvation north of the wall. It does, however, highlight the problem of outflanking of the defences and the increased exposure the defence faces in the future.

The overall intent over the main developed frontage would be to sustain the towns and the important amenity value. This developed area is seen as covering four slightly different areas. At Shanklin the shoreline is held in advance of what might have been expected to be the natural curve of the bay. This is seen as being a feature as much of the local geology and the ridge running through into the nearshore sea bed as of development taking place in advance of a more natural curve of the bay. The defence line is, however, held forward by the breakwater at the northern end of the promenade.



General topography and bathymetry of Sandown Bay.

Immediately north of the Shanklin promenade, the defence steps back and runs as a promenade close to the toe of the cliff below Lake. Beach levels are low in front of the promenade. This is seen as being principally a lack of width and due to the slight reorientation of the whole coastline rather than being a result of sediment being trapped along the main Shanklin frontage. Basically there is an increased drift potential along the frontage which does not allow sediment to be retained over the upper beach.

The shoreline then adjusts over the main Sandown frontage to the apparently more natural curve of a typical crenulate bay. The suggested decrease in drift potential along this frontage does support a higher beach and this is reinforced by the breakwater at the northern end.

The final section across the Eastern Yar Valley, between Sandown and Yaverland is now in advance of the natural bay shoreline as discussed above in relation to the set back of the undefended Red Cliff area to the north.

Management of all four sections is seen as being economically sustainable adopting current practice over the first epoch. Certainly over the southern three sections described above (Shanklin, Lake promenade and Sandown) there is little or no opportunity for general realignment either with respect to the values associated with the sea front or from a technical view point. In addition to loss of the main built amenity along the coast, any additional width created between the existing defence line and the steeply rising cliffs would be insufficient to allow any substantially greater upper beach to develop. In effect removal of existing defence would merely transfer the management problem further back.

Monitoring data, demonstrating the variation both seasonally and over longer periods, shows the potential for the upper beach to be both drawn down and banked up against the defences along all sections of the developed shoreline. This would indicate significant cross shore movement, as well as the evident longshore behaviour, highlighting the important interaction between the shoreline and the nearshore area. In many ways the shoreline may be seen as two mechanisms: that driven by longshore drift, most obviously exemplified by the trapping of sand against existing cross shore breakwaters, and this interaction of sand moved to and from the wide intertidal beach and nearshore zone into the area of the upper beach. There is therefore likely to be opportunity to manage these two processes to develop and retain beaches along the main defended length and this is considered to be the likely sustainable approach in the future with sea level rise. Artificial recharge of the frontage, without some additional control, would be committing to an approach which is likely to be unsustainable in the longer term. Sediment would be transported longshore and lost to the nearshore area. More probably the need will be for larger cross shore and nearshore structures to ensure the important amenity value of the frontage is maintained.

Given the increasing anticipated pressure on national funding in the future, together with the increasing actual cost in moving towards cross shore or nearshore structures, there may be a need for additional funding sources to maintain the full economic value of the area. Typically other sources would need to recognise the importance of tourism to the Isle of Wight and the importance of this area in that respect.

Developing from this there might be opportunity for deliberately advancing the line, making use of control structures to reclaim land and attract additional funding to the area. Such an approach would require overall planning of the frontage both in terms of the interaction between sections of the shoreline and in terms of spatial planning of new development in keeping with the use of the present sea front. It would have significant impacts on the environment and character of the area. In particular the expectation of ongoing sporadic but notable cliff-falls occurring from the former seacliffs, behind and above much of the current defence line, would also be a key issue for consideration. Advancing the line may be an option in the third epoch, recognising the time necessary to develop such a process. Fortunately, the condition of defences is such that there would be time to develop this while still maintaining the existing approach over the short to medium term. The policy over the main three southerly defended and developed frontages is therefore Hold the Line. The possibility of advancing the defence line in the future would have important impacts on cliff risk assessment, character, environment, amenity use and businesses of the area. At the level of the investigation undertaken by the SMP, these issues cannot be adequately addressed. The possibility could be investigated further and would need extensive co-ordinated planning. The SMP, therefore, cannot recommend this as policy but this option could be examined in more detail in a Coastal Defence Strategy.

The fourth of the defended sections within Sandown Bay (Sandown to Yaverland) is potentially different both in its character and its nature. It is, in effect, the transition both from the area of intensive sea front development and use and the transition zone between the defended and undefended shoreline. This frontage provides essential protection against breach through to the Eastern Yar Valley. The economic assessment, though only at a high level, indicates substantial economic risk of flooding the area behind. There would, therefore, be good justification in maintaining the defence over this area. This could justify increasing the robustness and standard of protection provided and further development of the cross shore/nearshore control of the shoreline drift and shape of the coast in line with the approach recommended to the south. However, this would continue to incur increasing cost (which is likely to be justified) in to the future but would also result in a very stark change from defence to natural erosion to the north of Yaverland.

Because of the nature of the area, there remains an alternative approach of allowing and managing a breach into the Eastern Yar Valley. This has the potential of restoring natural estuary conditions to the upper Yar Valley and, through the potential to create a significant ebb tide delta, providing a far more natural transition between the developed coast and the natural coast to the north. There would be substantial economic, environmental and social implications of this. These would include: loss of nationally designated sites but opportunity for significant saline habitat, the need for either new defence to be created around the edges of the new estuary or the need to move property and infrastructure, and the need to safeguard important transport routes. At the level of the investigation undertaken by the SMP, none of these issues can be addressed. The approach, which would need to be developed further would need extensive co-ordinated planning and is not something that is likely to be considered within the first two epochs. The SMP, therefore, cannot recommend this as policy but does strongly recommend that this approach is given further thought and discussion as a potentially more sustainable manner of managing this area of the shoreline. The underlying policy for this frontage is Hold the Line, but the option of realignment rather than advance the line is offered as a realistic if challenging alternative in the third epoch which could be examined in a Coastal Defence Strategy.

PDZ3
Management Area Statements

- **Bembridge Harbour (MA 3A)** includes five policy units.
- **Bembridge Headland to Culver Cliff (MA 3B)** includes five policy units, reducing to three in epoch 3.
- **Sandown Bay (MA 3C)** includes six policy units.

Within these areas a summary of policy is provided below. Management Areas statements are provided in the following sheets, with maps showing each area.

Location reference	**Bembridge Harbour**
Management Area reference	**MA 3A**
Policy Development Zone	**PDZ 3**

The following descriptions are provided to assist interpretation of the maps shown of each Management Area.

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical rates and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change, these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan, reference should be made to the baseline data (see Appendix C3).

100 year shoreline position:

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

In some areas the preferred policy does not change from that under the existing management approach. In some areas where there are hard defences this can be accurately identified. In other areas there is greater uncertainty. Even so, where the shoreline is likely to be quite clearly defined by a change such as the crest of a cliff the estimated position is shown as a single line.

- Where there is a difference between With Present Management and the Preferred Policy this distinction is made in showing two different lines:

With Present Management.
Preferred Policy.

- In some areas, the Preferred Policy either promotes a more adaptive approach to management or recognises that the shoreline is better considered as a width rather than a narrow line. This is represented on the map by a broader zone of management:

Flood Risk Zones:

All flood risk zones are based upon the current tidal EA Flood Zone 2. This is an extreme flood event (1:1000 year at current levels) meaning that it has 0.1% chance of occurring each year.

General Flood Risk Zones. The explanation of these zones is provided on the Environment Agency's web site www.environment-agency.gov.uk. The maps within this SMP document show where SMP policy might influence the management of flood risk.

Indicate areas where the intent of the SMP policy is to continue to manage this risk.

Indicate where over the 100 years the policy would allow increased risk of flooding.

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

Note: This Management Area corresponds to IW13, 14, 15 and 16 in selected Appendices.

Policy Development Zone 3 - Bembridge and Sandown Bay
Management Area 3A - Nettlestone to Bembridge Harbour
(Ch 43 - 50)
Key
Policy Development Zone boundary
Management Area boundary
Policy Unit boundary
Existing Coastline and Chainage (km)
Scheduled Monument
Cowes
East Cowes
Gurnard
Fishbourne
Ryde
Springvale
Seaview
Seagrove
Yarmouth
Newtown
Wootton Creek
St Helens
Colwell
Newport
Brading
Totland
Freshwater
Yaverland
Brook
Brighstone
Sandown
Wroxall
Shanklin
Ventnor
Bonchurch
Seaview
43
44
45
46
47
48
49
50
PU3A.1
PU3A.2
PU3A.3
PU3A.4
PU3A.5
MA3A
ST HELENS CP
St Helens
Bembridge
0
400
800 Metres
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Key
100 Year Shoreline Position:
Preferred Policy would be the same as With Present Management
With Present Management where this differs from the Preferred Policy
Preferred Policy where this differs from the With Present Management
Indicative shoreline zone under the Draft Preferred Policy
Existing Indicative EA Flood Risk Zone 2
EA Flood Risk Zone 2 where SMP policy is for continued management of defence
EA Flood Risk Zone 2 where unfer SMP policy there would be increased probability of flooding
ROYAL HASKONING
ISLE of WIGHT COUNCIL

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN:

There are several important factors relating to the management of this area. The overall intent is to maintain the flood defence provided by the embankment at back of the harbour, reducing flood risk to the Eastern Yar river valley. In managing this, the intent is also to continue to manage the flood risk to St Helens and the properties at Bembridge Point. Alongside this is the intent to sustain use of Bembridge Harbour, together with the aim of supporting continued use of areas of St Helens Duver. This Management Area has been examined in detail through the Eastern Yar Flood and Erosion Risk Management Strategy (Environment Agency, 2010).

Essential to long term management is the need to maintain sediment supply to the area and to maintain the overall natural resilience of St Helens Duver as an important feature providing protection to the harbour area. To achieve this, and to sustain the important nature conservation interest in the harbour area (intertidal mudflats and saltmarsh habitats), there is a need to introduce a better ability for the natural system of the Duver to evolve in response to change in the estuary and in response to sea level rise. The current line of defence works fronting the Duver is against this, creating an artificially constrained alignment that will be become increasingly difficult to maintain and one that increases the vulnerability of the Duver in the face of extreme storm conditions and sea level rise. The intent of the plan is to support maintenance of the existing defence to the front face of the Duver in the short to medium term in accordance with historic local management requirements but with the aim to allow managed realignment beyond this. The whole frontage would continue to be managed with the intent of maintaining defence at the northern end and maintaining control at the head of the spit. Allowing the central section to realign would provide width for this section to adapt to change in the alignment of the main channel, while still forming a robust defence against overtopping and potential breach. This approach to managed realignment needs to incorporate future need for dredging the main channel and to be developed as an overall management plan for the area. An essential factor in future harbour management activities is the need to maintain sediment supply to the area, to complement the plan to continue to protect the Duver.

The management intent along the inner face of the St Helens Duver would be support local action to sustain both the nature conservation value (intertidal mudflats, saltmarsh and sand dune habitats) and current use of the southern end of the Duver by local marine industry. There would, however, be increased flood risk to the inner face of the Duver and it is not intended to provide a continuous defence of this area against flooding. Existing defences can be maintained for 50 years, then the policy of Managed Realignment creates potential to realign defences after this time. Along the water's edge of St Helens, the existing defences can be maintained at their current level for 100 years but it is recognised that securing central government funding will be difficult for this frontage and homeowners and businesses should be prepared to take action to protect their properties from flooding.

As outlined by the Eastern Yar Flood and Erosion Risk Management Strategy (led by the Environment Agency, 2010), sustaining Embankment Road will primarily meet obligations to protect the internationally protected freshwater habitat in and around Brading Marshes (under Article 6 of the habitat regulations), as well as protecting around 450 properties and the key road between Bembridge and St Helens from flooding to a standard of 1:25 and meets obligations under the Bembridge Harbour railways act.

At Bembridge Point, the intent to manage the frontage is specifically in respect of the property at flood risk. It would not be the intent to manage the behaviour and development of Bembridge Spit. The aim is to allow natural behaviour of the coast, to maintain the sediment supply from the shoreline to the south (around the Bembridge headland). There is no proposal to spend public funds to repair the groyne, however, the SMP recognises that NAI would not preclude private maintenance of the groyne if there is a wish to do so, subject to the normal planning permissions.

The behaviour of the spit would need to be considered as part of the management plan for maintaining the channel and the realignment of the St Helens Duver in the long term.

PREFERRED POLICY TO IMPLEMENT PLAN:	
From present day	Maintain the embankment and flood defence along Embankment Road. Support riparian owners undertaking local defence to St Helens the harbour area. Maintain defence of St Helens Duver. Manage the harbour entrance channel to ensure no adverse effect upon coastal processes.
Medium term	Maintain the embankment and flood defence along Embankment Road and to properties at Bembridge Point. Support riparian owners undertaking local defence to St Helens the harbour area. Maintain defence of St Helens Duver, with consideration of the intent to reduce management of the area in the long term.
Long term	Maintain the embankment and flood defence along Embankment Road and to properties at Bembridge Point. Support riparian owners undertaking local defence to St Helens the harbour area. Maintain defence to the northern end and control of the southern end of the Duver in line with a management plan for realignment of the Duver and management of the main channel.

SUMMARY OF SPECIFIC POLICIES

Policy Unit (& length)		**Policy Plan**			
		to 2025	**to 2055**	**to 2105**	**Comment**
PU3A.1	**Priory Bay** (1,515m)	NAI	NAI	NAI	
PU3A.2	**St. Helens Duver** (1,958m)	HTL	HTL	MR	HTL with public and private defences; Realignment in the third epoch in line with a plan for management of the harbour entrance.
PU3A.3	**St Helens** (879m)	HTL	HTL	HTL	Maintain the defences at the current level. Securing central government funding will be difficult for this frontage and homeowners and businesses should be prepared to take action to protect their properties from flooding.
PU3A.4	**Embankment Road** (1,497m)	HTL	HTL	HTL	Strong links to PU3C.2.
PU3A.5	**Bembridge Point** (583m)	NAI	NAI	NAI	No intervention will be undertaken at public expense along the shoreline of Bembridge Point (allowing the groyne to collapse/disappear and continuation of natural coastal processes along the beach and the sand dunes). However, NAI does not preclude private maintenance of the groyne. Nb. During epoch one a new defence alignment to be defined that links Embankment Road (PU3A.4) with higher ground at the back of Bembridge Point; this will provide a continuous defence around properties that will be held in future epochs (nb. Eastern Yar Strategy 2010).
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment					

CHANGES FROM PRESENT MANAGEMENT

The general intent of management remains the same in that the aim is to continue management of flood risk to the Eastern Yar valley and to the main areas of properties to the rear of the harbour, while also sustaining the use of the harbour. However, in practice the SMP introduces change in terms of management of the St Helens Duver, reflecting the findings of the Eastern Yar Strategy and in taking a longer term perspective. For the Duver, the policy would change to Managed Realignment in the long-term.

IMPLICATION WITH RESPECT TO BUILT ENVIRONMENT

Economics		**by 2025**	**by 2055**	**by 2105**	**Total £k PV**
Property	Potential NAI Damages/ Cost £k PV	75,045	86,033	77,726	238,804
	Preferred Plan Damages £k PV	11,908	12,161	5,042	29,111
	Benefits £k PV	63,137	73,872	72,684	209,693
	Costs of Implementing plan £k PV	5,437	2,497	1,342	9,276

The preferred plan for this Management Area is economically viable overall. Individual schemes will need to be investigated in further detail to assess their economic viability and affordability.

Location reference	**Bembridge Headland to Culver Cliff**
Management Area reference	**MA 3B**
Policy Development Zone	**PDZ 3**

The following descriptions are provided to assist interpretation of the maps shown of each Management Area.

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical rates and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change, these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan, reference should be made to the baseline data (see Appendix C3).

100 year shoreline position:

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

In some areas the preferred policy does not change from that under the existing management approach. In some areas where there are hard defences this can be accurately identified. In other areas there is greater uncertainty. Even so, where the shoreline is likely to be quite clearly defined by a change such as the crest of a cliff the estimated position is shown as a single line.

- Where there is a difference between With Present Management and the Preferred Policy this distinction is made in showing two different lines:

With Present Management.
Preferred Policy.

- In some areas, the Preferred Policy either promotes a more adaptive approach to management or recognises that the shoreline is better considered as a width rather than a narrow line. This is represented on the map by a broader zone of management:

Flood Risk Zones:

All flood risk zones are based upon the current tidal EA Flood Zone 2. This is an extreme flood event (1:1000 year at current levels) meaning that it has 0.1% chance of occurring each year.

General Flood Risk Zones. The explanation of these zones is provided on the Environment Agency's web site www.environment-agency.gov.uk. The maps within this SMP document show where SMP policy might influence the management of flood risk.

Indicate areas where the intent of the SMP policy is to continue to manage this risk.

Indicate where over the 100 years the policy would allow increased risk of flooding.

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

Note: This Management Area corresponds to IW17, 18 and 19 in selected Appendices.

Policy Development Zone 3 - Bembridge and Sandown Bay
Management Area 3B - Bembridge Harbour to Culver Cliff
(Ch 49 - 55)
Key
Policy Development Zone boundary
Management Area boundary
Policy Unit boundary
Existing Coastline and Chainage (km)
Scheduled Monument
ST HELENS CP
St Helens
BEMBRIDGE CP
Bembridge
Bembridge Airport
PU3B
PU3B.2
PU3B.3
PU3B.4
PU3B.5
MA3B
45
46
47
48
49
50
51
52
53
54
55
56
Cowes
East Cowes
Gurnard
Fishbourne
Ryde
Springvale
Seaview
Seagrove
Yarmouth
Newtown
Wootton Creek
St Helens
Colwell
Newport
Brading
Totland
Freshwater
Yaverland
Brook
Brighstone
Sandown
Wroxall
Shanklin
Ventnor
Bonchurch
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0
400
800 Metres
Key
100 Year Shoreline Position:
Preferred Policy would be the same as With Present Management
With Present Management where this differs from the Preferred Policy
Preferred Policy where this differs from the With Present Management
Indicative shoreline zone under the Preferred Policy
Existing Indicative EA Flood Risk Zone 2
EA Flood Risk Zone 2 where SMP policy is for continued management of defence
EA Flood Risk Zone 2 where under SMP policy there would be increased probability of flooding
ROYAL HASKONING
ISLE of WIGHT COUNCIL
I:\9V7634\Technical_Data\GIS\Projects\SMP_Figures\Baseline_Location_Maps

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN:

Much of the frontage is of international importance for nature conservation with the foreshore and the Bembridge Ledges (nearshore reefs) an essential aspect of this. The outcropping rock ledges also act to provide important erosion protection to the main frontage. The undefended areas of Whitecliff Bay are subject to active slumping and erosion of the toe of the coastal slope, and together with the erosion of the low cliffs around to Bembridge provide important sediment supply both locally and as a feed to Bembridge Harbour. The rock outcrop has retained sediment along the backshore and local defences have been constructed taking advantage of this. There will be increased pressure on existing defences with sea level rise as the rock outcrop becomes progressively submerged. There will be an increased risk to existing defences due to outflanking as undefended sections of coast erode back. The intent of the plan is to maintain defence to local areas while sustainable to do so. However, the longer term intent is to manage the natural realignment of the area. This intent would support efforts to slow erosion through recharge and shoreline control of the backshore where detailed study can demonstrate that this does not significantly impact of the nature conservation values. The intent would, however, be to maintain the general pattern of sediment drift along the frontage and to areas to the north. It is anticipated that existing defence would be maintained to areas of Foreland Fields and Lane End during epochs one and two but this would critically depend on the rate of sea level rise. There would be no intent to significantly improve or raise defences, or to extend defences beyond their present length. In the long term there would continue to be management of the area in slowing erosion but with no intent to construct new hard defences. Managed realignment would therefore be implemented as a continuing approach of allowing the shoreline to retreat. The aim would be to increase the time before property was affected or lost and to maintain local use of the frontage. It will be important to continue monitoring of the frontage to provide improved advice to property owners as to when property might be lost. In Whitecliff Bay, the important geological, nature conservation interest and landscape of the area supports continued policy of no active intervention in this area; adaptation to cliff top retreat will be required.

PREFERRED POLICY TO IMPLEMENT PLAN:	
From present day	Maintain local existing defences and beach control structures. Examine opportunities for beach management. Monitor recession rates and improve predictions of erosion. Continue NAI along undefended frontages.
Medium term	Maintain local existing defences and beach control structures. Examine opportunities for beach management. Monitor recession rates and improve predictions of erosion. Develop adaptation planning with the intent of slowing erosion. Continue NAI along Whitecliff Bay.
Long term	Abandon existing hard defence but maintain an approach of beach management and slowing erosion rates in a coordinated manner along the whole frontage. Continue NAI along Whitecliff Bay.

SUMMARY OF SPECIFIC POLICIES

Policy Unit (& length)		**Policy Plan**			
		to 2025	**to 2055**	**to 2105**	**Comment**
PU3B.1	**Bembridge** (1,233m)	NAI	NAI	NAI	
PU3B.2	**Lane End** (472m)	HTL	HTL	MR	Gradually reduce influence of management as existing defences fail in the third epoch.
PU3B.3	**Foreland** (600m)	MR	MR		
PU3B.4	**Foreland Fields** (309m)	HTL	HTL		
PU3B.5	**Whitecliff Bay** (2,831m)	NAI	NAI	NAI	
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention MR – Managed Realignment					

CHANGES FROM PRESENT MANAGEMENT

There would be no change in policy from that of No Active Intervention at Whitecliff Bay. The current approach to management of existing defences would continue along other sections of the frontage over the next two epochs but recognising that in the third epoch this would change to a policy of Managed Realignment. In detail this would influence the way in which the existing Hold the Line policy was implemented, in that maintenance would be undertaken on the basis of sustaining defence only over this period of time. A longer term plan would be developed to manage the realignment of the frontage.

IMPLICATION WITH RESPECT TO BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	1,080	130	174	1,384
	Preferred Plan Damages £k PV	895	102	116	1,112
	Benefits £k PV	185	29	59	272
	Costs of Implementing plan £k PV	159	157	377	693

The preferred plan for this Management Area is not economically viable overall, although individual works will need to be investigated in further detail to assess their economic viability and affordability, including examining the level of maintenance required. This has been recognised in the preferred plan by moving towards ‘Managed Realignment’ and ‘No Active Intervention’ in the third epoch, allowing time for the local community to adapt. Given the low benefit/cost ratio, it is unlikely that all interventions will be funded nationally, so third-party funding sources should be explored at strategy and scheme level.

Location reference	**Sandown Bay**
Management Area reference	**MA 3C**
Policy Development Zone	**PDZ 3**

The following descriptions are provided to assist interpretation of the maps shown of each Management Area.

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical rates and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change, these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan, reference should be made to the baseline data (see Appendix C3).

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

In some areas the preferred policy does not change from that under the existing management approach. In some areas where there are hard defences this can be accurately identified. In other areas there is greater uncertainty. Even so, where the shoreline is likely to be quite clearly defined by a change such as the crest of a cliff the estimated position is shown as a single line.

- Where there is a difference between With Present Management and the Preferred Policy this distinction is made in showing two different lines:

With Present Management.
Preferred Policy.

- In some areas, the Preferred Policy either promotes a more adaptive approach to management or recognises that the shoreline is better considered as a width rather than a narrow line. This is represented on the map by a broader zone of management:

Flood Risk Zones:
All flood risk zones are based upon the current tidal EA Flood Zone 2. This is an extreme flood event (1:1000 year at current levels) meaning that it has 0.1% chance of occurring each year.

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

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

Note: This Management Area corresponds to IW20 to 25 in selected Appendices.

Policy Development Zone 3 - Bembridge and Sandown Bay
Management Area 3C - Culver Cliff to Luccombe (Ch 55 - 65)
Key
Policy Development Zone boundary
Management Area boundary
Policy Unit boundary
Existing Coastline and Chainage (km)
Scheduled Monument
PU3C.1
PU3C.2
PU3C.3
PU3C.4
MA3C
SANDOWN
SHANKLIN
Sandown Bay
Cowes
Gurnard
East Cowes
Fishbourne
Ryde
Springvale
Seaview
Seagrove
Yarmouth
Wootton Creek
St Helens
Newtown
Colwell
Newport
Brading
Totland
Freshwater
Yaverland
Brook
Brighstone
Sandown
Wroxall
Shanklin
Ventnor
Bonchurch
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0 0.5 1 Kilometre
Key
100 Year Shoreline Position:
Preferred Policy would be the same as With Present Management
With Present Management where this differs from the Preferred Policy
Preferred Policy where this differs from the With Present Management
Indicative shoreline zone under the Preferred Policy
Existing Indicative EA Flood Risk Zone 2
EA Flood Risk Zone 2 where SMP policy is for continued management of defence
EA Flood Risk Zone 2 where under SMP policy there would be increased probability of flooding
ROYAL HASKONING
ISLE of WIGHT COUNCIL

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN:

The aim of the plan is to sustain the important economic and tourism value of the frontage alongside the equally important and interrelated nature conservation and landscape values of Sandown Bay. The intent is therefore to continue to defend the essential built areas of the frontage, maintaining also the important beaches, while continuing a policy of no intervention along the natural sections of the coast to north and south. An important aspect of this is that defence should not encroach beyond areas currently defended. This is essential in maintaining the supply of sediment to the whole area of the bay, in addition to maintaining nature conservation values. This will result in loss of property and features of the historic environment; adaptation will be required. Equally important will be the need to consider options, along the defended areas, for sustaining beach levels. This will be significantly more difficult as sea level rises. This longer term concern raises the issue of funding and the need to consider the degree to which alternative funding may be required to sustain an appropriate form of management which would address both the need for defence and the requirement to support essential recreational and tourism interests. The SMP identifies the probable need to move from the current linear approach of defence to one where there is a need to impose more control on sediment movement with cross shore structures. The option for advancing the line, with the intent of adding value to the area, has been raised by the SMP but is not specifically taken forward as a long term policy option. It would remain, however, as an option that could be considered further in developing a Strategy for the developed frontage. The further issue is raised with respect to the transition between the defended and undefended shoreline at Yaverland. This would require specific attention in developing a Strategy. The SMP identifies the potential advantage that might arise from opening a new estuary entrance through Culver Parade at Yaverland. The potential benefits of this, in terms of supporting sediment accumulation and beach width to the south and reducing long-term and increasing reliance on raised defences protecting the low-lying river floodplain behind, can be considered further but alongside the benefits significant adverse economic, social and environmental impacts would also occur.

PREFERRED POLICY TO IMPLEMENT PLAN:	
From present day	Maintain and improve existing defences. Maintain a No Active Intervention policy to other areas.
Medium term	Maintain and improve existing defences. Maintain a No Active Intervention policy to other areas. Consider potential adaptation of use in undefended areas.
Long term	Maintain and improve existing defences, with further consideration of potential for retaining a functional beach and economic defences, alongside consideration of the potential for managed realignment to the north. Maintain a No Active Intervention policy to other areas. Consider potential adaptation of use in undefended areas.

SUMMARY OF SPECIFIC POLICIES

Policy Unit (& length)		**Policy Plan**			
		to 2025	**to 2055**	**to 2105**	**Comment**
PU3C.1	**Culver Cliff and Red Cliff** (2,733m)	NAI	NAI	NAI	
PU3C.2	**Yaverland and Eastern Yar Valley** (1,201m)	HTL	HTL	HTL	Strong links to PU3A.4.
PU3C.3	**Sandown and Shanklin** (4,691m)	HTL	HTL	HTL	
PU3C.4	**Luccombe** (1,436m)	NAI	NAI	NAI	
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention MR – Managed Realignment					

CHANGES FROM PRESENT MANAGEMENT

Overall the policy for management of the developed areas continues. The intent however is that defences would not be extended beyond those areas currently managed and there will be areas of transition between defended and undefended sections of shoreline.

IMPLICATION WITH RESPECT TO BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	277,987	289,421	233,706	801,114
	Preferred Plan Damages £k PV	7,218	7,245	5,415	19,878
	Benefits £k PV	270,769	282,176	228,291	781,236
	Costs of Implementing plan £k PV	772	1,613	3,351	5,735

The preferred plan for this Management Area is clearly economically viable overall. Individual schemes will need to be investigated in further detail to assess their economic viability and affordability.

4.5 Policy Development Zone 4 – Ventnor and the Undercliff (PDZ4)

Above: The town of Ventnor developed on the terraces of a landslide complex (Isle of Wight Council).

4.5 Policy Development Zone 4 – Ventnor and the Undercliff (PDZ4)

Contents

Key facts:

Policy Development Zone 4: includes the communities of Bonchurch, Ventnor, St. Lawrence, Niton and Blackgang.

PDZ4 frontage = approximately 14km in length

PDZ4 boundaries = Includes the Ventnor Undercliff landslide complex, from Luccombe Chine in the east to Chale Terrace (near Blackgang) in the east.

As listed in SMP2 Appendices: areas IW29 to IW39

Old policies from SMP1 in 1997, reviewed in this chapter:

Unit	Location	Length	Policy
VEN1	Horse Ledge to Monks Bay	2335m	Retreat the existing defence line
VEN2	Monks Bay to Steephill Cove	3541m	Hold the existing defence line
VEN3	Steephill Cove to East of Binnel Bay	3076m	Retreat the existing defence line
VEN4	East of Binnel Bay to Puckaster Point	1334m	Retreat the existing defence line
VEN5	Puckaster Point to West of Castlehaven	824m	Hold the existing defence line
VEN6	West of Castlehaven to St Catherine's Point	824m	Do nothing
FRE1 (part)	St Catherine's Point to Brook Chine	14391m (part)	Do nothing

Shoreline Management Plan Sub Cell 5D + E - Isle of Wight
Baseline Location Map
Policy Development Zone 4 - Ventnor and the Undercliff
PDZ4
MA4A
MA4B
Ventnor
Niton
St Lawrence
Wroxall
Shanklin
Godshill
Whitwell
Chale
This map is based on Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. 100019229 2010.
0 1 2 Kilometres
Key
Existing Coastline and Chainage (km)
100 Year Recession Line with No Active Intervention
Policy Development Zone boundary
Management Area boundary
Policy Unit boundary
Ramsar
SAC
SPA
SSSI
NNR
Scheduled Monument
EA Flood Zone 3
Ventnor Undercliff Landslide Complex (potential landslide reactivation area)
ROYAL HASKONING
ISLE of WIGHT COUNCIL

1. Overview & Description

1.1 Principal Features (further details are provided in Appendix D)

Built Environment:
This section of coastline was rapidly and heavily developed during the Victorian period in response to the growing trend for tourism and the reported 'health giving air' in the microclimate of the Undercliff. Ventnor is the main town within the Undercliff and is built on a series of terraces forming a steep gradient, with surrounding villages linked by the A3055 main road, locally known as the Undercliff Drive. Approximately 7,000 people live in the town and surrounding villages.
Access to the town is via four main roads. The former railway tunnel through the Downs backing the town is used for utility piping. There is a small industrial estate at the old railway station in upper Ventnor. Tourism is very important to the economy, offering numerous hotels and cafés benefiting from the southerly aspect, sea views and unique character of the town.
Located on Ventnor seafront is a Southern Water pumping station and a small harbour, with a local shellfish industry. Significant coastal defences have been built fronting Ventnor town and Bonchurch, providing amenity access along seawalls, although to the west and east the landscape is more natural in character with scattered development.

Heritage and Amenity:
Heritage:
The south coast of the Island has a rich maritime history and evidence of human occupation stretching back to the Neolithic (4000bc). During the Victorian period the coast was extremely popular both as a health resort and with the art and literary communities. Records indicate there are 116 grade II listed buildings, 3 grade II* listed buildings, one Grade II registered park, nine items on the local list and 169 monument records within the coastal frontage. Offshore there are also 71 recorded shipwreck sites and 3 air wrecks classed as Military Remains Protected Places. The Victorian Villas and terraces have led to Bonchurch, Ventnor and St. Lawrence being designated Conservation areas.
At Flowers Brook advance archaeological investigations as part of the construction of a small pumping station revealed evidence for Saxon and Medieval occupation. Middens and palaeoenvironmental deposits at Binnel Bay, Woody Bay, St Catherines Point and Rocken End attest to occupation from the Bronze Age, Iron Age, Roman and Medieval periods and can contribute to our understanding of the chronology of the formation of the Undercliff. An Iron Age warrior burial was unearthed at St Lawrence, and other burials of unknown date have been recorded. Offshore, St Catherine's Point and Blackgang have seen many shipwrecks and was a known site for wreckers. The famous Clarendon wreck occurred here and prompted the building of St Catherines Lighthouse.

Amenity:
The unique geology of the coastline has led to the development of seaside communities that rely on tourism with some light industry. Luccombe Village, at the eastern boundary of this PDZ, is mostly residential with some hotels closer to Luccombe Chine. Between Luccombe and Bonchurch is a wooded area known as 'The Landslip' that is an active landsliding area full of interesting geological features, footpaths and steps hewn into the rock faces. At Bonchurch, hotels, a pub and seafront pottery, cafes and fishing launch are found along the seafront. A seawall that is popular for walkers and anglers runs the length of the low cliff frontage from Monks Bay at Bonchurch through to Ventnor Bay with several slipways and small boat parks (Wheelers Bay and Ventnor Fishing Club) allowing access to the water. The coastal cliff from Bonchurch to Ventnor is backed by residential and holiday accommodation, car parks and small public greens.
In Ventnor Bay and the surrounding seafront there are a wide of array of facilities including hotels, restaurants, play areas, a harbour and the popular Ventnor Botanical Gardens, which are all very important and valuable to the community. These are outlined in greater detail in Appendices D and E.
The cliff top westwards to Niton Undercliff is mostly undeveloped or agricultural land, backed by the residential area of St. Lawrence**.** The Undercliff environment is used extensively by walkers. Reeth Bay is used by surfers. At the most southerly point of the Isle of Wight is St Catherine's

Point and the Gore Cliff scenic landscape owned by the National Trust. To the west is Blackgang Chine Theme Park which is a popular tourist attraction.
Nature Conservation: This coastline predominantly consists of medium to high sandstone, clay or chalk debris cliffs that are important for their geomorphological, ecological and entomological interest. The cliffs are fronted by narrow sand and shingle beach, boulders or rocky reefs, with the subtidal area comprising of rocky reefs that support kelp and diverse red algal communities. The actively eroding open cliffs and slopes (e.g. Binnel Bay and Reeth Bay cliffs) support a complex mosaic of habitats and species, particularly invertebrates (e.g. bees, crickets and wasps). There is only one international designation within this PDZ, the South Wight Maritime SAC, which includes both intertidal and subtidal habitats and species. The designation covers the entire length of the PDZ and is of biological importance for its reefs, maritime cliffs and submerged caves. There are four SSSIs along the coastline, two of which cover the coastal cliffs and intertidal zone – Bonchurch Landslips SSSI and Compton Chine to Steephill Cove SSSI, and two at the top of the cliffs – Ventnor Downs and Rew Down. Bonchurch Landslips SSSI is biologically important because of the maritime cliffs and slopes (a BAP priority habitat) and broadleaved native woodland, and geologically important because of the Undercliff, coastal landslips and mud flows. Compton Chine to Steephill Cove SSSI is a nationally important geological site, which supports outstanding invertebrate assemblages.

1.2 Key Values

The residential communities of Ventnor, Bonchurch, St. Lawrence, Niton and Blackgang, along with associated transport links, are key features of this area, set within a unique natural landscape. The scale of the underlying landslide topography gives rise to the unique pattern of development, natural environment and coastal scenery found in this PDZ. The landsliding risks affecting the area are unique in scale in England but share similar issues with other significant communities affected by landsliding such as Lyme Regis in Dorset and Scarborough in North Yorkshire.

1.3 Objectives

Overarching objectives for PDZ4:

- To sustain and adapt the large community of Ventnor town.
- To sustain and adapt the communities of the surrounding villages, in view of the changing climate.
- To consider the impact of the increasing risks of climate change on the landslide complex, including the impacts of sea level rise and coastal erosion.
- To maintain or adapt access to the Ventnor Undercliff.
- To support opportunity for adaptation supporting and enhancing the nature conservation value of the area.
- To maintain and adapt the important landscape.
- To sustain the historic landscape and environment where practical.

Above: Landsliding and cliff retreat encroaching near the village of Bonchurch (Isle of Wight Council).

1.4 Description

The town of Ventnor and surrounding villages of Bonchurch, St. Lawrence, Niton and Blackgang are located on the south-facing terraces of a large coastal landslide complex, parts of which are reactivating.

The Ventnor Undercliff is approximately 12km in length and is the largest urbanised landslide complex in England and Wales, and one of the largest in north-west Europe. Based on current shoreline management practices, there are specific areas within the Undercliff that are at risk of ground movement and all proposed developments must take account of the ground conditions. A programme of ground monitoring is in place and detailed landslide mapping (geomorphology, ground behaviour, planning guidance) is available. The sea cliffs are approximately 20-30m in height, with terraces of developed ground rising behind in Ventnor town (up to the back scar at approximately 100m height, approximately 400m inland), with more scattered development to the west. Sea level rise, cliff toe erosion and increased winter rainfall will affect slope stability. Coastal road links will be at risk over the next 100 years. The centre of Ventnor town is protected by coastal defences, along with Reeth Bay in the west, but the majority of the Undercliff is undefended. The present management practices of sea cliff stabilisation and toe weighting at Wheelers Bay and Monks Bay appear to have significantly reduced the occurrences of landslide re-activations.

Above: Ventnor Bay.

Left. Blackgang cliffs, looking south-east, with Blackgang Chine Theme Park located on the cliff top (Isle of Wight Council).

The town of Ventnor has a unique scenery and microclimate popular with visitors, and recent years have seen significant redevelopment of small businesses within the area serving both residents and holidaymakers. Ventnor and Bonchurch are predominantly residential communities with a number of hotels and guesthouses.

The natural environment of the relatively undeveloped areas of the Undercliff to the west includes extensive woodlands and coastal cliffs also important to the character of the area, surrounding the villages at St. Lawrence and Niton.

At Blackgang in the far west, spectacular coastal scenery and the scale of the erosion and landsliding forming the exposed coastal cliffs is resulting in a gradual retreat of the Blackgang

Chine visitor attraction and scattered properties located above the high retreating cliff tops. Cliff elevation varies between 70m and 110m.

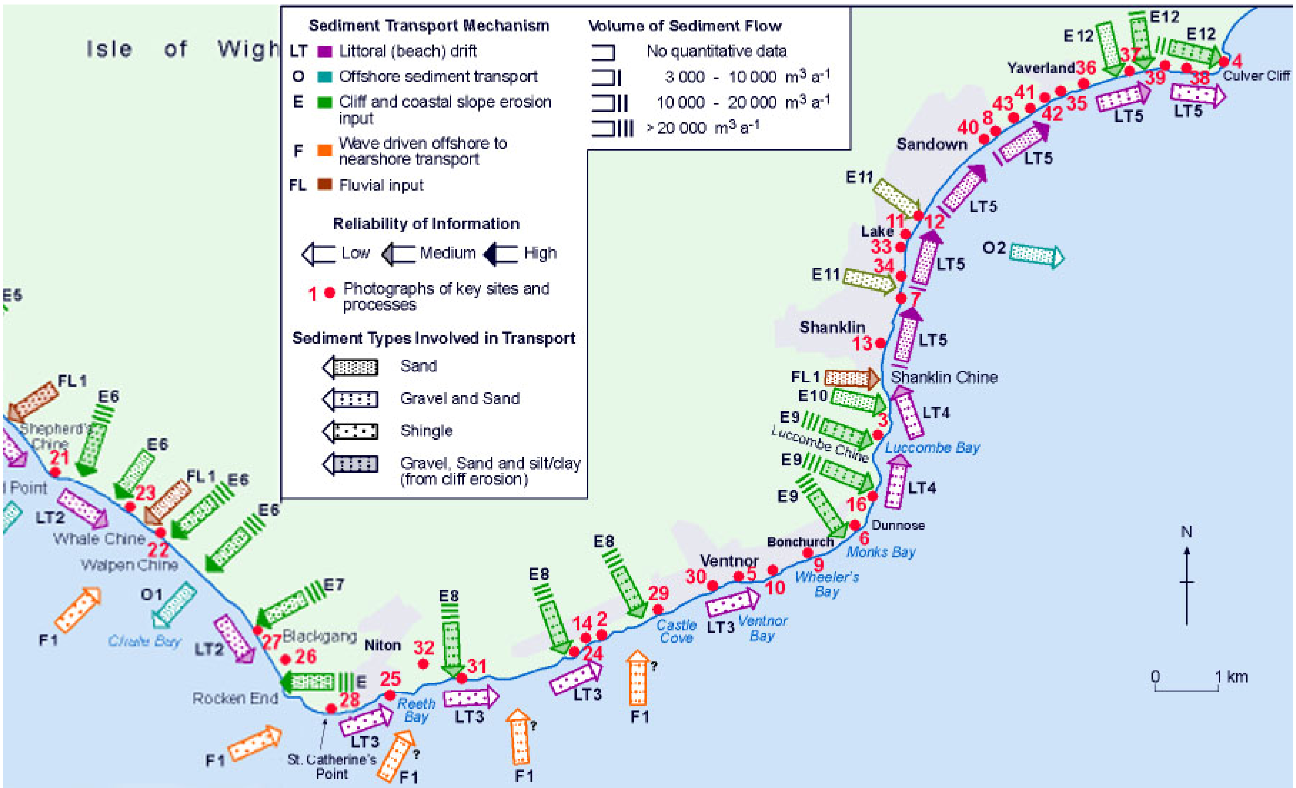
1.5 Physical Processes

1.5.1 Coastal Processes (further details are provided in Appendix C1).

Stretching from Luccombe to Chale, this PDZ is characterised by the Undercliff Landslide Complex. The following summary outlines the wave climate, tidal flows, geomorphological controls, sediment supplies and coastal processes characterising PDZ4.

It is important to note that coastal processes and cliff retreat in this PDZ are fundamentally controlled by and impacting upon the underlying landslide complex, which is vulnerable to reactivation (caused by coastal erosion as well as water in the ground). The area is subject to high-energy wave attack resulting from storm events and from the description of current behaviour of the shoreline provided below, the potential for significant future change is clear.

The general pattern of sediment movement along the shoreline is summarised in the following diagram from the SCOPAC Sediment Transport Study.

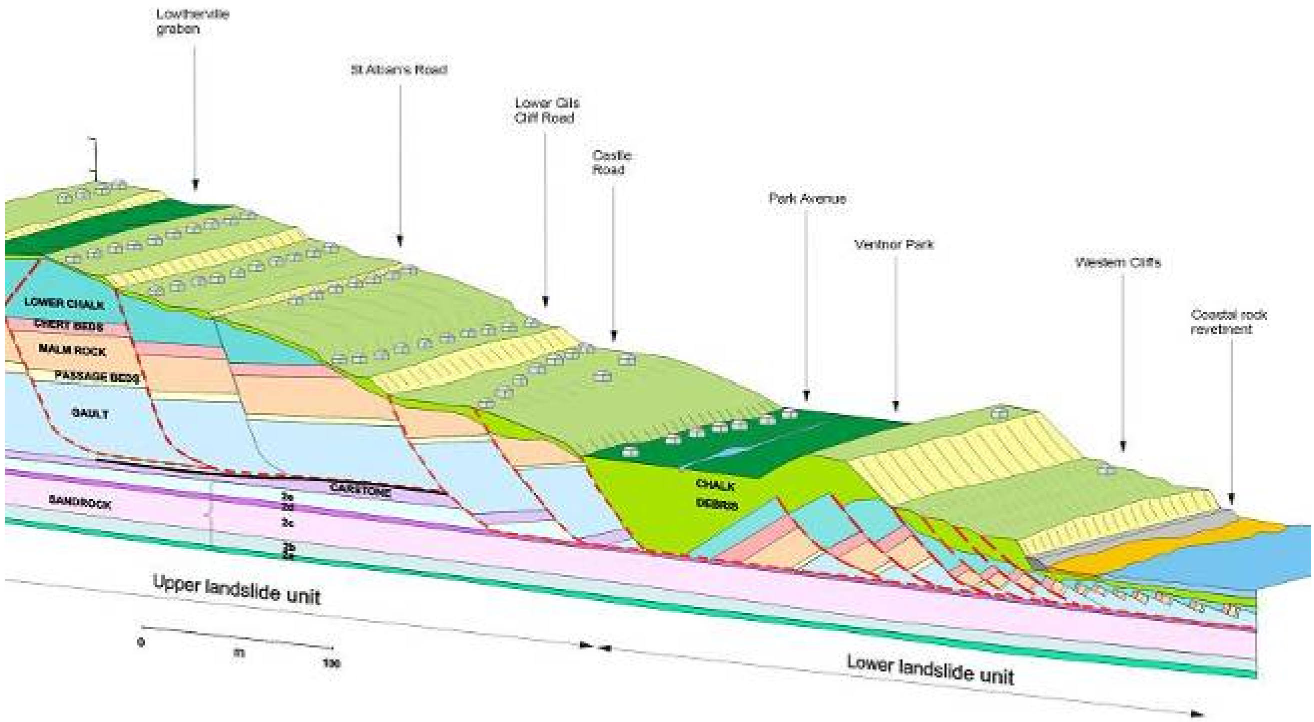


Sediment transport sources, pathways and sinks along the Ventnor Undercliff coast and at Blackgang, from the SCOPAC Sediment Transport Study, 2004.

The Ventnor Undercliff is an ancient coastal landslide complex forming the Isle of Wight's south coast approximately 12km in length and extending approximately 500m inland and nearly 2km seawards. Its physical form today is the result of marine erosion at the toe of the landslide acting on a gently dipping (approximately 1.5° seaward) stratigraphy comprising of Upper Greensand and Lower Chalk sequences overlying relatively impermeable Gault Clay. The landslide complex was activated as a result of aggressive coastal erosion following a rise in sea level after the last Ice Age, between 10,000-7,000 years ago. The relic landslides form distinct units that interlock with each other and are mutually supporting. It means that a re-activation of one unit may lead to destabilisation of its neighbours and eventually result in a much wider re-activation of the

Undercliff. Large-scale re-activations of landsliding would considerably increase the delivery of sediments to the local shoreline and potentially supplement supply of sand north-east to Sandown Bay.

The Undercliff is an exceptionally dynamic and unique section of coast, therefore it is treated here as a separate unit. The cliffs that are present on the coast line of the Undercliff are mainly formed of loosely consolidated Chalk and Upper Greensand debris. In this unit the coastal cliffs are approximately 20-30m in height, with terraces of rising ground behind (up to the back scar at approximately 100m height, approximately 400m inland).



Schematic cross-section through the Undercliff Landslide Complex underneath the town of Ventnor, showing deep-seated failures within the Gault Clay and clay layers within the Sandrock. The town of Ventnor and surrounding villages developed on the south-facing terraces of the landslide complex. The landslide extends out under the sea, with toe protection in the form of coastal defences helping to stabilise the terraces above (Isle of Wight Council).

In the east, within Luccombe Bay, an extensive medium sand beach and foreshore has accumulated derived from eroded cliff material. Three degraded groynes at the north of Luccombe Bay have intercepted drift and indicate the general north eastern direction of transport. This area acts as a source and zone of northward transmission for much of the sediment that forms the beaches of Sandown Bay. At Dunnose, there is a sharp change in coastal orientation to the west. The 40m high cliffs are cut into landslide debris, and into Gault Clay and Lower Greensand further north. Marine erosion of the cliff base is ongoing and translational slides and mudflows are frequent and often temporarily conceal bedrock. Terrace recession results in cliff top retreat.

From Dunnose to Reeth Bay 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. Although coastal defences protect sections of the developed frontage in the east, the coastline is subject to high-energy wave attack resulting from storm events, which can lead to a significant loss in beach material over a relatively short time period where coastal protection is not present. Tidal currents are often strong, especially during spring tides and where either the shape of the coast or the seabed contours cause concentration of the flows.

The relief of the majority of the seabed around the Island is fairly slight, with large areas effectively featureless. However, one feature of note off the south coast of the Island is St Catherine's Deep, an enclosed deep channel that reaches depths of up to 80m below the general seabed. The feature is approximately 21km long and 1.2 km wide. St Catherine's Deep lies offshore from the major Undercliff landslide complex and runs parallel to the coastline. The bathymetric deep means that deep water is present relatively close to the toe of the Isle of Wight Undercliff and this may have an effect on wave energy striking this section of coast.

Between Ventnor and St Catherine's Point, several well defined pocket beaches consisting of 'pea' gravel (well sorted, sub-angular to sub-rounded flint clasts of a mean diameter of 10mm) have developed and exhibit weak west to east littoral drift. There appears to be little exchange between adjacent bays. Some beaches, particularly at the eastern end of this coastline, have been subject to draw down, indicating that potential rates of transport exceed available supply. Average cliff top retreat rates along this section of coast are of the order of 0.4m per year. Erosion of the cliff face yields a mixture of clay, sand, marl, chert and chalk. Pocket beaches migrate landward as the cliffs erode and over time this process gradually extends the widths of the boulder aprons. The main exception is at Rocken End near Niton where there has been rapid erosion at the toe of a large 1928 rockfall and debris slide.

At the western end of this PDZ the coastline between Rocken End and Chale is characterised by high eroding soft rock cliffs subject to high wave exposure and complex landsliding within two distinct areas. The first area extends between Rocken End and Blackgang, and contains cliffs up to 180m in height that are cut into Upper Greensand and Gault Clay overlying interbedded sandy and clayey Lower Cretaceous strata in a major landslide generating sequence. The second area extends along the Chale Undercliff, where cliffs of 60 to 110m in height are cut into the Lower Cretaceous Atherfield Clay, Sandrock and Ferruginous Sandstone strata with a sequence of near-horizontal terraces forming an undercliff of up to 200m in width. Cliff recession takes place through falls, mudslides and erosion by groundwater seepage.

Historically, the Undercliff has remained relatively stable, but over the past fifty or so years ground movements have increased in frequency at Monks Bay, in parts of Ventnor, St Lawrence and at Niton. Since the formation of the landslide complex, coastal erosion has gradually and critically reduced the support at the toe of the complex. Ground stability is related closely to groundwater conditions, and recent wet winters have been characterised by exceptional landslide activity. Over the past decade major re-activations have occurred at Niton (Castlehaven and a recent movement to the east inland from Puckaster Cove) and St Lawrence (Woodlands and a recent re-activation immediately to the west).

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. From Luccombe to Dunnose the cliff erosion is likely to continue or accelerate as the cliffs are sensitive to winter rainfall promoting higher pore water pressures within the landslides. Also continued cliff retreat around Luccombe and to the south will cut further into the flanks of Shanklin and Luccombe Downs and is likely to re-activate relic landslides leading, on occasion, to rapid landward progressions of cliff top instability by several tens, or possibly hundreds, of metres within specific events. Within the Undercliff, without defences, a natural trend for re-activation of the relic landslides of the Undercliff will persist and intensify in the future, based on the following contributory factors:

1) Sea cliff erosion will continue. As the cliffs retreat, vital toe support is removed and the overall coastal slope will steepen. This will tend to 'prepare' the slopes above such that relatively smaller events could be sufficient to trigger re-activations.
2) Slopes are sensitive to winter rainfall promoting higher pore water pressures within the landslides and potentially triggering re-activations of the 'prepared' slopes.
3) The relic landslides are deep-seated, and interlock with other relic slides further upslope such that stability may be mutually dependent and potentially large areas could become at risk following initially modest re-activations.

The relic landslides are sensitive to an increase in frequency of ground movements due to future climate change (sea-level rise that promotes increased toe erosion and increased winter rainfall promoting higher pore water pressures within the landslides). The implications of climate change predictions for the Undercliff are both spatial and temporal: Firstly, there are concerns that hitherto marginally stable areas of the Undercliff may become unstable due to reactivation of ground movement and the occurrence of new landslides; Secondly, in areas previously affected by ground movement or landslides, the frequency and rate of ground movement and landsliding is expected to increase. The main consequence of predicted climate change on the stability of the Undercliff is likely to be an increased risk of damage to assets due to ground movement, particularly in built up areas, such as Ventnor.

From Blackgang to Rocken End continued re-activation of the undercliffs will occur such that they become activated fully up to the toe of the Upper Greensand backscar. The episodic nature of landslide re-activation and movement mean that the zone of destabilisation could migrate by as much as 50m inland within single events and minor ground movements involving tension cracks and pressure ridges can extend even further until confined by the backscar. As material is excavated from the undercliffs by landslides moving over the sea-cliffs, the backscar will lose vital support from its toe and will become increasingly susceptible to renewed first time rotational failures that could cause recession of the cliff top. At Chale, the cliffs are already fully re-activated so that continued toe erosion is likely to result in continuation of the high rates of retreat that appear characteristic of recent decades.

1.5.2. Existing Defences

The following description of coastal defences outlines the current condition and expected remaining effective life of the defences in the area, if no further maintenance is carried out. In addition to the following summary, individual defences are described in detail in Appendix C2 - Defence Appraisal (areas IW29 to 39).

From Luccombe Bay towards Dunnose no defences are present and the foreshore is strewn with boulders. Within Monks Bay is an offshore rock armour breakwater, and shingle protects and adds weight to the unstable coastal slope. Seawalls continue from Bonchurch to Wheelers Bay and through to Ventnor, generally expected to fail in 15-25 years, though two short sections in the east of Wheeler's Bay and under the Eastern Cliffs will fail first in 5-10 years. Various short groynes along the frontage will fail in approximately 5-7 years. Within Wheelers Bay the exposed steel sheet piled toe is showing signs of excessive erosion/corrosion. A rock armour revetment protects the Wheelers Bay Coast protection and slope stabilisation scheme. Eroded Tetrapods protect the seawall west of Wheelers Bay. At the beginning of Ventnor Eastern Esplanade the exposed steel sheet piled toe is showing signs of excessive erosion / corrosion. Rock armour revetment protects seawall fronting the Eastern Esplanade car park. A rock armour groyne and breakwater arm form Ventnor Haven adjacent to the Southern Water Lion Pumping Station and will remain in place throughout the first epoch.

Within Ventnor Bay itself the seawall continues, sheltered by a fine gravel beach, with a timber groyne to the west of Ventnor Bay. Along Ventnor Western Cliffs a rock armour revetment extends from Ventnor Bay to Castle Cove protecting the steep near vertical cliffs of weak chalks and marls from toe erosion for the next 15-25 years, with a number of rock armour groynes along this frontage. A rock armour revetment, seawall and gabions will protect and stabilise the coastal slope of Castle Cove for 15-25 years. Rock armour revetment and defences protect Steephill Cove, with rock armour groynes either end of the small bay. Sections of seawall, groyne and concrete apron will deteriorate and fail during the second half of this epoch, with the exception of the east of Steephill Cove where defences will remain for 25-35 years.

Between Steephill Cove and Reeth Bay the low cliff frontage is undefended with a boulder strewn foreshore, with the exception of an outfall below Ventnor Botanical Gardens and the private defences of a 65m length of stone masonry wall and concrete ramp within Orchard Bay with a residual life of 15-25 years.

A rock armour revetment will protect the coastal cliff at Reeth Bay for 25-35 years, with additional concrete and rock structures at the western margin of the Bay likely to fail in 10-25 years, forming a total defended length of 785m. This marks the westernmost limit of defences, until Freshwater Bay in PDZ6.

1.5.3 Potential Baseline Erosion Rates

The SMP reviewed a wide range of data to define the current and potential rates of coastal erosion and cliff retreat along the Isle of Wight coast using the best available information. Full details can be found in Appendix C3. Future erosion rates are predicted using Walkden & Dickson formula (2008) and allow for future sea level rise –the full methodology is explained in the Appendix. Predicted sea level rise rates of 4mm/yr (to 2025), 8.5mm/yr (to 2055), 12mm/yr (to 2085) then 15mm/yr (to 2105) have been used, in accordance with SMP national guidance by Defra. These rates equate to 7cm of sea level rise (above the 2009 baseline) by 2025, 32cm by 2055 and 98cm by 2105. The IW numbering units refer to lengths of coast for which future behaviour is described and mapped in Appendix C (based on SMP1 and Strategies). These are not SMP2 policy units which are developed in section 3 below.

Potential total erosion over the next 100 years is shown, however it is important to note that this is an estimate that is based on an undefended coastline. Within Appendix C3, these erosion rates are only applied following the predicted failure date of each individual element of the defences within the unit; therefore the resulting erosion amounts shown in the Appendix C3 tables and maps (and used in the development of this SMP) will show smaller erosion totals than the overview provided below.

Potential coastal erosion rates (all figures in metres/year):-

Numbering in SMP2 Appendices (2010) *(area and name, clockwise)*		Historical Rate	Current to 2025	2025 to 2055	2055 to 2085	2085 to 2105	Potential 100 year erosion (if undefended) - total in metres	Notes
IW29	**Luccombe**	0.40	0.46	0.61	0.71	0.77	37	Important note: This area is also at risk of significant landslide reactivation over the next 100 years due to coastal erosion and water in the ground. Please see Appendix C3 for full details.
IW30	**Monks Bay**	0.40	0.46	0.61	0.71	0.77	37	
IW31	**Bonchurch**	0.40	0.46	0.61	0.71	0.77	37	
IW32	**Wheeler's Bay**	0.40	0.46	0.61	0.71	0.77	37	
IW33	**Eastern Cliffs, Ventnor**	0.40	0.46	0.61	0.71	0.77	37	
IW34	**Ventnor Haven & Eastern Esplanade**	0.40	0.46	0.61	0.71	0.77	37	
IW35	**Ventnor Bay & Western Cliffs**	0.40	0.46	0.61	0.71	0.77	37	
IW36	**Castle Cove & Steephill Cove**	0.40	0.46	0.61	0.71	0.77	37	
IW37	**St Lawrence Undercliff**	0.30	0.35	0.46	0.53	0.58	27	
IW38	**Castlehaven & St. Catherines**	0.60	0.69	0.91	1.06	1.15	55	
IW39	**Blackgang**	1.00	1.15	1.52	1.77	1.92	91	

Note:
i) Erosion rates have been determined from monitoring data and examination of historical records and have been calculated to take account of sea level rise. See Appendix C3 for details.
ii) The IW numbering units refer to lengths of coast described in Appendix C. These are not SMP2 policy units.

2. Baseline management scenarios

2.1 Present Management

Present management of the shoreline is taken as the policy defined by SMP1, modified by subsequent strategies or studies. It should be noted that in the case of SMP1 the period over which the assessment was carried out was 50 years. SMP2 extends this to an assessment period of 100 years. The table below sets of the current shoreline management policies for Policy Development Zone 4. This SMP2 will assess all the available evidence and update these previous management policies.

The key documents outlining the present management of the shoreline in this PDZ are:-

Isle of Wight Shoreline Management Plan 1 (1997)
The first Shoreline Management Plan (SMP1) for the Isle of Wight 's coast was published in 1997. It consists of two volumes.

- Volume 1 is the 'Data Collection and Objective Setting', which presents information on a range of topics including coastal processes, natural environment, etc.
- Volume 2 is the 'Management Strategy', which presents information for each Management Unit around the Island's coast and sets a management Policy for each unit.

Coastal Defence Strategy Studies, Isle of Wight:
Whilst the Shoreline Management Plan provides the risk framework for management of the coast, Coastal Defence Strategy Studies provide a more detailed assessment of particular frontages in order to identify the most suitable type of coastal defence schemes that may be required to fulfil the agreed shoreline management policy and to plan a programme of future works.

Sandown & Undercliff Coastal Defence Strategy Study
A Coastal Defence Strategy Study for the Sandown and Undercliff coastlines will be completed following the publication of SMP2.

Landslide Management
Landslide management practices undertaken in the area by the local authority include monitoring ground conditions and coastal slope reactivation within the town and the road network and the widespread use of publicly available landslide mapping (geomorphology, ground behaviour, planning guidance), encouraging avoidance of unsuitable localised areas of contemporary movement and higher risk. Other aspects include controlling water in the ground and providing education and information.

Catchment Flood Management Plan
The Environment Agency has undertaken a programme of Catchment Flood Management Plans (CFMPs) for the major river catchments in the Southern Region. A CFMP is a large scale plan that covers an entire river catchment or group of catchments that identifies long-term, sustainable policies to manage flood risk within the catchment. These policies form the basis for development of Strategy Plans, covering all or part of the overall catchment area, which will identify in more detail appropriate flood defence measures.

Whilst CFMPs principally address fluvial (river) flooding, SMPs address tidal (sea) flooding, alongside coastal erosion. The Isle of Wight Catchment Flood Management Plan (Summary Report) was published in December 2009.

The previous shoreline management policies set for this PDZ are listed in the table below:

The IW numbering units refer to lengths of coast for which previous shoreline management policies were set in SMP1, modified by subsequent Strategy Studies (where available), used to gather information in the Appendices. These are not SMP2 policy units which are developed in section 3 below.

Numbering in SMP2 Appendices (2010)		**SMP1 (1997)**	
Area *(clockwise)*	**Name**	**Unit**	**Policy**
IW29	**Luccombe**	VEN 1	Retreat the existing defence line
IW30	**Monks Bay**	VEN 2	Hold the existing defence line
IW31	**Bonchurch**		
IW32	**Wheeler's Bay**		
IW33	**Eastern Cliffs, Ventnor**		
IW34	**Ventnor Haven & Eastern Esplanade**		
IW35	**Ventnor Bay & Western Cliffs**		
IW36	**Castle Cove & Steephill Cove**		
IW37	**St Lawrence Undercliff**	VEN 3	Retreat the existing defence line
		VEN 4	Retreat the existing defence line
IW38	**Castlehaven**	VEN 5	Hold the existing defence line
IW39	**St. Catherine's Point & Blackgang**	VEN 6	Do nothing
		FRE1 (part)	Do nothing

2.2 Baseline Scenarios for the Policy Development Zone

Overview:
Along the Ventnor Undercliff, coastal protection has a clear role in protecting against the landslide reactivation, which is triggered by erosion. The SMP is a plan for shoreline management only, and although the SMP does not provide a plan for landslide management, it does need to take account of all of the impacts of shoreline management, including the risk of landsliding. The following two scenarios describe the impact that allowing the coastal defences to fail, or continuing to maintain them, will have on the coastline.

Over the next 100 years cliff erosion and potential for reactivation of deep-seated landslide ground movements is a key risk for the future of the communities in Ventnor Undercliff, but is likely to be episodic in timing and concentrated on areas that are more active. Risk levels will increase due to the impacts of climate change (sea level rise causing erosion and increasing winter rainfall). Access routes to the towns and villages are also threatened over the longer term, although the Undercliff Drive road linking the communities from St. Lawrence to Niton is at risk from slope failure in the short to medium term.

2.2.1 No Active Intervention (Scenario 1, NAI):

Under this scenario no further work would be undertaken to maintain defences. Where defences fail they would not be repaired. The principal difference between this scenario and the unconstrained scenario discussed earlier is the residual impact existing defences would have on the behaviour of the coast. A detailed description of this NAI scenario is given in Appendix C3, area by area. The following discussion provides a summary, drawing together an overview with particular focus on how the use of the coast and the objectives outlined above would be affected.

The entire frontage is formed within a zone of massive relic landslides subject to marine erosion at their toes and so vulnerable to large-scale reactivation under the NAI scenario. Coastline conditions are especially critical in determining the protection or exposure of the cliff toes that provide vital support for large areas of the landslide complex above, formed of a distinctive series of rotational blocks (mostly composed of Upper Greensand) leading from shore to the rear scarp or hills. The Isle of Wight Downs SAC backs the landslide complex. On the undefended coast and following the failure of existing defences in late epoch 1 or early in epoch 2 (in approximately 20 years time) significant erosion will occur with the potential to trigger wider landslide reactivation in developed areas.

Luccombe to Dunnose
At the eastern margin of the landslide complex, the high sandstone, mudstone and clay cliffs from Luccombe Chine to Monk's Bay are undefended and actively eroding and retreating, with increasing landsliding behaviour in the south. The cliff line is fully exposed to marine erosion and supplies essential input to the sediment transport system feeding the beaches of Sandown Bay to the north. Cliff height and landslide potential are likely to increase in future epochs. The natural environment of the area is characterised by cliff top woodlands and fields with a small number of assets at risk. Principal access to the area is through a network of footpaths which will be affected by coastal slope retreat. The soft cliffs and nearshore reefs in this location form part of the South Wight Maritime SAC; under the NAI scenario these features will be allowed to erode, retreat and evolve naturally. Cliff erosion will see the coastline retreat towards the Isle of Wight Downs SAC, which represents an area of important chalk grassland. While is it not expected that any of the SAC will be directly lost to coastal retreat, the grassland habitat adjacent to Bonchurch may come to be under greater maritime influence, with more maritime species present, as the distance between it and the sea is reduced.

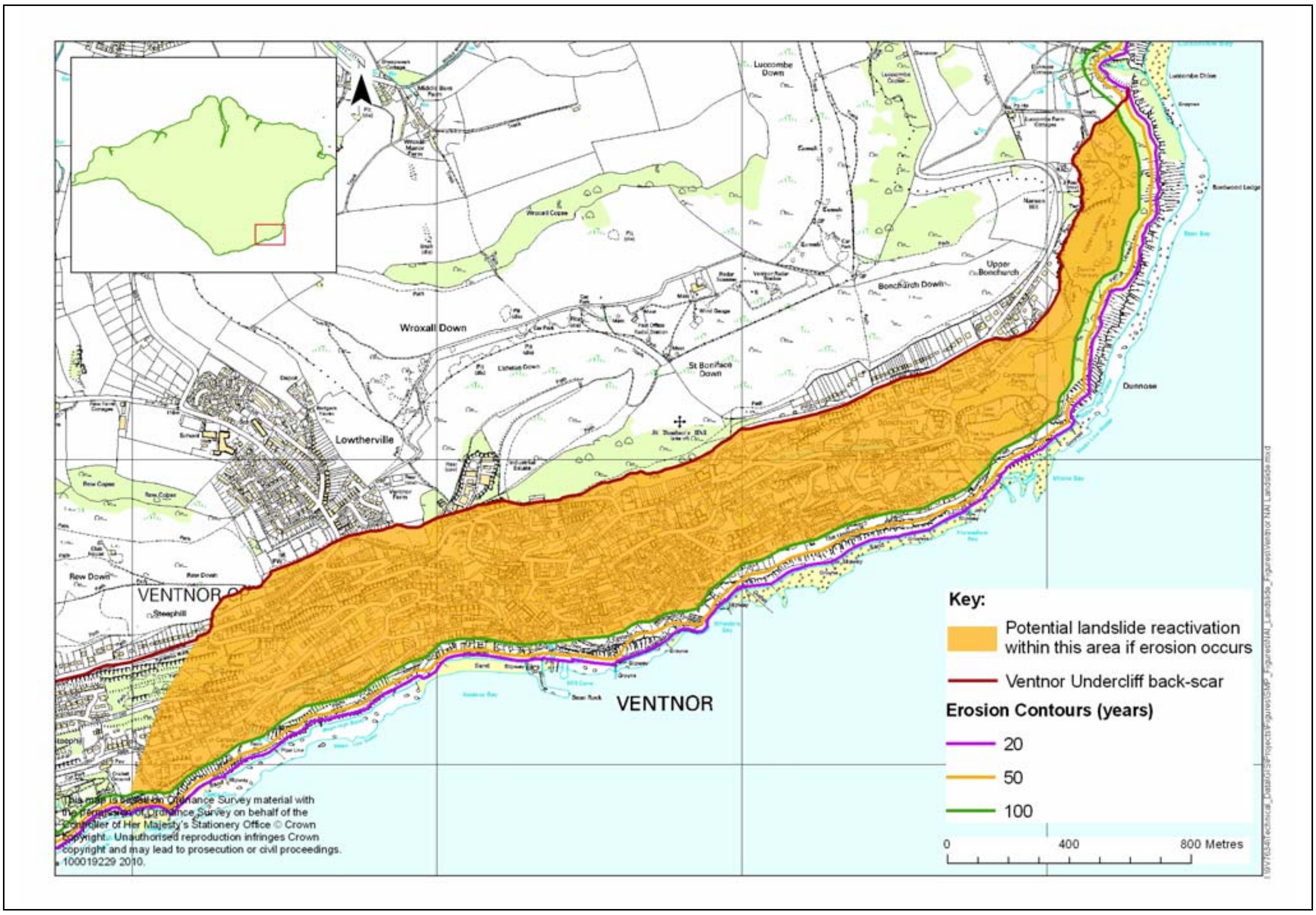
Ventnor and the surrounding villages at Bonchurch and Steephill
Continuous coastal defences and cliff stabilisation schemes involving re-grading and drainage protect the developed coastline. A scenario of NAI would result in the deterioration and eventual loss of these defences and would have devastating consequences for the future of the Ventnor town and surrounding villages.

Much of the area within the urban parts of the Undercliff has been stable where coastal defences are present, and the consequences of the failure towards the end of the first epoch or early in the second epoch will allow erosion to commence and have a major effect in reducing ground stability. The defences function directly to halt erosion and also to provide support to the toe of the coastal slope to reduce occurrences of instability within the relic landslides above. Erosion of the coastal cliffs will commence progressively following seawall breaches and failures, typically from year 15, opening up of the whole exposed frontage to wave attack, with erosion outflanking and undermining adjacent sections of defences. Slope failures could cause seaward displacement of remaining sections of revetment. The popular coastal footpath route along the Bonchurch to Ventnor esplanade seawall will be lost. During the second epoch and beyond, erosion of the remaining sections of sea cliffs will fully reactivate resulting in loss of properties, businesses and access roads and paths. The coastal cliff recession will not progress in a simple linear pattern, as progressively removing the lower slopes of the landslide complex by coastal erosion would trigger episodic reactivations and failures in the landslide terraces supporting the town above, increasing through the second and particularly through the third epoch. The relic landslides are deep-seated, and form distinct units that interlock with each other and are mutually supporting. It means that a re-activation of one unit may lead to destabilisation of its neighbours and eventually result in a much wider re-activation of the Undercliff. Climate change is predicted to increase significantly the frequency and intensity of winter rainfall causing corresponding increases in groundwater levels, which will assist in accelerating ground movement under a NAI scenario and increase the probability of a major landslide event. Also, marginally stable areas may become unstable. Under the NAI scenario erosion could lead to an increase in ground instability, localised ground movement or even to a 'domino effect' in terms of landsliding extending back through the centre part of Ventnor up to the Lowtherville Graben which crosses the B3327 Newport Road at the rear of the landslide complex and severing a main access road into the town

This scale of erosion and slope failure will affect not only the coastal properties, infrastructure and businesses, but severely affect the economic functioning of the town (centred on the town centre and the Ventnor Bay seafront below) and the confidence of the residents which may lead to blight and decline. There would not be sufficient time for the community to adapt sustainably. NAI will result in increasing loss of the historic features and landscape of Ventnor and Bonchurch. The Victorian character and unique aspect of the town landscape will be damaged, although elsewhere NAI will maintain the natural character of the rural Undercliff landscape.

Features of biodiversity interest along this stretch of coastline include narrow sections of vegetated sea cliffs backed in some locations, where seafront development is set slightly back from the cliff, by small areas of maritime grassland, and nearshore boulder reefs. Under the NAI scenario natural erosion and retreat of the soft cliff line will occur, with resulting debris contributing to the ongoing evolution of the reefs. Maritime grassland habitat may be lost during coastal retreat.

It is important to be aware of the remote possibility of a step change in ground behaviour or the impact of an extreme landslide event within the Undercliff, which could trigger an unpredictable scenario. There is of course the great uncertainty in predicting how the coastal slopes respond to antecedent conditions.



Map showing potential erosion over the next 20, 50 and 100 years if 'No Active Intervention' occurs and coastal defences are allowed to fail and are not replaced. The map also shows (in orange) the zone of potential landslide reactivation or destabilisation which may result if significant shoreline erosion and cliff retreat occurs. Please note: the area to the west of the zone marked in orange is also vulnerable to landslide reactivation, but the topography in this area is less steep and the coast is already undefended.

St. Lawrence Undercliff

To the west of Ventnor, the eroding St. Lawrence Undercliff is also controlled by deep-seated landslide phenomena and has similar reactivation issues to those described in the Bonchurch and Ventnor unit to the east. However, the impacts of NAI will be different as the coastal slopes are often wooded with development generally set further back. The cliffs are cut into the massive relic landslides and will be subject to marine erosion and retreat, increasing the potential for large-scale reactivations retreating back up slope, setting the pattern for future behaviour. Slope reactivations are already occurring and will worsen under the NAI scenario. Increasing rates of coastal erosion, recession and slope reactivation are likely through the three epochs (20, 50 and 100 years) reflecting the impacts sea level rise on erosion of the soft rock coastline and winter rainfall increasing groundwater levels. Coastal slope reactivations will generally occur more rapidly in this unit than the defended frontage of Ventnor and Bonchurch. Further wet winters will continue recent trends of landslide activity which have destabilised the main A3055 coastal road running along the crest of a series of coastal mudslides approximately 300-400m inland, below the backscar, which is also affected by rockfalls. This coastal road has already been rerouted and narrowed in places and is likely to be severed during the first epoch (0-20 years) at several locations, in due course cutting-off access to a number of businesses and properties and cutting the ‘round the Island’ road link, requiring upgrading of alternative inland routes.

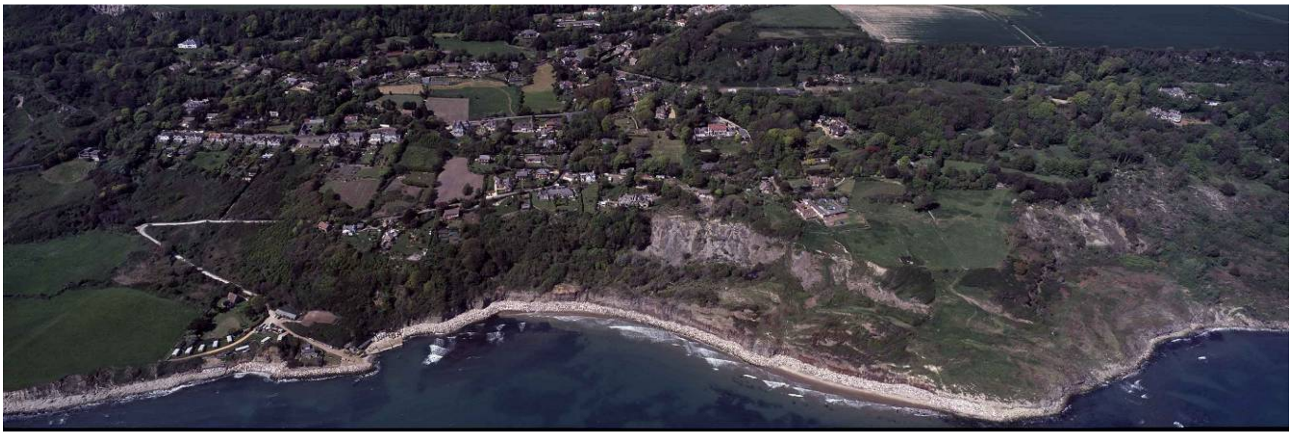
In contrast to the steeply sloping topography of central Ventnor and parts of Bonchurch the frontage from Steephill to west of St. Lawrence is relatively gentle with a wide ancient debris apron, providing some protection to the village of St. Lawrence as erosion progresses. The close association between ground movements and rainfall, together with the effects of coastal erosion as sea levels rise, leads to serious implications and in the long term, re-activation of landslides in the west of this area may lead to the initiation of new failures and renewed recession of the backscar. The likely timescale for such events is difficult to estimate, although localised failures are already approaching the backscar and the steps towards full slope re-activation are occurring more rapidly in western Undercliff than in east.

The consequences of this behaviour under the NAI scenario will be loss of infrastructure and road access to a number of properties and several businesses. In the longer term ongoing coastal erosion may trigger slope reactivations affecting a wider zone and require adaptation of the village community.

Features of biodiversity interest along this stretch of coastline include sections of vegetated sea cliffs backed in some locations by small areas of maritime grassland, and nearshore boulder reefs. Under the NAI scenario the natural landscape and important nature conservation interest of the area will be retained, although the increasing slope reactivations may change the balance of habitats in the area.

Castlehaven

At Castlehaven the impacts of a NAI scenario will be increasingly felt in the second and third epochs, as lack of maintenance of the current defences would critically reduce coastal slope stability in the area below the village of Niton. The 785m Reeth Bay frontage is protected by rock revetment and slope drainage measures, constructed in 2004, to address rapid coastal slope retreat. Without further maintenance, the rock armour revetment will continue to reduce cliff toe erosion throughout the first epoch. However, the extensive system of drainage pipes and siphon drains provided in roadways in the hinterland (in order to reduce ground water levels to the summer mean) is an essential component to the coastal protection scheme but requires ongoing maintenance and, in the event of no active intervention, by year 5 the drainage system could be seriously affected; certainly by year 10 it could be no longer functional, with the consequence that higher ground water levels will encourage reactivation of retreat or slumping of the coastal slope over the revetment in places. Failures could push the revetment seawards and open up the frontage to wave attack. In the second and third epochs significant reactivation of the landslide terraces behind will result, extending back into the developed areas. There is clear potential for larger-scale slope reactivation to be triggered by coastal erosion and groundwater which would retreat the upper scarp further inland at a much faster rate than the sea cliffs retreat. Ground movements back as far as Undercliff Drive are likely. The NAI scenario will have a serious and adverse impact on the village and road infrastructure, but will have benefits for nature conservation interest (features of interest include soft vegetated cliffs and boulder reefs) by allowing the natural evolution of the coastline and restoring the natural behaviour of the area in line with the extensive coast to the east and west.



Castlehaven: Reeth Bay rock revetment and slope drainage scheme (Isle of Wight Council)

St. Catherine's Point and Blackgang
The whole of this frontage at the western end of the Undercliff comprises an undefended actively eroding cliff line which will undergo continued rapid retreat under an NAI scenario. Deep-seated landslide phenomena are the context for future coastal change along this frontage, as described in the units to the east, although here the scale of retreat of the active coastal slopes is the most rapid on the Isle of Wight. Marine erosion at the toe and sensitivity to groundwater levels means the high coastal cliffs and slopes will be affected by further large-scale cliff falls and reactivations retreating back up slope to the back-scar of the landslide complex. The frequency of major events will increase over the next 100 years as the cliffs and coastal slopes within this frontage are sensitive to heavy winter rainfall promoting higher pore water pressures within the landslides triggering re-activations or new failures. Over the next 100 years total reactivation of the coastal landslide complex extending back to Old Sandrock Road and across the whole of the Blackgang frontage is anticipated, leading to potential further recession of the rear scarp of the Undercliff.

The coastline is made up of soft cliffs, small sections of maritime grassland and nearshore reef, which are designated features of South Wight Maritime SAC. Rapid cliff erosion and retreat is expected to continue under NAI, allowing coastal habitats to evolve naturally. NAI will also maintain the spectacular coastal scenery of this area, although St Catherine's lighthouse is likely to be one of the listed buildings lost in the area. Further retreat of scattered development will be necessary at Blackgang, where loss of buildings and infrastructure at the Blackgang Chine Theme Park is anticipated, requiring eventual closure of the popular tourist attraction for the Isle of Wight. A section of the main coastal road from Niton to Chale is also threatened by cliff retreat in the second or third epoch and may require realignment.

The economic damages due to flooding and erosion are summarised in Table 1, at the end of this sub-section and a summary of impacts with respect to the overarching objectives are set out in Table 2, in comparison with the assessment made for the following With Present Management scenario. It is important to note that the economic consequences of a NAI policy will extend far beyond the properties directly impacted by coastal erosion in Ventnor, and damage to millions of pounds of properties and assets in the town above would be triggered by reactivation and movement of landslide blocks underlying the town resulting from erosion of the lower terraces of the landslide complex along the shoreline.

2.2.2. With Present Management (Scenario 2, WPM):

This scenario examines the consequences of continuing with current shoreline management practices and policies as defined in SMP1 including the maintenance of existing defences. The previous shoreline management policies for the PDZ are summarised in the table at the start of Section 2.

Overall, if present management practices were continued, the approach of the management would be defined as the intent to:

- Maintain and improve the standard of defences fronting Ventnor and maintain the existing defences at Castlehaven.
- The remainder of the coastline is left to function naturally (at Dunnose, along the St Lawrence Undercliff, at St Catherines Point and Blackgang).

The Undercliff landslide complex has been intensively mapped in terms of geomorphology, ground behaviour and planning guidance, which has allowed informed *landslide management* to take place in recent decades an essential accompaniment to the current *shoreline management* practices in the area. The scenario of continuing WPM outlined below is effective in minimising the risks of coastal erosion and landsliding impacting on the coastal town and villages in the area and in allowing the communities' time to adapt.

Luccombe to Dunnose
Under a WPM scenario erosion, retreat and reactivation of the active undefended wooded cliffs at the eastern margin of the landslide complex will continue in line with the NAI scenario above resulting from coastal erosion and water in the ground.

Ventnor, Bonchurch and Steephill
The present management practices of sea cliff stabilisation and toe weighting around Ventnor and Bonchurch appear to have significantly reduced the occurrences of landslide reactivations within these parts of the Undercliff. If continued, these measures could considerably delay reactivations such that the eastern section of the Undercliff around Ventnor might remain relatively stable for over 100 years, whereas western parts (the St. Lawrence to Niton Undercliff) would in future become increasingly active.

With continued maintenance of the seawalls and revetments fronting Ventnor and Bonchurch, erosion of the cliffs cut into the landslide complex would be prevented, and slope reactivation behind the defence line minimised. Ongoing maintenance and replacement of defences would have increasingly important stabilising effects through the future epochs, as sea levels rise and stability of the slopes gradually declines. The predicted increase in future winter rainfall may still promote reactivation of ground movement in some areas, especially in the longer term, with episodic slumps or slides occurring which could overrun sections of the seawall and rock revetment. The contrasts of moving from defended to undefended coast under a WPM policy will be increasingly evident at Monk's Bay in the east and Steephill Cove in the west. Slope reactivation is likely behind Monk's Bay in the second and third epochs, as beach recycling at current levels is likely to become insufficient to retain an effective beach as a soft defence, and erosion and landsliding increasingly cuts back into the adjacent undefended coastal slopes at Dunnose. This offset may be reduced by landslide debris slumping forwards as the cliff retreats. Similar coastal cliff retreat would outflank the defences at Steephill. The seawalls fronting the majority of the unit may be vulnerable to overtopping in future epochs and low beach levels or absence of fronting beaches will expose them to wave attack, requiring improvement of the standard of the defences. The economic functioning of the town centre and Ventnor Bay would be retained if present management practices continue, also preserving the unique character of the terraced Victorian town landscape and numerous historic features within the town and villages. This would provide time for the community to adapt more sustainably to the challenges of climate change.

Under WPM, natural processes of erosion and succession of the cliff line will be prevented and there will be no opportunity for the restoration of the natural cliff habitats that form part of the South Wight Maritime SAC. The current status of nearshore reef features and of small areas of maritime grassland will largely be maintained under WPM.

It is important to be aware of the remote possibility of a step change in ground behaviour or the impact of an extreme landslide event within the Undercliff, which could trigger an unpredictable scenario. Whilst shoreline management has a very important role in prevention of worsening slope stability conditions, there is of course the great uncertainty of the coastal slopes responding to certain antecedent conditions irrespective of the measures put in place at the toe of the Undercliff. This is of course a risk to shoreline management as it is to residential, commercial, amenity use, access and landscape in the area.

St. Lawrence, Castlehaven and Blackgang

Continuing present management practices would result in few changes to the largely undefended western half of the Undercliff from St Lawrence to Blackgang when compared with the NAI scenario described above. This western section of the Undercliff will become increasingly active through the epochs as coastal erosion increases and slope stability declines. Key impacts will include the severing of the main coastal road from St Lawrence to Niton with loss of access to a number of properties and businesses in the area and the restoring of the natural quiet landscape and benefits for nature conservation interest. At Blackgang limited infrastructure and buildings will be lost as the theme park and coastal road need to adapt to increasingly rapid coastal retreat at this exposed location, maintaining the scenery and biodiversity features (soft cliffs and nearshore reef) of the area. Regarding the heritage interest, continuing WPM will result in loss of several find spots and listed buildings (including St Catherine's Lighthouse) but no loss of Scheduled Monuments is anticipated. WPM will preserve the natural character of the rural landscape by allowing 'No Active Intervention' to continue.

The exception to this is at Castlehaven, where maintaining the present management practice of 'Hold the Line' will mean that some slope failure and retreat is likely to continue within the weak coastal slopes behind the Bay in the second and third epochs, although this will be minimised by the continued presence of the toe rock revetment. Continuation of the previous system of slope drainage may no longer be sufficient to reduce winter groundwater levels in the third epoch, increasing the likelihood of larger-scale slope reactivation affecting properties and road access. Erosion and slope failure along the adjacent coast will continue outflanking the defences and could destabilise the sides of the Reeth Bay landslide complex, although erosion is largely prevented in the centre of the bay. Continuing WPM at this location will sustain the community in this area of Niton village to allow time for longer-term adaptation, although the full nature conservation interest of the site, which is focused on the soft cliff line, would not be restored whilst the defences and policy are maintained and natural processes of erosion and succession are prevented.

The area of the Undercliff to the east of Reeth Bay has been particularly active in terms of ground movements in recent years, and even under a WPM scenario, the community at Niton will need to adapt to increasingly unstable slopes in the surrounding areas of the western Undercliff.

Table 1a. Economic Assessment: – Erosion damages

The following table provides a brief summary of damages determined by the SMP2 MDSF analysis for the whole PDZ. Further details are provided in Appendix H. Where further, more detailed information is provided by studies, this is highlighted. The table aims to provide an initial high level assessment of potential damages occurring under the two baseline scenarios.

It is important to note that the economic consequences of an NAI policy will extend far beyond the properties directly impacted by coastal erosion in Ventnor identified in the table below. 2,879 properties are located on the terraces of the landslide complex above the defended coastal cliffs, and these properties are at risk from the potential landslide reactivation likely to be triggered by erosion of the coastal cliffs, but these additional properties are not included in the economic calculation below (which is based purely on direct erosion losses from coastal cliff retreat over the next 100 years). The erosion damages below provide a clear indication of the assets directly at risk from potential erosion, but do not fully represent the risk of damage to millions of pounds of properties and assets in the town above which would be triggered by reactivation and movement of landslide blocks underlying the town. Further information is provided in the Management Area statement below and in Appendix C3.

ASSESSMENT OF EROSION DAMAGES

Epoch	**0 -20 year**			**20 – 50 years**			**50 – 100 years**			
No Active Intervention	**Number of properties:**		**Value**	**Number of properties:**		**Value**	**Number of properties:**		**Value**	**PV Damages**
Location	*Residential*	*Commercial*	**x £1000**	*Residential*	*Commercial*	**x £1000**	*Residential*	*Commercial*	**x £1000**	**(£x1000)**
Dunnose	0	0	0	0	1	0	0	2	30	3
Ventnor (Monks Bay to Steephill Cove)	0	8	157	16	27	3,624	80	64	17,545	3,348
St Lawrence Undercliff	0	4	30	2	0	421	4	2	901	229
Castlehaven	0	2	0	1	5	304	20	21	4,619	724
St. Catherine's and Blackgang	0	6	150	8	21	2,727	13	38	6,278	1,871
									Total for PDZ4	**6,175**
With Present Management	**Number of properties**		**Value**	**Number of properties**		**Value**	**Number of properties**		**Value**	**PV Damages**
Location	*Residential*	*Commercial*	**x £1000**	*Residential*	*Commercial*	**x £1000**	*Residential*	*Commercial*	**x £1000**	**(£x1000)**
Dunnose	0	0	0	0	1	0	0	2	30	3
Ventnor (Monks Bay to Steephill Cove)	0	0	0	0	0	0	0	0	0	0
St Lawrence Undercliff	0	4	30	2	0	421	4	2	901	229
Castlehaven	0	0	0	0	0	0	0	0	0	0
St. Catherine's and Blackgang	0	6	150	8	21	2,727	13	38	6,278	1,871
									Total for PDZ4	**2,103**

Notes: Please see sections 2 and 3 of this chapter regarding landslide reactivation alongside these direct erosion damages. It is important to note that the economic consequences of a NAI policy will extend far beyond the properties directly impacted by coastal erosion in Ventnor identified above, and damage to millions of pounds of properties and assets in the town above would be triggered by reactivation and movement of landslide blocks underlying the town.

Table 1b. Economic Assessment –Flood damages

Please note: No flood damages are reported by MDSF for PDZ4.

ASSESSMENT OF POTENTIAL FLOOD RISK

	Flood risk tidal 2010			Flood risk tidal 2060			Flood risk tidal 2110			
No Active Intervention	**No. of properties**		**AAD**	**No. of properties**		**AAD**	**Number of properties**		**AAD**	**PVD**
Location	< 1:100yr	>1:100yr	**x £1000**	< 1:100yr	>1:100yr	**x £1000**	< 1:100yr	>1:100yr	**x £1000**	**(£x1000)**
0	0	0	0	0	0	0	0	0	0	0
Agricultural Total										
									Total for PDZ4	0
With Present Management	**No. of properties**		**AAD**	**No. of properties**		**AAD**	**No. of properties**		**AAD**	**PVD**
Location	< 1:100yr	>1:100yr	**x £1000**	< 1:100yr	>1:100yr	**x £1000**	< 1:100yr	>1:100yr	**x £1000**	**(£x1000)**
0	0	0	0	0	0	0	0	0	0	0
Agricultural Total										
									Total for PDZ4	0

Table 2. General Assessment of Objectives

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

STAKEHOLDER OBJECTIVE	NAI			WPM		
	Fails	Neutral	Acceptable	Fails	Neutral	Acceptable
To sustain and adapt the large community of Ventnor town.						
To sustain and adapt the communities of the surrounding villages, in view of the changing climate						
To consider the impact of the increasing risks of climate change on the landslide complex including the impacts of sea level rise and coastal erosion.						
To maintain or adapt access to the Ventnor Undercliff.						
To support opportunity for adaptation, supporting and enhancing the nature conservation value of the area.						
To maintain and adapt the important landscape.						
To sustain the historic landscape and environment where practical.						

3. Discussion and detailed policy development

The discussion of the baseline scenarios outlined above demonstrates that there is a marked contrast between the western and eastern Undercliff in terms of both the current shoreline management and the scale of future risks, which form the driver for future policy. The current management of coastal risks in the area comprises not only current shoreline management practices but also active landslide management, to mitigate the impact of ground movements for the thriving community living on the landslide complex. The landslide management practices minimise the impact of ground movements and the likelihood of future reactivations. Lengths of coastal defence within the landslide complex protect coastal properties, assets and access, and in doing so also form an essential component of current landslide management by preventing erosion removing the lower terraces of the landslide complex which would trigger movement and reactivation in the terraces above underlying the town.

In this PDZ coastal management and landslide management are intrinsically linked, especially in the eastern half of the Undercliff, where the majority of development and steeper slopes occur. The present management practices of ‘No Active Intervention’ (NAI) in the long undefended, natural stretches of the Undercliff and ‘Hold the Line’ in the developed town frontages have evolved and been tested over recent decades and proved effective in maintaining an effective community and minimising risks. This PDZ will be especially sensitive to the predicted impacts of climate change over the next 100 years, reinforcing the importance of present shoreline management practices. Despite challenges that may require adaptation by the community, it is the recommendation of this Shoreline Management Plan that it is the detail of delivery of the existing ‘With Present Management’ approach that needs to be considered rather than a major change from current practice.

In essence, NAI is not a realistic option for currently defended areas, while there is no strong case for building new defences in areas that are currently undefended. The key decisions to be made are therefore how to provide continued defence in the currently defended sections, and how shoreline management can support adaptation in the undefended frontages. Shoreline management should work in a fully integrated way with landslide management, particularly in the long term.

Dunnose (Luccombe Chine to Monk’s Bay)
At the eastern limit of the PDZ, the coastal slopes and landslide benches forming the coastal cliffs from Luccombe to Monks Bay are undefended, actively retreating, and supply essential sediments to the longshore drift system feeding the beaches of Sandown Bay to the north. The consequences of the NAI and WPM scenarios along this coastline are therefore the same, with the exception under the WPM scenario of retreat cutting back against adjacent defences in Monk’s Bay. The present management of this area of NAI is therefore appropriate and will be continued as future SMP policy. The landslide phenomena are more active at the eastern and western extremes of the Undercliff (in this area, and at Blackgang to the west) due to the underlying geological structure, which, alongside the unspoilt natural environment of the area and the small number of assets at risk, means that it would be technically unfeasible as well as environmentally and economically inappropriate to construct coastal defence structures in this area. It is important to note that coastal cliff retreat will trigger landslide reactivation in this wooded area, progressively increasing over the next 100 years, initially affecting footpaths, and if larger scale slope failures are triggered inland of the zone directly affected by erosion they may in later epochs or beyond impact upon the A3055 coastal road from Shanklin to Ventnor, forming one of the main access routes into Ventnor and the developed centres discussed below. The application of the NAI policy will enable the continued natural evolution of important nature conservation features, including soft cliffs and nearshore reefs.

Ventnor and Bonchurch (Monk’s Bay to Steephill Cove)
The coastal town of the Ventnor and surrounding villages at Bonchurch and Steephill Cove are the core of the intensively developed area underlain by the deep-seated landslide complex, affected by

specific areas of reactivation, and along which seawalls and rock revetments (preventing coastal erosion) currently reduce the risk of landslide reactivation. When setting shoreline management policy, it is relevant to consider the scale of the problem. This is the most significant coastal slope stability issue for the Isle of Wight and approximately 7,000 people live on the landslide complex. In recent decades the knowledge disseminated by clear landslide mapping and planning guidance and the relative stability of the town have resulted in a thriving town centre and seafront, with the unique character and setting of the town benefiting increasing numbers of restaurants, shops, hotels and flats. The NAI scenario outlined above would result in widespread loss of properties, businesses, shoreline access roads, esplanades and footpaths due directly to coastal erosion in epochs two and three. More importantly, ongoing erosion would also be likely to trigger significant ground movements and damages to the terraces of the town above following loss of the coastal cliff support, with risks worsening progressively over the next 100 years. This NAI scenario is unacceptable in this developed eastern area of the Undercliff.

The present management of maintaining the coastal defence line through the most developed and steepest areas of the town has proved effective in preventing erosion and maintaining relative ground stability in the area, which includes approximately £600 million of properties and assets in addition to those listed in Table 1. Continuing WPM practices in the future is the most effective way of minimising future risks of coastal erosion and landsliding to the communities of Ventnor and surrounding villages by maintaining the current defence line at the foot of the developed coastal cliffs from Monks Bay to Steephill Cove. At the western edge of this area there is a change from the steeper terraces in central Ventnor to the more gentle topography moving west through the village of St. Lawrence, where the gentler topography and less intensive development has not prompted the same requirement for coastal defence structures on this undefended coast. Although maintaining a Hold the Line Policy in central Ventnor will protect a large number of assets and sustain an effective community, it will not eliminate risks entirely. The community has adapted to living with landslides, but the effects of increasing winter rainfall in particular may also have adverse impacts on ground stability.

It is known that maintaining defences to remove the known trigger of coastal erosion and continuing landslide management (including working with utilities and residents to control water in the ground) will minimise the risk of reactivation in a significant and achievable way, and allow time for the community to adapt in the long term. It should also be noted that the four main access roads into Ventnor (from Shanklin, Niton, Whitwell and Wroxall) cross the back-scar of the landslide complex into the area, and although all are currently operating effectively, maintaining security of access is also fundamental to the future of the town. Regular minor maintenance of the Wroxall route crossing the ‘graben’ feature in upper Ventnor is required and potential rockfalls from the back-scar could prompt additional requirements for road maintenance along the Whitwell and Shanklin routes. The road access running west along the Undercliff from Ventnor to Niton is threatened and is discussed below.

Coastal habitats here are already squeezed between town infrastructure and sea defences, with only small sections of cliff habitat remaining. WPM will continue to prevent the natural evolution of the coastal cliff line and nearshore reefs.

St. Lawrence to Niton

The western half of the Undercliff is more natural in character and more sparsely developed with villages and properties strung along the main A3055 road (the Undercliff Drive). From St. Lawrence to Niton the current management of the area has been NAI, which is already resulting in impacts for the local community. Properties are generally located higher up to landslide terraces, rather than directly on the coast. In recent decades coastal erosion and resulting reactivation of specific landslide units on the lower slopes have had "knock-on" effects upslope such that instability, exacerbated by water in the ground, has progressed now almost to the toe of the landward back-scar of the landslide complex between St Lawrence and Niton. Recent wet winters have been characterised by exceptional landslide activity, which has destabilised the coastal road running along the crest of a series of coastal mudslides approximately 300-400m inland, below the back-scar, which is also affected by rockfalls. This coastal road is already stepped and patched and is likely to be severed during the first epoch at several locations, in due course cutting-off access to a number of businesses and properties and cutting the ‘round the Island’ road link, which will need to be diverted inland through the villages inland of the back-scar. It is recognised that adaptation is required in this area, alongside recommended maintenance the road access for as long as possible with minor works. This section of the Undercliff does not have the same economic justification for coast protection measures as those in place fronting the town to the east and the area is also more vulnerable to the impacts of climate change. The quality of the natural environment and landscape is also fundamental to the character of the area, and NAI will allow the natural retreat and succession of cliff habitats to continue. Recent coastal slope failures and ground movements have been evident west of St. Lawrence (in contrast to the more stable Ventnor and St Lawrence areas) and are expected to continue. Nevertheless, a significant community is resident in the village of St. Lawrence, and as the current ground movements are occurring further to the west, access to this community is expected to be maintained through Ventnor to the east and through local roads to the north. NAI therefore continues to be the preferred approach for shoreline management in this area, as the behaviour and pattern of the natural phenomena, relatively sparse and set-back development and the natural environment of the area do not justify an alternative approach. It is however recognised that ongoing coastal erosion and the impacts of climate change (including sea level rise and increasing winter rainfall) will have significant impacts on slope reactivation and access routes in the area and will require adaptation by the local community.

Castlehaven

In contrast to the surrounding natural coastline, a very short section in the western Undercliff has a legacy of existing defence which is fundamental to the future of the area. The area of the Undercliff landslide complex above Reeth Bay (known as Castlehaven) has also been the scene of rapid coastal cliff retreat and slope reactivation in recent years (triggered by coastal erosion and water in the ground), with the difference at this location being that a significant community and number of properties in the village of Niton are affected. This has prompted a policy of Hold the Line (HTL) since SMP1 in 1997 which has recently been enacted with the construction of a rock revetment and slope drainage scheme designed to remove the winter peak of rainfall from the ground, which is expected to preserve the future of the community for the next 50 years. This 785m length of ‘Hold the Line’ policy is in marked contrast to the surrounding 8km of undefended coast which has been effectively undergoing a policy of No Active Intervention in recent years. This choice of shoreline management policy was examined in detail prior to the scheme being constructed and through use of drainage a way found to maintain the current community above the bay whilst still allowing the natural character of the open coastal slopes below to remain for the benefit of the nature conservation interest and landscape of the area. Changing the management intent in this area will result in increasing slumping of the weak coastal slopes of Reeth Bay and retreat affecting cliff top properties; whereas, continuing maintaining the slope drainage will delay the commencement of major cliff retreat for as long as possible allowing time for the community to adapt. With maintenance, the existing defences were designed to protect the community for the next 50 years. Continuing the present management of HTL in epochs 1 and 2, whilst practical to do so, is therefore achievable whilst minimising adverse impacts on the adjacent shorelines. In the 3rd epoch it is anticipated to transfer to a policy of Managed Realignment on this specific short frontage, with the intention of slowing the rate of retreat, but this will be dependent on local conditions at the time, including the deterioration or continued effective functioning of the revetment and/or drainage and the degree of erosion and reactivation of the local coastal slopes and adjacent shorelines. If the coastal retreat can no longer be effectively minimised or the defences are no longer required the area would transfer to a policy of NAI. By this time, the access road leading east out of Niton towards St. Lawrence is expected to be severed, so access to the community will be from the north. Importantly, there are no proposals to extend the defences or the policy to adjacent shorelines in any epoch, and it is recognised that this area is a response to specific local characteristics and the larger-scale and long-term character of the western Undercliff is a return to increasingly natural behaviour with erosion and groundwater causing coastal slope reactivation. This approach will ultimately allow the natural evolution of the coastline, with cliff and beach habitats being allowed to erode and retreat in harmony with the adjacent coastline.

St Catherine's Point and Blackgang

Moving west, the coastal slopes around St. Catherine's Point and Blackgang are natural, undefended and affected by increasingly severe landslide failures and reactivations from Gore Cliff to Chale Terrace, triggered by coastal erosion and groundwater. This western end of the landslide complex is the most active and exposed and the large-scale of the landsliding behaviour and coastal erosion means that the current policy of Do Nothing or No Active Intervention is the sensible choice in this area, which is also important for spectacular natural coastal landscape and scenery, nature conservation interest associated with South Wight Maritime SAC (soft cliffs and nearshore reefs) and sediment supply to the eastwards littoral drift system. The NAI (and WPM) scenario will therefore result in further loss of several properties at St. Catherine's, Blackgang and Chale. Aside from the fundamental natural character of the area, the other main asset that will be affected is the Blackgang Chine Theme Park on top of the high cliffs. Here the owners have in place a programme of inspections to ensure the spectacular coastal location is an asset to the park whilst it is safe to remain so, alongside a longer-term policy of retreat and relocation. There is no demand for an alternative shoreline management policy in this area as there is no economic justification or achievable option to implement a policy to reduce erosion, which would also have severe adverse consequences for the natural environment and landscape. NAI and adaptation is recognised as the sustainable option for the future of the area.

PDZ4
Management Area Statements

- **Eastern Undercliff (including Ventnor) (MA 4A)** includes two policy units
- **Western Undercliff (MA 4B)** includes three policy units

Within these areas a summary of policy is provided below. Management Areas statements are provided in the following sheets, with maps showing each area.

Location reference	**Eastern Undercliff (including Ventnor)**
Management Area reference	**MA 4A**
Policy Development Zone	**PDZ 4**

The following descriptions are provided to assist interpretation of the maps shown of each Management Area.

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical rates and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change, these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan, reference should be made to the baseline data (see Appendix C3).

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

In some areas the preferred policy does not change from that under the existing management approach. In some areas where there are hard defences this can be accurately identified. In other areas there is greater uncertainty. Even so, where the shoreline is likely to be quite clearly defined by a change such as the crest of a cliff the estimated position is shown as a single line.

- Where there is a difference between With Present Management and the Preferred Policy this distinction is made in showing two different lines:

With Present Management.
Preferred Policy.

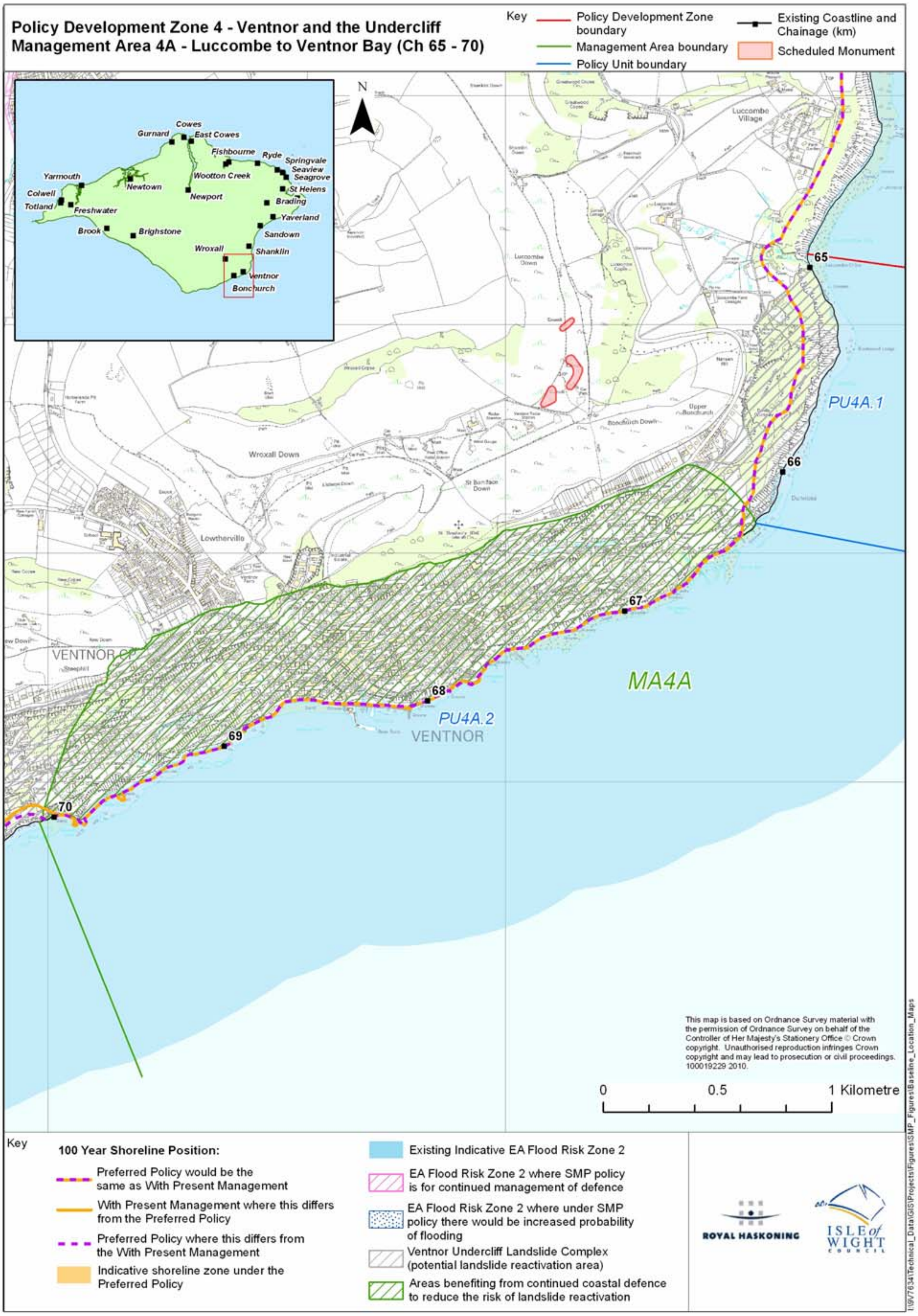
- In some areas, the Preferred Policy either promotes a more adaptive approach to management or recognises that the shoreline is better considered as a width rather than a narrow line. This is represented on the map by a broader zone of management:

Flood Risk Zones:
All flood risk zones are based upon the current tidal EA Flood Zone 2. This is an extreme flood event (1:1000 year at current levels) meaning that it has 0.1% chance of occurring each year.

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

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

Note: This Management Area corresponds to IW29 to IW36 in selected Appendices.



Policy Development Zone 4 - Ventnor and the Undercliff
Management Area 4A - Luccombe to Ventnor Bay (Ch 65 - 70)
Key
Policy Development Zone boundary
Management Area boundary
Policy Unit boundary
Existing Coastline and Chainage (km)
Scheduled Monument
Cowes
Gurnard
East Cowes
Fishbourne
Ryde
Springvale
Seaview
Seagrove
Yarmouth
Wootton Creek
Newtown
St Helens
Colwell
Newport
Brading
Totland
Freshwater
Yaverland
Brook
Brighstone
Sandown
Wroxall
Shanklin
Ventnor
Bonchurch
Luccombe Village
Wroxall Down
Bonchurch Down
Lowtherville
VENTNOR
PU4A.1
PU4A.2
MA4A
65
66
67
68
69
70
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0
0.5
1 Kilometre
Key
100 Year Shoreline Position:
Preferred Policy would be the same as With Present Management
With Present Management where this differs from the Preferred Policy
Preferred Policy where this differs from the With Present Management
Indicative shoreline zone under the Preferred Policy
Existing Indicative EA Flood Risk Zone 2
EA Flood Risk Zone 2 where SMP policy is for continued management of defence
EA Flood Risk Zone 2 where under SMP policy there would be increased probability of flooding
Ventnor Undercliff Landslide Complex (potential landslide reactivation area)
Areas benefiting from continued coastal defence to reduce the risk of landslide reactivation
ROYAL HASKONING
ISLE of WIGHT COUNCIL

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN:

The general intent of management for this area is to maintain the community and economic viability of Ventnor and surrounding settlements through continuing provision of coastal defences to prevent erosion and resulting reactivation of the Ventnor Undercliff Landslide Complex. The town of Ventnor has developed from its unique coastal location and aspect. The SMP recommends that shoreline management offers an effective and achievable method of minimising future risks to preserve the character and functioning of this town in the foreseeable future. It is accepted that, despite coastal protection measures, the long-term risks of landslide reactivation will gradually increase in a changing climate due to the impact of increasing winter rainfall. Continuing shoreline management over the next 100 years should lead to adaptation in the longer term in parts of the area as risk levels increase. Whilst shoreline management has a very important role in prevention of worsening slope stability conditions, there remains of course uncertainty in how the coastal slopes will respond episodically to certain antecedent conditions irrespective of the measures put in place at the toe of the Undercliff. Whilst the provision of defences to prevent erosion effectively minimises this risk, future behaviour of the landslide complex will determine the timing, location and nature of future adaptation required after or during the third epoch.

In this Management Area integrated landslide management is ongoing, and shoreline management is an essential element of this. This is true for the whole of PDZ4, but especially in this Management Area, where the majority of development is located and steeper slopes occur (therefore the reason that defences already exist in this section of the Undercliff). The intention is to maintain and improve the existing defence line of seawalls and rock revetments (supplemented by soft engineering) to directly protect coastal properties, assets and access. In doing so this will also, essentially, minimise the risk of more widespread landslide reactivation by preventing erosion removing the coastal cliffs and lower terraces of the landslide complex, which would trigger movement in the sequence of terraces above underlying the town. Landslide management practices will also continue, including detailed planning guidance to avoid inappropriate development in areas of known ground movement or geomorphological vulnerability, minimising water inputs into the ground from control of pipe networks and monitoring of ground instability. It is important to work with homeowners and utilities to manage the risk of living with landslides, alongside continued shoreline management.

In the east of the area, coastal cliff retreat and landslide reactivation will continue resulting from erosion of the undefended Dunnose coast from Luccombe to Monks Bay. It is important to maintain natural evolution of this coast to the continue sediment supply to the local shorelines. Coastal access through the footpath network will need to adapt to change.

PREFERRED POLICY TO IMPLEMENT PLAN:	
From present day	Maintain existing defences along Ventnor and Bonchurch but allow Dunnose to function in line with natural processes.
Medium term	Maintain and improve existing defences, but working locally to allow scope of some readjustment of defences which could incorporate slope drainage. Allow Dunnose to function in line with natural processes. Adapt transitions of defences to the adjacent eroding undeveloped shorelines.
Long term	Maintain and improve existing defences to minimise the likelihood of landslide reactivation by preventing erosion.

SUMMARY OF SPECIFIC POLICIES

Policy Unit (& length)		**Policy Plan**			
		to 2025	**to 2055**	**to 2105**	**Comment**
PU4A.1	**Dunnose** (1,320m)	NAI	NAI	NAI	
PU4A.2	**Ventnor & Bonchurch (Monk's Bay to**	HTL	HTL	HTL	

	Steephill Cove) (3,823m)				
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention MR – Managed Realignment					

CHANGES FROM PRESENT MANAGEMENT

No change.

IMPLICATION WITH RESPECT TO BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	157	943	2,251	3,351
	Preferred Plan Damages £k PV	-	-	3	3
	Benefits £k PV	157	943	2,248	3,348
	Costs of Implementing plan £k PV	265	677	2,654	3,596

At the broad level of analysis conducted by the SMP, the economic viability of the preferred plan for this Management Area is of marginal economic viability when only considering the losses resulting directly from erosion of the coastal strip of land, affecting 198 properties, as shown in the table above. However, there are clearly more important factors involved in the decision to continue to defend this length of coastline. 2,879 properties are located on the terraces of the landslide complex above the defended coastal cliffs, and these properties are at risk from the potential landslide reactivation likely to be triggered by erosion of the coastal strip of land (which provides toe weighting). These additional properties are not included in the economic calculation above, which is based purely on direct erosion losses from coastal cliff retreat over the next 100 years. However, the coastline of this unit would not retreat in a linear fashion, as erosion would be likely to unlock episodic and localised landslide phenomena with material slumping forward onto the foreshore and the crest of the failures retreating inland, with consequences further upslope. These phenomena will be localised and complex based on the variations in the particular underlying landslide topography and on where initial breaches in the coastal defences occur, and cannot be predicted with accuracy in this SMP. The NAI damages above provide a clear indication of the assets directly at risk from potential erosion, but do not fully represent the risk of damage to millions of pounds of properties and assets in the town above which would be triggered by reactivation and movement of landslide blocks underlying the town.

Ventnor is an important population centre for the Isle of Wight and coastal erosion and landsliding are inextricably linked in this area, where the coastal defences are an effective and essential method of minimising the risk of landslide reactivation under the town, particularly in the light of the predictions of sea level rise and increasing winter rainfall in the future. The full scale of the benefits of the Hold the Line shoreline management policy are therefore unquantifiable at the broad-scale of assessment of the SMP. The EA is currently investigating funding of intervention where landsliding is a dominating issue.

Location reference	**Western Undercliff**
Management Area reference	**MA 4B**
Policy Development Zone	**PDZ 4**

The following descriptions are provided to assist interpretation of the maps shown of each Management Area.

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical rates and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change, these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan, reference should be made to the baseline data (see Appendix C3).

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

In some areas the preferred policy does not change from that under the existing management approach. In some areas where there are hard defences this can be accurately identified. In other areas there is greater uncertainty. Even so, where the shoreline is likely to be quite clearly defined by a change such as the crest of a cliff the estimated position is shown as a single line.

- Where there is a difference between With Present Management and the Preferred Policy this distinction is made in showing two different lines:

With Present Management.
Preferred Policy.

- In some areas, the Preferred Policy either promotes a more adaptive approach to management or recognises that the shoreline is better considered as a width rather than a narrow line. This is represented on the map by a broader zone of management:

Flood Risk Zones:
All flood risk zones are based upon the current tidal EA Flood Zone 2. This is an extreme flood event (1:1000 year at current levels) meaning that it has 0.1% chance of occurring each year.

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

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

Note: This Management Area corresponds to IW37 to 39 in selected Appendices.


Policy Development Zone 4 - Ventnor and the Undercliff
Management Area 4B - Ventnor Bay to Chale (Ch 70 - 79)
Key
Policy Development Zone boundary
Management Area boundary
Policy Unit boundary
Existing Coastline and Chainage (km)
Scheduled Monument
PDZ4
MA4B
PU4B.1
PU4B.2
PU4B.3
ST CATHERINE'S POINT
Niton
St Lawrence
Chale
Whitwell
0
1
2 Kilometres
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100 Year Shoreline Position:
Preferred Policy would be the same as With Present Management
With Present Management where this differs from the Preferred Policy
Preferred Policy where this differs from the With Present Management
Indicative shoreline zone under the Preferred Policy
Existing Indicative EA Flood Risk Zone 2
EA Flood Risk Zone 2 where SMP policy is for continued management of defence
EA Flood Risk Zone 2 where under SMP policy there would be increased probability of flooding
Ventnor Undercliff Landslide Complex (potential landslide reactivation area)
Areas benefiting from continued coastal defence to reduce the risk of landslide reactivation
ROYAL HASKONING
ISLE of WIGHT COUNCIL

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN:

The western half of the Undercliff is more natural in character with generally undefended shoreline and scattered development along the main A3055 road (the Undercliff Drive) and the general intent of management in this area is to continue to allow natural change to occur from St. Lawrence to Blackgang, with the exception of maximising the benefit of existing defences at Castlehaven.

Along the St. Lawrence Undercliff the current management of the area has allowed natural change to occur, which is already resulting in impacts for the local community. The SMP recommends continuing this management approach, but it is recognised that adaptation is required, alongside recommending maintaining the road access for as long as possible with minor works. However, maintaining the road access could not be achieved through shoreline management and there are no proposals to construct or extend defences in this management area. This section of the Undercliff does not have the same economic justification for coast protection measures as the town of Ventnor to the east and the area is also more vulnerable to the impacts of climate change. Access to the village of St. Lawrence is expected to be maintained through Ventnor to the east and through local roads to the north. NAI therefore continues to be the preferred approach for shoreline management in this area, as the behaviour and pattern of coastal slope reactivation (triggered by coastal erosion and groundwater), relatively sparse and set-back development and the natural environment of the area do not justify an alternative approach.

At Castlehaven the intention is to continue present management of the shoreline in maintaining the recent coastal protection and slope stabilisation scheme (preventing erosion and lowering groundwater) which is anticipated to minimise slope reactivation and retreat for 50 years and allow time for the cliff top community to adapt to long-term change. This management intent affects under 800m of shoreline and was designed to use slope drainage to minimise adverse impacts on the nature conservation interest in the area. In the long term (beyond 50 years) it is anticipated to transfer to a policy of managed realignment, but this will be dependent on local conditions at the time, including the degree of erosion and reactivation of the coastal slope and adjacent shorelines and the deterioration or continued effective functioning of the revetment and/or drainage. If the coastal retreat can no longer be effectively minimised or the defences are no longer required, the area would transfer to a policy of NAI. It is recognised that this area is a response to specific local characteristics and the larger-scale and long-term character of the management unit is a return to increasingly natural behaviour and coastal slope reactivation due to coastal erosion and water in the ground.

The undefended western end of the landslide complex at St Catherine’s Point and Blackgang is the most exposed and active landsliding behaviour and cliff retreat means that the current policy No Active Intervention is the sensible choice in the area, in-keeping with the natural coastal landscape, nature conservation interest and providing sediment supply. Local businesses are practicing progressive retreat and relocation while maximising the benefit of the coastal location in the short to medium term. There is no demand for an alternative shoreline management policy in this area. NAI and adaptation is recognised as the sustainable option for the future of the area.

NAI will support the natural evolution of important nature conservation features along the majority of this PDZ coastline. Erosion and succession of mobile vegetated cliff habitats that are a feature of the South Wight Maritime SAC will be allowed to continue. Nearshore boulder reefs will similarly be allowed to evolve naturally, with eroded cliff debris supporting the development of new reef areas as the cliff line retreats.

PREFERRED POLICY TO IMPLEMENT PLAN:	
From present day	No Active Intervention with the exception of continued management of the coast at Castlehaven to reduce coastal slope reactivation and retreat.
Medium term	No Active Intervention with the exception of continued management of the coast at Castlehaven.

Long term	No Active Intervention. Potential realignment of the coast at the end of life of the existing defence scheme at Castlehaven, allowing time for adaptation of the local community. This may involve minimising rather than preventing cliff retreat if achievable.

SUMMARY OF SPECIFIC POLICIES

Policy Unit (& length)		**Policy Plan**			
		to 2025	**to 2055**	**to 2105**	**Comment**
PU4B.1	**St. Lawrence Undercliff** (4,531m)	NAI	NAI	NAI	
PU4B.2	**Castlehaven** (725m)	HTL	HTL	MR	Management option in epoch three will be dependent on the slope stability conditions in the area at the time and whether the cliff retreat can be minimised through MR.
PU4B.3	**St. Catherine's and Blackgang** (3,468m)	NAI	NAI	NAI	
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention MR – Managed Realignment					

CHANGES FROM PRESENT MANAGEMENT

No change

IMPLICATION WITH RESPECT TO BUILT ENVIRONMENT

Economics		**by 2025**	**by 2055**	**by 2105**	**Total £k PV**
Property	Potential NAI Damages/ Cost £k PV	158	1,008	1,658	2,824
	Preferred Plan Damages £k PV	158	848	1,022	2,028
	Benefits £k PV	-	160	636	796
	Costs of Implementing plan £k PV	0	69	256	324

The preferred plan for this Management Area is marginally economically viable overall. This has been recognised in the preferred plan by moving towards 'Managed Realignment' and 'No Active Intervention' in the third epoch, allowing time for the local community to adapt. The EA is currently investigating funding of intervention where landsliding is a dominating issue.

4.6 Policy Development Zone 5 – South-west Coastline (PDZ5)

Left to right: View along the eroding south-west coast of the Isle of Wight from near Blackgang in 2009 (N.Dix); Erosion of the car park behind Compton Bay, 2006.

4.6 Policy Development Zone 5 – South-west Coastline (PDZ5)

Contents

Key facts:

Policy Development Zone 5: includes the coastline near Chale, Brighstone, Brook, Compton and Afton Down.

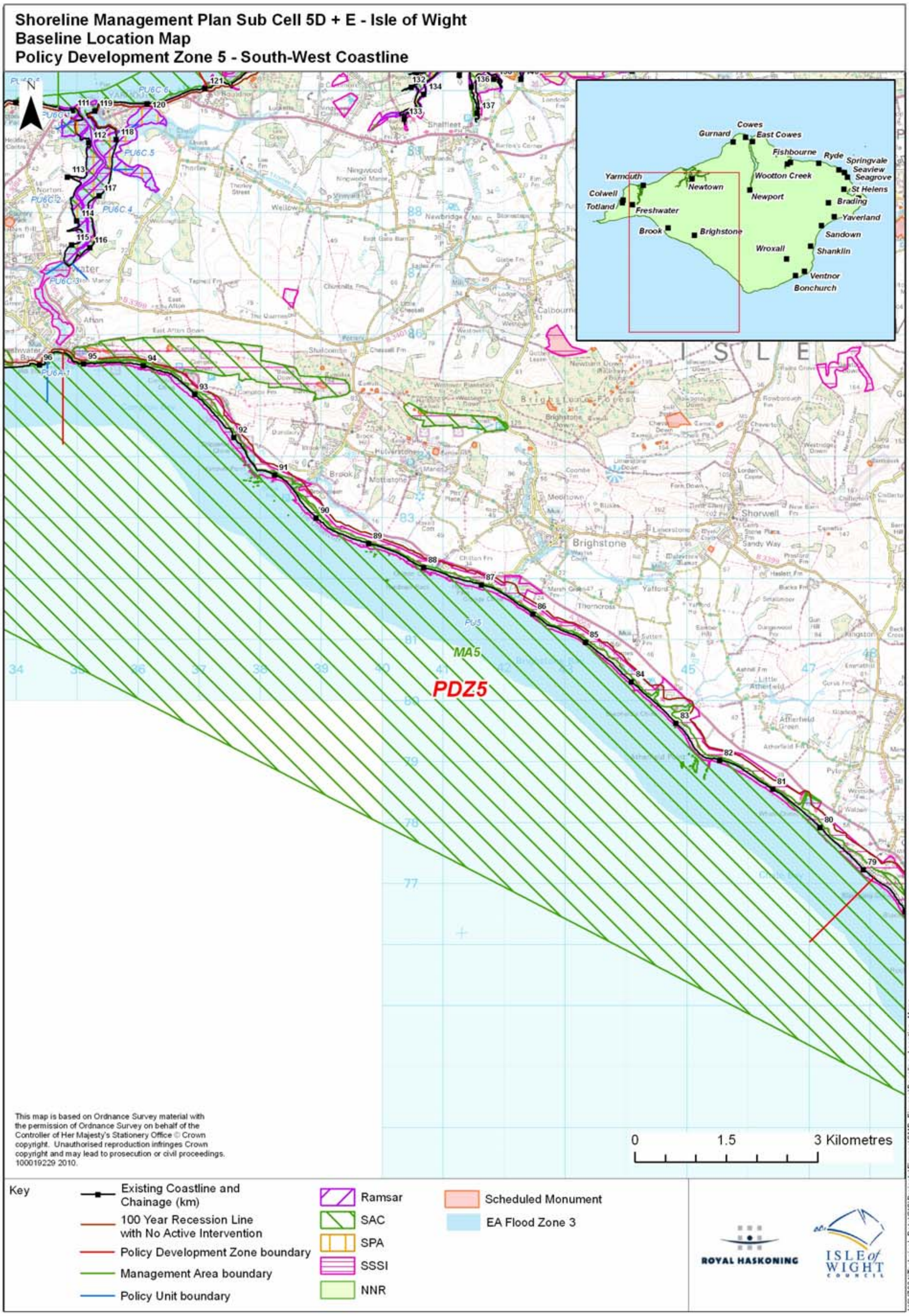
PDZ5 frontage = approximately 17km in length

PDZ5 boundaries = From Chale Terrace (near Blackgang) in the east to Afton Down in the west (the eastern margin of Freshwater).

As listed in SMP2 Appendices: area IW40

Old policies from SMP1 in 1997, reviewed in this chapter:

Unit	Location	Length	Policy
FRE1	St. Catherine's Point to Brook Chine	14391m	Do nothing
FRE2	Brook Chine to Compton Chine	2115m	Do nothing
FRE3	Compton Chine to Freshwater Bay	1862m	Do nothing


Shoreline Management Plan Sub Cell 5D + E - Isle of Wight
Baseline Location Map
Policy Development Zone 5 - South-West Coastline
PDZ5
MA5
PU5
Cowes
Gurnard
East Cowes
Fishbourne
Ryde
Springvale
Seaview
Seagrove
Yarmouth
Wootton Creek
Newtown
St Helens
Colwell
Newport
Brading
Totland
Freshwater
Yaverland
Brook
Brighstone
Sandown
Wroxall
Shanklin
Ventnor
Bonchurch
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0
1.5
3 Kilometres
Key
Existing Coastline and Chainage (km)
100 Year Recession Line with No Active Intervention
Policy Development Zone boundary
Management Area boundary
Policy Unit boundary
Ramsar
SAC
SPA
SSSI
NNR
Scheduled Monument
EA Flood Zone 3
ROYAL HASKONING
ISLE of WIGHT COUNCIL

1. Overview & Description

1.1 Principal Features (further details are provided in Appendix D)

Built Environment: This long stretch of natural coastline is relatively undeveloped. There are small communities at Brook Green and Chale as well as scattered properties near the cliff tops. Most of the land is agricultural. The A3055 runs the length of this stretch of coastline and is a key transport link for tourism and industry connecting the West Wight to South and East Wight. Coastal access is via the popular cliff top coastal footpath and footpaths linking to the main road.
Heritage and Amenity: *Heritage:* The rapid erosion of this coastline in the last 15,000 years has left many shipping hazards offshore in the form of reefs and boulders that are shallow and often exposed at spring low tides. This has led to 170 recorded shipwrecks in this unit. There are also 5 air wrecks, now Military Remains Protected Places. The south-west coast is the longest open coastal unit within this review and contains important palaeoenvironmental deposits related to the Old Western Yar, a former tributary of the Solent River, which are visible at various locations along the coast. The river deposits were first examined in detail in the 1930s but it was only in 2007 that radiocarbon dates of 8540-8290 cal BC and 8330-8250 cal BC were obtained for the organic sediments. Archaeological sites tend to be associated with the former river valley, or clustered around the chines and on high points along the coast. Prehistoric material includes find spots of worked flints and hearths comprising pits or lenses of burnt stones and charcoal. Two Bronze Age urn cemeteries have been recorded at Barnes High and Hanover Point, and Roman occupation sites are known from Atherfield, Grange Chine, Barnes High and Sudmoor. There are 273 monument records within 300-400m of the eroding cliffs, ranging in date from the Palaeolithic onwards. This PDZ contains 2 Scheduled Monuments, one a mound of unknown age and the other a barrow cemetery on Afton Down comprising of a Neolithic long barrow surrounded by Bronze Age round barrows. The Barrow Cemetery is located within a golf course and is well inland, although can be considered in long-range planning. The mound to the North West of Sudmoor is located on more rapidly eroding sandstones, although still around 200m inland. The Brook Green character area of the Brook Conservation Area includes the coastal area between the National Trust car park and the Military Road. *Amenity:* The south-west of the Isle of Wight has a beautiful coastline that is popular with visitors and residents alike. From Blackgang through to Freshwater the cliff top is largely grade 3 agricultural land, with small pockets of development. Several holiday camps are sited on the coast in this area, along with scattered farms and houses, the only residential concentration being at Brook Green. The A3055 Military Road runs along this stretch, roughly parallel with the coast and is a popular tourist route on the Island due to the scenic views. The cliffs along this unit are entirely undefended by hard structures and are actively eroding. Cliff heights vary from about 100m near Blackgang to as low as 10m in a few areas and the cliffs are used by paragliders. A narrow but significant beach of sand and shingle fronts the long shoreline; this is used by surfers, fossil hunters, anglers and walkers. The busiest stretch of the coast is generally at Compton where access to the beach is easy from the National Trust car park, but along the coast there are several other parking areas with paths to the beach which use the chines as access routes, as well as a continuous cliff top coastal path. Compton beach is very popular with surfers. Isle of Wight Pearl, a popular coach stop for visitors is also within this section along with the Dinosaur Farm Museum. The golf course at Afton Down is located on the clifftops behind the Military Road.
Nature Conservation: The entirety of this coastline comprises of soft sandstone and clay cliffs that are prone to landslide slumps. The coast in this PDZ is of particular importance for its geomorphology, and demonstrates a diversity of coastal landforms that reflect varying geology, the changing intensities of coastal processes,

as well as the differing timescales of coastal evolution. The tops of the cliffs are dry heathland and Chalk grassland, with sea cliff vegetation on the exposed cliffs edges. The intertidal area is formed from landslide debris and exposed clay bedrock, and sandstone and chert boulders that provide a diverse range of intertidal habitats and are of high marine conservation interest. The subtidal harbours a range of rocky reef types, including sandstone, clay/mudstone, greensand and Chalk bedrock, which support diverse red algal communities and kelp beds. There are also large ecologically important littoral sea caves in the Chalk cliffs around Compton Chine that host rare algal species specific to this type of habitat.

This PDZ sits within the South Wight Maritime SAC and Compton Chine to Steephill Cove SSSI. There is also a second SAC along the western end of the PDZ, from Compton Chine to Freshwater Bay, known as the Isle of Wight Downs SAC. This area is designated for its vegetated sea cliffs, European dry heaths, and semi-natural dry grasslands and scrubland faces on calcareous substrates.

1.2 Key Values

The key values in this area are the overriding importance of the natural landscape and scenery, nature conservation designations, unique geology and the continuous sediment supply from the eroding cliffs (which controls the behaviour of the beaches and feeds the longshore drift system to the east, anti-clockwise around the Isle of Wight). It is a popular coastline for tourism use.

Important features of the area are the A3055 Military Road running adjacent to the coastal cliffs along the length of the PDZ, and also the nearby cliff-top coastal footpath. This is a popular tourist route –one of the most spectacular sections of the ‘round the island’ coastal road for visitors, whilst it also provides access to the scattered coastal communities and properties which will be significantly affected by future breaches in the line of the coastal road. The road has been set-back and maintained at several locations, marking a substantial investment, but the road is now threatened near Brook, where the carriageway is located approx. 5m from the weak cliff edge (in November 2010) after recent failures in this area. The carriageway has been limited to single-width at this point for safety reasons. Realigning the road or upgrading and widening an alternative inland route will require further substantial investment. There will be local specific issues where small communities and properties lie adjacent to the changing coastline.

1.3 Objectives

Overarching objectives for PDZ5:

- To maintain and enhance the essential natural landscape of the area.
- To support and enhance the nature conservation value of the area and the geological significance of one of the finest Cretaceous successions in the world.
- To maintain access to and along the coastline by providing opportunity for adaptation and realignment of the coastal road.
- To support adaptation of access to the shoreline.
- To support opportunity for adaptation of local communities along the frontage.
- To sustain the historic landscape and environment where practicable.

1.4 Description

This 17km section of scenic open coast is characterised by undefended soft rock cliffs, generally 10-30m in height, which are undergoing rapid erosion and cliff retreat. Behind the cliff line of clays, marls, shales and sandstones, the south-west coast is fairly flat and undeveloped, characterised by agricultural land with scattered properties and the A3055 main road and coastal footpath. A distinctive feature of the coastline is the presence of a number of deeply incised coastal valleys, or chines, that interrupt the continuity of the cliffs and often provide access to the beaches.

Right: View from Compton Bay Car Park north-west towards the Chalk ridge. The settlement of Freshwater Bay is located at the low point in the Chalk cliffs. July 2006.

Properties at Chale Terrace (at the eastern limit of the PDZ) have been demolished over the years as the cliff has retreated. To the west the road at Brook is at imminent threat from erosion. The eroding cliffs are protected as SSSIs and are valuable for their geological interest. There are scattered local tourist attractions in this PDZ including coach stops and holiday park camping facilities.

The cliff height rises significantly at Blackgang in the east and along the Chalk cliffs of Afton Down in the west, providing scenic vantage points to view this unspoilt natural environment. The stretch of coastal road along the Chalk clifftop at Afton Down cannot be realigned inland due to the nature conservation interest, therefore two sections of the road were stabilised by deep piles and ground anchors in 2003 to maintain the road in it's current alignment for 50 years, whilst cliff-face erosion continues below.

Left: Whale Chine and the cliffs of the south-west coast (Isle of Wight Council).

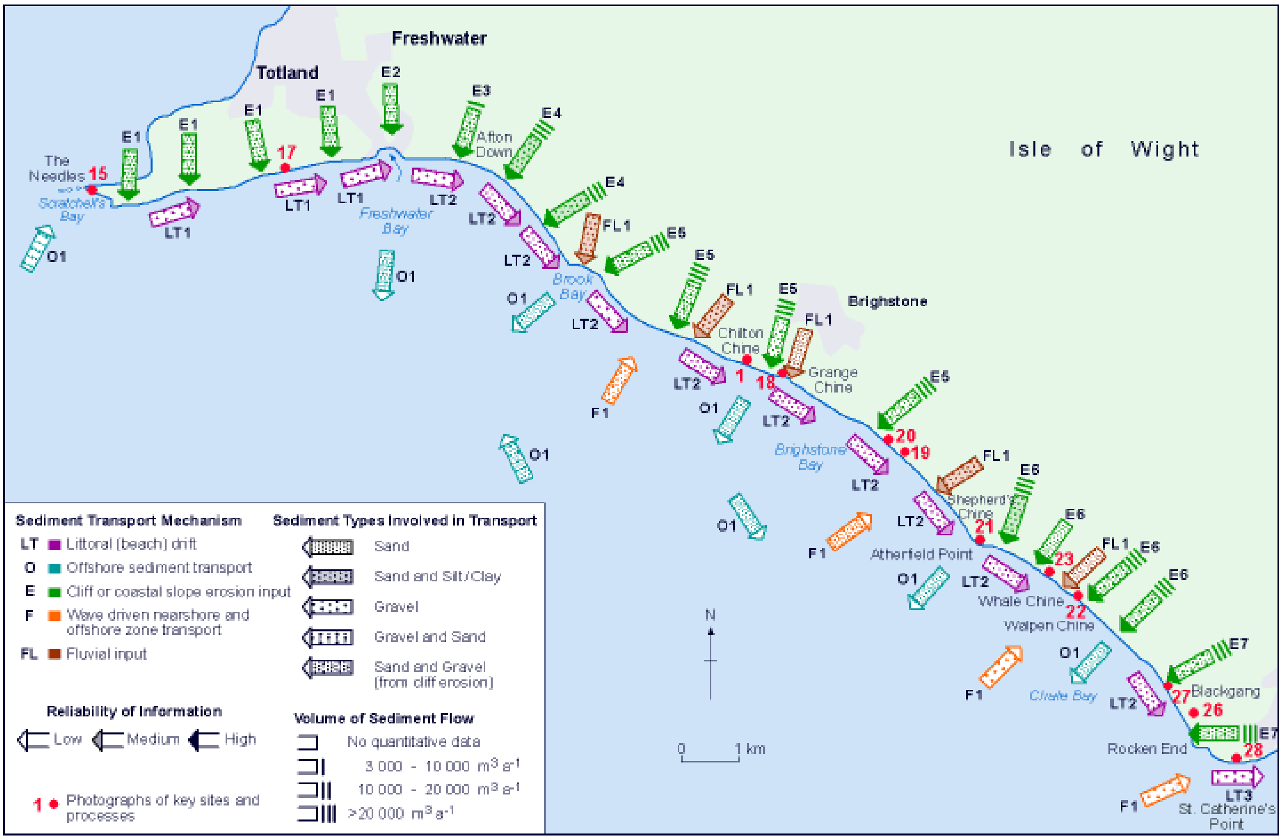
The unspoilt and spectacular scenery of the PDZ is popular with holidaymakers, families, walkers, surfers and fossil-hunters. The underlying geology of the area is continuously exposed in eroding coastal cliffs, including exposures of the Wealden beds (approximately 120 million years old) which (alongside a shorter length at Yaverland) have over the years revealed significant dinosaur remains, often species unique to the Isle of Wight.

1.5 Physical Processes

1.5.1 Coastal Processes (further details are provided in Appendix C1).

This PDZ includes the exposed south west coast of the Island from Chale to Freshwater Bay. The general pattern of sediment movement is summarised in the following diagram from the SCOPAC Sediment Transport Study.

West and South Isle of Wight (The Needles to St Catherine's Point): Sediment Transport



Sediment transport sources, pathways and sinks on the south-west coast, from SCOPAC Sediment Transport Study, 2004.

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. It is exposed to significant swell wave activity as well as to energetic locally-generated wind waves. The well-documented history of shipwrecks along this largely unprotected rugged coast is a testimony to this fact.

Tidal range is small so that wave energy is concentrated over a limited vertical range. However, the shallow nearshore and shore platform provides for some dissipation and breaking of very large waves a distance offshore. Wave exposure and the steepness of the nearshore profile are greatest towards the south-east so that Chale Bay experiences the most energetic shoreline wave conditions.

As a general trend, beaches consist of a gravel backshore and sandy foreshore, and progressively steepen between Freshwater Bay and Chale. The beaches are rarely high or well developed, affording very limited protection to cliff toes. The gravel component becomes more dominant in this direction, although the median grain size of coarse clastic material gets smaller in a south-eastwards direction.

In the west the Chalk of Afton Down forms high, steep rockfall-dominated cliffs that retreat at slow to modest rates. The main central portion of the frontage, formed in soft Lower Greensand and Wealden clays and sands, forms rapidly eroding cliffs typically adopting simple landslide morphology. Local transitions to complex landslides and rockfall-dominated forms also exist. Between Compton Down and Hanover Point, recession has been at moderate rates, although there are examples in recent years of high to extreme recession of the cliff top associated with rotational or translational failures in areas where ground conditions are especially favourable for landsliding. Between Hanover Point and Atherfield Point, there has been long-term recession at moderate rates, although some localised areas of high recession in recent decades have been associated with low cliffs eroding back into soft sediments e.g. Brook Bay. From Shepherds Chine to Chale, there have been moderate to high rates of recession. This section is possibly more exposed to wave action where deep water extends closer inshore off Atherfield Point. In the south-east the high cliffs around Chale and Blackgang are unstable and accelerate in recession rates. They can be expected to become increasingly active in future, eventually leading to new backscar failures. Upper Greensand overlies Gault Clay and interbedded sandy and clayey strata in a major landsliding-generating sequence, resulting in a complex landslide behaviour characterised by periodic cliff top recession events. Many other soft rock cliffs along this coast are also likely to be susceptible to accelerating recession, as all the cliffs along this PDZ are sensitive to heavy winter rainfall promoting higher pore water pressures within permeable strata, potentially triggering failures. The cliffs are also sensitive to sea-level rise that could increase toe erosion and result in increased landsliding and retreat of the cliff top.

It is known that the erosion of this coast yields substantial quantities of sediments making it an important regional source. Accelerated landsliding and cliff recession would considerably increase the delivery of sediments to the shoreline.

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. Continuation of cliff toe erosion and cliff top recession will occur throughout this frontage, resulting in continued coastal retreat. Large quantities of sediment will continue to be delivered to the shoreline and transported to other areas. Moderate to high rates of recession are likely to be characteristic of this frontage for the foreseeable future because any tendency for self-regulation of recession is likely to be extremely limited. This is because the widening shore platform is unlikely to significantly increase the dissipation of wave energy over the next 100 years or longer and the majority of the sediments delivered by cliff erosion are removed from the shoreline and do not afford protection against wave attack.

1.5.2. Existing Defences

This frontage is undefended and erosion threatens infrastructure / properties at various points. At Afton Down cliff top stabilisation works (in the form of deep piles and ground anchors into the Chalk) were completed in 2003 which stabilised the cliff top carriageway and secured two sections of the road link for approximately 50 years.

1.5.3 Potential Baseline Erosion Rates

The SMP reviewed a wide range of data to define the current and potential rates of coastal erosion and cliff retreat along the Isle of Wight coast using the best available information. Full details can be found in Appendix C3. Future erosion rates are predicted using Walkden & Dickson formula (2008) and allow for future sea level rise –the full methodology is explained in the Appendix.

Predicted sea level rise rates of 4mm/yr (to 2025), 8.5mm/yr (to 2055), 12mm/yr (to 2085) then 15mm/yr (to 2105) have been used, in accordance with SMP national guidance by Defra. These rates equate to 7cm of sea level rise (above the 2009 baseline) by 2025, 32cm by 2055 and 98cm by 2105. The IW numbering units refer to lengths of coast for which future behaviour is described and mapped in Appendix C (based on SMP1 and Strategies). These are not SMP2 policy units which are developed in section 3 below.

Potential total erosion over the next 100 years is shown, however it is important to note that this is an estimate that is based on an undefended coastline. Within Appendix C3, these erosion rates are only applied following the predicted failure date of each individual element of the defences within the unit; therefore the resulting erosion amounts shown in the Appendix C3 tables and maps (and used in the development of this SMP) will show smaller erosion totals than the overview provided below.

Potential coastal erosion rates (all figures in metres/year):-

Numbering in SMP2 Appendices (2010) ***(area and name, clockwise)***		**Historical Rate**	**Current to 2025**	**2025 to 2055**	**2055 to 2085**	**2085 to 2105**	**Potential 100 year erosion (if undefended) -total in metres**
40 - South-west coast	**Chale to & including Atherfield Clay**	0.75	0.86	1.14	1.33	1.44	120
	Atherfield Clay to Compton Chine	0.50	0.58	0.76	0.88	0.96	80
	Compton Chine to Freshwater	0.30	0.35	0.46	0.53	0.58	48

Note:
i) Erosion rates have been determined from monitoring data and examination of historical records and have been calculated to take account of sea level rise. –see Appendix C3 for details.
ii) The IW numbering units refer to lengths of coast described in Appendix C . These are not SMP2 policy units.

2. Baseline management scenarios

2.1 Present Management

Present management of the shoreline is taken as the policy defined by SMP1, modified by subsequent strategies or studies. It should be noted that in the case of SMP1 the period over which the assessment was carried out was 50 years. SMP2 extends this to an assessment period of 100 years. The table below sets of the current shoreline management policies for Policy Development Zone 3. This SMP2 will assess all the available evidence and update these previous management policies.

The key documents outlining the present management of the shoreline in this PDZ are:-

Isle of Wight Shoreline Management Plan 1 (1997)
The first Shoreline Management Plan (SMP1) for the Isle of Wight 's coast was published in 1997. It consists of two volumes.

- Volume 1 is the 'Data Collection and Objective Setting', which presents information on a range of topics including coastal processes, natural environment, etc.
- Volume 2 is the 'Management Strategy', which presents information for each Management Unit around the Island's coast and sets a management Policy for each unit.

Coastal Defence Strategy Studies, Isle of Wight:
Whilst the Shoreline Management Plan provides the risk framework for management of the coast, Coastal Defence Strategy Studies provide a more detailed assessment of particular frontages in order to identify the most suitable type of coastal defence schemes that may be required to fulfil the agreed shoreline management policy and to plan a programme of future works.

West Wight Coastal Defence Strategy Study
A Coastal Defence Strategy Study for the West Wight Coastline will be completed following the publication of SMP2.

Catchment Flood Management Plan:
The Environment Agency has undertaken a programme of Catchment Flood Management Plans (CFMPs) for the major river catchments in the Southern Region. A CFMP is a large scale plan that covers an entire river catchment or group of catchments that identifies long-term, sustainable policies to manage flood risk within the catchment. These policies form the basis for development of Strategy Plans, covering all or part of the overall catchment area, which will identify in more detail appropriate flood defence measures.

Whilst CFMPs principally address fluvial (river) flooding, SMPs address tidal (sea) flooding, alongside coastal erosion. The Isle of Wight Catchment Flood Management Plan (Summary Report) was published in December 2009.

- Sub Area 2: Newtown River and the Chines

  “The issues in this sub-area: There is a relatively low risk of fluvial flooding. Surface water flooding occurs in some urban areas due to the capacity of drains being exceeded. Nearer the coast, river flooding may be affected by high tide levels, which will get worse with predicted future sea level rise. Only modest urban development is planned.”

  Policy Option 2 – areas of low to moderate flood risk where we can generally reduce existing flood risk management actions.

The previous shoreline management policies set for this PDZ are listed in the table below:
The IW numbering unit refers to a length of coast for which previous shoreline management policies were set in SMP1, modified by subsequent Strategy Studies (where available), used to gather information in the Appendices. These are not SMP2 policy units which are developed in section 3 below.

Numbering in SMP2 Appendices (2010)		**SMP1 (1997)**	
IW Unit *(clockwise)*	**Name**	**Unit**	**Policy**
IW40	**South-west coast**	FRE1	Do nothing
		FRE2	Do nothing
		FRE3	Do nothing

2.2 Baseline Scenarios for the Policy Development Zone

Progressive erosion and retreat of the coastal cliffs will breach the existing line of the 'round the island' coastal road and footpath, and affect access to the scattered communities and properties along this largely undeveloped coastline.

2.2.1 No Active Intervention (Scenario 1, NAI):

This 17km section of coast is characterised throughout by eroding soft rock cliffs approximately 10-30m high undergoing rapid erosion and episodic cliff retreat, which will continue throughout all three epochs under a scenario of 'No Active Intervention'. This will maintain the important landscape of the area (Area of Outstanding Natural Beauty and Heritage Coast), support the aims of the geological designation (Compton Chine to Steephill Cove SSSI) and allow the nature conservation interests (reefs, vegetated sea cliffs and dry grasslands of the South Wight Maritime and Isle of Wight Downs SACs) of the area to adapt naturally.

Erosion of the flat and agricultural land will impact on the popular coastal footpath following the line of the coastal cliffs and require realignment. At Brook the A3055 main road will be lost by cliff retreat during the first epoch, followed later by adjacent sections. The road will require local realignment or alternative inland routes will require upgrading. Severing of the coastal road will limit access to scattered properties and impact on the amenity use of the area which is currently a spectacular section of the 'round the Island' coach route. Ongoing cliff retreat will also impact on the archaeological heritage of the area, though these tend to be on the high points along the coast, with the greatest interests further inland. Furthermore, due to the nature of the deposits exposed by the retreating cliff tops, there is often opportunity to record the sites before they are lost to erosion (subject to availability of resources for monitoring, recording and analysis, including scientific dating).

A distinctive feature of the coastline is the presence of a number of deeply incised coastal valleys, or chines, that interrupt the continuity of the cliffs and which form part of the vegetated sea cliffs interest feature of the South Wight Maritime SAC (and Geological SSSI). Erosion may steepen the chines and will potentially affect access to the beaches from the first epoch if retreat at their landward extents does not keep pace with increasing coastal erosion rates. Where Military Road crosses the chines, drainage is impeded by the current arrangement of culverts (underneath the road), which are interrupting headward (fluvial) erosion, and is likely to worsen over time. This means the vegetated sea cliffs cannot naturally migrate inland, and are becoming reduced in length as the sea continues to erode the sea facing cliffs (i.e. coastal squeeze). A policy of NAI will not in itself adversely affect these chines, but rather when the road needs moving back, so will the culverts.

Several properties are at risk in the second and third epochs at Atherfield Coastguard Cottages, Atherfield Holiday Centre, Brighstone Holiday Centre, Chilton Chine, Brook Green and on the outskirts of Freshwater. They may also be affected by reduced access or loss of access dependent on when and where breaches in the road occur.

In the second and third epochs under the NAI scenario sea-level rise or downcutting of shore platforms will create conditions for acceleration of cliff retreat, triggered by increases in winter rainfall and the impact of coastal storms. Increasing cliff recession rates and slumping will supply increasing amounts of sediments to the reefs below and beaches and shorelines to the south-east. Relatively resistant headlands such as Atherfield Point and Hanover Point may become more pronounced with faster erosion in the bays between them. The coastal slopes of Compton Bay will be affected by increasing slope failures and cliff top retreat, to which amenity use and access to the area will need to adapt.

The retreat of the Chalk cliff top at Afton Down has already created a problem for maintaining the A3055 road at two sections where the carriageway could not be retreated due to the nature conservation interest of the maritime-influenced Chalk grassland inland. Engineering support piles and ground anchors were installed in 2003 to support the road. However, the works are contained entirely within the cliff top, placed at the seaward edge of the carriageway, and with NAI the cliff foot and 70m high cliff face will continue to erode naturally, slowly exposing half the height of the piles through the first and second epochs, whilst maintaining the coastal road. In the third epoch, the structure will be removed once the lower half of the piles becomes exposed (or fail under a NAI scenario), allowing the small areas of retained Chalk to erode though further rockfalls and 'catch-up' to the natural cliff top line. The undefended cliff base will have evolved and retreated naturally throughout all three epochs in-keeping with the character of the area Continued cliff recession will induce shallow slides within upslope head deposits that could affect nearby sections of the main road and large tension cracks landward of the cliff top will be an indication of incipient large-scale toppling failures, perhaps involving cliff top losses of 5-15m within single events. Cliff height will increase through the third epoch as the cliff cuts back into the slopes of Afton Down.

Through the second and third epochs the main coastal road (the only road) may be severed at several locations within PDZ7, but at most locations there is opportunity to setback and realign the road, a local management decision.

2.2.2. With Present Management (Scenario 2, WPM):

There are no defences along this policy development zone and therefore the cliff behaviour will be the same as the 'No Active Intervention' scenario described above. Until recently there have been periodic engineering works to realign and retreat the A3055 main road, but the Isle of Wight Council will review this decision in 2010.

Table 1a. Economic Assessment –Erosion damages

The following table provides a brief summary of damages determined by the SMP2 MDSF analysis for the whole PDZ. Further details are provided in Appendix H. Where further, more detailed information is provided by studies, this is highlighted. The table aims to provide an initial high level assessment of potential damages occurring under the two baseline scenarios.

ASSESSMENT OF EROSION DAMAGES

Epoch	0 -20 year			20 – 50 years			50 – 100 years			
No Active Intervention	**Number of properties:**		**Value**	**Number of properties:**		**Value**	**Number of properties:**		**Value**	**PV Damages**
Location	*Residential*	*Commercial*	**x £1000**	*Residential*	*Commercial*	**x £1000**	*Residential*	*Commercial*	**x £1000**	**(£x1000)**
Central Chale Bay to Afton Down	0	2	3	5	13	1095	11	44	4021	691
									Total for PDZ5	**691**
With Present Management	**Number of properties**		**Value**	**Number of properties**		**Value**	**Number of properties**		**Value**	**PV Damages**
Location	*Residential*	*Commercial*	**x £1000**	*Residential*	*Commercial*	**x £1000**	*Residential*	*Commercial*	**x £1000**	**(£x1000)**
Central Chale Bay to Afton Down	0	2	3	5	13	1095	11	44	4021	691
									Total for PDZ5	**691**
Notes										
SMP.										

Table 1b. Economic Assessment –Flood damages
Please note: No flood damages reported by MDSF for PDZ5.

ASSESSMENT OF POTENTIAL FLOOD RISK

	Flood risk tidal 2010			Flood risk tidal 2060			Flood risk tidal 2110			
No Active Intervention	**No. of properties**		**AAD**	**No. of properties**		**AAD**	**Number of properties**		**AAD**	**PVD**
Location	< 1:100yr	>1:100yr	**x £1000**	< 1:100yr	>1:100yr	**x £1000**	< 1:100yr	>1:100yr	**x £1000**	**(£x1000)**
Central Chale Bay to Afton Down	0	0	0	0	0	0	0	0	0	0
Agricultural Total										
									Total for PDZ5	0

With Present Management	**No. of properties**		**AAD**	**No. of properties**		**AAD**	**No. of properties**		**AAD**	**PVD**
Location	< 1:100yr	>1:100yr	**x £1000**	< 1:100yr	>1:100yr	**x £1000**	< 1:100yr	>1:100yr	**x £1000**	**(£x1000)**
Central Chale Bay to Afton Down	0	0	0	0	0	0	0	0	0	0
Agricultural Total										
									Total for PDZ5	0

Table 2. General Assessment of Objectives

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

STAKEHOLDER OBJECTIVE	NAI			WPM		
	Fails	Neutral	Acceptable	Fails	Neutral	Acceptable
To maintain and enhance the essential natural landscape of the area						
To support and enhance the nature conservation value of the area and the geological significance of one of the finest Cretaceous successions in the world.						
To maintain access to and along the coastline by providing opportunity for adaptation and realignment of the coastal road.						
To support opportunity for adaptation of local communities along the coast.						
To sustain the historic landscape and environment where practicable.						

3. Discussion and detailed policy development

The discussion provided above of the two baseline scenarios highlights, foremost, that even with the present management of the naturally evolving coastline some of the high level objectives are not being achieved. Interestingly, there is no management intent along this section of coastline that would be successful in delivering a plan that protected the road and access to rural communities, was economically justifiable, while allowing natural processes along the designated cliffs to continue.

Therefore the policy along this area is No Active Intervention in all three epochs, to preserve the essential natural character of the area and maintain sediment supply from the eroding cliffs, also due to the limited number of assets at risk. The management intent at Strategy level can focus on supporting both the Isle of Wight and these communities through coastal adaptation during the first and second epochs. Maintaining the unbroken length of undefended eroding cliffs is an essential component of the NAI management intent of this area and the local loss of scattered features along the coastline, though important, is not sufficient to justify an alternative fragmented approach to shoreline management.

PDZ5
Management Area Statements

- **Central Chale Bay to Afton Down (MA 5)** includes one policy unit.

Within these areas a summary of policy is provided below. Management Areas statements are provided in the following sheets, with maps showing each area.

Location reference	**Central Chale Bay to Afton Down**
Management Area reference	**MA 5**
Policy Development Zone	**PDZ 5**

The following descriptions are provided to assist interpretation of the maps shown of each Management Area.

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical rates and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change, these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan, reference should be made to the baseline data (see Appendix C3).

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

In some areas the preferred policy does not change from that under the existing management approach. In some areas where there are hard defences this can be accurately identified. In other areas there is greater uncertainty. Even so, where the shoreline is likely to be quite clearly defined by a change such as the crest of a cliff the estimated position is shown as a single line.

- Where there is a difference between With Present Management and the Preferred Policy this distinction is made by showing two different lines:

With Present Management.
Preferred Policy.

- In some areas, the Preferred Policy either promotes a more adaptive approach to management or recognises that the shoreline is better considered as a width rather than a narrow line. This is represented on the map by a broader zone of management:

Flood Risk Zones:
All flood risk zones are based upon the current tidal EA Flood Zone 2. This is an extreme flood event (1:1000 year at current levels) meaning that it has 0.1% chance of occurring each year.

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

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

Note: This Management Area corresponds to IW40 in selected Appendices.

Policy Development Zone 5 - South-west Coastline
Management Area 5 - Chale to Freshwater Bay (Ch 79 - 96)
Key
Policy Development Zone boundary
Management Area boundary
Policy Unit boundary
Existing Coastline and Chainage (km)
Scheduled Monument
PU5
MA5
PDZ5
Brighstone
Shorwell
Brook
Mottistone
Calbourne
Cowes
East Cowes
Gurnard
Fishbourne
Ryde
Springvale
Seaview
Seagrove
Yarmouth
Wootton Creek
St Helens
Colwell
Newtown
Newport
Brading
Totland
Freshwater
Yaverland
Brook
Brighstone
Sandown
Wroxall
Shanklin
Ventnor
Bonchurch
This map is based on Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. 100019229 2010.
0
1.5
3 Kilometres
Key
100 Year Shoreline Position:
Preferred Policy would be the same as With Present Management
With Present Management where this differs from the Preferred Policy
Preferred Policy where this differs from the With Present Management
Indicative shoreline zone under the Preferred Policy
Existing Indicative EA Flood Risk Zone 2
EA Flood Risk Zone 2 where SMP policy is for continued management of defence
EA Flood Risk Zone 2 where under SMP policy there would be increased probability of flooding
ROYAL HASKONING
ISLE of WIGHT COUNCIL

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION
PLAN:

The overriding intent of the plan is to maintain the important nature conservation, geological and exceptional landscape quality of the area. The policy for the frontage is for No Active Intervention, with cliff erosion and retreat. There are no issues that conflict with this approach.

PREFERRED POLICY TO IMPLEMENT PLAN:	
From present day	No Active Intervention
Medium term	No Active Intervention
Long term	No Active Intervention

SUMMARY OF SPECIFIC POLICIES

Policy Unit (& length)		**Policy Plan**			
		to 2025	**to 2055**	**to 2105**	**Comment**
PU5.1	**Central Chale Bay to Afton Down** (16,663m)	NAI	NAI	NAI	Allow cliff erosion, support the geological designation, abandon current A3055 and re-route.
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention MR – Managed Realignment					

CHANGES FROM PRESENT MANAGEMENT
No change

IMPLICATION WITH RESPECT TO BUILT ENVIRONMENT

Economics		**by 2025**	**by 2055**	**by 2105**	**Total £k PV**
Property	Potential NAI Damages/ Cost £k PV	3	326	361	691
	Preferred Plan Damages £k PV	3	326	361	691
	Benefits £k PV	-	-	-	-
	Costs of Implementing plan £k PV	0	0	0	0

The economic viability of the preferred plan for this Management Area is not applicable since the benefits and costs of implementation are both zero. There will be no need to justify any flood and coastal erosion risk management expenditure.

4.7 Policy Development Zone 6 – West Wight (PDZ6)

Above: Freshwater Bay, with the low lying land of the Western Yar Estuary extending southwards towards the south coast of the Isle of Wight; View of the Needles headland at the western tip of the Isle of Wight (Isle of Wight Council).

4.7 Policy Development Zone 6 – West Wight (PDZ6)

Contents

Key facts:

Policy Development Zone 6: includes the communities of Freshwater, Alum Bay, Totland, Colwell, Yarmouth and Port la Salle.

PDZ6 frontage = approximately 27km in length

PDZ6 boundaries = From the eastern margin of Freshwater around the west Wight headland to include Yarmouth (to the eastern margin of Port la Salle).

As listed in SMP2 Appendices: areas IW41 to IW51

Old policies from SMP1 in 1997, reviewed in this chapter:

Unit	Location	Length	Policy
FRE 4	Freshwater Bay	697m	Hold the existing defence line
FRE 5	Freshwater Bay to the Needles	5607m	Do nothing
TOT 1	South Alum Bay	1269m	Do nothing
TOT 2	South-east Alum Bay to Totland West	2466m	Do nothing
TOT 3	West Totland to Colwell Chine	1871m	Hold the existing defence line
TOT 4	Colwell Chine to Fort Albert	1506m	Retreat the existing defence line
NEW1	Fort Albert to Fort Victoria	835m	Do nothing
NEW2	Fort Victoria to Norton Spit	1149m	Hold the existing defence line
NEW3	Yarmouth Harbour	2834m	Hold the existing defence line
NEW4	Royal Solent Yacht Club to the Common, Yarmouth	320m	Hold the existing defence line
NEW5	The Common, Yarmouth to Bouldnor	1390m	Hold the existing defence line


Shoreline Management Plan Sub Cell 5D + E - Isle of Wight
Baseline Location Map
Policy Development Zone 6 - West Wight
PDZ6
MA6A
MA6B
MA6C
PU6A.1
PU6A.2
PU6B.1
PU6B.2
PU6B.3
PU6B.4
PU6B.5
PU6C.1
PU6C.2
PU6C.3
PU6C.4
PU6C.5
PU6C.6
Cowes
East Cowes
Gurnard
Fishbourne
Ryde
Springvale
Seaview
Seagrove
St Helens
Yarmouth
Wootton Creek
Newtown
Newport
Colwell
Totland
Freshwater
Brading
Yaverland
Brook
Brighstone
Sandown
Wroxall
Shanklin
Ventnor
Bonchurch
Starting Platform
Jack in the Basket
Totland
Freshwater
Norton
Middleton
Afton
Thorley
Wilmingham
Totland Bay
Compton Bay
THE NEEDLES
0 1 2 Kilometres
This map is based on Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. 100019229 2010.
Key
Existing Coastline and Chainage (km)
100 Year Recession Line with No Active Intervention
Policy Development Zone boundary
Management Area boundary
Policy Unit boundary
Ramsar
SAC
SPA
SSSI
NNR
Scheduled Monument
EA Flood Zone 3
Weak cliff vulnerable to landslip
ROYAL HASKONING
ISLE of WIGHT COUNCIL
I:\9V7634\Technical_Data\GIS\Projects\SMP_Figures\Baseline_Location_Maps

1. Overview & Description

1.1 Principal Features (further details are provided in Appendix D)

Built Environment: The built environment for the PDZ incorporates the three main towns located in the west of the Island -Freshwater, Totland and Yarmouth, as well as smaller communities such as Colwell and Norton. These towns are linked by a network of local, A and B roads which cross the Western Yar estuary and river in several locations. The Western Yar valley (which runs south to north through West Wight) is crossed by roads and tracks in several locations and there is potential to cut off these links during future flood events. At Freshwater Bay the A3055 coastal road links through the main town of Freshwater to the north-west. The principal road from Newport to the West Wight crosses the Western Yar estuary at Yarmouth Harbour via a swing bridge. A coastal footpath runs around the length of this frontage. The majority of beaches are accessible via small local roads and footpaths and at Alum Bay via steep steps or a chairlift. A vehicle and passenger ferry from Yarmouth to Lymington provides a key transport link for the community, industry and tourism. Several small piers and boat moorings are located around the coastline and RNLI lifeboats operate from Freshwater Bay and Yarmouth Harbour.
Heritage and Amenity: *Heritage:* PDZ6 is prolific for prehistoric finds, palaeo-environmental deposits and areas of archaeological potential. There are 337 monument records in the coastal and estuarine erosion/flood areas, many of which are focused on the chalk headland and represent human history back to the Bronze Age. On West Down and Tennyson Down are 4 Scheduled Monuments (SM) including a Neolithic Mortuary Enclosure, Bronze Age Barrows and the Needles Battery site. At Headon Warren another Bronze Age Bowl Barrow is a SM. Yarmouth Castle, built by Henry VIII to defend the shore, is also a SM. The constant human occupation and historic development of the West Wight has led to a wealth of historically important buildings in the towns and villages close to the coast including 1 Grade I listed church, 7 Grade II* listings and 58 Grade II listings. Freshwater Bay and Yarmouth are also Conservation Areas. Access to the Western Solent for shipping has resulted in much of this stretch of coastline being used for military defence, leaving many historic military features. The marine area surrounding this area has a notorious history of shipwrecks with 122 recorded shipwrecks and two Protected Wreck Sites. Within the area of the Needles and Scratchels Bay alone there have been 40 recorded ships lost, two of which form the Needles Protected Wreck Site. *Pomone* and *HMS Assurance* foundered on Goose Rock and are protected with a 75 metre exclusion zone. Also within the area of the Needles are the remains of 8 air wrecks which are now Military Remains Protected Places. *Amenity:* The southern aspect of this PDZ is characterised by steep chalk cliffs facing into the English Channel, providing stunning views and popular walks. Freshwater Bay has a small amount of infrastructure to support the community as well as an RNLI lifeboat station. At the tip of the western headland is the Needles -a series of chalk stacks that form an iconic view. At Alum Bay the Needles Pleasure Park is located on the cliff tops, the coloured sands of Alum Bay providing a popular tourist attraction. A track leads up to the National Trust run Needles Old Battery above the Needles. The north-west facing coastline has a series of small beach fronted bays accessible by local roads and public footpaths. At Totland Bay there is an esplanade and Pier, public conveniences, a pub and café and some residential development. Warden Point is backed by holiday camps and grade 4 agricultural land. In Colwell Bay cliff top holiday camps are backed by the housing of Colwell. A promenade runs the length of Totland Bay from Totland to Colwell. Colwell Bay has a slipway, concessions, cafes and beachfront tourist accommodation alongside car parking and public conveniences and is locally popular visitors beach. The stretch of coast between Fort Albert and Fort Victoria is undeveloped and includes Fort Victoria Country Park, adjoining Fort Victoria which contains tourist attractions, the Countryside

Rangers Office, public conveniences and several holiday cottages.
Located at Yarmouth is the cross-Solent vehicle ferry terminal which is a vital link for the community in supporting both their economy and tourism. The settlement of Yarmouth is predominantly residential, with a wooden Grade II listed pier and several cafes, and a pub within the town centre square and small shopping area. Yarmouth Castle is a popular tourist destination run by English Heritage. Yarmouth Common is a seafront green to the east of the town centre.
The Western Yar valley links from Yarmouth in the north to Freshwater Bay in the south where it becomes marshland. From Yarmouth to The Causeway the river is an estuarine system accessible to small crafts via the swing bridge crossing Yarmouth harbour. At the river mouth, the harbour is vital to the economy of the area both as a vehicle ferry port and as a centre for yachting. The river is popular for recreational boating and fishing as well as a hotspot for wildlife enthusiasts. There is a cycle route from Yarmouth and Freshwater along the old railway line on the eastern bank of the estuary. This is extremely well used by both locals and tourists and forms part of the National Cycle Network.

Nature Conservation:

The coastline from Freshwater Bay and around the north side of the Needles includes an extensive tide-exposed chalk reef that supports a diverse range of species both in the intertidal and subtidal, whilst the cliffs above support ecologically important chalk plants (e.g. lowland heath and acid grasses) and invertebrates. The reefs are some of the most important subtidal chalk reefs in Britain, with the only known chalk subtidal caves in the UK. The western coastline is geologically important in places, particularly at Colwell Bay. The headland west of Fort Victoria comprises coastal vegetated cliffs, secondary woodland, grassland and intertidal sand and single beach. The Western Yar estuary is relatively natural with little development and therefore supports a wide range of coastal and estuarine habitats, particularly extensive saltmarsh and intertidal mudflats that support nationally important overwintering populations of wildfowl and waders and important breeding populations of terns, gulls and waders. To the east of the estuary the landward extent of the saltmarsh is constrained by the old railway embankment. Surrounding the saltmarshes are areas of low lying grazing marsh communities that provide high tide roosts for nationally important breeding birds.
This PDZ straddles four European sites (SAC and SPA), one international site (Ramsar site), and a number of national designations (e.g. SSSIs and Sites of Importance for Nature Conservation (SINCs). On the south side of the peninsular there are two international designations. The *South Wight Maritime SAC* extends from the south-eastern extent of Freshwater Bay to Hatherwood Point (Headon Warren), whilst the *Isle of Wight Downs SAC* that is designated for the grasslands, vegetated sea cliffs and Heathland, includes the eastern headland at Freshwater Bay and the cliffs along Tennyson Down to the Needles. The latter SAC has a SSSI ‘Headon Warren & West High Down’ that protects the cliffs of Tennyson Down and Headon Warren under the Habitats Regulations. There are no international designations from Hatherwood Point along Totland Bay and Colwell Bay to Sconce Point, though some of this coastline is protected by SSSIs. Headon Warren & West High Down SSSI extends to the built up area south of Totland Bay, whilst Colwell Bay SSSI protects the geological features of the cliffs from the north side of Totland Bay Pier to south of Fort Albert.
On the northern coastline of this PDZ there are components of three international sites, the *Solent Maritime SAC* and the *Solent and Southampton Water SPA and Ramsar sites.* The area of all three designations includes the mudflats and saltmarsh of the Western Yar estuary, including Norton Spit that extends across the mouth, to the road at Freshwater near Afton Manor. The Solent Maritime SAC also includes the intertidal and subtidal areas from Sconce Point to Bouldnor. The SPA and Ramsar sites include the flood zone areas of two streams feeding into the Western Yar estuary, at Thorley Brook immediately south of the Yarmouth town (and the main access road) and at Barnfield Stream further south. There is one component SSSI for these international designations, the Yar Estuary SSSI, which protects the estuary, including the intertidal and related brackish wetland habitats, which extends to the tidal limit at Causeway Road. The SSSI also includes the small sand dune system at Norton Spit with its rare plant species. There is also a SSSI that protects the freshwater marshes, fens and reedbeds along the valley of the Western Yar, called the Freshwater Marshes SSSI. Furthermore, there are a number of SINCs within this PDZ that contain a

variety of species including National Biodiversity Action Plan (BAP) species; these are Freshwater Bay Cliffs SINC, Fort Victoria SINC and a number around the outside of the internationally designated Western Yar Estuary.

1.2 Key Values

A key risk in this area is the loss or deterioration of West Wight residential communities as a result from erosion and flood impacts (specifically the tidal flood risk at Yarmouth and Freshwater). Key road links through Freshwater and Yarmouth are also at risk, as well as the ferry terminal at Yarmouth. The internationally important habitats of the Western Yar valley and the spectacular coastal scenery surrounding the Needles headland are key features of the area and are important to the tourism industry supporting West Wight communities.

1.3 Objectives

Overarching objectives for PDZ6:

- To sustain and adapt the important communities of West Wight to sea level rise, including the towns of Yarmouth, Freshwater and Totland.
- To support adaptation of the towns and villages of West Wight to reduce flood and erosion risks.
- To address the risk of tidal breach of the Western Yar valley at Freshwater and access to West Wight communities.
- To maintain access as a gateway to the Island at Yarmouth Harbour and support water use and navigation in the area, taking account of the important water sports activities and vehicle ferry links to the Island's transport system.
- To support opportunity for adaptation supporting and enhancing the nature conservation value of the Western Yar and West Wight.
- To sustain the built heritage, historic landscape and environment where practicable.
- To maintain the iconic landscapes as driven by the geological exposures.

1.4 Description

Left: Freshwater Bay, forming a low point along the high Chalk coastal cliffs of Afton Down to the east and Tennyson Down to the west (Isle of Wight Council).

This PDZ forms the western headland of the Isle of Wight, with coastal scenery and eroding cliffs surrounding sections of seawalls fronting coastal communities. The largest settlement in the West Wight is the town of Freshwater. Smaller towns and villages include Yarmouth and Totland. On the south coast, Freshwater Bay is a small low-lying embayment surrounded by high Chalk cliffs, where a seawall in the centre of the bay protects the flat land of the Western Yar Estuary behind. The Western Yar is effectively an estuary whose freshwater catchment has been destroyed by historic coastal erosion. Without flood protection works the estuary would be open to the sea at both ends, and there is the potential for large scale flooding of properties. There are similar issues to PDZ3 (the Eastern Yar) where the transport links crossing the Western Yar valley are at risk at both the northern and southern shores of the Island, so co-coordinated decision-making is necessary to secure the future of the communities and the environment in this area.

Further west is the high Chalk peninsula of Tennyson Down, the Needles and the coloured-sand cliffs of Alum Bay. Tennyson Down headland exerts an important control on wider shoreline evolution, forming the resistant western tip of the Isle of Wight and providing shelter from dominant south-westerly wave climate to the shores of the Solent. On the north-west coast, in Totland and Colwell Bays, seawalls, promenades and cliff drainage schemes help to stabilise the reactivating developed coastal cliffs. The north-west coast is generally characterised by eroding clayey cliffs, interrupted by fixed headlands of former fort structures at Fort Albert and Fort Victoria, with some development on the adjacent cliff tops and coastlines.

Right: Totland Bay, where cliff reactivations have slumped over sections of the seawall. July 2009

Fort Albert is now private apartments with Cliff End holiday bungalows on the cliff top above. Fort Victoria is a popular countryside and education centre as well as housing a number of tourist attractions. It is well used by anglers and visitors. The large hotel complex of Norton Grange fronts the coastline to the east.

Left: Eroding coastal cliffs in the north of Colwell Bay. View from Colwell Bay (where the south of the bay is defended by a seawall) looking north-east to Fort Albert (Cliff End), June 2009.

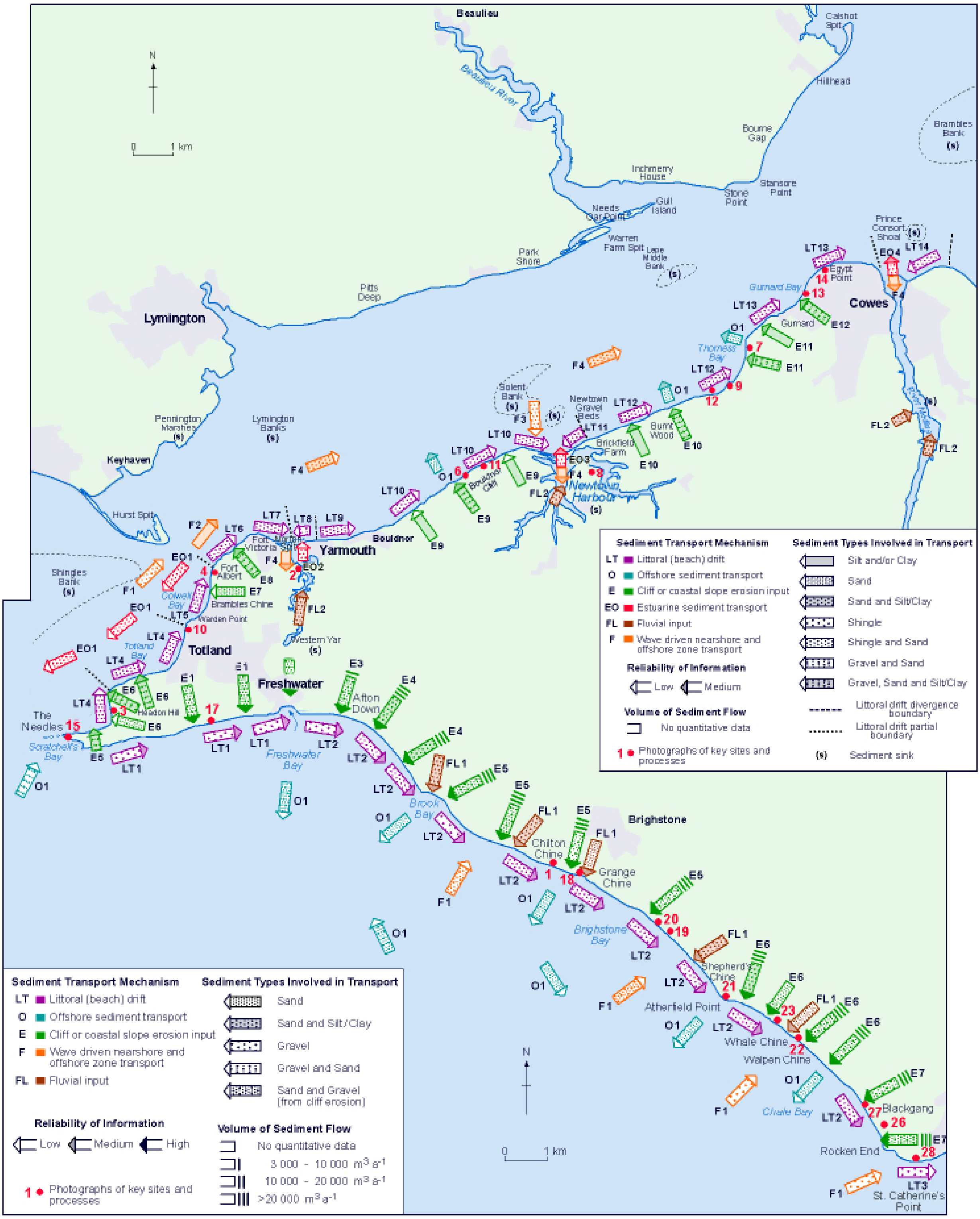
The Western Yar Estuary is open to the sea at Yarmouth and is protected by a narrow stabilised sand and gravel spit at Norton with a harbour arm in poor condition. The estuary is also sheltered by the town of Yarmouth, the Harbour and the ferry terminal. The estuary runs inland 3km almost due south towards Freshwater, with approximately 9km of frontage within the estuary. There are extensive mudflats, marshes and reed beds. The estuary almost dries at low water and effectively ends at The Causeway road bridge where there are tidal flaps. Within the gateway town of Yarmouth there are a large number of residential and non-residential properties that are low-lying and vulnerable to tidal flooding. A swing bridge carries the main road from Newport to West Wight communities across the estuary mouth. The seaward face of the communities of Yarmouth and Port la Salle is currently defended but is vulnerable to future coastal erosion and retreat, including a section of coastal road embankment housing the main road link from Newport.

1.5 Physical Processes

1.5.1 Coastal Processes (further details are provided in Appendix C1).

The following summary outlines the wave climate, tidal flows, geomorphological controls, sediment supplies and coastal processes characterising PDZ6.

The general pattern of sediment movement is summarised in the following diagram from the SCOPAC Sediment Transport Study.



Sediment transport sources, pathways and sinks on the west coast, from SCOPAC Sediment Transport Study, 2004.

The pocket beach of Freshwater Bay is surrounded by the Chalk cliffs of Afton Down and Tennyson Down and is composed of shingle and well-rounded and abraded flint cobbles, suggesting that the bay is a re-entrant trap receiving sediment from both east and west.

The Needles headland is an important control affording shelter from dominant south-westerly waves to the north-west Isle of Wight coast. North of the Needles this coastline comprises the north facing valley side of the former Solent River that was cut-off by marine inundation some

7,000 to 8,000 years before present. It is considerably more exposed than the corresponding mainland shore to waves and tidal currents. The combination of relatively non-resistant rock material and a spatially varied exposure to waves and currents has resulted in the formation of a predominantly eroding coastline characterised at several locations by well-developed cliffs and landslides. Headlands occur on more resistant strata.

The northern face of the Chalk ridge runs from the Needles to Alum Bay. The Chalk is significantly more resistant than other geological units outcropping further northeast but is nevertheless subject to slow erosion. It should be noted that the recession process is episodic with major cliff falls and long intervening periods of little activity. Erosion takes place by basal undercutting followed by periodic localised falls that generate temporary accumulations of scree at the cliff toe. The cliff face then retreats very slowly by sub-aerial processes until marine erosion removes the debris at the toe and another cycle of undercutting can begin. Erosion of the high cliffs yields quantities of predominantly fine sediments. These materials are not usually stable on the foreshore, thus widespread offshore transport of fine sediments can be inferred.

It is thought that Alum, Totland and Colwell Bays were once linked by shoreline drift, but headlands have increased in prominence as the Bays have become more deeply eroded so that each of the three bays now behaves as a relatively independent pocket beach. As the bays are relatively closed systems, they receive sediment inputs only from erosion of local cliffs. Much of the material yielded is too fine to remain on beaches and is transported seaward, where tidal currents may transport it south-westward of the Needles or north-eastwards into the Western Solent.

Alum Bay is a west-facing bay cut into soft Eocene sand and clay sediments. The geological strata dip steeply northward and rest unconformably against the Chalk. Interbedded cycles of clay, silt and sand the cliffs form generally steep profiles that erode readily by rock fall, gullying, translational slides and mudsliding (within the clayey areas, especially the Reading Clay). A steep and relatively narrow shingle beach provides partial protection at the cliff toe.

A major phase of landslide activity produced rapid cliff top recession over the period 1909-75 at Headon Warren, thereafter the cliff top remained relatively static. Such events are episodic and are interspersed between prolonged inactive periods at the cliff top. During such periods activity is concentrated in lower parts of the coastal slope involving degradation of detached blocks as they are transported down to the shore. The overall result has been mean recession at relatively high rates over the last century: this is thought to be representative of the long term recession rate. The cliff toe has fluctuated in position due to episodic seaward movement of landslide lobes.

The cliffs of Totland and southern Colwell Bays presently form relatively steep, partly vegetated slopes following protection of their toes by defences. Prior to protection in the early 20th Century the cliffs of Totland and Colwell Bays retreated at relatively high rates. Protection almost completely halted recession, but an increasing tendency for instability and failures affecting the cliff top have been observed in recent decades, resulting in some cliff top recession. The cliffs would have been similar in form to those of central Colwell Bay prior to their protection. Central and northern Colwell Bay is characterised by rapidly eroding low clay cliffs (15-25m). The unprotected cliffs are composed of soft permeable strata overlying impermeable clays in a classic landslide-generating sequence. Rapid seepage erosion, simple landslides and occasional deeper-seated failures are the main recession mechanisms. A wider degradation zone and increased propensity for mudsliding is evident closer to Fort Albert. High recession rates have occurred in recent decades in central-northern Colwell Bay where retreat of the unprotected cliffs remains extremely active. Beaches in both bays have suffered losses of sediment and lowering and narrowing over the past century. Incoming north-eastward littoral drift is partially intercepted by groynes in central and southern Totland Bay. The beach comprises a steep shingle upper and sandy lower profile. Warden Point at the eastern extremity of Totland Bay is a natural headland resulting from outcrop of resistant limestone strata on the foreshore to form Warden Ledge, limiting northern movement of sediment. The foreshore has narrowed and lowered significantly so that deep water now extends to the toes of the sea walls. Direct cliff inputs are prevented by protection structures. Totland Bay is therefore virtually an enclosed system and dependent upon management interventions to maintain stability.

Eroding soft rock cliffs and foreshore debris lobes are continuous from Fort Albert to Fort Victoria. The clayey materials of the cliffs degrade by mudsliding and simple translational slides, creating a shallow actively retreating coastal slope. Strong tidal currents are effective in removing clayey debris that accumulates at the cliff toe. The shore is drift-aligned with respect to dominant waves approaching from the west. Sconce Point was stabilised by the construction of Fort Victoria. An inactive or relict low coastal slope extends from Fort Victoria to Norton. Its beaches comprise a narrow strip of sand and gravel above a narrow muddy foreshore. The coastal slope is protected by defences so that the only historical trend has been for narrowing of the foreshore.

The western entrance to the Western Yar Estuary is protected by a narrow eastward trending sand and gravel spit at Norton, stabilised and extended by a breakwater. The town of Yarmouth has been built upon a shorter counterpart spit on the low-lying eastern bank and the area provides protection from wave attack to the Western Yar outer estuary. The foreshore at Yarmouth has lowered and narrowed in front of seawall defences. Dredging of Yarmouth Harbour entrance has been undertaken for navigation purposes and in 2009 a trial seeking 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. The low-lying valley of Thorley Brook runs parallel to the shore a few tens of metres inland of the shoreline to the immediate west of the town.

The coastal areas of the Western Yar estuary are subject to rapid tidal currents and open sea waves which enter Hurst Narrows. Dominant ebb currents in the Western Solent cause seaward flushing of coarse bedloads and input of suspended sediments into the Western Yar estuary, most likely derived from clay cliff erosion in the immediate vicinity between Bouldnor and Newtown. Fluvial transport from the Western Yar catchment is negligible with predominantly marine clays having partially infilled the estuary.

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. The Western Yar valley is vulnerable to tidal inundation if the beach and seawall in Freshwater Bay is overtopped and breaches. It is uncertain whether a breach would seal naturally, or whether the Western Yar valley would flood such that the land to the west would become an island separated by tidal flows between the West Solent and Freshwater Bay. Without defences cliff recession of the Chalk headland will continue with the small quantities of flints eroded from the northern facing cliffs comprising the main inputs of fresh gravels to the Alum Bay beach. Although at Headon Warren the upper cliff has been relatively stable over recent decades, it will be subject to reactivation of landsliding in the longer-term due to coastal erosion and groundwater. This could potentially occur at some point within the next century, although the presence of a considerable volume of debris material from previous failures provides a degree of protection at the cliff toe. Within Totland and Colwell Bays the unprotected frontage would erode rapidly, although the enhanced sediment supply arising would only partly enhance beach volumes because most of the cliff materials are sand and clay and mechanisms exist for rapid removal seaward of these sediment grades. The cliffs between Fort Albert and Sconce Point would continue to recede through mudsliding, with the fresh material largely transported offshore in suspension. From Sconce Point to Norton continuing foreshore erosion may in the long term cut into the relict coastal slope eventually triggering formation of low eroding cliffs over 30 to 50 years. This process is likely to be slow due

to the low wave energy.

Norton Spit is depleted and would be likely over the forthcoming 30 years to become subject to landward migration such that it would increasingly recurve into the estuary and possibly breach. This process may be slowed by sediment inputs released from updrift as recession processes within cliffs re-activate. However, the spit could migrate and breach before this potential sediment supply becomes fully active. Any breach in the spit could allow greater wave penetration into the Western Yar estuary.

The Yarmouth shoreline is likely to retreat at slow to moderate rates as the foreshore is narrow and provides limited protection. Immediately east of Yarmouth there is the possibility that shore erosion could cut through into the lowland valley of Thorley Brook to produce a small new tidal inlet. This could potentially link to the Western Yar estuary leaving the town of Yarmouth as an island at high tide.

1.5.2. Existing Defences

The following description of coastal defences outlines the current condition and expected remaining effective life of the defences in the area, if no further maintenance is carried out. In addition to the following summary, individual defences are described in Appendix C2 -Defence Appraisal (areas IW41 to 51).

At Freshwater Bay a seawall protects Freshwater and Afton Marsh. It is expected to fail towards the end of epoch 1 (up to 20 years). The groynes are in poor condition. During winter storms shingle is thrown up onto the promenade, and is removed periodically.

From central Totland Bay around Warden Point to southern Colwell Bay there is a continuous seawall defence. Within Totland Bay from Totland Old Lifeboat House to the Waterfront restaurant the defences are frequency undermined and the groynes are in poor condition. Residual life of the seawalls along the frontage is often 15-25 years, but in central Totland Bay there are sections which are showing cracking and rapid deterioration which may fail in as little as 5 years. Rock armour groynes and some rock armour is present between Totland Pier and Warden Point and to the north in central Colwell Bay a field of timber groynes with rock stubs have now been rendered ineffective through cliff retreat.

At Fort Albert (Cliff End) western frontage the remains of defences and more robust rock armour revetment are present. Fort Albert itself is protected by steel sheet piling, and concrete defences extend to Round Tower Point. The defences are likely to fail near end of epoch 1 without maintenance, although the steel sheet piling surrounding the Fort may provide protection throughout epoch 2 (up to 50 years). This section of defences is surrounded by adjacent eroding coast to the north and south.

From Fort Victoria to Norton there is a patchwork of ageing defences and short groynes along the shoreline. At the southern limit, low timber breastwork will fail in 5-7 years, and moving north-eastwards around Sconce Point a series of continuous concrete and masonry seawalls will likely fail in the first epoch. Moving east a short undefended section is protected by a shingle ridge, giving way to deteriorated rockfilled gabions (lasting approx. 1-3 years), fronting the most vulnerable section of the adjacent local coastal access road and ground movement in the gentle slopes is affecting the road surface. A more robust seawall fronts Norton Grange, with a residual life of 15-25 years.

To the west of Yarmouth harbour, Norton Spit is a natural feature which has been stabilised by timber breastwork and extended by a rock armour breakwater. Without maintenance, the stabilisation of the spit and breakwater are expected to fail in the first epoch. To the east of the harbour, around the western edges of the town of Yarmouth (from the Castle to Thorley Brook) a series of seawalls and revetments have residual lives of 15-25 years, with the exception of two sections of steel sheet piling within the ferry terminal which are expected to last until the second and possibly into the third epoch.

Within the Western Yar Estuary there are scattered short lengths of wall and embankments. The west banks of the Estuary are relatively undeveloped with some localised marine facilities and infrastructure. At the Freshwater causeway there are tidal flaps that mark the southern tidal limit. There is an embankment which cuts off Thorley Marshes that also acts as footpath and cycle track along the east side of the Western Yar Estuary.

From Yarmouth Castle the defences are continuous until Port la Salle. There are localised land stability problems in this area that may be re-activated by deterioration of the sea-wall. From Yarmouth Common to Bouldnor the steel piled toe of the seawall is poor condition and suffering from extensive corrosion. The series of seawalls from Yarmouth to Bouldnor have residual lives (without any further maintenance) of 15-25 years. Some sections of recent wall and steel sheet piles are in better condition and will last into the second epoch. It is important to note that the central section (where the main road is supported on an embankment adjacent to the seawall) is in poor condition and could fail in 5-10 years. Along the Port la Salle frontage development is protected by combination of steel sheet-piling, rock armour, concrete wall and gabions.

1.5.3 Potential Baseline Erosion Rates

The SMP reviewed a wide range of data to define the current and potential rates of coastal erosion and cliff retreat along the Isle of Wight coast using the best available information. Full details can be found in Appendix C3. Future erosion rates are predicted using Walkden & Dickson formula (2008) and allow for future sea level rise –the full methodology is explained in the Appendix. Predicted sea level rise rates of 4mm/yr (to 2025), 8.5mm/yr (to 2055), 12mm/yr (to 2085) then 15mm/yr (to 2105) have been used, in accordance with SMP national guidance by Defra. These rates equate to 7cm of sea level rise (above the 2009 baseline) by 2025, 32cm by 2055 and 98cm by 2105. The IW numbering units refer to lengths of coast for which future behaviour is described and mapped in Appendix C (based on SMP1 and Strategies). These are not SMP2 policy units which are developed in section 3 below.

Potential total erosion over the next 100 years is shown, however it is important to note that this is an estimate that is based on an undefended coastline. Within Appendix C3, these erosion rates are only applied following the predicted failure date of each individual element of the defences within the unit; therefore the resulting erosion amounts shown in the Appendix C3 tables and maps (and used in the development of this SMP) will show smaller erosion totals than the overview provided below.

Potential coastal erosion rates (all figures in metres/year):-

Numbering in SMP2 Appendices (2010) (no. & name, clockwise)		Historical Rate	Current to 2025	2025 to 2055	2055 to 2085	2085 to 2105	Potential 100 year erosion (if undefended) -total in metres	Notes
IW41	**Freshwater Bay**	0.30	0.35	0.46	0.53	0.58	48	
IW42	**Tennyson Down & The Needles**	0.25	0.29	0.38	0.44	0.48	40	
IW43	**Alum Bay**	0.30	0.35	0.46	0.53	0.58	48	
IW44	**Headon Warren**	0.30	0.35	0.46	0.53	0.58	48	
IW45	**Totland & Colwell**	0.50	0.58	0.76	0.88	0.96	80	Potential slope failure and landslip in this area.
IW46	**Central Colwell Bay**	0.50	0.58	0.76	0.88	0.96	80	
IW47	**Fort Albert**	0.50	0.58	0.76	0.88	0.96	80	
IW48	**Fort Victoria Country Park**	0.30	0.35	0.46	0.53	0.58	48	
IW49	**Fort Victoria & Norton**	0.30	0.35	0.46	0.53	0.58	48	
IW50	**Yarmouth Estuary**	0.10	0.12	0.15	0.18	0.19	16	
IW51	**Yarmouth Town & Bouldnor**	0.30	0.35	0.46	0.53	0.58	48	

Note:
i) Erosion rates have been determined from monitoring data and examination of historical records and have been calculated to take account of sea level rise. –see Appendix C3 for details.
ii) The IW numbering units refer to lengths of coast described in Appendix C. These are not SMP2 policy units.

2. Baseline management scenarios

2.1 Present Management

Present management of the shoreline is taken as the policy defined by SMP1, modified by subsequent strategies or studies. It should be noted that in the case of SMP1 the period over which the assessment was carried out was 50 years. SMP2 extends this to an assessment period of 100 years. The table below sets of the current shoreline management policies for Policy Development Zone 6. This SMP2 will assess all the available evidence and update these previous management policies.

The key documents outlining the present management of the shoreline in this PDZ are:-

Isle of Wight Shoreline Management Plan 1 (1997)
The first Shoreline Management Plan (SMP1) for the Isle of Wight 's coast was published in 1997. It consists of two volumes.

- Volume 1 is the 'Data Collection and Objective Setting', which presents information on a range of topics including coastal processes, natural environment, etc.
- Volume 2 is the 'Management Strategy', which presents information for each Management Unit around the Island's coast and sets a management Policy for each unit.

Coastal Defence Strategy Studies, Isle of Wight:
Whilst the Shoreline Management Plan provides the risk framework for management of the coast, Coastal Defence Strategy Studies provide a more detailed assessment of particular frontages in order to identify the most suitable type of coastal defence schemes that may be required to fulfil the agreed shoreline management policy and to plan a programme of future works.

West Wight Coastal Defence Strategy Study
The West Wight Coastal Defence Strategy Study is being prepared for this area and preliminary work undertaken to date will be updated and the Strategy completed following the publication of SMP2.

Catchment Flood Management Plan:
The Environment Agency has undertaken a programme of Catchment Flood Management Plans (CFMPs) for the major river catchments in the Southern Region. A CFMP is a large scale plan that covers an entire river catchment or group of catchments that identifies long-term, sustainable policies to manage flood risk within the catchment. These policies form the basis for development of Strategy Plans, covering all or part of the overall catchment area, which will identify in more detail appropriate flood defence measures.

Whilst CFMPs principally address fluvial (river) flooding, SMPs address tidal (sea) flooding, alongside coastal erosion. The Isle of Wight Catchment Flood Management Plan (Summary Report) was published in December 2009.

- Western Yar, and catchment to the west of the river: Sub Area 1: Western Yar

  "The issues in this sub-area: The key risk in this sub-area is from river flooding in Freshwater. The river channel of the Western Yar drains a small catchment which runs through Freshwater. The channel is restricted in places which can give rise to localised flash flooding. Nearer the coast, river flooding may be affected by high tide levels, which will get worse with the predicted future sea level rise. Only modest development is planned within the sub-area, however any new development could act as an additional source and/or receptor of flooding."

Policy Option 4 – areas of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change.

- Catchment to the east of the Western Yar: Sub Area 2: Newtown River and the Chines

  "The issues in this sub-area: There is a relatively low risk of fluvial flooding. Surface water flooding occurs in some urban areas due to the capacity of drains being exceeded. Nearer the coast, river flooding may be affected by high tide levels, which will get worse with predicted future sea level rise. Only modest urban development is planned."

  Policy Option 2 – areas of low to moderate flood risk where we can generally reduce existing flood risk management actions.

Western Yar Estuary Management Plan
The Western Yar Estuary Management Plan was written in 1998 and revised in 2004. It sets out key issues, policies and actions that aim to manage the Western Yar's sensitive environment through partnership. The Plan was revised and updated through consultation with local people, organisations and authorities that sit on the Western Yar Estuary Management Committee. The key policy relevant to the SMP is as follows:

- *Key Policy Area 2: Physical Processes. Aim: To allow the physical and other natural processes within the Western Yar to function with the minimum of human modification. Including:*
  - *2.2 The natural and physical processes within the Western Yar should continue with the minimum of human modification. This should allow present and future activities and processes of the estuary to co-exist or restore more natural coastline or processes.*
  - *2.3 Protect, as appropriate, the urban and commercial development (people, property and businesses) in the core area and area of wider influence from erosion and flooding by the sea.*
  - *2.4 Maintain, as appropriate, the existing defences to protect people and property from flooding.*
  - *2.5 Hold the defence line by maintaining the level of coast protection afforded by the breakwater whilst minimising the adverse impacts to the natural processes of sediment transport, especially those which sustain sensitive habitats.*
  - *2.6 Any new built development that does not rely upon a coastal location should not be constructed in coastal areas. Development should also be avoided in areas that are at risk from either flooding or coastal erosion.*
  - *2.7 Any improvements to the level of coastal defences should take into consideration or, if possible, enhance the nature conservation.*

The previous shoreline management policies set for this PDZ are listed in the table below:

The IW numbering units refer to lengths of coast for which previous shoreline management policies were set in SMP1, modified by subsequent Strategy Studies (where available), used to gather information in the Appendices. These are not SMP2 policy units which are developed in section 3 below.

Numbering in SMP2 Appendices (2010)		**SMP1 (1997)**	
Area *(clockwise)*	**Name**	**Unit**	**Policy**
IW41	**Freshwater Bay *(centre of the bay only)***	FRE 4	Hold the existing defence line
IW42	**Tennyson Down & The Needles**	FRE 5	Do nothing
		TOT 1	Do nothing
IW43	**Alum Bay**	TOT 2	Do nothing
IW44	**Headon Warren**		
IW45	**Totland & Colwell**	TOT 3	Hold the existing defence line
IW46	**Central Colwell Bay**	TOT 4	Retreat the existing defence line
IW47	**Fort Albert**		
IW48	**Fort Victoria Country Park**	NEW1	Do nothing
IW49	**Fort Victoria & Norton**	NEW2	Hold the existing defence line
IW50	**Yarmouth Estuary**	NEW3	Hold the existing defence line
IW51	**Yarmouth Town & Bouldnor**	NEW4	Hold the existing defence line
		NEW5	Hold the existing defence line

2.2 Baseline Scenarios for the Policy Development Zone

Coastal erosion will continue along much of the headland, preserving the spectacular coastal scenery. Along the developed areas, erosion and retreat of coastal slopes will commence following deterioration of the current seawalls and defences at the end of the first epoch. In Totland and Colwell over the next 100 years erosion of coastal slopes with episodic landsliding and ongoing retreat of the sea cliff line into developed cliff top frontages could occur. Properties and assets may also be lost along the cliff lines and coastal slopes behind Alum Bay, Fort Albert, Fort Victoria, Norton, Yarmouth and Port-la-Salle. There is current and increasingly significant tidal flood risk in areas of the town and ferry port of Yarmouth and also in the future at Freshwater. A future tidal breach through Freshwater Bay and tidal inundation along the Western Yar valley could potentially create a separate island of the West Wight peninsula. The low-lying valley of Thorley Brook runs parallel to the shore just inland of the town of Yarmouth, extending eastwards from the Western Yar estuary. Erosion of the shoreline and coastal road embankment just east of Yarmouth has the potential to create a breach and small tidal inlet from the coast into Thorley Brook. In the medium to long term this could effectively place Yarmouth on a ‘tidal’ island at high tide.

2.2.1 No Active Intervention (Scenario 1, NAI):

Under this scenario no further work would be undertaken to maintain defences. Where defences fail they would not be repaired. The principal difference between this scenario and the unconstrained scenario discussed earlier is the residual impact existing defences would have on the behaviour of the coast. A detailed description of this NAI scenario is given in Appendix C3, area by area. The following discussion provides a summary, drawing together an overview with particular focus on how the use of the coast and the objectives outlined above would be affected.

Shoreline defences within the low-lying embayment of Freshwater Bay offer protection to the village of Freshwater. With no maintenance these defences would fail by the end of the first epoch. In the West Wight, Totland lies on a raised area of land adjacent the coast, while Freshwater is built at a lower level. A historic narrow river valley is present behind the sea wall at

Freshwater Bay. With no future works at this location, both the main A3055 road and the southern section of the Western Yar valley would be at risk of wave attack and tidal inundation. It is likely that the defence failure would lead to a permanent flood breach. To the north, the Western Yar Estuary runs inland south from Yarmouth towards Freshwater. The implications of the NAI policy in this location will be discussed later in this section, but the key risk to Freshwater is dependent on the southern limit of the estuary currently controlled at the Causeway. Under the NAI, with no further defence works the estuary could breach and be open to the sea at both ends, creating dynamic and unpredictable tidal conditions with potential for inundation of properties in the town of Freshwater. While some lengths of the defence could remain until the second epoch, the failure of one section would allow the area behind to become vulnerable to tidal inundation. During the second and third epoch this exposure would be come more frequent.

The Local Development Framework (LDF) aspirations for the area include the appropriate expansion of the towns of Totland and Freshwater in the future (a Key Development Area), in order to support communities in West Wight. This is to be achieved through a strengthening of services and the public transport connection to Newport, with development to be encouraged on brownfield sites and tourism to be promoted. The potential tidal breach between Yarmouth and Freshwater is likely to divide the existing transport links between West Wight and the rest of the Island (both main roads at Freshwater and Yarmouth are threatened by erosion in epoch 2 (20-50 years) as well as tidal flooding). While this could be mitigated through infrastructure (i.e. bridges), this would take time and be at considerable cost to the Island. Therefore, the NAI scenario will have serious adverse consequences for the sustainability of West Wight; impacting important transport links and access with limited time given for adaptation to the change. Interrupting the transport links to West Wight would also adversely affect the ability of the iconic landscapes of West Wight headland to act as a draw supporting the local communities.

Along the Tennyson Down coastline and the Needles there are no defences; but the Needles is a relatively resistant headland, which exerts an important control on the wider shoreline evolution of the Isle of Wight and Solent. Natural erosion processes would continue under the NAI scenario, providing some sediment to the littoral system. During the third epoch the retreat of the headland may create new 'Needles' stacks, and some of the previous stacks may erode and topple. This could leave a sequence of underwater hazards. Erosion will threaten the significant heritage interest of the headland, and including loss and/or damage to the Needles Battery Site (SM).

NAI will allow features of conservation interest to evolve naturally. Erosion will continue to act upon the most important subtidal chalk reefs in Britain and the only known chalk subtidal caves in the UK, both of which are a features of the South Wight Maritime SAC. Natural evolution of the Isle of Wight Downs SAC features (grasslands, vegetated sea cliffs and heathland) will also continue, with no adverse effects on designated sites. The important iconic landscapes of the West Wight will be effectively maintained with erosion continuing under NAI, but infrastructure and access to them as a driver of the local economy would be compromised in the surrounding areas.

In Alum Bay, cliff erosion would continue throughout the three epochs. These natural processes will maintain the exposure of the coloured sands forming the cliffs at Alum Bay, although significant proportions of the cliff top car park and some amusement park infrastructure will be lost causing the need for adaption (likely through retreat).

Moving eastwards to Headon Warren, under the NAI scenario the undefended and natural section of coastline would continue to function in line with natural processes by slope reactivation and retreat caused by erosion and water in the ground, with no adverse effects on designated sites. From here the coastline curves northwards into Totland and Colwell Bays. Totland and southern Colwell Bays have heavily defended shorelines which help to provide stabilisation to the reactivating developed coastal cliffs. Under this scenario the majority of the defences would fail towards the end of the first epoch or the start of the second epoch and there will be a reversion to 'natural' cliff line retreat and cliff instability. This would help provide sediment input to the local beaches. In epoch 2 cliff recession will pose risks to cliff top development, particularly in the south of Totland Bay, at the limit of the coastal defences. During epoch 3 (50-100 years) continued erosion and water in the ground will cause complete activation of coastal slopes with episodic landsliding of the sea cliff line into developed cliff top frontages. This will impact on several businesses, cliff top properties, seafront amenities and access. Unlike other sections within this PDZ, the cliff retreat in this area, once reactivated, will continue back through developed areas into the centre of Totland.

The central section of Colwell Bay is generally undefended and rapid coastal erosion and cliff retreat will continue under a NAI scenario. This will impact on the Colwell Bay SSSI features but maintain the important geological exposures from the north side of Totland Bay Pier to the south of Fort Albert. The defended section around Fort Albert is protected by a variety of coastal defences which would fail towards the end of the first epoch with no maintenance. Within the second epoch, erosion, simple landslides and occasional deeper-seated failures would occur, but the steel and concrete walls around the Fort itself are in good condition and could survive longer, possibly into the third epoch. At some point the coastal slope will increasingly revert to natural soft cliff with potential destabilisation at the cliff top. This would threaten both the residential use of the Fort and particularly local access. The areas of the cliff top properties near the margins of the unmaintained defences would be at risk towards the end of the second epoch and through the third epoch, dependent on the retreat of the top of the cliff as marine erosion undermines the toe of the slopes. Increased sediment supplies from the erosion and retreat of the cliffs will supplement local beaches.

Continued erosion along the Fort Victoria Country Park area under NAI would supply sediment both to the beaches in this area and potentially to the frontages to the north-west. This would support beach use (although diminished due to potential loss of supporting coastal infrastructure) and the important nature conservation values of the area (namely vegetated cliffs, which form a feature of the Solent Maritime SAC, Solent and Southampton Water SPA and Ramsar sites). The defences from Fort Victoria to Norton would fail within the first epoch or soon in the second epoch and erosion will affect the local access road, several properties, holiday cottages and tourism businesses. The renewed erosion of this frontage may release shingle material into the system and could have a beneficial effect on Norton Spit to the east which provides some protection to Yarmouth Harbour and the Western Yar estuary entrance.

Norton Spit has been stabilised and extended by a breakwater to provide shelter to the harbour and also provides a popular local amenity area. Without maintenance, under the NAI scenario, the stabilisation of the spit and breakwater would fail during the first epoch. The dunes, which are a designated feature of the Solent Maritime SAC, and beach forming Norton Spit are likely to migrate south and possibly breach. This process may be slowed by sediment inputs released from additional sediments into the system from cliff recession elsewhere. There is some scope for gain of intertidal habitats to the rear of the spit under NAI.

Surrounding Yarmouth Harbour under the NAI scenario, there will be an increased frequency of tidal inundation and erosion as defences fail in the vicinity of the harbour mouth. Towards the end of the first epoch, the defences and sheltering structures protecting the mouth of the estuary are expected to fail, opening up the estuary behind to wave attack. This will expose a number of features of international designated sites (Solent Maritime SAC and the Solent and Southampton Water SPA and Ramsar sites) to increased marine inundation and erosion. Saline intrusion associated with sea level rise and increasingly frequent tidal flooding will result in change to coastal grazing marsh and saline lagoons. Although initially exposed to erosion, there is potential for habitat gain of saltmarsh and intertidal flats in restricted locations, though this is limited given the relatively steep slopes of the coastal margins and rising sea levels. Overall, however, NAI will see the estuarine system revert increasingly to its natural behaviour and evolution in epochs 2 and 3 with long term benefits for nature conservation.

There is a potential impact on the tidal prism and dynamics of the whole Western Yar Estuary following the collapse of the breakwater and changes in the estuary entrance. Since this is a valley type estuary with relatively steeply sloping margins, saltmarsh within the estuary is likely to be sensitive to future climate change and sea-level rise unless vertical accretion can compensate. There remains significant uncertainty as to future estuary behaviour under this scenario, especially with the likelihood of tidal breach through to the Freshwater Bay coast resulting in inundation and changing the tidal regime through the valley. However, the point made is that there would be substantial changes to the area, with significant impacts on the behaviour of the estuary and on the use of the harbour and waterside supporting the town of Yarmouth. Significantly, the use of the harbour would be difficult without some form of intervention and control and the operation of the commercial harbour (ferry port) is reliant on hard defence structures which will largely fail in epoch 2 and undergo increasing inundation prior to this. The defences surrounding the road bridge would also fail and the main road link will also be inundated by tidal flooding from the estuary to the edge of the town.

There is significant flood risk to the town of Yarmouth. Tidal flooding has already affected the harbourside and western edge of the town and flood risk will continually increase in future epochs under the NAI scenario. The topography of Yarmouth is relatively flat and western parts of the town are below 3m AOD. Flood risk in the town is complex with the tidal flood risk along the northern edge of the town, and a combination of tidal and fluvial risk from the estuary and tributaries to the south and west. Lanes between houses on the seafront provide possible access routes for flood waters to enter the town in the future. The current Environment Agency Flood Zones appear to completely encircle the town, presenting potentially serious problems relating to access/egress routes and emergency planning. In the event of the 1 in 200 year tidal event, the A3054 road would be flooded. Under the NAI scenario, Yarmouth could potentially face economic blight and cut off from the rest of the Island. The LDF has identified Yarmouth as an important settlement and gateway to the Island with future aspirations including appropriate expansion to support neighbouring communities. This is to be achieved through a strengthening of services and the public transport connection to Newport, encouraging development on brownfield sites, and promotion of tourism opportunities. The area adjacent to Yarmouth is designated and it is essential that the close proximity of the SAC, SPA and SSSI, and resulting impacts, be considered alongside issues of flood risk.

NAI in Yarmouth and the surrounding area would not sustain or allow adaptation of the communities and local commercial interests. It would not maintain access to West Wight communities and, due to the change to saline conditions, would affect the existing nature conservation values of the area. Arguably the estuary landscape, though changed, would still be much valued. Access via the footpath and cycle route bordering the estuary would be affected. There would be damage to the historic character and landscape of Yarmouth, including loss of Yarmouth Castle.

Along the developed coastal frontage from Yarmouth to Port la Salle the majority of the defences will deteriorate and fail during the first epoch; with initial breaches in the seawall leading to more widespread failure and commencement of erosion. In future epochs the NAI will result in the loss of seafront properties in both Yarmouth and Port la Salle, the amenity feature of Yarmouth Common and importantly a significant length of the A3054 road. The collapse of the seawalls and reversion to a natural low soft cliff would be a major change, but would not be detrimental to adjacent management units in terms of coastal processes.

Just east of Yarmouth there is increasing potential during the second epoch for a breach through the foreshore and embankment enabling the creation of a small tidal inlet into Thorley Brook, which may offer nature conservation benefits. If a breach occurs, shoreline sediments could be transported by tidal currents generated at the new inlet and become flushed seaward. Loss of the A3054 road (which is the main link between West Wight and Newport) and also the coastal footpath link would result.

The economic damages due to flooding and erosion are summarised in Table 1, at the end of this sub-section and a summary of impacts with respect to the overarching objectives are set out in Table 2, in comparison with the assessment made for the following With Present Management scenario.

2.2.2 With Present Management (Scenario 2, WPM):

This scenario examines the consequences of continuing with current shoreline management practices and policies as defined in SMP1 including the maintenance of existing defences. The previous shoreline management policies for the PDZ are summarised in the table at the start of Section 2.

Overall, if present management practices were continued, the approach of the management would be defined as the intent to:

- Maintain and improve the standard of defence in Freshwater Bay.
- The coastline along the Tennyson Down and the Needles is left to function naturally.
- The defended stretches in Totland and Colwell Bays, at Fort Albert and Fort Victoria, with present management continuing, would be maintained and replaced when necessary protecting the cliff top properties, with ongoing cliff retreat separating these sections.
- From Norton Spit to Port la Salle defences would be maintained, including those surrounding Yarmouth and the Western Yar Estuary mouth.

With maintenance of the defences at Freshwater Bay at their current standard of protection, the present beach configuration would be maintained and flooding through to the Western Yar valley from the south would be prevented for all three epochs. However, the standard of defence would need to be heightened significantly to counter the risk of overtopping with rising sea levels and wave attack. From the second epoch the risk of tidal inundation from the north increases and erosion of the surrounding coastal cliffs will gradually outflank the defences.

The impacts of continuing WPM along the western headlands of Tennyson Down, West High Down, the Needles, Alum Bay and Headon Warren would be similar those discussed in scenario 1 above. The important iconic landscapes of the West Wight will be effectively preserved with erosion continuing under the WPM scenario (as the cliffs will remain undefended), but access to these landscapes as a draw and driver of the local economy would be preserved by maintaining vulnerable transport links across the Western Yar valley if present management also continues there.

Moving westwards, the defences along Totland Bay and southern Colwell Bay would be maintained and prevent widespread erosion and resulting activation of movement in the weak cliff line. This would secure the promenade, protecting seaside amenity and properties. Without upgrading, in the second epoch, overtopping of the seawall would become more frequent. The continued defence line will greatly reduce the frequency of landsliding events within the backing sea cliffs, but are unlikely to completely eliminate instability where high groundwater levels are also a factor. Periodic localised slumping and slope failures behind the seawall are therefore likely to occur. The fronting beaches will continue to narrow along defended frontages resulting in increasing exposure of defences to wave energy. It is likely that shoreline stability cannot be sustained at these locations without significantly improved defences in future epochs. At the southern end of the defences continued cliff retreat will place properties at risk in epochs 2 and 3. Outflanking of the seawall and defence line will occur to the north and south.

At Fort Albert, defences would be maintained and replaced effectively preventing cliff toe erosion. This would maintain access and properties, but the coastal slope may still destabilise to a degree due to encroaching coastal slope retreat from the north and south and increased winter rainfall raising ground water levels. Moving eastwards, at Fort Victoria Country Park under WPM the coastal slopes will continue to erode providing valuable sediment to the local beaches. From Fort

Victoria to Norton the defences would require significant maintenance and upgrading to prevent renewal of erosion right along the frontage. A narrow undefended gap in the centre of the unit could allow erosion to destabilise adjacent defences, although this may be minimised by the presence of the shingle beach. Small scale slope movement may damage the defences, but replacing the ageing structures would reduce this likelihood. WPM would maintain the access road to Fort Victoria and sustain the properties, tourism businesses and amenity use of the Fort Victoria area and Country Park.

Under the WPM scenario defences around the Western Yar Estuary and surrounding coastline would be maintained and replaced. These structures will come under increased pressure with increased wave action and water depth but would maintain the present form and operation of the Estuary. Maintenance of the current defence levels would not reduce the present and increasing risk of flooding to Yarmouth town centre, where defence levels are already overtopped. There would be a need within the first epoch to investigate options to provide a higher standard of protection. During the second epoch the rising sea levels and tidal inundation may impact upon saltmarshes within the Estuary, with coastal squeeze resulting in loss of habitat of nature conservation importance. The seawall barrier at Freshwater Bay will continue to prevent tidal inundation of the Estuary from the south and maintain the operation of the Estuary in its current sheltered form.

Considering the overarching objectives, this WPM scenario would support, to a large degree, the continued viability and economic activity of Yarmouth. The core of Yarmouth and the historic features would be defended. Maintenance of the current defence line will not be sufficient and significant upgrading will be required in a comprehensive scheme to defend against increasing sea level rise. In Yarmouth Harbour the various commercial activities would be supported but, with potential for increased siltation and the increasing flood risk along the Estuary, there would be a need for adaptation to the changing conditions. The WPM intent is also to maintain the existing natural habitats of the Western Yar Estuary (including coastal saltmarsh, intertidal mud and sandflats, saline lagoons, coastal grazing marsh), but in future epochs this will require increasing effort in areas like Thorley Brook. From Yarmouth to Port la Salle maintenance of the seawalls will prevent erosion and a marine breach through to Thorley Brook, maintaining properties and infrastructure, but the defences themselves would become increasingly exposed to wave action.

Continuing the WPM scenario in PDZ6 will preserve the key settlements in the area and allow significant areas of natural change to occur, but will also result in several increasingly fragmented stretches of defences separated by lengths of rapidly retreating coastal cliffs.

Table 1a. Economic Assessment – Erosion damages

The following table provides a brief summary of damages determined by the SMP2 MDSF analysis for the whole PDZ. Further details are provided in Appendix H. Where further, more detailed information is provided by studies, this is highlighted. The table aims to provide an initial high level assessment of potential damages occurring under the two baseline scenarios.

ASSESSMENT OF EROSION DAMAGES

Epoch	**0 -20 year**			**20 – 50 years**			**50 – 100 years**			
No Active Intervention	**Number of properties:**		**Value**	**Number of properties:**		**Value**	**Number of properties:**		**Value**	**PV Damages**
Location	*Residential*	*Commercial*	**x £1000**	*Residential*	*Commercial*	**x £1000**	*Residential*	*Commercial*	**x £1000**	**(£x1000)**
Freshwater Bay	0	0	0	0	1	1	11	4	2,607	228
West Wight headland (edge of Freshwater to edge of Totland)	0	0	0	1	5	325	8	11	1,695	254
Totland & Colwell Bays	0	2	30	6	13	1,720	90	44	201,289	2,916
Central Colwell Bay	0	0	0	11	2	2,319	30	14	6,341	1,548
Fort Albert	0	1	0	9	0	1,848	1	26	295	514
Fort Victoria Country Park	0	0	0	0	0	0	0	1	0	0
Fort Victoria & Norton	0	2	30	1	5	325	1	11	553	196
Norton Spit	0	7	0	0	1	30	0	4	414	98
Yarmouth Town and Port la Salle	0	24	134	1	16	458	32	19	7,461	895
									Total for PDZ6	**6,649**
With Present Management	**Number of properties**		**Value**	**Number of properties**		**Value**	**Number of properties**		**Value**	**PV Damages**
Location	*Residential*	*Commercial*	**x £1000**	*Residential*	*Commercial*	**x £1000**	*Residential*	*Commercial*	**x £1000**	**(£x1000)**
Freshwater Bay	0	0	0	0	0	0	0	0	0	0
West Wight headland (edge of Freshwater to edge of Totland)	0	0	0	1	5	325	8	11	1,695	254
Totland & Colwell Bays	0	0	0	0	0	0	3	6	766	106
Central Colwell Bay	0	0	0	11	2	2,319	30	14	6,341	1,548
Fort Albert	0	1	0	0	0	0	0	2	60	11
Fort Victoria Country Park	0	0	0	0	0	0	0	1	0	0
Fort Victoria & Norton	0	0	0	0	0	0	0	0	0	0
Norton Spit	0	0	0	0	0	0	0	0	0	0
Yarmouth Town and Port la Salle	0	0	0	0	0	0	0	0	0	0
									Total for PDZ6	**1,919**
Notes										
SMP.										

Table 1b. Economic Assessment –Flood damages

The following flood damages have been determined through use of MDSF. These figures are aimed to indicate the level and impact of flood risk rather than being a detailed economic appraisal. In many areas substantial numbers of properties would be liable to flooding on the more frequent events both under NAI and WPM, a nominal write off value has been allowed in the table for properties at frequent risk; this generally excludes values at risk at present on a 1:1 year event, in 50 years time for the 1:10 year event and in 100 year time the 1:50 year event.

ASSESSMENT OF POTENTIAL FLOOD RISK

	Flood risk tidal 2010			**Flood risk tidal 2060**			**Flood risk tidal 2110**			
No Active Intervention	**No. of properties**		**AAD**	**No. of properties**		**AAD**	**Number of properties**		**AAD**	**PVD**
Location	< 1:100yr	>1:100yr	**x £1000**	< 1:100yr	>1:100yr	**x £1000**	< 1:100yr	>1:100yr	**x £1000**	**(£x1000)**
Easton and Freshwater (M1)	110	38	1,803	152	28	3,549	212	24	6,974	85,507
Freshwater North (M2)	59	33	809	93	25	2,347	145	14	2,347	34,205
Norton (M3)	37	4	895	42	3	1,123	46	5	1,633	31,129
Yarmouth (M4)	229	66	194	301	59	372	449	95	840	9,397
Yarmouth Mill and Thorley (M5)	202	64	228	272	58	372	419	95	740	9,704
Agricultural Total			20			22			27	641
									Total for PDZ6	170,583
With Present Management	**No. of properties**		**AAD**	**No. of properties**		**AAD**	**No. of properties**		**AAD**	**PVD**
Location	< 1:100yr	>1:100yr	**x £1000**	< 1:100yr	>1:100yr	**x £1000**	< 1:100yr	>1:100yr	**x £1000**	**(£x1000)**
Easton and Freshwater (M1)	0	148	69	0	180	109	0	236	169	2,734
Freshwater North (M2)	6	86	116	9	109	178	19	140	54	3,827
Norton (M3)	0	41	102	4	41	128	0	51	36	3,074
Yarmouth (M4)	0	295	50	0	360	91	0	544	186	2,278
Yarmouth Mill and Thorley (M5)	94	172	29	87	243	49	119	395	21	1,020
Agricultural Total			2			2			3	64
									Total for PDZ6	12,997

Table 2. General Assessment of Objectives

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

STAKEHOLDER OBJECTIVE	**NAI**			**WPM**		
	Fails	Neutral	Acceptable	Fails	Neutral	Acceptable
To sustain and adapt the important communities of West Wight to sea level rise, including the towns of Yarmouth, Freshwater and Totland.						
To support adaptation of the towns and villages of West Wight to reduce flood and erosion risks.						
To address the risk of tidal breach of the Western Yar valley at Freshwater and access to West Wight communities.						
To maintain access as a gateway to the Island and support water use and navigation in the area, taking account of the important water sports activities and ferry links to the Island.						
To support opportunity for adaptation supporting and enhancing the nature conservation value of the Western Yar and West Wight.						
To sustain the historic landscape and environment where practicable.						
To maintain the iconic landscapes as driven by the geological exposures.						

3. Discussion and detailed policy development

The overriding factors affecting future shoreline management policy in this PDZ are threefold:-

- The high cliffs and natural environment of the Needles headland and surroundings, forming the southern half of the PDZ.
- The discontinuous defences from Totland to Norton which hold the coast at three minor headlands, with undefended bays in between.
- The significant flood risk to the town of Yarmouth and the potential for a tidal breach through into Western Yar valley from Freshwater.

The consequences of the NAI scenario outlined above would be serious for the communities and environment of the West Wight area. Under the WPM scenario, the communities are already experiencing flood and erosion risks, and therefore it would not fully deliver a sustainable future where reliance on defences could be reduced.

Along the southern half of the PDZ from western Freshwater to southern Totland the NAI management intent is an acceptable and an important statement for the future of this shoreline. The high cliffs will continue to erode, allowing the landscape to evolve naturally, which is fundamental to the scenery and character of this area and of great importance for the Isle of Wight as a tourism destination. This will also enable the natural erosion and succession of habitats of nature conservation importance, such as the chalk reefs and sea caves. The Chalk cliffs of Tennyson Down and West High Down will continue to erode and retreat, but the scale of the peninsula is such that the headland will remain largely in its current form over the next 100 years, providing an important control point and shelter to the north-west Isle of Wight coastline. There will be loss of heritage features at the Needles Old Battery, but the exposed location at the tip of a peninsular surrounded by high cliffs means that shoreline defence would be unfeasible and undesirable in this location. There is no economic justification for an alternative management intent throughout this area and any alternative policy would have unacceptable adverse consequences for the natural environment, landscape, sediment supply and tourism. Continuing an uninterrupted policy of NAI right along this shoreline is therefore a clear recommendation of this SMP. The single exception to this policy is the short adjacent section of coast at the centre of Freshwater Bay. This area is discussed below, as it requires a coordinated policy with the rest of the Western Yar valley and estuary to the north.

The central section of the PDZ from Totland to Norton is characterised by a mixture of defended and undefended coastlines protecting largely fragmented communities. The longest length of defence in the area is the seawall fronting the community of Totland, extending along the cliff foot of Totland Bay through to Colwell Bay. In the short to medium term, it is sensible to maintain the existing defences along this section to prevent landslipping of the coastal cliff, and hence the loss of cliff top properties and amenity use of the shoreline and promenade. In the longer term, the defences should be replaced to maintain the community and community facilities, where it is economic to do so, due to the risks of slope failure and retreat continuing back into the developed areas behind the coastal properties. The length of the defences should not be extended in Colwell Bay due to the geological and nature conservation interest of the cliffs and to avoid creating an additional burden of maintenance for future generations. It is important to note that erosion and cliff retreat will continue to both the north and south of this ‘Hold the Line’ policy, and design of future defences should take appropriate account of these transitions. In central Colwell Bay, cliff retreat will result in the loss of part of the Holiday Park near Brambles Chine. In the south of Totland Bay, cliff top retreat is expected to affect several properties along cliff road in the second or third epoch, and may sever the local access road. This area may require further examination at Strategy level to determine if local actions can reduce this rate of retreat and to confirm the management of the boundary from the defended to undefended coast at this point. It should also be noted that the cliffs behind Totland Bay are weak and vulnerable to localised slope failures, which should be considered when planning maintenance or replacement of the fronting defence line which acts to stabilise the coastal slope from onset of erosion. The intent of shoreline management in this area is therefore to continue present management techniques whilst economic to do so, but not to extend the defence line significantly or alter the character of the area.

The cliffs of central Colwell Bay and Fort Victoria Country Park are undefended and actively retreating, with Fort Albert forming a fixed control point separating them. It is proposed that maintenance works along this section of defence could secure the future of this small community into epoch 2. The management intent at Fort Albert would be to maintain the existing structures in the short and medium term, providing the essential time for coastal adaption by the community. However, in the long term, the intent is to gradually remove the influence of management allowing the coast to gradually return to its natural form, reducing the offset to the adjacent eroding shorelines. Fort Albert will therefore continue to provide a degree of control and shelter to the adjacent eroding shorelines and assist in maintaining the navigation channel of the western Solent.

Further east, Fort Victoria has assisted in preserving the low-lying shore alignment of Sconce Point and marks the final change in coastal orientation (within this PDZ) to the west, entering the more sheltered Solent. The shoreline of wooded coastal slopes south-west of Fort Victoria will continue to erode under and there is no justification for extending the defences in this area. To the east, the 800m area of coastline from Fort Victoria to Norton is a patchwork of deteriorating defences, and the NAI scenario will result in loss of several properties, the shingle beach and road access to the properties and businesses at Fort Victoria. The seawall fronting the Norton Grange Hotel is likely to endure into epoch 2 with no active management and hold the alignment of the coast approaching the entrance of the Western Yar Estuary. Continuing 'With Present Management' in this area will preserve the business amenity use of the frontage and access to several properties, but the direct economic justification for maintaining defences is limited and would require upgrading of several structures in the short to medium term. In common with the areas to the south, the intent of management in this area is to allow maintenance of existing defence structures for the benefit of the local communities, whilst allowing time for adaptation and minimising the future reliance on defences. A policy of 'hold the line' in epoch 1 will allow maintenance of the existing defences whist practical to do so, then moving to an intent of 'no active intervention' (but not precluding private maintenance) while the standard of protection of the defences gradually declines. Under the proposed management intent the Fort itself may endure over the longer term, dependent on resistance or undermining of the structure as the coast retreats, but the loss of part of the access road into the site and surrounding buildings may occur in the short to medium term if existing defences are not maintained beyond the first epoch. Realigning road access to the Fort Victoria site and adjacent properties should also be considered, to minimise the impact of NAI on the area.

At Norton Spit, Yarmouth and eastwards to Port la Salle, the character of the coastline is dominated by the mouth of the Western Yar Estuary and adjacent tributary of Thorley Brook. Tidal flood risk presents the main challenge to the future of this significant and historic community. To not undertake management in this area is unacceptable due to the large number of properties at risk in Yarmouth, the scale of damage to the character of the town and historic features, and the impact on key transport links. However, continuing the current management regime at this location is not sufficient to secure the future of the community, as the defence structures will need to be redesigned to protect against the current and future tidal flood risk under a hold the line policy. At Yarmouth, the grassed amenity areas and car parks at the south-west of the town provide potential space to create raised defences, although doing so in a manner that is sufficiently in-keeping with the character of the town and not detrimental to the functioning of the area would be essential to an effective scheme. It is recommended that of the current defences and embankments around the town of Yarmouth and the Western Yar Estuary, only those are maintained where there is a clearly justified reason and effective method based on the overwhelming scale of the flood and erosion risk.

Adjoining the coast, the low-lying tributary of Thorley Brook backs the properties of Yarmouth town and the coastal road. It is part of the Ramsar site and there is some future tidal flood risk, largely to the gardens of properties adjoining the floodplain. The future management of the constraining embankment immediately south of Yarmouth Mill needs to be carefully considered with regard to habitat management alongside addressing flood risk to the southern margin of Yarmouth. Moving back to the coastal defence line along the seafront, erosion under the NAI scenario could result in a tidal breach through from the coast into Thorley Brook (near Thorley Copse) in epoch 2 or 3. Based on current information, an HTL policy is recommended for this shoreline for all three epochs, due to the importance of maintaining the road link, sustaining an effective community at Yarmouth and Bouldnor and sustaining the communities of West Wight who are also reliant on this road link. However, further work at Strategy level could examine the potential implications of the alternative approach of creating a managed tidal breach through the road in future epochs, maintaining the road on a bridge. The impacts of this proposal on the habitats and nature conservation interest of Thorley Brook, on tidal flood risk for surrounding properties, on tidal interactions with the main channel of the Western Yar Estuary and on coastal processes and sediment transfers along the adjacent shorelines would need to be carefully assessed. At Port la Salle (at the eastern margin of the PDZ) a small residential community is at risk of shoreline erosion under the NAI scenario when existing defences fail towards the end of epoch 1. Maintenance of the current defences through continuing the present management of 'Hold the Line' will sustain the future of this settlement, with the recognition that there can be no extension of the current defence line to the east into the unspoilt and natural character of the Bouldnor coastline (PDZ7).

Another key feature of the area, and a parallel key driver of policy, is the natural environment and nature conservation interest of the Western Yar Estuary. Significant infrastructure controls the outer 200m of the estuary mouth, but tidal flow through the area is unconstrained and upstream of Yarmouth the estuary is largely natural in character. The international importance of this area for nature conservation interest justifies a widespread policy of No Active Intervention within the estuary, with minor exceptions at 'The Causeway' and the shoreline along Thorley Brook and Barnfields Stream. At the Causeway the management intent is to hold the line through the continued future maintenance and improvement of the road bridge and masonry walls to address the tidal flood risk to Freshwater and the functioning of Afton Marsh. At Thorley Brook and Barnfields stream the intent is to manage the existing defence embankment and sluices during the first epoch to allow time for habitat adaption, but then gradually remove the influence of management to allow tidal inundation of the inlets. This should be a planned change, and consider the implications of the restoration of natural behaviour on adjacent properties, infrastructure and nature conservation interest. The intention is to maintain the adjacent main coastal road link (at the narrow section from Yarmouth Common to the Thorley Road junction) whilst tidal inundation of Thorley Brook behind occurs more frequently. The cycle track along the eastern bank of the estuary will also need to adapt through a bridge or link dependent on the design of any future increase in tidal flow through the embankment, or accept periodic tidal inundation of the route, which could be considered in its design.

Current potential tidal flood risk in the Western Yar, if defences were not in place (1:1 year tidal flood area, present day). This image shows the low-lying nature of the valley and that current vulnerability to tidal inundation would already exist without the defences in place at Freshwater, Causeway Road and across Thorley Brook.

In addition to the tidal flood risk issues at the mouth of the Western Yar at Yarmouth, the wider scale consequences of increased tidal inundation of the Western Yar valley are outlined in the Baseline Scenarios above. The map above summarises the current and ongoing importance of managing the breach risk at Freshwater Bay for the West Wight, showing the low-lying area currently vulnerable to a 1:1 year flood event, if the defences were not in place. With the addition of approximately 1m of sea level rise over the next 100 years, along with more serious anticipated flood events, the vulnerability of this area is clear. A tidal breach occurring through from Causeway road to Freshwater as outlined in the NAI scenario is considered unacceptable. This would result in severe adverse consequences for all the communities of West Wight, which could be increasingly cut-off as all road links across the Estuary (at Yarmouth and in Freshwater Bay) are destroyed or increasingly threatened by erosion or flooding under this scenario. The breach would also have serious implications for the tidal regime of the estuary at Yarmouth and on the habitats and nature conservation interest of the estuary, potentially affecting the features and condition of the SAC, SPA and Ramsar sites. The key feature preventing this tidal breach is the approximately 130m seawall in the centre of Freshwater Bay (within the 300m defended length). The SMP therefore recommends continuing the present management policy of HTL within Freshwater Bay, with the intention of maintaining but not extending the structure due to the natural landscape character of the surrounding area. The shelter provided by the relatively enclosed shape of Freshwater Bay itself provides additional protection to the seawall, alongside the fronting pebble and shingle beach. A management intent that delivers long term protection to the Western Yar valley is required for Freshwater Bay. There may be an opportunity to achieve this through managed realignment during the second epoch to a new alignment of the defence line back deeper into the bay to provide additional natural protection and a wider beach. This would provide a more sustainable coastline and a stronger defence line to hold in the long term. However, this would have significant consequences for main road links and junctions, properties and also habitats in the area that would need to be addressed to generate space for the realignment and it is likely to be more economical to hold the line in the current location. The width of the current defences and road provides opportunity to redesign the defences to support or enhance the protection of the fronting beach.

The general intent of management in PDZ6 is to sustain the important communities of Yarmouth, Freshwater and Totland by minimising flood risk and maintaining transport links across the Western Yar Estuary. The majority of the coastline and estuary within the PDZ will be left to erode and evolve naturally, preserving the character and natural environment of the area. Elsewhere, the intention is to reduce the management of fragmented lengths of hard defences in the medium to long term. Policy Development Zone 6 may be sensibly divided into three general management areas, described below.

PDZ6
Management Area Statements

- **Freshwater and the Tennyson Down headland (including Alum Bay and Headon Warren) (MA 6A)** includes two policy units.
- **Totland to Norton (MA 6B)** includes five policy units
- **Yarmouth town and the Western Yar Estuary (MA 6C)** includes six policy units

Within these areas a summary of policy is provided below. Management Areas statements are provided in the following sheets, with maps showing each area.

Location reference	**Freshwater and the Tennyson Down headland (including Alum Bay and Headon Warren)**
Management Area reference	MA 6A
Policy Development Zone	PDZ 6

The following descriptions are provided to assist interpretation of the maps shown of each Management Area.

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical rates and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change, these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan, reference should be made to the baseline data (see Appendix C3).

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

In some areas the preferred policy does not change from that under the existing management approach. In some areas where there are hard defences this can be accurately identified. In other areas there is greater uncertainty. Even so, where the shoreline is likely to be quite clearly defined by a change such as the crest of a cliff the estimated position is shown as a single line.

- Where there is a difference between With Present Management and the Preferred Policy this distinction is made in showing two different lines:

With Present Management.
Preferred Policy.

- In some areas, the Preferred Policy either promotes a more adaptive approach to management or recognises that the shoreline is better considered as a width rather than a narrow line. This is represented on the map by a broader zone of management:

Flood Risk Zones:
All flood risk zones are based upon the current tidal EA Flood Zone 2. This is an extreme flood event (1:1000 year at current levels) meaning that it has 0.1% chance of occurring each year.

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

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

Note: This Management Area corresponds to IW41 to IW44 in selected Appendices.


Policy Development Zone 6 - West Wight
Management Area 6A - Freshwater Bay to Totland Bay (Ch 95 - 106)
Key
Policy Development Zone boundary
Management Area boundary
Policy Unit boundary
Existing Coastline and Chainage (km)
Scheduled Monument
Cowes
Gurnard
East Cowes
Fishbourne
Ryde
Springvale
Seaview
Seagrove
St Helens
Brading
Yaverland
Sandown
Shanklin
Ventnor
Bonchurch
Wroxall
Brighstone
Brook
Freshwater
Totland
Colwell
Yarmouth
Newtown
Newport
Wootton Creek
N
Fort Albert
Cliff End
Holiday Centre
Hill Fm
Norton Green
Country Park
Golden Hill Fort
Colwell Bay
Brambles Chine
Warden Point
Colwell
Totland
Pier
Totland Bay
School Green
Pound Green
Middleton
Easton
Weston Manor
Farringford Hotel
Nodewell Fm
Freshwater Bay
Tennyson Down
Tennyson's Monument
The Nodes
IRB Sta
Headon Warren
Tumuli
Hatherwood Point
Chair Lift
Alum Bay
Warren
Pleasure Fm Park
Old Battery
Main Bench
Scratchell's Bay
PU6A.1
PU6A.2
MA6A
A3054
A3055
B3322
87
84
83
96
97
98
99
100
101
102
103
104
105
106
107
108
109
113
114
115
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0
0.5
1 Kilometre
Key
100 Year Shoreline Position:
Preferred Policy would be the same as With Present Management
With Present Management where this differs from the Preferred Policy
Preferred Policy where this differs from the With Present Management
Indicative shoreline zone under the Preferred Policy
Existing Indicative EA Flood Risk Zone 2
EA Flood Risk Zone 2 where SMP policy is for continued management of defence
EA Flood Risk Zone 2 where under SMP policy there would be increased probability of flooding
Area benefitting from continued coastal defence to reduce the risk of landslip
ROYAL HASKONING
ISLE of WIGHT COUNCIL

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN:

This Management Area is recognised as a very important area of the natural environment of the Isle of Wight in terms of nature conservation interest, unspoilt landscape and tourism and amenity use of the area. The general intent of management is to maintain this natural character through a continuous policy of No Active Intervention along the high undefended clifflines. The clear intent of management throughout this area is continuation of the natural processes of coastal erosion and cliff retreat. There is no economic justification or requirement for an alternative approach. At Freshwater in the south-eastern corner of the area the management intent contrasts to the majority of the area, but this arises from the specific issue of the low-lying valley of the Western Yar cutting through from the south to the north coast of the Island at this point. The management of this small policy unit is intrinsically linked to the management of area MAN6C to the north. In Freshwater Bay the intention is to maintain and raise the level of the hard defences currently protecting Freshwater and the Yar valley behind from tidal inundation. The width of the current defences and road alignment can be examined to consider the design of future defences to support or increase the natural protection offered by the fronting beach and embayment of Freshwater Bay. There may be potential to align the structure further inland, but significant movement of the line is likely to increase the cost of defence and associated adaptations to the resulting adverse impacts on infrastructure, properties and nature conservation interest. As well as immediate effects for Freshwater and the valley behind, maintaining the short section of defence within Freshwater Bay will also maintain an important transport link to West Wight and contribute to sustaining effective communities in Totland and the west Wight headland.

PREFERRED POLICY TO IMPLEMENT PLAN:	
From present day	No Active Intervention along Tennyson Down, West High Down, Alum Bay and Headon Warren allowing cliff retreat. Maintain defences to hold the line in the low-lying centre of Freshwater Bay.
Medium term	No Active Intervention from Tennyson Down to Headon Warren. Maintain and improve defences to hold the line within Freshwater Bay.
Long term	No Active Intervention from Tennyson Down to Headon Warren. Maintain and improve defences to hold the line within Freshwater Bay.

SUMMARY OF SPECIFIC POLICIES

Policy Unit (& length)		**Policy Plan**			
		to 2025	**to 2055**	**to 2105**	**Comment**
PU6A.1	**Freshwater Bay** (286m)	HTL	HTL	HTL	Short section of HTL provides flood defence for the Western Yar Valley (with PU6C.3). Maintain the road and support or enhance the protective beach.
PU6A.2	**Tennyson Down, Alum Bay and Headon Warren** (9,764m)	NAI	NAI	NAI	
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment					

CHANGES FROM PRESENT MANAGEMENT

No change from present management.

IMPLICATION WITH RESPECT TO BUILT ENVIRONMENT

Economics		**by 2025**	**by 2055**	**by 2105**	**Total £k PV**
Property	Potential NAI Damages/ Cost £k PV	22,574	29,928	33,487	85,989
	Preferred Plan Damages £k PV	869	1,082	1,036	2,988
	Benefits £k PV	21,705	28,846	32,451	83,001
	Costs of Implementing plan £k PV	119	310	13	443

The preferred plan for this Management Area is clearly economically viable overall. Individual schemes will need to be investigated in further detail to assess their economic viability and affordability.

Location reference	**Totland to Norton**
Management Area reference	**MA 6B**
Policy Development Zone	**PDZ 6**

The following descriptions are provided to assist interpretation of the maps shown of each Management Area.

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical rates and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change, these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan, reference should be made to the baseline data (see Appendix C3).

100 year shoreline position:

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

In some areas the preferred policy does not change from that under the existing management approach. In some areas where there are hard defences this can be accurately identified. In other areas there is greater uncertainty. Even so, where the shoreline is likely to be quite clearly defined by a change such as the crest of a cliff the estimated position is shown as a single line.

- Where there is a difference between With Present Management and the Preferred Policy this distinction is made in showing two different lines:

With Present Management.
Preferred Policy.

- In some areas, the Preferred Policy either promotes a more adaptive approach to management or recognises that the shoreline is better considered as a width rather than a narrow line. This is represented on the map by a broader zone of management:

Flood Risk Zones:

All flood risk zones are based upon the current tidal EA Flood Zone 2. This is an extreme flood event (1:1000 year at current levels) meaning that it has 0.1% chance of occurring each year.

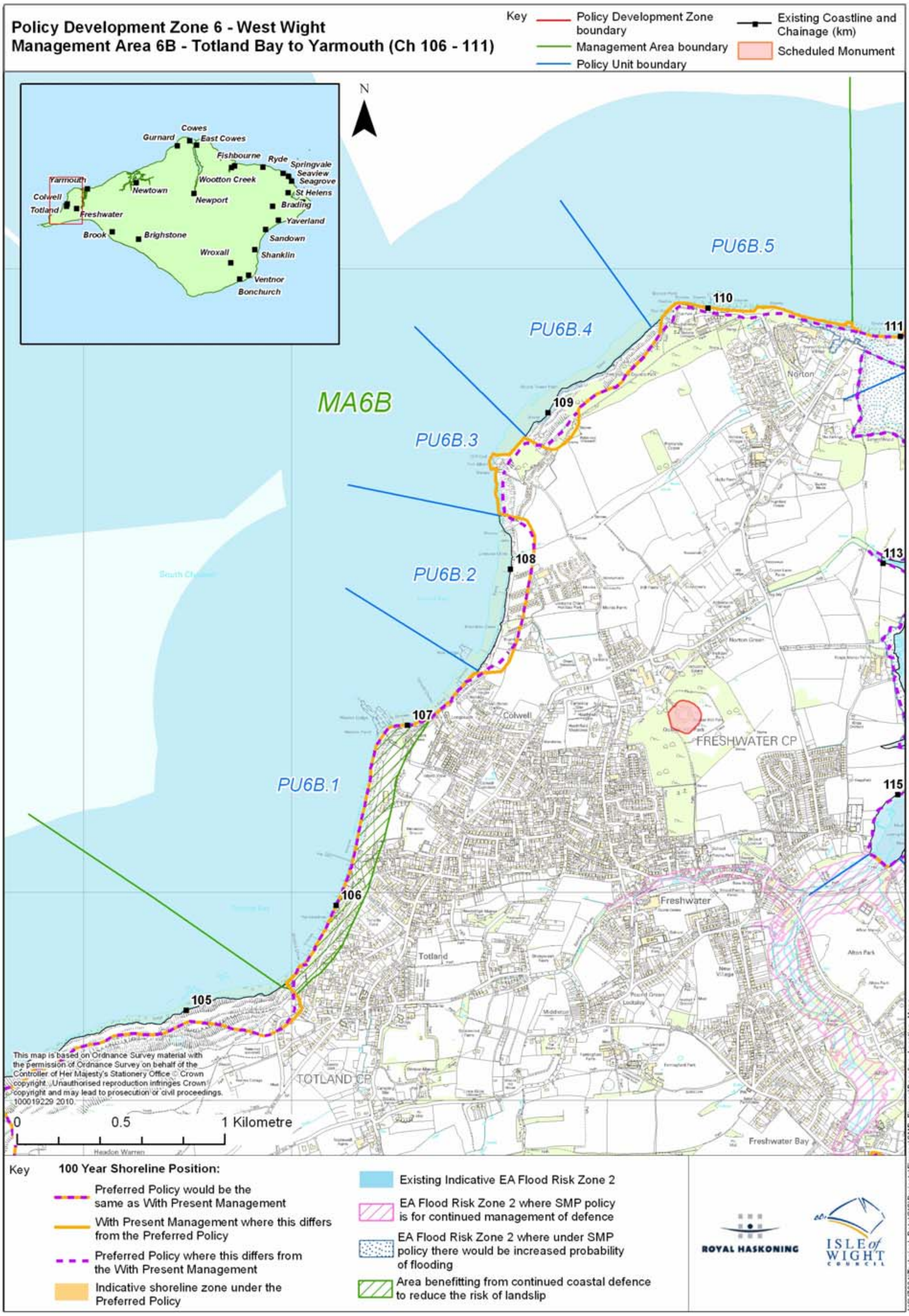
General Flood Risk Zones. The explanation of these zones is provided on the Environment Agency's web site www.environment-agency.gov.uk. The maps within this SMP document show where SMP policy might influence the management of flood risk.

Indicate areas where the intent of the SMP policy is to continue to manage this risk.

Indicate where over the 100 years the policy would allow increased risk of flooding.

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

Note: This Management Area corresponds to IW45 to IW49 in selected Appendices.



Policy Development Zone 6 - West Wight
Management Area 6B - Totland Bay to Yarmouth (Ch 106 - 111)
Key
Policy Development Zone boundary
Management Area boundary
Policy Unit boundary
Existing Coastline and Chainage (km)
Scheduled Monument
N
Cowes
Gurnard
East Cowes
Fishbourne
Ryde
Springvale
Seaview
Seagrove
Yarmouth
Newtown
Wootton Creek
St Helens
Colwell
Totland
Newport
Brading
Freshwater
Yaverland
Brook
Brighstone
Sandown
Wroxall
Shanklin
Ventnor
Bonchurch
MA6B
PU6B.1
PU6B.2
PU6B.3
PU6B.4
PU6B.5
105
106
107
108
109
110
111
113
115
Norton
Colwell
FRESHWATER CP
Freshwater
Totland
TOTLAND CP
Freshwater Bay
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0
0.5
1 Kilometre
Key
100 Year Shoreline Position:
Preferred Policy would be the same as With Present Management
With Present Management where this differs from the Preferred Policy
Preferred Policy where this differs from the With Present Management
Indicative shoreline zone under the Preferred Policy
Existing Indicative EA Flood Risk Zone 2
EA Flood Risk Zone 2 where SMP policy is for continued management of defence
EA Flood Risk Zone 2 where under SMP policy there would be increased probability of flooding
Area benefitting from continued coastal defence to reduce the risk of landslip
ROYAL HASKONING
ISLE of WIGHT COUNCIL

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN:

The second management area is the coastline from Totland to Norton, characterised by a mixture of defended headlands and undefended bays backed by Totland and several smaller largely fragmented settlements. In this area the management intent is to maximise the benefit of the existing defence structures but to adapt to a more natural coastline over the medium to longer term, minimising future reliance on coastal defences and avoiding long term increased embayment of retreating bays between fixed headlands. The long term intent for the areas where development is relatively sparse is to transfer to a policy of No Active Intervention in future epochs on this rapidly changing coastline. Within this general intent to reduce future management and adapt to a more sustainable coastline in the long-term, the specific intent is to allow maintenance of existing defended frontages for the benefit of the local communities and to allow time for the areas to adapt. At Norton and Fort Victoria, transfer to a policy of No Active Intervention in the medium term would not preclude maintenance of private defences, but sections of the defences along this unit are already in poor condition and adaptation of the access and use of the area should be considered in the short to medium term. In the south of this area, the defences fronting the central areas of Totland and Colwell should be replaced to maintain the community and community facilities, where it is economic to do so. In this area, erosion would retreat back through coastal properties and on into the developed areas behind, where the weak cliffs are at risk of slope failure and retreat through localised but significant landslide failures. There are not proposals to extend the current defences.

PREFERRED POLICY TO IMPLEMENT PLAN:	
From present day	Maintenance and improvement of existing defences within Totland and Colwell Bay, Fort Albert and maintenance at Norton. No active intervention on the undefended areas between.
Medium term	Continue as outlined in the previous epoch, except transfer to NAI from Fort Victoria to Norton.
Long term	Transfer to NAI at Fort Albert, allowing the natural behaviour of the coast to be gradually restored from Colwell Bay to Yarmouth.

SUMMARY OF SPECIFIC POLICIES

Policy Unit (& length)		**Policy Plan**			
		to 2025	**to 2055**	**to 2105**	**Comment**
PU6B.1	**Totland and Colwell** (1,945m)	HTL	HTL	HTL	
PU6B.2	**Central Colwell Bay** (840m)	NAI	NAI	NAI	
PU6B.3	**Fort Albert** (544m)	HTL	HTL	NAI	Existing structures can be maintained to extend their life, but gradually removing the influence of management.
PU6B.4	**Fort Victoria Country Park** (831m)	NAI	NAI	NAI	
PU6B.5	**Fort Victoria and Norton** (1,077m)	HTL	NAI	NAI	Existing structures can be maintained to extend their life, but gradually removing the influence of management.
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment					

CHANGES FROM PRESENT MANAGEMENT

The management outlined above is broadly in line with previous shoreline management within the area of Hold the Line to protect assets and infrastructure and do nothing or retreat the shoreline in areas of fewer assets, but with increased emphasis on transferring to a more sustainable approach in the long-term. The intention is to avoid the fragmented approach likely to result from previous shoreline management policies (which were set for 50 years) to transfer to a more sustainable approach between 50 and 100 years time which will allow the local communities time to adapt to co-exist with a more natural coastline, whilst making best use of existing defences that are currently relied upon.

IMPLICATION WITH RESPECT TO BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	5,654	7,538	7,546	21,338
	Preferred Plan Damages £k PV	639	6,387	5,365	12,391
	Benefits £k PV	5,015	1,151	2,181	8,947
	Costs of Implementing plan £k PV	956	1,386	500	2,842

The preferred plan for this Management Area is economically viable overall. Individual schemes will need to be investigated in further detail to assess their economic viability and affordability.

Location reference	**Yarmouth and the Western Yar Estuary**
Management Area reference	**MA 6C**
Policy Development Zone	**PDZ 6**

The following descriptions are provided to assist interpretation of the maps shown of each Management Area.

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical rates and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change, these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan, reference should be made to the baseline data (see Appendix C3).

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

In some areas the preferred policy does not change from that under the existing management approach. In some areas where there are hard defences this can be accurately identified. In other areas there is greater uncertainty. Even so, where the shoreline is likely to be quite clearly defined by a change such as the crest of a cliff the estimated position is shown as a single line.

- Where there is a difference between With Present Management and the Preferred Policy this distinction is made in showing two different lines:

With Present Management.
Preferred Policy.

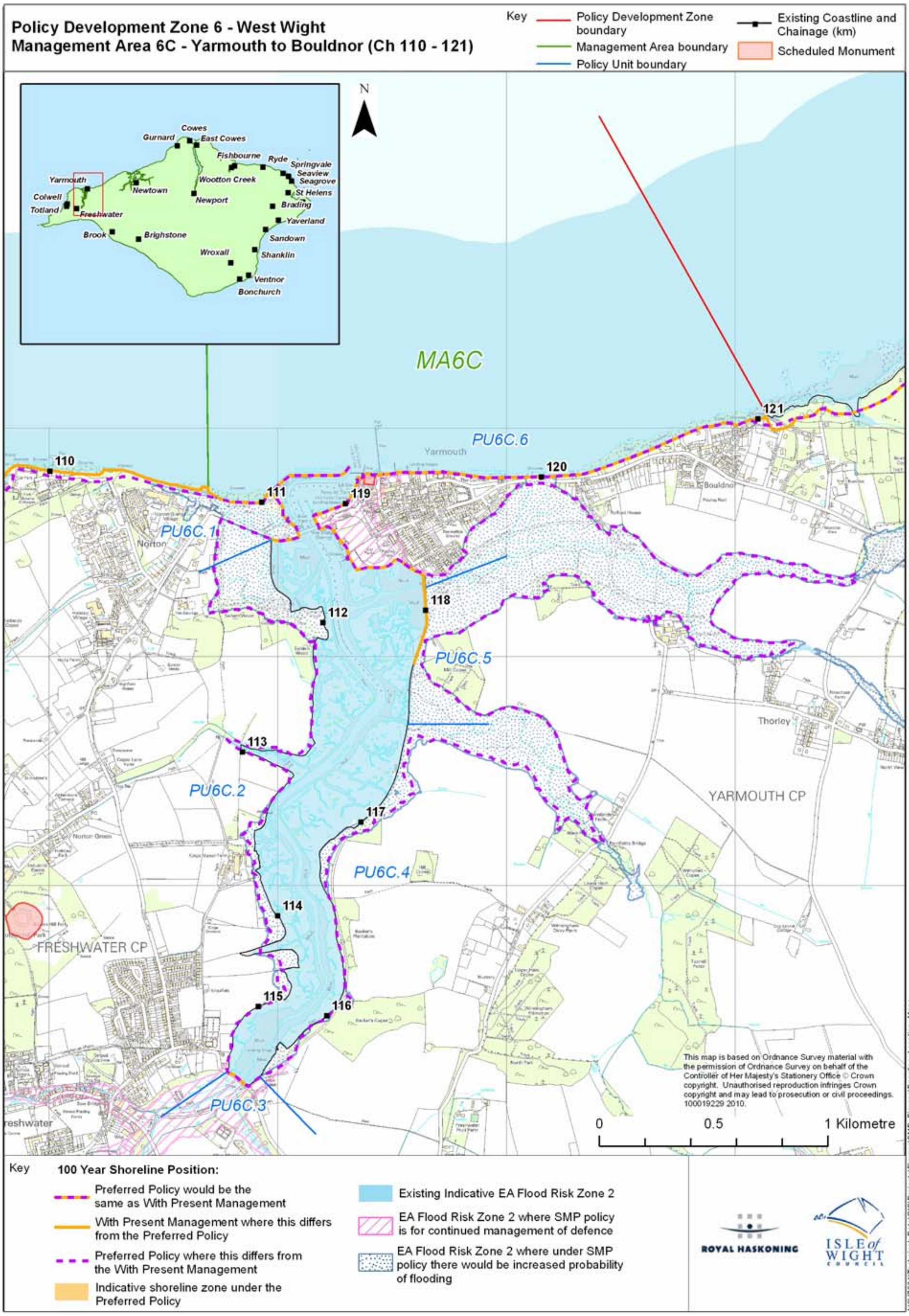
- In some areas, the Preferred Policy either promotes a more adaptive approach to management or recognises that the shoreline is better considered as a width rather than a narrow line. This is represented on the map by a broader zone of management:

Flood Risk Zones:
All flood risk zones are based upon the current tidal EA Flood Zone 2. This is an extreme flood event (1:1000 year at current levels) meaning that it has 0.1% chance of occurring each year.

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

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

Note: This Management Area corresponds to IW50 & IW51 in selected Appendices.



Policy Development Zone 6 - West Wight
Management Area 6C - Yarmouth to Bouldnor (Ch 110 - 121)
Key
Policy Development Zone boundary
Management Area boundary
Policy Unit boundary
Existing Coastline and Chainage (km)
Scheduled Monument
MA6C
PU6C.1
PU6C.2
PU6C.3
PU6C.4
PU6C.5
PU6C.6
110
111
112
113
114
115
116
117
118
119
120
121
Yarmouth
Norton
Thorley
YARMOUTH CP
FRESHWATER CP
Freshwater
Bouldnor
Cowes
Gurnard
East Cowes
Fishbourne
Ryde
Springvale
Seaview
Seagrove
St Helens
Brading
Yaverland
Sandown
Shanklin
Ventnor
Bonchurch
Wroxall
Brighstone
Brook
Freshwater
Totland
Colwell
Yarmouth
Newtown
Wootton Creek
Newport
This map is based on Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. 100019229 2010.
0
0.5
1 Kilometre
Key
100 Year Shoreline Position:
Preferred Policy would be the same as With Present Management
With Present Management where this differs from the Preferred Policy
Preferred Policy where this differs from the With Present Management
Indicative shoreline zone under the Preferred Policy
Existing Indicative EA Flood Risk Zone 2
EA Flood Risk Zone 2 where SMP policy is for continued management of defence
EA Flood Risk Zone 2 where under SMP policy there would be increased probability of flooding
ROYAL HASKONING
ISLE of WIGHT COUNCIL

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN:
This Management Area includes the coastline surrounding the town of Yarmouth and the adjoining Western Yar Estuary. The increasing potential interactions of the Western Yar and Thorley Brook with the adjacent coastlines and the issues surrounding the town of Yarmouth and Yarmouth Harbour require a coordinated management approach. In this area the general management intent is to protect the important town of Yarmouth, the functioning of the harbour and maintain road access by bridge to west Wight and to adjacent communities, whilst allowing the majority of the estuary to adapt naturally to sea level rise. This will allow adaptation of the habitats and important nature conservation interests equally important to the character of the area. It is recommended that of the current defences and embankments around the town of Yarmouth and the Estuary, only those are maintained where there is a clearly justified reason and effective method based on the overwhelming scale of the flood and erosion risk.

The intention is to maintain and improve the defences surrounding Yarmouth, including allowing maintenance of the defences sheltering the harbour and lining the ferry terminal, retaining these important assets of the local and wider community. Whilst the importance and vulnerability of this community is recognised and clearly stated in this SMP, it is recognised that issues remain to be addressed at Strategy level, including developing a proposal to raise the level of protection of public and private defences which is achievable and co-ordinated, economically robust and which also maintains or co-exists alongside the historic character and use of the town and the surrounding natural environment. To the west of Yarmouth, the preferred option is to hold the overall current defence line along the Harbour Breakwater and Norton Spit where structures are already in place, but the intention behind the policy is to protect the road and infrastructure, allow a functional harbour and provide shelter for the town, the detailed design and location of which can be developed in a future Strategy for the area. It is recognised that tidal inundation of the inlet between the spit and the road will continue to occur. To the east of Yarmouth, the intention is to maintain the position of the existing defence line from Yarmouth to Port la Salle, protecting properties and the key road link from Newport which provides access to Yarmouth and the west Wight.

Within the Western Yar Estuary the intention is to reduce management and allow the estuary to adapt naturally to sea level rise through all three epochs, with some limited minor exceptions. The majority of the frontage is currently undefended, although a policy of No Active Intervention cannot preclude maintenance of existing short stretches of private defences on the western bank linked to local businesses and properties. At current southern tidal extent of the estuary the intention is to maintain and improve the short length of flood defence at the Causeway bridge to prevent tidal inundation of the properties and habitats upstream in Freshwater, and prevent tidal breach through from Freshwater Bay to Yarmouth. On the eastern bank of the estuary historic embankments and some defences protect the entrances to Thorley Brook and Barnfields Stream. The principal interest of these tributaries is their important nature conservation interest and there is clear potential to restore more natural behaviour and operation of these inlets. Therefore the intended management of this area is to maintain existing defence line across the mouth of the potential inlets in the first epoch (0-20 years), to allow time to plan for adaptation of habitats and importantly to assess and plan to reduce the consequences of restoring natural behaviour on adjacent properties and infrastructure. In the medium term (20-50 years) a policy of Managed Realignment will allow increasing tidal inundation of Thorley Brook and Barnfields stream, followed in the long term (50-200 years) by a policy of No Active Intervention, in line with the rest of the Estuary shoreline. As part of designing the Managed Realignment, particular attention will be paid to the risk of tidal flooding in the south-east part of Yarmouth (along the margin of the new floodplain that would gradually be flooded more frequently in the medium and long term), and that risk will be addressed and managed. It is recognised that short localised areas of defence may be required in the medium or long term surrounding the new tidal floodplain, to be examined in more detail at Strategy level. The intention would be to take localised action to address the flood risk where required. Restoring the natural evolution of Thorley Brook will have benefits for nature conservation interest and will reduce the future reliance on defences, restoring focus onto other more critical defences elsewhere. Implementing this management approach will not instantly place Yarmouth on an 'island' as such but instead will allow tidal flooding to encroach around the rear of the town increasingly frequently over the next 100 years. It is recognised that increasing tidal inundation of Thorley Brook would need to be co-ordinated with maintenance of the coastline defences near the Thorley Road junction (where the main coastal road carriageway is supported on a raised causeway between Thorley Brook floodplain and the sea). There may be potential to allow a tidal link through this area whilst maintaining the road link on a bridge, but this requires investigations beyond the level of this SMP and will require more detailed examination. The SMP also recognises the importance of the cycle route and link along the eastern shore of the Estuary to the local community, and recommends that adaptation should be planned in terms of seeking to maintain the route, perhaps on a bridge or link in places, or accepting tidal inundation of this route will sometimes occur.

PREFERRED POLICY TO IMPLEMENT PLAN:	
From present day	To maintain and improve defences around Yarmouth against tidal flooding and erosion. Allow natural adaptation within the Western Yar Estuary. Develop plans to restore the natural behaviour of Thorley Brook and Barnfields Stream. Continue flood defence at the Causeway.
Medium term	To maintain and improve defences around Yarmouth. Allow natural adaptation within the Western Yar Estuary, including Thorley Brook and Barnfields Stream, allowing adaptation of habitats. Maintain and improve flood defence at the Causeway.
Long term	To maintain and improve defences around Yarmouth. Allow natural adaptation within the Western Yar Estuary. Maintain flood defence at the Causeway.

SUMMARY OF SPECIFIC POLICIES

Policy Unit (& length)		**Policy Plan**			
		to 2025	**to 2055**	**to 2105**	**Comment**
PU6C.1	**Norton Spit** (687m)	HTL	HTL	HTL	
PU6C.2	**Western Yar Estuary – western shore** (3,919m)	NAI	NAI	NAI	
PU6C.3	**The Causeway** (173m)	HTL	HTL	HTL	Short section of HTL provides flood defence for Freshwater (with PU6A.1)
PU6C.4	**Western Yar Estuary – eastern shore** (1,975m)	NAI	NAI	NAI	
PU6C.5	**Thorley Brook and Barnfields Stream** (619m)	HTL	MR	NAI	HTL for the first epoch to allow time for habitat adaptation; MR in the second epoch; NAI in the third epoch; with localised HTL to protect the south-east of the town in the second and third epochs.
PU6C.6	**Yarmouth to Port la Salle** (2,920m)	HTL	HTL	HTL	
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention, MR – Managed Realignment					

CHANGES FROM PRESENT MANAGEMENT

This will continue the present management of a Hold the Line policy around Yarmouth town and to Bouldnor, but is a partial change to the present management within the Western Yar Estuary. A Hold the Line policy was set by SMP1 within this area, but the intention of that SMP1 policy was Hold the Line around the harbour, rather than throughout the estuary. SMP2 has assessed and developed this approach in more detail.

IMPLICATION WITH RESPECT TO BUILT ENVIRONMENT

Economics		**by 2025**	**by 2055**	**by 2105**	**Total £k PV**
Property	Potential NAI Damages/ Cost £k PV	21,109	24,616	24,120	69,845
	Preferred Plan Damages £k PV	3,200	4,000	2,400	9,600
	Benefits £k PV	17,909	20,616	21,720	60,245
	Costs of Implementing plan £k PV	293	304	1,610	2,207

The preferred plan for this Management Area is clearly economically viable overall. Individual schemes will need to be investigated in further detail to assess their economic viability and affordability.

4.8 Policy Development Zone 7 – North-west Coastline (PDZ7)



Above: Newtown Estuary (National Trust); Thorness Bay.

4.8 Policy Development Zone 7 – North-west Coastline (PDZ7)

Contents

Key facts:

Policy Development Zone 7: includes the areas of Hamstead, Newtown Estuary and Thorness Bay.

PDZ7 frontage = approximately 39km in length (including Newtown Estuary)

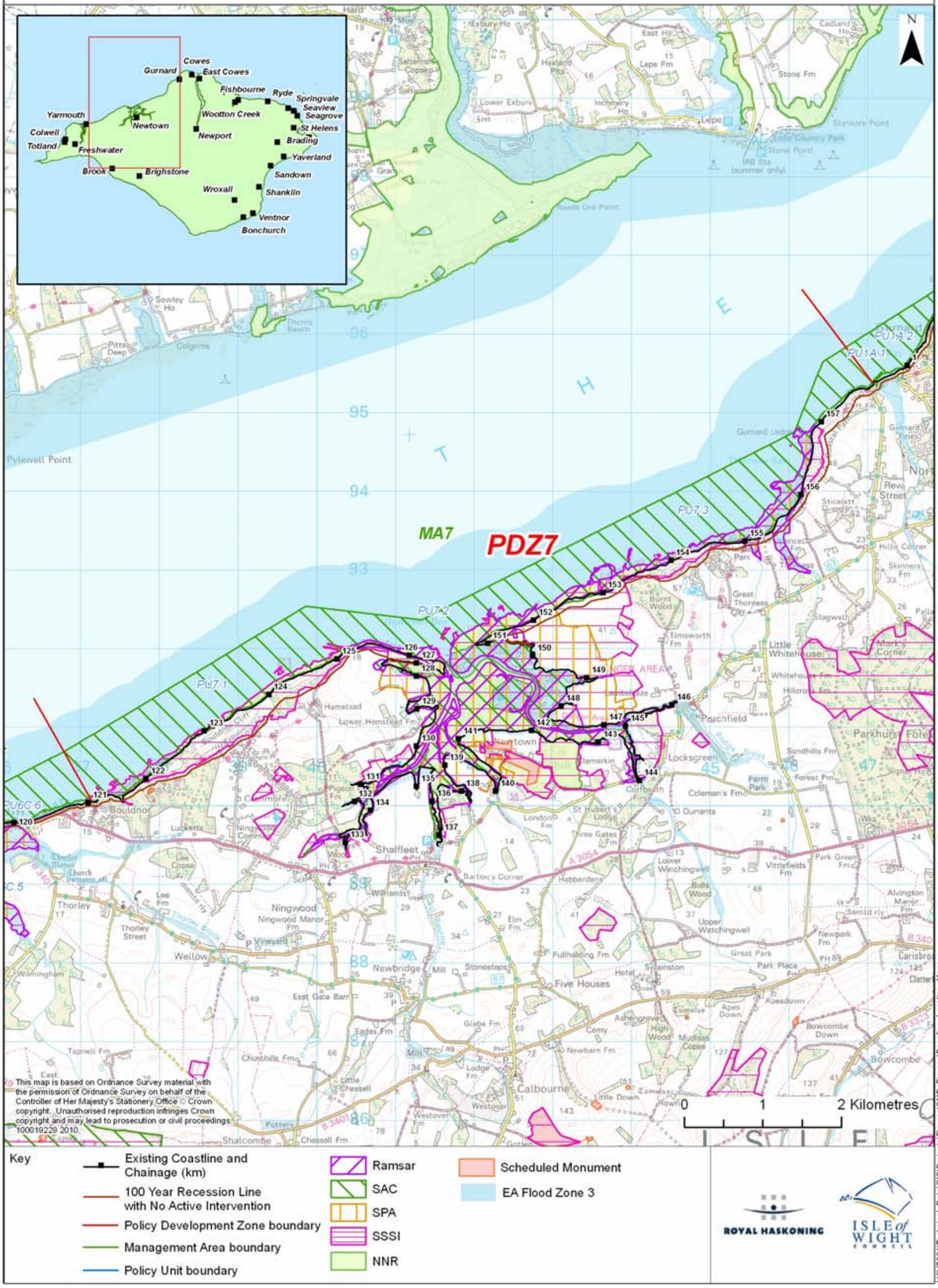
PDZ7 boundaries = from eastern margin of Bouldnor to the western margin of Gurnard Luck.

As listed in SMP2 Appendices: areas IW52 to IW54

Old policies from SMP1 in 1997, reviewed in this chapter:

Unit	Location	Length	Policy
NEW 6	Bouldnor to Hamstead	4487m	Do nothing
NEW 7	Newtown Harbour	32387m	Retreat the existing defence line
NEW 8	Brickfield Farm to Thorness Wood	3264m	Do nothing
NEW 9	Thorness Marshes	779m	Do nothing
NEW 10	Thorness Bay to Cliff Farm, Gurnard	2055m	Do nothing

Shoreline Management Plan Sub Cell 5D + E - Isle of Wight
Baseline Location Map
Policy Development Zone 7 - North-West Coastline



1. Overview & Description

1.1 Principal Features (further details are provided in Appendix D)

Built Environment: The coastal frontage of this PDZ is undeveloped with scattered properties and farms at Cranmore and Hamstead and a holiday park at Thorness Bay. The coast is accessible mainly through public footpaths and the occasional small local road or track. The Newtown estuary reaches inland from the coast, with five main branches causing the A3055 coastal road to run inland from the end of PDZ6 in the west, so the coast of PDZ7 is not visible or accessible directly from the main road. The A3055 runs through the village of Shalfleet at the inland limit of the estuary and is mainly residential, with small local business, public house, car parking and to the south a small sewage works. The hamlet of Newtown lies on a peninsula between the branches of the estuary. The small village of Porchfield and the local roads to access it are at the eastern margin of the estuary basin. Much of the coastal land surrounding Newtown Estuary is owned by the National Trust. The eastern shore of Newtown estuary (Clamerkin Lake) is a firing range operated by South East Reserves Forces and Cadet Association (SERFCA) consisting of 810 acres. The northern border of the area is 1.5 miles of coastline and is used for beach landing exercises. The Coastal Path runs significantly inland around the estuary and the firing range, rejoining the frontage at Thorness Bay.
Heritage and Amenity: *Heritage:* This PDZ contains two Scheduled Monuments, Bouldnor Battery, constructed in 1938 and the remains of the medieval town of Newtown. There are numerous records of finds of prehistoric implements from the intertidal zone and eroding cliffs, including a large number of Mesolithic flint picks and tranchet axes. At Bouldnor a substantial scatter of late Iron Age and Roman pottery has been found on intertidal gravel banks and a medieval antler working site was excavated from the intertidal silts in the early 1970s. Offshore is the internationally important site of Bouldnor underwater cliff, with its extensive palaeoenvironmental deposits and evidence for human occupation of Mesolithic date at *c* 11.5m OD. The eastern spit of Newtown Estuary has structures and finds that have been radiocarbon dated, producing dates in the Late Neolithic to Early Bronze Age, Early Bronze Age, Middle Iron Age, and Late Iron Age to Roman periods. Newtown Marsh, to the north of the medieval town, was reclaimed from the sea between 1656 and 1768 and surrounded by a clay bank. This reclamation may have been carried out in two stages as there are signs of an inner embankment as well as the outer embankment shown on a map of 1768. The primary purpose of the reclamation may have been either salt production or the creation of extra grazing land. The unpublished Ordnance Survey of *c*1800 shows salt pans inside the embankment, facing onto Clamerkin Lake. In Shalfleet there is a Grade II* Listed Building, Shalfleet Manor, which is one of the original Domesday Manors on the Island. Newtown and Shalfleet are also Conservation Areas. The coast between Brickfield Farmhouse and Gurnard is rich in archaeological and palaeoenvironmental features. Prehistoric flint and stone implements have been recovered from the intertidal zone throughout the unit, with concentrations around Saltmead, in Thorness Bay and Gurnard Cliffs. Roman material including pottery and building material has been recorded at locations throughout the unit, including a Roman villa at Gurnard which was excavated in the 1860s, now eroded, and a possible pottery kiln at Burntwood. Thorness Bay has been recognised as being of high archaeological importance, with palaeoenvironmental deposits including organic silts and peats and recumbent trees, post alignments, hurdles and other wooden structures radiocarbon dated to the late Bronze Age, Iron Age, Roman and post medieval periods. There are numerous records of prehistoric implements from the bay, and midden deposits of Roman and Medieval date have been recorded. *Amenity:* The coastline of this unit is relatively inaccessible compared with other parts of the Isle of Wight.

The coastal frontage at Bouldnor is fronted by a predominantly shingle beach, which is littered by debris from cliff failures and is not a popular tourist beach. Woodland and agricultural land largely back these cliffs, with some residential properties behind Bouldnor Cliff.

Newtown harbour is a popular destination for sailing. Hamstead Duver spit extends from Hamstead Point east across the mouth of Newtown Harbour. This sand and shingle feature is largely backed by woodland, and partially vegetated as it extends into the harbour mouth. The central Newtown Estuary is popular with walkers, kayakers and bird watchers who visit the well equipped bird hide, accessible via wooden bridge over the marshes. Land around the edge of the harbour is generally grassed or wooded with the hamlet of Newtown just inland. There is a residential scout camp which undertakes activities such as dingy sailing within the estuary and Shalfleet Quay has a boat yard and some moorings/pontoons.

To the east of Newtown Harbour is the SERFCA training grounds where low cliffs are backed by agricultural land. East of the woodland the cliffs are backed by agricultural land and the Thorness Bay Caravan Park, one of the Island's major holiday camps. The cliffs rise again in this unit, up to 45 metres south of Gurnard Ledge. North of Gurnard Ledge cliff levels gradually decrease to Cliff Farm. The cliff top land is predominantly in agricultural use, although there are a few scattered tourist properties. Thorness beach is used by walkers and anglers, although vehicle access is through the holiday park.

Nature Conservation:

There are a variety of coastal habitats within PDZ7, including soft cliffs, intertidal sandflats, estuarine mudflats, saltmarsh and coastal grazing marsh. The western extent of the zone comprises predominantly shingle beach, backed by unstable soft cliffs known as the Bouldnor and Hamstead cliffs, and is littered by debris from cliff failures. The area on top of the cliffs is mostly covered in mature pedunculate oak woodland, whilst the instability of the cliffs ensures a mixture of broadleaved woodland, scrub and early pioneer plants. The cliffs are also of geological importance, as they illustrate the succession of rocks through the Oligocene age and harbour important fossil mammals, birds, reptiles, and insects, and for this reason the cliffs are designated as a SSSI. The central area of this PDZ is dominated by the large natural undeveloped inland estuary, known as Newtown Estuary, which is the only National Nature Reserve on the Island. The estuary consists of a number of inundated small rivers and forms an integral part of the Solent's estuarine system. The habitats within the estuary range from woodland, ancient coastal grazing meadows, mudflats and marshland, and support nationally important and threatened wildlife. The estuary is a particularly significant feeding and over-wintering ground for waders and other wildfowl. The entrance of the estuary is dominated by a large expanse of intertidal sand and shingle stretching along the coastline to the east as far as Burnt Wood. The area backing the sandflats comprises low maritime cliffs backed by agricultural land that rises to over 40 metres high near Burnt Wood, where the cliffs are soft and slumping. East of the woodland is Thorness Bay, which is predominantly intertidal mudflats interspersed with rocky outcrops and ledges comprising of Bembridge Limestone, and two small areas of brackish marshland with club rush and saltmarsh.

The coastline of this PDZ is almost completely undefended at present and sits within three international designations, the *Solent Maritime SAC, the Solent and Southampton Water SPA and Ramsar sites*. The entire coastline for this PDZ is part of the SAC, and includes estuaries, saltmarsh and *Spartina* swards for which it is designated. The Solent and Southampton Water SPA and Ramsar sites protect the entirety of Newtown Estuary, the coastline around the entrance and the coastline to the east until Gurnard Ledges. The extent of the SPA goes beyond that of the SAC and Ramsar sites, protecting the entire flood zone, and includes areas of coastal grazing, in particular to the east of the estuary. The PDZ also contains three SSSIs (Bouldnor and Hamstead Cliffs, Newtown Harbour and Thorness Bay) and a number of coastal SINCs (e.g. Bouldnor Copse and Hart's Farm Meadows) that support a variety of habitats including BAP priority habitats (e.g. intertidal mudflats and wetland areas) with a diverse number of national BAP priority species, as well as Red Data book species and nationally scarce and locally important species.

1.2 Key Values

The high-quality designated natural environment, relative inaccessibility and tranquillity of this coastline are key features of the PDZ, which is an Area of Outstanding Natural Beauty. The coastal cliffs are generally eroding and evolving naturally. There will be local specific issues where small communities lie adjacent to the changing coastline.

1.3 Objectives

Overarching objectives for PDZ7:

- To maintain and enhance the nature conservation values of the area through adaptation in sympathy with natural processes.
- To maintain the tranquillity of the area and its landscape.
- To support low level use and access of the area.
- To support adaptation of local communities.
- To sustain the historic landscape and environment.
- To support adaptation of agricultural use.

Above: Newtown Estuary, view looking east along the eastern spit, showing the furthest section of the eastern spit partially submerged/overwashed at high tide. November 2009.

1.4 Description

This is a quiet, relatively undeveloped coastline, characterised by the eroding cliffs of Bouldnor and Hamstead, the natural harbour of the branching Newtown Estuary and the eroding slopes and low-lying streams near Thorness to the north. Newtown Estuary forms an integral part of the Solent's estuarine system and represents one of the best examples in south-east England of a relatively unmodified estuary containing a diverse range of semi-natural habitats. It is a National Nature Reserve (NNR) and supports nationally important and threatened wildlife, and is a particularly significant feeding and over-wintering ground for waders and other wildfowl. The area is popular with birdwatchers and walkers. Permanent moorings/pontoons are available for small boats or visiting craft to anchor and enjoy the peaceful environment.

Left: Newtown Estuary: wooden access bridge to Newtown Quay and the bird hide at high tide.

Below: The coast near Thorness Bay.

The landscape of the Newtown area has changed little over the centuries and it is an area rich in features of historical interest. Newtown, formerly known as 'Francheville', was founded by the Bishop of Winchester. in 1256, chosen because of its deep and sheltered harbour utilised for saltworks and shellfish beds, though later raids and silting up of the harbour meant the town diminished and the port was replaced by Yarmouth and Newport. The estuary came under the protection of the National Trust in 1965 when local yachtsmen and naturalists raised funds for its purchase following a proposal to develop a nuclear power station at Hamstead. It remains a beautiful, tranquil and unspoilt area of the Island.

The nearest principal roads run further inland and do not provide views of, or immediate access to the coast, and the coastal footpath also diverts inland from the coast.

There are scattered farms and properties and small communities at Hamstead, Newtown and the large holiday park at Thorness Bay, with large numbers of static caravans occupied for 10 months of the year. Minor managed realignment activities have been tested in Thorness Bay through the Environmental Stewardship Scheme, administered by Defra through the Rural Development Service (RDS).

1.5 Physical Processes

1.5.1 Coastal Processes (further details are provided in Appendix C1).

This PDZ is a quiet, relatively undeveloped coastline, characterised by the eroding cliffs of Bouldnor and Hamstead, the natural harbour of the branching Newtown Estuary and the eroding slopes and low-lying streams near Thorness to the north. The following summary outlines the wave climate, tidal flows, geomorphological controls, sediment supplies and coastal processes characterising PDZ7. The general pattern of sediment movement is summarised in the following diagram from the SCOPAC Sediment Transport Study.

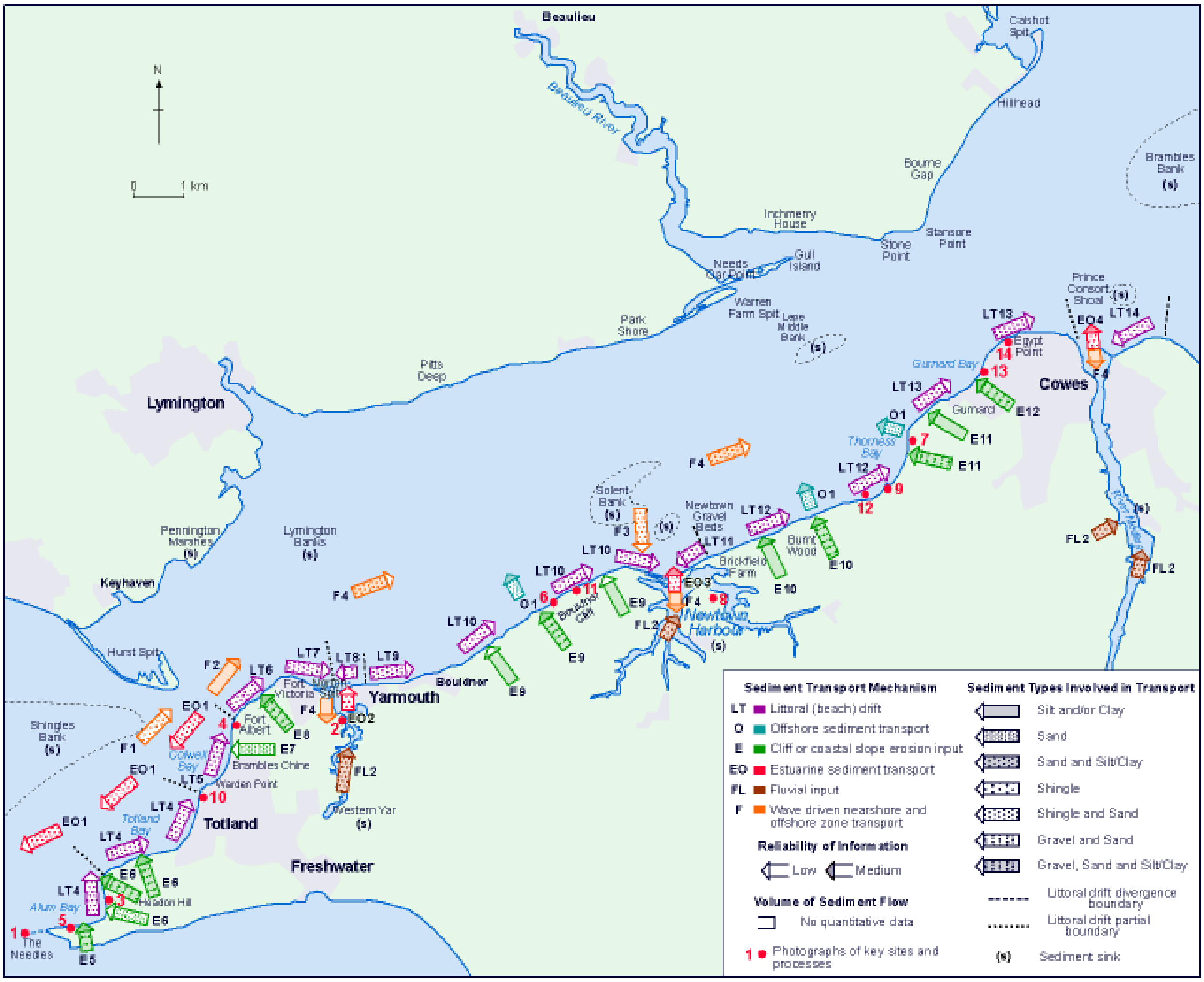
The coast has been formed by erosion into gently north eastward dipping, soft clayey, late Eocene and early Oligocene strata. Mudslides are an especially prevalent slope degradation mechanism within these strata. The coastal topography is generally undulating with high points at Bouldnor Cliff (61m), Burnt Wood (57m) and Gurnard Cliff (45m) where major landslide systems have developed.

In marked contrast to the sedimentation-dominated Northern Solent shores, the coast of this unit has been subject to long term retreat. The overall sediment input from the eroding cliffs is considerable, but most of the erosion products are transported offshore and do not contribute to protect local beaches.

The north west coast of the Island is sheltered from the open sea and incident waves generated in the West Solent are fetch-limited and generally are less than 1m in height. Weak littoral drift generally operates north eastward along the whole coast with the exception of local reversals on the eastern entrances to inlets. Rivers on the north coast of the Island are small due to limited catchments and therefore contribute negligible sediment to the coast. The configurations of spits at estuary entrances do not appear stable due to shortages of sediment such that there is a tendency for these features to be driven into each estuary, possibly in association with breaching events.

Newtown Estuary occupies a low valley, with narrow twin gravel spits protecting diverging branches of the estuary which extend over 3km inland. The Newtown Estuary gravel entrance spits are exposed and evolving, the eastern spit overtopping at high tides. A small infilled low valley also occurs further east within Thorness Bay, fronted by a gravel beach.

NW Wight (Needles to Old Castle Point): Sediment Transport



Sediment transport sources, pathways and sinks on the north west coast, from SCOPAC Sediment Transport Study, 2004.

West of Newtown Estuary the cliffs, developed within the predominantly clayey strata of the Bouldnor Formation (Solent Group) rise from beach level at Bouldnor village (the western edge of the PDZ) to 61m at Bouldnor Cliff and 35m at Hamstead Cliff before declining steadily east to the Newtown Harbour inlet. The coastal slope exhibits complex morphology and degrades by mudslides, relatively shallow multiple translational slides and infrequent deep-seated rotational slides.

East of Newtown Harbour there are simple low cliffs developed in clays of the Bouldnor Formation. Abundant landslide debris and fallen trees on the beach indicate rapid recession. There is a mixed, mud, sand and boulder foreshore, interrupted periodically by lobes of landslide debris that surge across the beach from the cliffs above. Topography rises rapidly eastwards to Burnt Wood. There is a wide degradation zone characterised by shallow multiple translational landsliding and mudslide lobes. Thorness Bay is a small low lying valley floor. From Thorness to Gurnard the cliffs rise to 45m and comprise clays and marls of the Bouldnor Formation overlying Bembridge limestone at beach level. The limestones outcrop as foreshore reefs to form the protective Gurnard Ledge. There is much evidence of coast erosion with debris accumulations on the foreshore being fed with material from mudslides and shallow translational slides within a cliff degradation zone.

High long term cliff recession rates are typical within this frontage, although it should be noted that the cliff top recession process involves high magnitude low frequency failures that can result in loss of between 5 and 25m within single events associated with intense mudsliding downslope.

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. The trend for narrowing of the foreshore suggests that debris and cliff toe erosion will continue or intensify in the future and the cliffs remain unstable and actively eroding. Increases in sediment supply to beaches due to the acceleration of freely eroding cliffs would be unlikely to generate substantial protective beaches because most of the cliff materials are clay and mechanisms exist for seaward removal of these sediment grades. Instead, there may be very local increases in beach accumulation at Hamstead Duver and in Thorness Bay. A breach in the eastern Newtown spit would be unlikely to seal naturally due to limited sediment supply, possibly resulting from the proximity of a local drift reversal and divide. Instead it is likely that the breach would enlarge in the short-term and the spit breakdown further as sea level rises. The corresponding western spit is rather more stable because it is sustained by a modest sediment supply from the cliffs to the west. It would be likely to remain static or slowly migrate into the harbour inlet. The effect of these changes would primarily be to permit increased wave penetration into the harbour with implications for the erosion of saltmarshes and mudflats.

1.5.2. Existing Defences

The following description of coastal defences outlines the current condition and expected remaining effective life of the defences in the area, if no further maintenance is carried out. In addition to the following summary, individual defences are described in Appendix C2_Defence Appraisal areas IW52 to 54.

PDZ7 is largely undefended with only minor defence or access structures in limited locations. No defences are present along the western frontage from Bouldnor to Newtown Estuary, with the exception of a short 30m concrete revetment located at Hamstead (residual life 10-15 years). Within Newtown Estuary the branching shoreline is undeveloped with the exception of short lengths of masonry walls and embankments at Shalfleet Quay and Newtown Quay (residual life approx 15-25 years) providing local quayside access for the National Trust. No defences are present along the eastern frontage from Newtown Estuary to Gurnard Luck. There are two short sections of gabions immediately approaching Gurnard Luck (residual life 1-10 years).

1.5.3 Potential Baseline Erosion Rates

The SMP reviewed a wide range of data to define the current and potential rates of coastal erosion and cliff retreat along the Isle of Wight coast using the best available information. Full details can be found in Appendix C3. Future erosion rates are predicted using Walkden & Dickson formula (2008) and allow for future sea level rise –the full methodology is explained in the Appendix. Predicted sea level rise rates of 4mm/yr (to 2025), 8.5mm/yr (to 2055), 12mm/yr (to 2085) then 15mm/yr (to 2105) have been used, in accordance with SMP national guidance by Defra. These rates equate to 7cm of sea level rise (above the 2009 baseline) by 2025, 32cm by 2055 and 98cm by 2105. The IW numbering units refer to lengths of coast for which future behaviour is described and mapped in Appendix C (based on SMP1 and Strategies). These are not SMP2 policy units which are developed in section 3 below.

Potential total erosion over the next 100 years is shown, however it is important to note that this is an estimate that is based on an undefended coastline. Within Appendix C3, these erosion rates are only applied following the predicted failure date of each individual element of the defences within the unit; therefore the resulting erosion amounts shown in the Appendix C3 tables and maps (and used in the development of this SMP) will show smaller erosion totals than the overview provided below.

Potential coastal erosion rates (all figures in metres/year):-

Numbering in SMP2 Appendices (2010) *(area and name, clockwise)*		Historical Rate	Current to 2025	2025 to 2055	2055 to 2085	2085 to 2105	Potential 100 year erosion (if undefended) -total in metres
52	**Bouldnor Copse & Hamstead**	0.30	0.35	0.46	0.53	0.58	48
53	**Newtown Estuary -western spit**	0.60	0.69	0.91	1.06	1.15	96
	Newtown Estuary -eastern spit	0.62	0.72	0.94	1.10	1.19	99
	Newtown Estuary -inside eastern spit	0.20	0.23	0.30	0.35	0.38	32
54	**Thorness Bay (& cliffs west to meet Newtown gravel spit)**	0.40	0.46	0.61	0.71	0.77	64

Note:
i) Erosion rates have been determined from monitoring data and examination of historical records and have been calculated to take account of sea level rise. –see Appendix C3 for details.
ii) The IW numbering units refer to lengths of coast described in Appendix C . These are not SMP2 policy units.

2. Baseline management scenarios

2.1 Present Management

Present management of the shoreline is taken as the policy defined by SMP1, modified by subsequent strategies or studies. It should be noted that in the case of SMP1 the period over which the assessment was carried out was 50 years. SMP2 extends this to an assessment period of 100 years. The table below sets out the current shoreline management policies for Policy Development Zone 7. This SMP2 will assess all the available evidence and update these previous management policies.

The key documents outlining the present management of the shoreline in this PDZ are:-

Isle of Wight Shoreline Management Plan 1 (1997)
The first Shoreline Management Plan (SMP1) for the Isle of Wight's coast was published in 1997. It consists of two volumes.

- Volume 1 is the 'Data Collection and Objective Setting', which presents information on a range of topics including coastal processes, natural environment, etc.
- Volume 2 is the 'Management Strategy', which presents information for each Management Unit around the Island's coast and sets a management Policy for each unit.

Coastal Defence Strategy Studies, Isle of Wight:
Whilst the Shoreline Management Plan provides the risk framework for management of the coast, Coastal Defence Strategy Studies provide a more detailed assessment of particular frontages in order to identify the most suitable type of coastal defence schemes that may be required to fulfil the agreed shoreline management policy and to plan a programme of future works.

West Wight Coastal Defence Strategy Study
A Coastal Defence Strategy Study for the West Wight Coastline will be completed following the publication of SMP2.

Catchment Flood Management Plan
The Environment Agency has undertaken a programme of Catchment Flood Management Plans (CFMPs) for the major river catchments in the Southern Region. A CFMP is a large scale plan that covers an entire river catchment or group of catchments that identifies long-term, sustainable policies to manage flood risk within the catchment. These policies form the basis for development of Strategy Plans, covering all or part of the overall catchment area, which will identify in more detail appropriate flood defence measures.

Whilst CFMPs principally address fluvial (river) flooding, SMPs address tidal (sea) flooding, alongside coastal erosion. The Isle of Wight Catchment Flood Management Plan (Summary Report) was published in December 2009.

- Sub Area 2: Newtown River and the Chines

"The issues in this sub-area: There is a relatively low risk of fluvial flooding. Surface water flooding occurs in some urban areas due to the capacity of drains being exceeded. Nearer the coast, river flooding may be affected by high tide levels, which will get worse with predicted future sea level rise. Only modest urban development is planned."

Policy Option 2 – areas of low to moderate flood risk where we can generally reduce existing flood risk management actions.

The previous shoreline management policies set for this PDZ are listed in the table below:

The IW numbering units refer to lengths of coast for which previous shoreline management policies were set in SMP1, modified by subsequent Strategy Studies (where available), used to gather information in the Appendices. These are not SMP2 policy units which are developed in section 3 below.

Numbering in SMP2 Appendices (2010)		**SMP1 (1997)**	
Area (clockwise)	**Name**	**Unit**	**Policy**
IW52	**BOULDNOR COPSE & HAMSTEAD**	NEW 6	Do nothing
IW53	**NEWTOWN ESTUARY**	NEW 7	Retreat the existing defence line
IW54	**THORNESS BAY**	NEW 8	Do nothing
		NEW 9	Do nothing
		NEW 10	Do nothing

2.2 Baseline Scenarios for the Policy Development Zone

2.2.1 No Active Intervention (Scenario 1, NAI):

The western section of this PDZ until Hamstead Point, Newtown Bay has no defences. Under the NAI scenario the coastal slopes would continue to evolve naturally, with erosion of the cliff toe and cliff foot debris triggering mudslides, translational slides and infrequent deep-seated rotational slides. Towards the third epoch, increased erosion and higher winter rainfall are expected to promote a significant increase in coastal landsliding activity at Cranmore and Hamstead. These ongoing processes would provide additional sources of sediment to the local beaches, particularly Hamstead, and the West Solent. This retreat will allow the nature conservation interest (sea cliffs and reefs associated with Solent Maritime SAC and Solent and Southampton Water SPA/Ramsar) and landscape of the area to evolve naturally but is likely to impact upon several properties on the seaward edge of Cranmore in the second and third epochs.

Newtown Estuary is a significant undefended, undeveloped and naturally evolving inlet with a few scattered short sections of masonry wall and timber breastwork at Shalfleet Quay, Newtown Quay (saltworks) and on the upper reaches of Shalfleet Lake. These are expected to fail within the first epoch. The entrance of the estuary has two entrance spits which perform a natural coastal defence function, sheltering the branches of the estuary behind forming a natural harbour. The effect of erosion or retreat/roll back of the spits in the first epoch will could lead to increased wave penetration with implications for the erosion of saltmarshes and mudflats. Leading into the second epoch, rising sea levels will open the whole frontage to more aggressive wave attack and tidal inundation of the National Nature Reserve and increased salt penetration on adjacent farmland with impacts on the bordering woodlands. The tidal flooding may periodically inundate the local access road links to Newtown village from the south (near Fleetlands Farm), the channel approaching Porchfield and cross the Porchfield-Shalfleet road at Clamerkin Bridge. By the third epoch, rising sea levels will mean that significant amounts of the frontage could be under standing water throughout the year. The estuary will evolve naturally under the NAI scenario, and in the long term there is potential for gain of saltmarsh and intertidal flats (which support international nature conservation designations) as the coast is allowed to roll back. Changes to other important habitats are expected: coastal grazing marsh and lagoons will be altered as a result of increasing saline intrusion over time and shingle habitat associated with the entrance spits may be lost. There would be flooding of part of a Scheduled Monument (the remains of the medieval town of Newtown) and widespread exposure and loss of intertidal archaeological resources. Brickfields farmhouse on the eastern spit will be lost to erosion.

Thorness Bay, and the eastern section of this PDZ, is a stretch of undefended, relatively undeveloped slumping coastal slopes and cliffs. Under the NAI scenario coastal erosion resulting in slope retreat of the weak coastal cliffs will continue and increase in future epochs, providing sediment both to the beach at Thorness Bay and to the overall system. From the second epoch potential tidal flood risk extends up to 900m inland in two adjacent inlet zones within Thorness Bay, crossing the Porchfield to Northwood road. Retreat within low-lying Thorness Bay could form a small intertidal area controlled by the topography, similar in scale to the present King's Quay inlet on the north-east coast. The tidal prisms would be small and marginal in stability and potentially subject to episodes of periodic closure and breaching. Coastal retreat will allow the landscape of the area to evolve naturally but will impact upon the seaward edge of the Thorness Bay Holiday Park and several small cliff top properties north of Thorness stream in the third epoch, as well as loss of intertidal archaeological resources. Habitats of nature conservation important will also be allowed to evolve naturally. Cliffs will continue to undergo erosion and succession, and there is potential for gain of saltmarsh and intertidal flats in Thorness Bay as the coast is allowed to roll back. Club rush swamp habitat may be altered as a result of increasing saline intrusion.

2.2.2. With Present Management (Scenario 2, WPM):

Under this scenario the PDZ would function similarly as described under the NAI scenario with the exception of Newtown Estuary. Maintenance of the short sections of defences within the harbour would provide a small amount of additional 'time' for both habitats and historical structures but it would not have an overall impact on the behaviour of the system as a whole, or mitigate the increasing flood risk throughout the estuary.

Table 1a. Economic Assessment – Erosion damages

The following table provides a brief summary of damages determined by the SMP2 MDSF analysis for the whole PDZ. Further details are provided in Appendix H. Where further, more detailed information is provided by studies, this is highlighted. The table aims to provide an initial high level assessment of potential damages occurring under the two baseline scenarios.

Assessment of Erosion damages

Epoch	0 -20 year			20 – 50 years			50 – 100 years			
No Active Intervention	**Number of properties:**		**Value**	**Number of properties:**		**Value**	**Number of properties:**		**Value**	**PV Damages**
Location	*Residential*	*Commercial*	**x £1000**	*Residential*	*Commercial*	**x £1000**	*Residential*	*Commercial*	**x £1000**	**(£x1000)**
Bouldnor Copse and Hamstead	0	2	30	1	3	289	2	7	579	175
Newtown Estuary	0	2	0	0	1	0	0	1	30	5
Thorness Bay and southern Gurnard Bay	0	0	0	0	4	90	0	26	672	89
									Total for PDZ7	**269**
With Present Management	**Number of properties**		**Value**	**Number of properties**		**Value**	**Number of properties**		**Value**	**PV Damages**
Location	*Residential*	*Commercial*	**x £1000**	*Residential*	*Commercial*	**x £1000**	*Residential*	*Commercial*	**x £1000**	**(£x1000)**
Bouldnor Copse and Hamstead	0	2	30	1	3	289	2	7	579	175
Newtown Estuary	0	0	0	0	1	0	0	1	30	5
Thorness Bay and southern Gurnard Bay	0	0	0	0	4	90	0	26	672	89
									Total for PDZ7	**269**
Notes										
SMP.										

Table 1b. Economic Assessment –Flood damages

The following flood damages have been determined through use of MDSF. These figures are aimed to indicate the level and impact of flood risk rather than being a detailed economic appraisal. In many areas substantial numbers of properties would be liable to flooding on the more frequent events both under NAI and WPM, a nominal write off value has been allowed in the table for properties at frequent risk; this generally excludes values at risk at present on a 1:1 year event, in 50 years time for the 1:10 year event and in 100 year time the 1:50 year event.

ASSESSMENT OF POTENTIAL FLOOD RISK

	Flood risk tidal 2010			**Flood risk tidal 2060**			**Flood risk tidal 2110**			
No Active Intervention	**No. of properties**		**AAD**	**No. of properties**		**AAD**	**Number of properties**		**AAD**	**PVD**
Location	< 1:100yr	>1:100yr	**x £1000**	< 1:100yr	>1:100yr	**x £1000**	< 1:100yr	>1:100yr	**x £1000**	**(£x1000)**
Western Haven (N1)	25	4	215	29	1	357	32	0	581	8,830
Clamerkin Lake (N2)	50	4	74	54	1	127	58	2	218	3,137
Little Thorness (0)	3	0	5	3	0	12	3	0	30	284
Agricultural Total			5			6			7	156
									Total for PDZ7	12,407

With Present Management	**No. of properties**		**AAD**	**No. of properties**		**AAD**	**No. of properties**		**AAD**	**PVD**
Location	< 1:100yr	>1:100yr	**x £1000**	< 1:100yr	>1:100yr	**x £1000**	< 1:100yr	>1:100yr	**x £1000**	**(£x1000)**
Western Haven (N1)	1	28	29	2	28	47	2	30	13	976
Clamerkin Lake (N2)	4	50	11	2	53	16	2	58	5	348
Little Thorness (0)	3	0	5	3	0	2	3	0	1	105
Agricultural Total			1			2			2	44
									Total for PDZ7	1,473

Note: These estimated flood damages relate to scattered structures around the five inland branches of the estuary (26km of coastline), and include modest structures such as bird hides, boatsheds and abandoned farm buildings.

Table 2. General Assessment of Objectives

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

STAKEHOLDER OBJECTIVE	NAI			WPM		
	Fails	Neutral	Acceptable	Fails	Neutral	Acceptable
To maintain and enhance the nature conservation values of the area through adaptation in sympathy with natural processes.						
To maintain the tranquillity of the area and its landscape.						
To support low level use and access of the area.						
To support adaptation of local communities.						
To sustain the historic landscape and environment.						
To support adaptation of agricultural use.						

3. Discussion and detailed policy development

The overriding character of the PDZ is one of a naturally evolving coastal and estuary system, although the discussion provided above of the two baseline scenarios highlights that even with the present management (NAI) some of the high level objectives while not failing neither are they being achieved, particularly in the central section of the PDZ. Flooding in Newtown Estuary will encroach onto the medieval field system which is part of the Scheduled Monument of the remains of the medieval town of Newtown, formerly known as Francheville. Also, coastal change will lead to the progressive widespread exposure and loss of intertidal archaeology (palaeo-environmental features) and potentially impact on local agricultural land.

Along the open coast of the PDZ, there is no reason to alter the current management. The same holds true in the estuary where the landowner, the National Trust, would allow natural coastal processes to occur in the entirety of the estuary and foreshore within their ownership at Newtown. This will enable the habitats within the estuary, which support international nature conservation designations, to develop in a natural and dynamic way in response to coastal change. Benefits in the form of gain of intertidal habitats are likely. This would not preclude gentle local management at the former coastal defence structures at Shalfleet Quay and Newtown Quay where there are still short lengths of masonry wall, wooden walkways and two stone built quays. These are currently maintained to provide access to visitors on foot and for small boat users and in some cases represent historical features. At Newtown Quay there is a maintained embankment around a tidal lagoon which was formerly part of a salt manufacturing process. The lagoon is now valued as a habitat for specialist species and is a feature of the Solent Marine SAC. All the built structures will be maintained for as long as practically possible and if necessary adapted to continue to provide access, but not preventing the natural processes within the estuary.

PDZ7
Management Area Statements

- **Bouldnor Copse to southern Gurnard Bay (MA 7)** includes three policy units.

Within these areas a summary of policy is provided below. Management Areas statements are provided in the following sheets, with maps showing each area.

Location reference	**Bouldnor Copse to southern Gurnard Bay**
Management Area reference	**MA 7**
Policy Development Zone	**PDZ 7**

The following descriptions are provided to assist interpretation of the maps shown of each Management Area.

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical rates and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change, these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan, reference should be made to the baseline data (see Appendix C3).

100 year shoreline position:

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

In some areas the preferred policy does not change from that under the existing management approach. In some areas where there are hard defences this can be accurately identified. In other areas there is greater uncertainty. Even so, where the shoreline is likely to be quite clearly defined by a change such as the crest of a cliff the estimated position is shown as a single line.

- Where there is a difference between With Present Management and the Preferred Policy this distinction is made in showing two different lines:

With Present Management.
Preferred Policy.

- In some areas, the Preferred Policy either promotes a more adaptive approach to management or recognises that the shoreline is better considered as a width rather than a narrow line. This is represented on the map by a broader zone of management:

Flood Risk Zones:

All flood risk zones are based upon the current tidal EA Flood Zone 2. This is an extreme flood event (1:1000 year at current levels) meaning that it has 0.1% chance of occurring each year.

General Flood Risk Zones. The explanation of these zones is provided on the Environment Agency's web site www.environment-agency.gov.uk. The maps within this SMP document show where SMP policy might influence the management of flood risk.

Indicate areas where the intent of the SMP policy is to continue to manage this risk.

Indicate where over the 100 years the policy would allow increased risk of flooding.

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

Note: This Management Area corresponds to IW52 to 54 in selected Appendices.

Policy Development Zone 7 - North-west Coastline
Management Area 7 - Bouldnor to Gurnard (Ch 121 - 157)

Key
- Policy Development Zone boundary
- Management Area boundary
- Policy Unit boundary
- Existing Coastline and Chainage (km)
- Scheduled Monument

Key **100 Year Shoreline Position:**
- Preferred Policy would be the same as With Present Management
- With Present Management where this differs from the Preferred Policy
- Preferred Policy where this differs from the With Present Management
- Indicative shoreline zone under the Preferred Policy
- Existing Indicative EA Flood Risk Zone 2
- EA Flood Risk Zone 2 where SMP policy is for continued management of defence
- EA Flood Risk Zone 2 where under SMP policy there would be increased probability of flooding

ROYAL HASKONING
ISLE of WIGHT COUNCIL

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN:

The overriding intent of the plan is to maintain the important nature conservation and landscape quality of the area. The policy for the frontage is for No Active Intervention but with potential for local management by the National Trust on the quays and walkways. There are no overriding issues that conflict with this approach, although localised adaptation to coastal change will be required for isolated areas of property.

PREFERRED POLICY TO IMPLEMENT PLAN:	
From present day	No Active Intervention but encouraging the private landowner to adapt the current localised structure within the estuary
Medium term	No Active Intervention
Long term	No Active Intervention

SUMMARY OF SPECIFIC POLICIES

Policy Unit (& length)		**Policy Plan**			
		to 2025	**to 2055**	**to 2105**	**Comment**
PU7.1	**Bouldnor Copse and Hamstead** (4,424m)	NAI	NAI	NAI	Allow cliff erosion, supporting the natural habitats.
PU7.2	**Newtown Estuary** (26,269m)	NAI	NAI	NAI	Allow tidal flooding and erosion. This would not preclude local management by the landowner during the first epoch to maintain limited quay structures and access walkways.
PU7.3	**Thorness Bay and southern Gurnard Bay** (6,139m)	NAI	NAI	NAI	Allow cliff erosion, supporting the natural habitats.
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention MR – Managed Realignment					

CHANGES FROM PRESENT MANAGEMENT

No change

IMPLICATION WITH RESPECT TO BUILT ENVIRONMENT

Economics		**by 2025**	**by 2055**	**by 2105**	**Total £k PV**
Property	Potential NAI Damages/ Cost £k PV	3,701	4,506	4,314	12,521
	Preferred Plan Damages £k PV	3,701	4,506	4,314	12,521
	Benefits £k PV	-	-	-	-
	Costs of Implementing plan £k PV	0	0	0	0

The economic viability of the preferred plan for this Management Area is not applicable since the benefits and costs of implementation are both zero. There will be no need to justify any flood and coastal erosion risk management expenditure.

5. Policy summary of the preferred plan and implications

Contents

5. Policy summary of the preferred plan and implications

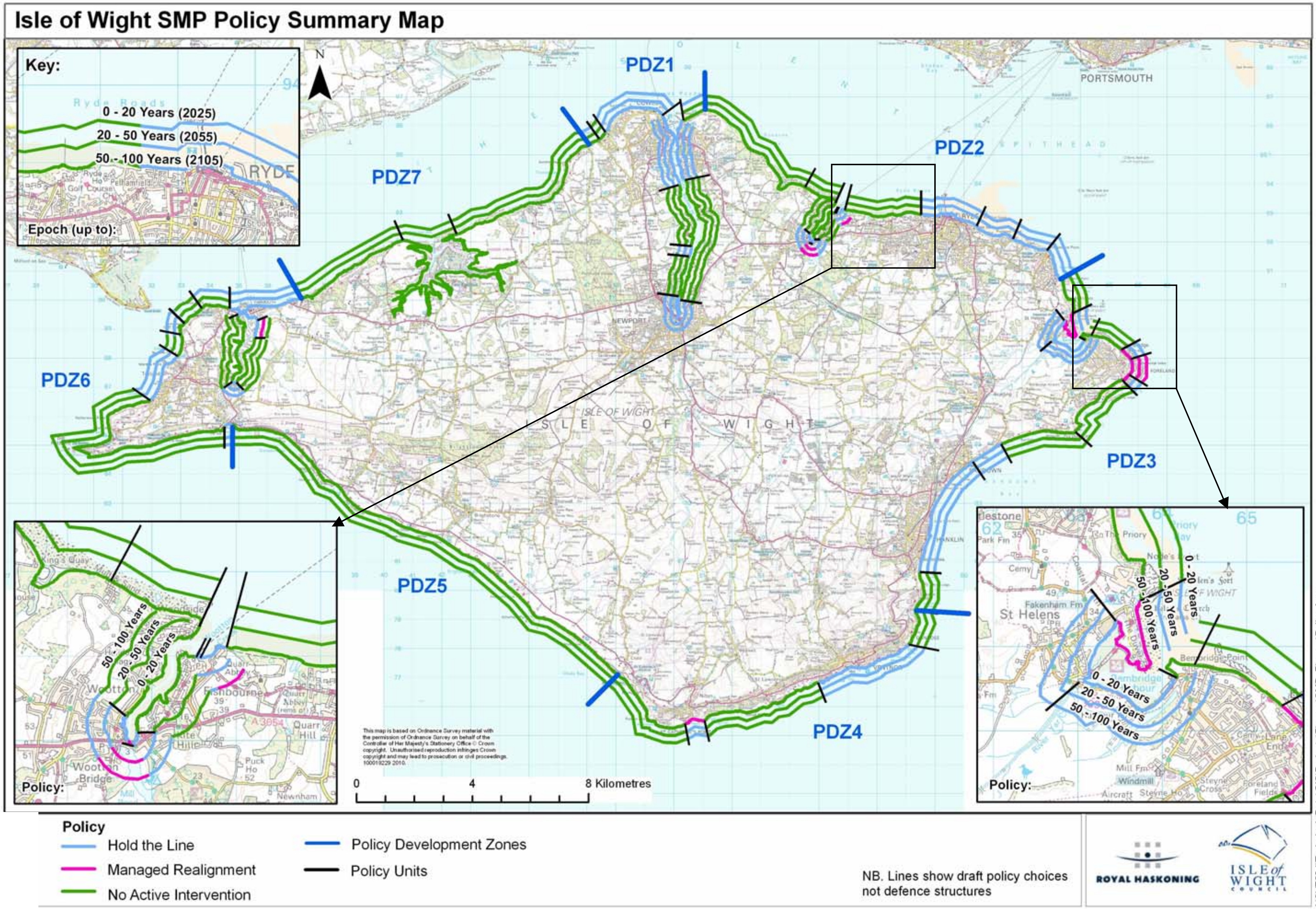
5.1 Introduction

This SMP has highlighted the importance of appropriate coastal policy decision-making for the Island which is heavily reliant on it's shoreline for tourism and marine industries as well as being home to many coastal towns and villages. The SMP proposes focusing future expenditure on defences for communities at significant risk from future coastal flooding and erosion to seek a sustainable future for the Isle of Wight and address the risks of climate change predicted sea level rise. In securing the future of vulnerable coastal communities, the SMP also aims to sustain key road infrastructure and ferry transport links. The proposals contained in the SMP include addressing the potential tidal flood risk to the low-lying valleys of the Western and Eastern Yar rivers, supporting the communities directly at risk and also those reliant on the transport links that cross the valleys to West Wight, Bembridge and Forelands. Significant tidal flood risk to the communities and infrastructure of Yarmouth, Cowes and Ryde is recognised and addressed, as is the risk of erosion to a number of coastal communities including Ventnor. It is also a key outcome of the SMP to recognise the important and scenic natural landscape and shoreline of the Isle of Wight coast and estuaries, valued by residents and visitors alike, including allowing natural change to continue uninterrupted along long stretches of the south-western and northern coasts and supplying sediment to local beaches. It is clear that communities around the Isle of Wight coast will be affected by coastal change and the SMP encourages recognition of this longer term perspective so areas can begin to gradually adapt to future change, and reliance of coastal defences can be reduced.

This chapter of the SMP provides a summary of the preferred plan and the preferred policy choices to implement that plan (as outlined in detail in chapter 4). Importantly it 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.

5.2 Policy Summary Map



5.3 Policy Summary Tables

Please note. For full details of SMP2 policies, please see chapter 4.

Key:
HTL - Hold the Line,
A - Advance the Line,
NAI – No Active Intervention,
MR – Managed Realignment.

PDZ1 Cowes and the Medina Estuary

Present & Previous Policy						SMP2 Policy						
SMP1 (1997)		North East Coastal Defence Strategy Study (2004)		Eastern Yar Flood and Erosion Risk Management Strategy		Management Area	Policy Unit		Policy Plan			
Unit	Policy	Unit	Policy	Unit	Policy				To 2025	2026 to 2055	2056 to 2105	Comment
NEW 11	Hold the existing defence line	*Strategy level examination of this frontage will be completed following publication of SMP2.*		-	-	**MA 1A**	**1A.1**	**Gurnard Luck**	HTL	NAI	NAI	HTL supports the existing community and allows time for adaptation. Unlikely to qualify for national funding but HTL would allow small scale private defences to be maintained. Moving to NAI reflects the medium to long term increasing risks and need for increasing adaptation. NAI would not preclude maintenance of private defences
NEW 12	Hold the existing defence line			-	-		**1A.2**	**Gurnard Cliff**	NAI	NAI	NAI	

Present & Previous Policy						SMP2 Policy						
SMP1 (1997)		North East Coastal Defence Strategy Study (2004)		Eastern Yar Flood and Erosion Risk Management Strategy		Management Area	Policy Unit		Policy Plan			
Unit	Policy	Unit	Policy	Unit	Policy				To 2025	2026 to 2055	2056 to 2105	Comment
							1A.3	Gurnard to Cowes Parade	HTL	HTL	HTL	
NEW 13	Hold the existing defence line *Or* Advance the existing defence line			-	-							
NEW 14 (west)	Hold the existing defence line *Or* Advance the existing defence line			-	-		1A.4	West Cowes	HTL	HTL	HTL	Recognise that HTL may be difficult to achieve with sea level rise and the community may need to consider coastal adaptation. This will be examined further in the Strategy Study.
Medina Estuary – Not covered by SMP1		-	-	-	-	MA 1B	1B.1	Central Medina – NW	NAI	NAI	NAI	NAI would not preclude maintenance of private defences
							1B.2	West Medina Mills	HTL	HTL	HTL	Private defences will be maintained
							1B.3	Central Medina – SW	NAI	NAI	NAI	NAI would not preclude maintenance of private defences
							1B.4	Newport Harbour	HTL	HTL	HTL	HTL with public and private defences
							1B.5	Central Medina –East	NAI	NAI	NAI	NAI would not preclude maintenance of private defences
						MA 1A	1A.5	East Cowes	HTL	HTL	HTL	Recognise that HTL may be difficult to achieve

Present & Previous Policy						SMP2 Policy						
SMP1 (1997)		North East Coastal Defence Strategy Study (2004)		Eastern Yar Flood and Erosion Risk Management Strategy		Management Area	Policy Unit		Policy Plan			
Unit	Policy	Unit	Policy	Unit	Policy				To 2025	2026 to 2055	2056 to 2105	Comment
NEW 14 (east)	Hold the existing defence line *Or* Advance the existing defence line	-	-	-	-							with sea level rise and the community may need to consider coastal adaptation. This will be examined further in the Strategy Study.
NEW 15	Hold the existing defence line *Or* Retreat the existing defence line	SMU1	Hold the Line, followed by No Active Intervention, but Monitor	-.	-		**1A.6**	**East Cowes Outer Esplanade**	HTL	NAI	NAI	HTL by maintenance of the existing seawall until the end of its effective life, gradually removing the influence of management.

PDZ2 Ryde and North-east Coastline

<table>
<tr><th colspan="6">Present & Previous Policy</th><th colspan="7">SMP2 Policy</th></tr>
<tr><th colspan="2">SMP1 (1997)</th><th colspan="2">North East Coastal Defence Strategy Study (2004)</th><th colspan="2">Eastern Yar Flood and Erosion Risk Management Strategy</th><th rowspan="2">Management Area</th><th rowspan="2" colspan="2">Policy Unit</th><th colspan="4">Policy Plan</th></tr>
<tr><th>Unit</th><th>Policy</th><th>Unit</th><th>Policy</th><th>Unit</th><th>Policy</th><th>To 2025</th><th>2026 to 2055</th><th>2056 to 2105</th><th>Comment</th></tr>
<tr><td rowspan="2">RYD 1</td><td rowspan="2">Do nothing or Retreat the existing defence line</td><td>SMU2</td><td>No Active Intervention, but Monitor</td><td>-</td><td>-</td><td rowspan="3">MA 2A</td><td rowspan="2">2A.1</td><td rowspan="2">Osborne Bay</td><td rowspan="2">NAI</td><td rowspan="2">NAI</td><td rowspan="2">NAI</td><td rowspan="2"></td></tr>
<tr><td>SMU3</td><td>No Active Intervention, but Monitor</td><td>-</td><td>-</td></tr>
<tr><td>RYD 2</td><td>Retreat the existing defence line</td><td>SMU4</td><td>No Active Intervention, but Monitor</td><td>-</td><td>-</td><td>2A.2</td><td>Woodside</td><td>NAI</td><td>NAI</td><td>NAI</td><td></td></tr>
<tr><td rowspan="2">RYD 3</td><td rowspan="2">Wootton Creek: Hold the existing line</td><td rowspan="2">SMU5</td><td rowspan="2">Hold the Line, by Seawall Encasement with Revetment, Floodwalls and Rip-Rap</td><td rowspan="2">-</td><td rowspan="2">-</td><td rowspan="2">MA 2B</td><td>2B.1</td><td>Western Wootton Creek</td><td>NAI</td><td>NAI</td><td>NAI</td><td>Properties are generally set back from the shoreline and not in the risk zone. NAI would not preclude maintenance of private waterside access structures and minor defences fronting the narrow individual properties and gardens, subject to normal approvals.</td></tr>
<tr><td>2B.2</td><td>South-west Wootton Creek</td><td>HTL</td><td>HTL</td><td>HTL</td><td>Continue defence to properties from flood risk by HTL with private and public defences.</td></tr>
</table>

Present & Previous Policy							SMP2 Policy					
SMP1 (1997)		North East Coastal Defence Strategy Study (2004)		Eastern Yar Flood and Erosion Risk Management Strategy		Management Area	Policy Unit		Policy Plan			
Unit	Policy	Unit	Policy	Unit	Policy				To 2025	2026 to 2055	2056 to 2105	Comment
							2B.3	**Old Mill Pond**	MR	MR	MR	Undertake no specific defence within the Mill Pond and accept increased saline intrusion. Continue to maintain use of the road.
							2B.4	**South-east Wootton Creek**	HTL	HTL	HTL	Continue defence to properties from flood risk by HTL with private and public defences.
							2B.5	**Eastern Wootton Creek**	NAI	NAI	NAI	Properties are generally set back from the shoreline and not in the risk zone. NAI would not preclude maintenance of private waterside access structures and minor defences fronting the narrow individual properties and gardens, subject to normal approvals.
							2B.6	**Fishbourne Ferry Terminal**	HTL	HTL	HTL	HTL with private defences.

Present & Previous Policy						SMP2 Policy						
SMP1 (1997)		North East Coastal Defence Strategy Study (2004)		Eastern Yar Flood and Erosion Risk Management Strategy		Management Area	Policy Unit		Policy Plan			
Unit	Policy	Unit	Policy	Unit	Policy				To 2025	2026 to 2055	2056 to 2105	Comment
							2B.7	Outer Eastern Creek	HTL	HTL	MR	Continue defence to properties by HTL with private and public defences; Assist protection of the ferry terminal at the mouth of Wootton Creek; Gradually realigning in the third epoch.
RYD 4	Retreat the existing defence line	SMU6	No Active Intervention, but Monitor	-	-		2B.8	Quarr and Binstead	NAI	NAI	NAI	
RYD 5	Hold the existing defence line	SMU7	Hold the Line by Seawall Encasement and Revetment	-	-	MA 2C	2C.1	Ryde	HTL	HTL	HTL	HTL by seawall encasement and revetment
		SMU8 a	Hold the Line followed by No Active Intervention, but Monitor (trigger governing change of policy option: economic or technical viability of maintaining existing defences)	-.	-		2C.2	Appley and Puckpool	HTL	HTL	HTL	HTL subject to the economic and technical viability of the maintaining existing defences.
RYD 6	Hold the existing defence line	SMU8 b	Hold the Line by Seawall Encasement and Revetment	-	-		2C.3	Springvale to Seaview (Including the Duver)	HTL	HTL	HTL	HTL with public and private defences, including HTL by seawall encasement and revetment.
		SMU8 c	Hold the Line by Seawall Encasement and Revetment	-	-							

Present & Previous Policy						SMP2 Policy						
SMP1 (1997)		North East Coastal Defence Strategy Study (2004)		Eastern Yar Flood and Erosion Risk Management Strategy		Management Area	Policy Unit		Policy Plan			
Unit	Policy	Unit	Policy	Unit	Policy				To 2025	2026 to 2055	2056 to 2105	Comment
RYD 7	Hold the existing defence line	SMU8 d	Hold the Line by Seawall Encasement and Revetment	-	-							
RYD 8	Hold the existing defence line	SMU9	Northern - GE 31-32a - Hold the Line by Seawall Encasement and Rock Revetment Central - GE 32b and c - Hold the Line by Seawall Encasement and Rock Revetment Central - GE 32d - Hold the Line by Offshore Breakwaters Southern - GE 33 - Hold the Line by Seawall Encasement and Rock Revetment	-	-		**2C.4**	**Seagrove Bay**	HTL	HTL	HTL	HTL with public and private defences. Along the majority of frontage HTL by seawall encasement and revetment. Opportunity along the central section to investigate offshore breakwaters

PDZ3 Bembridge and Sandown Bay

Present & Previous Policy						SMP2 Policy						
SMP1 (1997)		North East Coastal Defence Strategy Study (2004)		Eastern Yar Flood and Erosion Risk Management Strategy		Management Area	Policy Unit		Policy Plan			
Unit	Policy	Unit	Policy	Unit	Policy				To 2025	2026 to 2055	2056 to 2105	Comment
RYD 9	Retreat the existing defence line	SMU 10	No Active Intervention, but Monitor	-	-	**MA 3A**	**3A.1**	**Priory Bay**	NAI	NAI	NAI	
RYD 10	Hold the existing line	SMU 11	Hold the Line by Maintenance. Carry out further studies. Review generic option based upon the results.	Frontage 3 The Duver	Maintain the seawall for 50 years		**3A.2**	**St Helens Duver**	HTL	HTL	MR	HTL with public and private defences; Realignment in the third epoch in line with a plan for management of the harbour entrance.
RYD 11	Hold the existing line	SMU 12	Hold the Line by Maintenance. Carry out further studies. Review generic option based upon the results.									
				Frontage 2 St. Helens	Hold the line - maintain		**3A.3**	**St Helens**	HTL	HTL	HTL	Maintain the defences at the current level. Securing central government funding will be difficult for this frontage and homeowners and businesses should be prepared to take action to protect their properties from flooding.
				Frontage 1 Embankm ent Road	Hold the line - sustain		**3A.4**	**Embankment Road**	HTL	HTL	HTL	Strong links to PU3C.2.

Present & Previous Policy						SMP2 Policy						
SMP1 (1997)		North East Coastal Defence Strategy Study (2004)		Eastern Yar Flood and Erosion Risk Management Strategy		Management Area	Policy Unit		Policy Plan			
Unit	Policy	Unit	Policy	Unit	Policy				To 2025	2026 to 2055	2056 to 2105	Comment
RYD 12 (part)	Hold the existing defence line	SMU 11	Hold the Line by Maintenance. Carry out further studies. Review generic option based upon the results.	Frontage 4 Bembridge Point	Do nothing but monitor		**3A.5**	**Bembridge Point**	NAI	NAI	NAI	No intervention will be undertaken along the shoreline of Bembridge Point allowing the groyne to collapse/disappear and continuation of natural coastal processes along the beach and the sand dunes. Nb. During epoch one a new defence alignment to be defined that links Embankment Road (PU3A.4) with higher ground at the back of Bembridge Point; this will provide a continuous defence around properties that will be held in future epochs (nb. Eastern Yar Strategy 2010).
RYD 12 (part)	Hold the existing defence line	SMU 13a	Managed Realignment, by slowing the rate of erosion	-	-	**MA 3B**	**3B.1**	**Bembridge**	NAI	NAI	NAI	

Present & Previous Policy						SMP2 Policy						
SMP1 (1997)		North East Coastal Defence Strategy Study (2004)		Eastern Yar Flood and Erosion Risk Management Strategy		Management Area	Policy Unit		Policy Plan			
Unit	Policy	Unit	Policy	Unit	Policy				To 2025	2026 to 2055	2056 to 2105	Comment
		SMU 13b - north	Hold the Line by Seawall Encasement	-	-		**3B.2**	**Lane End**	HTL	HTL	MR	Gradually reduce influence of management as existing defences fail in the third epoch.
		SMU 13b – central	Managed Realignment by Beach Management	-	-		**3B.3**	**Foreland**	MR	MR	MR	
		SMU 13b - south	Hold the Line by Seawall Encasement	-	-		**3B.4**	**Foreland Fields**	HTL	HTL	MR	
RYD 13	Do nothing	SMU 14	No Active Intervention, but Monitor	-	-		**3B.5**	**Whitecliff Bay**	NAI	NAI	NAI	
SAN 1	Do nothing	*Strategy level examination of this frontage will be completed following publication of SMP2.*		-	-	**MA 3C**	**3C.1**	**Culver Cliff & Red Cliff**	NAI	NAI	NAI	
SAN 2	Do nothing			-	-							
SAN 3	Hold the existing defence line			-	-		**3C.2**	**Yaverland and Eastern Yar Valley**	HTL	HTL	HTL	Strong links to PU3A.4.
SAN 4	Hold the existing line			-	-							
SAN 5	Hold the existing defence line			-	-		**3C.3**	**Sandown and Shanklin**	HTL	HTL	HTL	
SAN 6	Hold the existing defence line			-	-							
SAN 7	Hold the existing defence line			-	-							
SAN 8	Hold the existing defence line			-	-							
VEN 1 (part)	Retreat the existing defence line	**-**		-			**3C.4**	**Luccombe**	NAI	NAI	NAI	

PDZ4 Ventnor and the Undercliff

<table>
<tr><th colspan="6">Present & Previous Policy</th><th colspan="7">SMP2 Policy</th></tr>
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<tr><th>Unit</th><th>Policy</th><th>Unit</th><th>Policy</th><th>Unit</th><th>Policy</th><th>To 2025</th><th>2026 to 2055</th><th>2056 to 2105</th><th>Comment</th></tr>
<tr><td>VEN 1 (part)</td><td>Retreat the existing defence line</td><td rowspan="7" colspan="2">Strategy level examination of this frontage will be completed following publication of SMP2.</td><td rowspan="7" colspan="2">-</td><td rowspan="2">MA 4A</td><td>4A.1</td><td>Dunnose</td><td>NAI</td><td>NAI</td><td>NAI</td><td></td></tr>
<tr><td>VEN 2</td><td>Hold the existing defence line</td><td>4A.2</td><td>Ventnor & Bonchurch (Monk's Bay to Steephill Cove)</td><td>HTL</td><td>HTL</td><td>HTL</td><td></td></tr>
<tr><td>VEN 3</td><td>Retreat the existing defence line</td><td rowspan="5">MA 4B</td><td rowspan="2">4B.1</td><td rowspan="2">St. Lawrence Undercliff</td><td rowspan="2">NAI</td><td rowspan="2">NAI</td><td rowspan="2">NAI</td><td rowspan="2"></td></tr>
<tr><td>VEN 4</td><td>Retreat the existing defence line</td></tr>
<tr><td>VEN 5</td><td>Hold the existing defence line</td><td>4B.2</td><td>Castlehaven</td><td>HTL</td><td>HTL</td><td>MR</td><td>Management option in epoch three will be dependent on the slope stability conditions in the area at the time and whether the cliff retreat can be minimised through MR.</td></tr>
<tr><td>VEN 6</td><td>Do nothing</td><td rowspan="2">4B.3</td><td rowspan="2">St. Catherine's and Blackgang</td><td rowspan="2">NAI</td><td rowspan="2">NAI</td><td rowspan="2">NAI</td><td rowspan="2"></td></tr>
<tr><td>FRE 1 (part)</td><td>Do nothing</td></tr>
</table>

PDZ5 South-west Coastline

Present & Previous Policy						SMP2 Policy							
SMP1 (1997)		North East Coastal Defence Strategy Study (2004)		Eastern Yar Flood and Erosion Risk Management Strategy		Management Area	Policy Unit		Policy Plan				
Unit	Policy	Unit	Policy	Unit	Policy				To 2025	2026 to 2055	2056 to 2105	Comment	
FRE1	Do nothing	*Strategy level examination of this frontage will be completed following publication of SMP2.*		-		**MA 5**	**5.1**	**Central Chale Bay to Afton Down**	NAI	NAI	NAI	Allow cliff erosion, support the geological designation, abandon current A3055 and re-route.	
FRE2	Do nothing												
FRE3	Do nothing												

PDZ6 West Wight

Present & Previous Policy						SMP2 Policy						
SMP1 (1997)		North East Coastal Defence Strategy Study (2004)		Eastern Yar Flood and Erosion Risk Management Strategy		Management Area	Policy Unit		Policy Plan			
Unit	Policy	Unit	Policy	Unit	Policy				To 2025	2026 to 2055	2056 to 2105	Comment
FRE 4	Hold the existing defence line	*Strategy level examination of this frontage will be completed following publication of SMP2.*		-		MA 6A	6A.1	Freshwater Bay	HTL	HTL	HTL	Short section of HTL provides flood defence for the Western Yar Valley (with PU6C.3). Maintain the road and support or enhance the protective beach.
FRE 5	Do nothing						6A.2	Tennyson Down, Alum Bay and Headon Warren	NAI	NAI	NAI	
TOT 1	Do nothing											
TOT 2	Do nothing											
TOT 3	Hold the existing defence line					MA 6B	6B.1	Totland and Colwell	HTL	HTL	HTL	
TOT 4	Retreat the existing defence line						6B.2	Central Colwell Bay	NAI	NAI	NAI	
							6B.3	Fort Albert	HTL	HTL	NAI	Existing structures can be maintained to extend their life, but gradually removing the influence of management.
NEW 1	Do nothing						6B.4	Fort Victoria Country Park	NAI	NAI	NAI	

Present & Previous Policy						SMP2 Policy						
SMP1 (1997)		North East Coastal Defence Strategy Study (2004)		Eastern Yar Flood and Erosion Risk Management Strategy		Management Area	Policy Unit		Policy Plan			
Unit	Policy	Unit	Policy	Unit	Policy				To 2025	2026 to 2055	2056 to 2105	Comment
NEW 2	Hold the existing defence line						6B.5	Fort Victoria and Norton	HTL	NAI	NAI	Existing structures can be maintained to extend their life, but gradually removing the influence of management.
NEW 3	Hold the existing defence line					MA 6C	6C.1	Norton Spit	HTL	HTL	HTL	
							6C.2	Western Yar Estuary - west	NAI	NAI	NAI	
							6C.3	The Causeway	HTL	HTL	HTL	Short section of HTL provides flood defence from Freshwater (with PU6A.1)
							6C.4	Western Yar Estuary - east	NAI	NAI	NAI	
							6C.5	Thorley Brook and Barnfields Stream	HTL	MR	NAI	HTL for the first epoch to allow time for habitat adaptation; MR in the second epoch; NAI in the third epoch, with localised HTL .
NEW 4	Hold the existing defence line						6C.6	Yarmouth to Port la Salle	HTL	HTL	HTL	
NEW 5	Hold the existing defence line											

PDZ7 North-west Coastline

Present & Previous Policy						SMP2 Policy						
SMP1 (1997)		North East Coastal Defence Strategy Study (2004)		Eastern Yar Flood and Erosion Risk Management Strategy		Management Area	Policy Unit		Policy Plan			
Unit	Policy	Unit	Policy	Unit	Policy				To 2025	2026 to 2055	2056 to 2105	Comment
NEW 6	Do nothing	*Strategy level examination of this frontage will be completed following publication of SMP2.*		-		MAN7	**7.1**	**Bouldnor Copse and Hamstead**	NAI	NAI	NAI	Allow cliff erosion, supporting the natural habitats.
NEW 7	Retreat the existing defence line						**7.2**	**Newtown Estuary**	NAI	NAI	NAI	Allow tidal flooding and erosion. This would not preclude local management by the landowner during the first epoch to maintain limited quay structures and access walkways.
NEW 8	Do nothing						**7.3**	**Thorness Bay and southern Gurnard Bay**	NAI	NAI	NAI	Allow cliff erosion, supporting the natural habitats.
NEW 9	Do nothing											
NEW 10	Do nothing											

5.4 Policy Summary Implications

The following table summarises the predicted implications of the preferred plan. Please also see the policy summary map in section 5.2 or the policies listed in section 5.3 in relation to the table below. This summary is based on the evidence contained in chapter 4 of the SMP and in the Appendices.

Location reference	**Gurnard, Cowes and East Cowes**
Management Area reference	**MA 1A**
Policy Development Zone	**PDZ 1**

PREDICTED IMPLICATIONS OF THE PREFERRED PLAN

Policy Unit		**Theme**				
		Property & Land Use	**Nature Conservation**	**Landscape**	**Historic Environment**	**Amenity & Recreational Use**
PU1A.1	Gurnard Luck	Potential longer term impact on property and the community.	Supports SAC designation.	Maintains landscape quality.	No significant historic interest on this frontage.	Support quality of, and access to, beach. In the longer term new access would need to be considered.
PU1A.2	Gurnard Cliff	Property set back on the cliff top further away from eroding cliff.	Supports SAC designation and natural processes.	Maintains landscape quality.	No significant historic interest on this frontage.	Support quality of beach.
PU1A.3	Gurnard to Cowes Parade	A large number of properties continue to be defended against flooding, erosion and landslide reactivation.	Impacts should generally be neutral.	Historic landscape of Cowes waterside is maintained under the preferred plan.	Historic built environment of Cowes waterside is maintained under the preferred plan. Numerous listed buildings would be maintained.	Maintaining frontline defences along the esplanade and parade will provide continued access.
PU1A.4	West Cowes	A large number of properties continue to be defended against flooding. Links to mainland via ferry terminal are protected.	Impacts should generally be neutral.	Historic landscape of West Cowes quayside is maintained, dependent on method of 'Holding the Line' applied (HTL) Consideration that the landscape of the town may change in the third epoch with SLR under the preferred plan.	Historic built environment of West Cowes quayside is maintained under the preferred plan. Numerous listed buildings would be maintained.	Maintaining frontline defences at along West Cowes promenade will provide continued areas of access.
PU1A.5	East Cowes	A large number of properties continue to be defended against flooding. Links to mainland via ferry terminal are protected.	Impacts should generally be neutral.	Historic landscape of East Cowes quayside is maintained, dependent on method of HTL. Consideration that the landscape of the town may change in the third epoch with SLR under the preferred plan.	Historic built environment of East Cowes quayside is maintained under the preferred plan. Several listed buildings would be maintained.	Maintaining frontline defences at quay will provide continued areas of access.

Policy Unit		Theme				
		Property & Land Use	**Nature Conservation**	**Landscape**	**Historic Environment**	**Amenity & Recreational Use**
PU1A.6	East Cowes Outer Esplanade	Longer term loss of car parking & access road along the promenade.	Supports SAC designations.	Maintains landscape quality.	Some impact on the conservation area along the seafront.	Impact on amenity use and car parking in longer term.

Location reference	**Central Medina Estuary and Newport**
Management Area reference	**MA 1B**
Policy Development Zone	**PDZ 1**

PREDICTED IMPLICATIONS OF THE PREFERRED PLAN

Policy Unit		Theme				
		Property & Land Use	**Nature Conservation**	**Landscape**	**Historic Environment**	**Amenity & Recreational Use**
PU1B.1	Central Medina – NW	Longer term inundation of surrounding natural waterside.	Natural estuary evolution will continue, is a positive benefit. Supports SPA, SSSi and Ramsar designation.	Preferred policy would maintain landscape in current form with some loss of terrestrial land to flood and erosion.	No significant impact. Natural change may result in loss of some historical features.	Possible adverse impacts on route of cycle route /footpath.
PU1B.2	West Medina Mills	Commercial property can be maintained through private defences.	Would prevent natural processes along this estuary stretch		No significant historic interest on this frontage.; however potential impacts on the remains of the cement kiln (recently added to Local List)	The preferred plan impacts would be neutral.
PU1B.3	Central Medina – SW	Longer term flooding impacts on gardens and properties.	Natural estuary evolution will continue, is a positive benefit. Supports SPA, SSSI and Ramsar designation.	Preferred policy would maintain landscape in current form with some loss of terrestrial land to flooding.	No significant historic interest on this frontage.	Possible adverse impacts on route of cycle route /footpath.
PU1B.4	Newport Harbour	A large number of properties continue to be defended against flooding.	Impacts should generally be neutral.	Historic landscape of Newport quayside is maintained under the preferred plan.	Historic built environment of Newport is maintained under the preferred plan. Numerous listed buildings would be maintained.	Maintaining frontline defences will provide continued access.

Policy Unit		Theme				
		Property & Land Use	Nature Conservation	Landscape	Historic Environment	Amenity & Recreational Use
PU1B.5	Central Medina –East	Longer term flooding impacts on properties and longer term inundation of natural waterside.	Natural estuary evolution will continue is positive benefit. Supports SPA, SSSi and Ramsar designation.	Preferred policy would maintain landscape in current form with some loss of terrestrial land to flood and erosion.	No significant impact. Natural change may result in loss of some historical features.	Possible adverse impacts on route of footpath and operation of small marina and recreational waterside facility .

Location reference	**Old Castle Point to Woodside**
Management Area reference	**MA 2A**
Policy Development Zone	**PDZ 2**

PREDICTED IMPLICATIONS OF THE PREFERRED PLAN

Policy Unit		Theme				
		Property & Land Use	Nature Conservation	Landscape	Historic Environment	Amenity & Recreational Use
PU2A.1	Osborne Bay	Potential loss in the longer term of land at Osborne House and Norris Castle.	Natural processes maintained under the preferred plan, therefore no negative impacts.	Continued no active intervention approach would help to maintain landscape value.	The gardens at Osborne House would have a small impact from the erosion processes. Potential to impact some listed buildings along the coast.	No negative impacts.
PU2A.2	Woodside	In the short term properties can be defended with private maintenance to current defences, but in the longer term potential for property losses.	With the removal of the influence of management Impacts should generally be neutral.	With the removal of the influence of management Impacts should generally be neutral.	No negative impacts.	Implications for access.

Location reference	**Wootton Creek and Quarr**
Management Area reference	**MA 2B**
Policy Development Zone	**PDZ 2**

PREDICTED IMPLICATIONS OF THE PREFERRED PLAN

Policy Unit		**Theme**				
		Property & Land Use	**Nature Conservation**	**Landscape**	**Historic Environment**	**Amenity & Recreational Use**
PU2B.1	Western Wootton Creek	Properties are generally set back above the floodzone. Some impacts on property and road access in the longer term.	Natural processes maintained under preferred plan, value of the SAC and Ramsar designations upheld.	Continued no active intervention approach would help to maintain landscape value.	There are no historic sites impacted.	Potential impact on edge of the holiday park, private moorings and access.
PU2B.2	South-west Wootton Creek	Preferred plan will help to maintain the community and manage risks from flooding. No loss of property would be anticipated.	Impacts should generally be neutral.	Impacts should generally be neutral.	Protection of private listed buildings.	Recreational and amenity opportunities will be maintained.
PU2B.3	Old Mill Pond	Preferred plan will help to protect link road between Newport and Ryde and manage risks from flooding.	Impacts should generally be neutral.	The existing pond would change with increased saline intrusion.	Protection of listed buildings.	Recreational and amenity opportunities will be maintained.
PU2B.4	South-east Wootton Creek	Preferred plan will help to maintain the community and floding. No loss of property would be anticipated.	Impacts should generally be neutral.	Impacts should generally be neutral.	Protection of private listed buildings.	Recreational and amenity opportunities will be maintained.
PU2B.5	Eastern Wootton Creek	Properties are generally set back above the floodzone. Some impacts on property and gardens in the longer term.	Natural processes maintained under the preferred plan, value of the SAC and Ramsar designations upheld.	Continued no active intervention approach would help to maintain landscape value.	Protection of private listed buildings. Natural change may impact upon some historical features such as wooden structures and palaeoenvironmental deposits in the area of Ranelagh Spit.	Potential impact on private moorings and access.
PU2B.6	Fishbourne ferry terminal	Ferry terminal, and therefore the link to the mainland, will be protected under the preferred plan.	Impacts on designations and coastal squeeze of the intertidal habitat.	Impacts should generally be neutral.	Impacts to important multi-period archaeological and palaeoenvironmental sites in the intertidal	Important ferry link to the mainland is maintained.

Policy Unit		Theme				
		Property & Land Use	Nature Conservation	Landscape	Historic Environment	Amenity & Recreational Use
					zone.	
PU2B.7	Outer Eastern Creek	Potential longer term impact on properties in the third epoch.	Impacts on designations and coastal squeeze of the intertidal habitat in short term. Re-alignment in the longer term should look for habitat creation opportunities.	Maintains landscape quality.	Potential impacts to multi-period archaeological and palaeoenvironmental sites in the intertidal zone.	Impacts are neutral.
PU2B.8	Quarr and Binstead	Generally no adverse impacts on property but may be some loss of gardens in the longer term.	Natural processes maintained under preferred plan, value of the SAC and Ramsar designations upheld.	Continued no active intervention approach would help to maintain landscape value.	Potential impacts to multi-period archaeological and palaeoenvironmental sites in the intertidal zone. Also in the longer term impacts to the medieval and modern abbeys at Quarr (SM and LBI).	Impacts are neutral.

Location reference	**Ryde to Seagrove Bay**
Management Area reference	**MA 2C**
Policy Development Zone	**PDZ 2**

PREDICTED IMPLICATIONS OF THE PREFERRED PLAN

Policy Unit		Theme				
		Property & Land Use	Nature Conservation	Landscape	Historic Environment	Amenity & Recreational Use
PU2C.1	Ryde	A large number of properties continue to be defended against flooding and erosion. Links to the mainland via ferry terminals and rail are protected.	Potential squeeze of habitat and the inability for the shoreline to respond to sea level rise without loss of important nature conservation interest.	Important landscape setting of Ryde and seafront is maintained.	Historic built environment of Ryde town centre is maintained under the preferred plan. Numerous listed buildings would be maintained.	Tourist and recreational facilities retained over long term, however loss of beach width is a risk over the long-term which could affect amenity and tourist value.

Policy Unit		Theme				
		Property & Land Use	**Nature Conservation**	**Landscape**	**Historic Environment**	**Amenity & Recreational Use**
PU2C.2	Appley and Puckpool	A large number of properties continue to be defended against flooding and erosion, including sewage treatment works.	Potential squeeze of habitat and the inability for the shoreline to respond to sea level rise without loss of important nature conservation interest.	Important landscape setting of Appley and Puckpool is maintained.	Historic built environment of including Puckpool Battery (SM) and listed buildings maintained.	Maintaining frontline defences will support important conservation value of the coast.
PU2C.3	Springvale to Seaview (Including the Duver)	A large number of properties continue to be defended against flooding and erosion.	Potential squeeze of habitat and the inability for the shoreline to respond to sea level rise without loss of important nature conservation interest.	Important landscape setting of Springvale to Seaview is maintained, dependent on method of HTL.	Many listed buildings would be maintained.	Maintaining frontline defences will support important conservation value of the coast.
PU2C.4	Seagrove Bay	A large number of properties continue to be defended against flooding and erosion.	Potential squeeze of habitat and the inability for the shoreline to respond to sea level rise without loss of important nature conservation interest.	Important landscape setting of Seagrove Bay is maintained.	Historic built environment of Seaview town centre is maintained under the preferred plan. Numerous listed buildings would be maintained.	Maintaining frontline defences will support important conservation value of the coast.

Location reference	**Bembridge Harbour**
Management Area reference	**MA 3A**
Policy Development Zone	**PDZ 3**

PREDICTED IMPLICATIONS OF THE PREFERRED PLAN

Policy Unit		Theme				
		Property & Land Use	**Nature Conservation**	**Landscape**	**Historic Environment**	**Amenity & Recreational Use**
PU3A.1	Priory Bay	Encroachment of shore inland towards hotel and caravan site with potential longer term impacts due to slope reactivation.	Impacts should generally be neutral.	Headland form may change with eventual reduction in form and definition.	There will be an impact on sites in the southern part of this PU, including prehistoric and Roman occupation sites, C19 battery and WWII structures	Beach width may widen, maintaining sand for amenity and recreational use. Amenity use of holiday park may be impacted in the longer term.

Policy Unit		Theme				
		Property & Land Use	**Nature Conservation**	**Landscape**	**Historic Environment**	**Amenity & Recreational Use**
PU3A.2	St Helens Duver	A number of residential and other properties at risk of flooding and erosion are protected, but flood risk on the inner Duver continues to increase in the medium to long term.	Impacts on designations and potential coastal squeeze of the intertidal habitat in the long term. Realignment in the longer term will allow designated habitats to evolve with sea level rise longer term.	Spit form will be maintained in the short and medium term, and (dependent on which areas of the spit are held or allowed to change under the proposed Managed Realignment policy in the long term) will be able to respond more naturally to coastal processes over the long term creating greater stability and ensuring positive function in relation to the harbour, maintaining harbour entrance.	Protection for St Helens Church in the medium term but potential impact on the Church, WWII structures and Conservation area in the medium to long term.	Car park, access roads, amenity use and beach maintained in the short and medium term, however may require longer term adaptation dependent on which areas of the spit are held or allowed to change under the proposed Managed Realignment policy in the long term.
PU3A.3	St Helens	Residential and commercial properties will be protected at current levels however flood risks will increase over the medium to long term requiring adaptation.	Impacts should generally be neutral.	Existing harbour land and seascape maintained through the prevention of flooding.	Impacts should generally be neutral.	Small harbour-related quay side businesses in this frontage which will benefit from a maintain option to maintain harbour amenity. Use of harbour maintained and supported.
PU3A.4	Embankment Road	Continuous defence provided to protect residential and commercial properties through the three epochs. Critical road access (Embankment Road) continued and protected.	Existing nature conservation values in the area maintained through protection of internationally designated freshwater environment behind the embankment.	Existing harbour land and seascape maintained through the prevention of major flooding and re-formation of the old estuary.	Historic assets protected. May be some impact on listed buildings and a locally important garden in the longer term.	Use of harbour maintained and supported.

Policy Unit		Theme				
		Property & Land Use	**Nature Conservation**	**Landscape**	**Historic Environment**	**Amenity & Recreational Use**
PU3A.5	Bembridge Point	No properties at risk on the spit. Adjacent properties will be protected by the Hold the Line policy along Embankment Road to the south.	Existing nature conservation values in the area maintained through the No Active Intervention (NAI) policy.	Existing landscape values in the area maintained by NAI of the relatively stable spit.	There are no historic sites impacted.	The spit is currently stable. Use of harbour maintained and supported.

Location reference	**Bembridge Headland to Culver Cliff**
Management Area reference	**MA 3B**
Policy Development Zone	**PDZ 3**

PREDICTED IMPLICATIONS OF THE PREFERRED PLAN

Policy Unit		Theme				
		Property & Land Use	**Nature Conservation**	**Landscape**	**Historic Environment**	**Amenity & Recreational Use**
PU3B.1	Bembridge	Properties are generally set back away from the potential erosion zone.	Impacts should generally be neutral.	Some retreat will occur with localised impact on landscape, however natural processes will drive the resulting landscape.	Historic assets subject to natural processes.	Continued sediment supply to the system will ensure beach widths are retained.
PU3B.2	Lane End	Residential and commercial properties including RLNI assets protected in the medium term. In the long term Managed Realignment (MR) can reduce the potential risk.	Impacts should generally be neutral. Some realignment will occur with localised impact on landscape, however management processes will ensure natural processes drive resulting landscape.	Some realignment will occur with localised impact on landscape.	Historic assets protected.	Long term adaptation of existing tourist and amenity assets would be required. RLNI assets protected. Continued sediment supply to the system will ensure beach widths are retained.
PU3B.3	Foreland	Commercial properties at potential risk in the medium to long term, and road access at potential risk in the shorter term, however Managed Realignment	Impacts should generally be neutral.	Realignment will occur with localised impact on landscape, however management processes will ensure natural processes drive resulting landscape.	Historic assets subject to natural processes.	Long term adaptation of existing tourist and amenity assets will be required. Continued sediment supply to the system will ensure beach widths are

Policy Unit		Theme				
		Property & Land Use	Nature Conservation	Landscape	Historic Environment	Amenity & Recreational Use
		(MR) can reduce the potential impact.				retained. MR can help maintain amenity use of the area.
PU3B.4	Foreland Fields	Some clifftop residential and commercial properties at risk in the long term, in the medium term however Managed Realignment (MR) can reduce the potential impact.	Impacts should generally be neutral. Some realignment will occur with localised impact on landscape, however management processes will ensure natural processes drive resulting landscape.	Some realignment will occur with localised impact on landscape, however management processes will ensure natural processes drive resulting landscape.	Historic assets protected.	Long term adaptation of and coastal footpath would be required. Continued sediment supply to the system will ensure beach widths are retained.
PU3B.5	Whitecliff Bay	Retreat to occur as natural processes drive resulting landscape, affecting some cliff top holiday park properties and grounds and cliff foot chalets in the north of the unit.	Impacts should generally be neutral.	Natural processes allowed to drive landscape change.	Historic assets subject to natural processes.	Long term adaptation of existing tourist and amenity assets and coastal footpath will be required. Continued sediment supply to the system will ensure beach widths are retained.

Location reference	**Sandown Bay**
Management Area reference	**MA 3C**
Policy Development Zone	**PDZ 3**

PREDICTED IMPLICATIONS OF THE PREFERRED PLAN

Policy Unit		Theme				
		Property & Land Use	Nature Conservation	Landscape	Historic Environment	Amenity & Recreational Use
PU3C.1	Culver Cliff and Red Cliff	No risk along the majority of the frontage. Impact on the edge of holiday park and Yaverland Sailing Club.	Habitats allowed to evolve in accordance with climate change in the longer term.	Landscape will evolve naturally.	Potential impact on Yaverland Battery SM.	Continued sediment supply to the system will ensure beach widths are retained.
PU3C.2	Yaverland and Eastern Yar Valley	Residential and commercial properties protected over the long	The shoreline and its habitats will continue to be somewhat modified	Preferred plan will support the landscape value but it will	Historic interests preserved.	Preferred plan will support all current recreational and

Policy Unit		Theme				
		Property & Land Use	**Nature Conservation**	**Landscape**	**Historic Environment**	**Amenity & Recreational Use**
		term.	by the sea walls and other defence structures. Nearshore coastal processes will be constrained. Protection to Brading Marshes – SSSI.	continue to be defined by the defences and development which dominate the shoreline.		amenity opportunities, however loss of beach width is a risk over the long-term which could affect amenity and tourist value.
PU3C.3	Sandown and Shanklin	Residential and commercial properties protected over the long term.	Frontage may experience coastal squeeze and loss of intertidal area due to rear of beach being constrained.	Plan will aim to support landscape value but the frontage will continue to be dominated by defence structures.	Historic interests preserved.	Tourist and recreational facilities retained over long term, however loss of beach width is a risk over the long-term which could affect amenity and tourist value.
PU3C.4	Luccombe	Some erosion risk exists for cliff top properties in the longer term.	Nature conservation areas allowed to respond naturally over time.	Landscape will evolve naturally.	Very little risk – generally no implications from the plan.	Preferred plan will support all current recreational and amenity opportunities. Continued sediment supply to the system will support beach widths in this area and to the north.

Location reference	**Eastern Undercliff (including Ventnor)**
Management Area reference	**MA 4A**
Policy Development Zone	**PDZ 4**

PREDICTED IMPLICATIONS OF THE PREFERRED PLAN

Policy Unit		Theme				
		Property & Land Use	**Nature Conservation**	**Landscape**	**Historic Environment**	**Amenity & Recreational Use**
PU4A.1	Dunnose	No risk along the majority of the frontage. Longer term risk of landslide reactivation retreating upslope.	Natural processes and value of SAC maintained. Continued sediment supply to local shorelines.	Continued no active intervention approach would help to maintain landscape value.	There are no historic sites impacted.	Coastal access through the footpath network will need to adapt and be re-routed.

Policy Unit		Theme				
		Property & Land Use	Nature Conservation	Landscape	Historic Environment	Amenity & Recreational Use
PU4A.2	Ventnor & Bonchurch (Monk's Bay to Steephill Cove)	A large number of properties continue to be defended against impacts of erosion and landslide reactivation.	The shoreline and its habitats will continue to be heavily modified by defences and natural processes will be constrained. This could lead to coastal squeeze and reduction in subtidal habitat area.	Preferred plan will support the landscape value and terraced frontage.	Victorian built environment of Ventnor is maintained under the preferred plan. Numerous listed buildings would be maintained.	Plan will support all current recreational and amenity opportunities.

Location reference	**Western Undercliff**
Management Area reference	**MA 4B**
Policy Development Zone	**PDZ 4**

PREDICTED IMPLICATIONS OF THE PREFERRED PLAN

Policy Unit		Theme				
		Property & Land Use	Nature Conservation	Landscape	Historic Environment	Amenity & Recreational Use
PU4B.1	St. Lawrence Undercliff	Generally no adverse impacts on property. Longer term risk of landslide reactivation retreating upslope.	Natural processes and value of SSSI and SAC maintained. Continued sediment supply to local shorelines.	Continued no active intervention approach would help to maintain landscape value.	There are middens and palaeoenvironmental deposits of prehistoric, Roman and medieval date on the cliff edge un this unit. Also, parks and gardens on the Local List, and structures relating to the St Lawrence Radar Station are at risk	Coastal access through may need to be re-routed.
PU4B.2	Castlehaven	Preferred plan will help manage risks from erosion, landslide reactivation. No loss of property would be anticipated in short and medium term but in the longer term slope stability conditions will	The shoreline and its habitats will continue to be modified by defences and natural processes will be constrained. This could lead to coastal squeeze and reduction in intertidal habitat area.	No impacts to the current landscape.	Protection provided to small number of listed buildings.	Recreational use would generally be unaffected by the plan.

Policy Unit		Theme				
		Property & Land Use	**Nature Conservation**	**Landscape**	**Historic Environment**	**Amenity & Recreational Use**
		influence potential management options and long term adaptation to cliff retreat will be required.				
PU4B.3	St. Catherine's and Blackgang	Impacts on properties at Blackgang, St. Catherine's Lighthouse and Chale Terrace. Longer term risk to sections of the A3055.	Natural processes and value of SSSi and SAC maintained. Continued sediment supply to local shorelines.	Continued no active intervention approach would help to maintain landscape value.	There will be some impact on archaeological and palaeoenvironmemtal sites located on the debris apron, and also listed buildings at Knowles Farm and St Catherine's Lighthouse.	NAI, coastal retreat and progressive adaptation already being practiced at this location. Amenity use of the area including Theme Park will gradually be lost. The coastal footpath will need to adapt to cliff retreat.

Location reference	**Central Chale Bay to Afton Down**
Management Area reference	**MA 5**
Policy Development Zone	**PDZ 5**

PREDICTED IMPLICATIONS OF THE PREFERRED PLAN

Policy Unit		Theme				
		Property & Land Use	**Nature Conservation**	**Landscape**	**Historic Environment**	**Amenity & Recreational Use**
PU5.1	Central Chale Bay to Afton Down	Sections of the current A3055 road alignment and isolated properties will be affected by cliff retreat or risk to access.	Preferred plan supports cliff erosion and value of natural maritime cliff habitat maintained. Natural evolution of the Chines.	Preferred plan will support the landscape value.	Impact on archaeological and palaeoenvironmental sites located on cliff edge, adjacent to Chines and associated with the former Western Yar tributary	NAI will maintain the natural landscape, beaches and scenery of the area, maintaining the amenity interest overall. However, loss of access through potential loss of the A3055 road link and loss of areas of car parking will impact on tourism use and access. The coastal footpath will need to

Policy Unit		Theme				
		Property & Land Use	**Nature Conservation**	**Landscape**	**Historic Environment**	**Amenity & Recreational Use**
						adapt to cliff retreat.

Location reference	**Freshwater and the Tennyson Down headland (including Alum Bay and Headon Warren)**
Management Area reference	MA 6A
Policy Development Zone	PDZ 6

PREDICTED IMPLICATIONS OF THE PREFERRED PLAN

Policy Unit		Theme				
		Property & Land Use	**Nature Conservation**	**Landscape**	**Historic Environment**	**Amenity & Recreational Use**
PU6A.1	Freshwater Bay	Provides flood defence for numerous properties in Freshwater and the Western Yar Valley. The preferred plan maintains the coastal road and seeks to support or enhance the protective beach.	The shoreline and its habitats will continue to be heavily modified by defences and natural processes will be constrained. This could lead to coastal squeeze and reduction in intertidal habitat area.	Preferred plan will support the landscape value.	Historic features will be protected.	Plan will support current recreational and amenity opportunities, however, cliff retreat adjoining the defences may also impact on amenity use of the area.
PU6A.2	Tennyson Down, Alum Bay and Headon Warren	No impact along the majority of the frontage. Properties on the margins of Freshwater and Totland affected in the medium to long term. Cliff-top facilities at the edge of the Alum Bay park also at risk, although the main buildings are set back from the cliff edge.	The preferred plan for a non-interventional approach will generally support the core objectives of the SAC and SSSI.	Preferred plan will support the landscape value and iconic Needles.	Full or partial loss of Needles Old Battery (SM).	Current recreation and amenity use of the frontage would not be altered by the preferred plan although sea level rise access to Alum Bay (chair lift and stair) may need relocating. Coastal access will need to adapt.

Location reference	**Totland to Norton**
Management Area reference	**MA 6B**
Policy Development Zone	**PDZ 6**

PREDICTED IMPLICATIONS OF THE PREFERRED PLAN

Policy Unit		**Theme**				
		Property & Land Use	**Nature Conservation**	**Landscape**	**Historic Environment**	**Amenity & Recreational Use**
PU6B.1	Totland and Colwell	Preferred plan will support protection of properties.	The shoreline and its habitats will continue to be heavily modified by defences and natural processes will be constrained. This could lead to coastal squeeze and reduction in intertidal habitat area.	The landscape will continue to be dominated by the developed nature of the frontage and the continuous defences from Totland to southern Colwell Bay.	No implications.	Recreational use and access to the coast would be supported by the plan.
PU6B.2	Central Colwell Bay	Continuing cliff retreat will affect part of the cliff-top Holiday Park.	Little natural change expected. Preferred plan will support SMP high level nature conservation objectives and geological interest.	Little natural change expected.	No implications.	Continued sediment supply to the system will support beach widths in this area.
PU6B.3	Fort Albert	Existing structures can be maintained to extend their life, but in the long term access to Fort Albert and the Fort and cliff top properties will be at risk. Increasing erosion from the adjacent units to the north and south will also increase the risk to cliff top chalets and buildings.	The shoreline will be subject to coastal squeeze in the short term with a move to natural processes in the final epoch.	Landscape may be altered with long term loss of Fort Albert.	Long term loss of Fort Albert (LBII*). Also impacts on Cliff End Battery	Private amenity use of the area will be retained over short term and medium term. Long term adaptation will be required.
PU6B.4	Fort Victoria Country Park	No impacts on property. Some loss of land at Fort Victoria Country Park.	Plan would increase intertidal foreshore area.	Landscape may be altered under no active intervention but not adversely.	No implications.	Impacts to recreational use and access to Victoria Country Park.
PU6B.5	Fort Victoria and Norton	Fort Victoria and some surrounding properties at risk in the long term.	No change in the short term moving towards natural processes in	Landscape may be altered under no active intervention but natural	Long term loss of historic Fort Victoria.	Current recreation and amenity use of the frontage would be

Policy Unit		Theme				
		Property & Land Use	**Nature Conservation**	**Landscape**	**Historic Environment**	**Amenity & Recreational Use**
		Access to the area may be affected in the medium term.	the longer term.	processes will drive the resulting landscape.		retained in the short term but lost or reduced in the medium to long term.

Location reference	**Yarmouth and the Western Yar Estuary**
Management Area reference	**MA 6C**
Policy Development Zone	**PDZ 6**

PREDICTED IMPLICATIONS OF THE PREFERRED PLAN

Policy Unit		Theme				
		Property & Land Use	**Nature Conservation**	**Landscape**	**Historic Environment**	**Amenity & Recreational Use**
PU6C.1	Norton Spit	No impacts on property.	Holding the line of defence will prevent the dunes, which are a designated feature of the Solent Maritime SAC from migrating south and possibly breaching.	Preferred plan will support the landscape value.	No implications.	Use of harbour maintained and supported.
PU6C.2	Western Yar Estuary -west	No impact along the majority of the frontage. Potential flood risk to some buildings near Salterns Wood and Kings Manor Farm.	The preferred plan for a non-interventional approach will generally support the core objectives the Estuary	Preferred plan will support the landscape value and the AONB designation.	Impacts on Listed Buildings at King's Manor and palaeoenvironmental deposits that are currently protected by saltmarsh within the Estuary. Generally there are numerous historic sites across the undefended parts of the estuary which may potentially be adversely impacted or ultimately lost under a no active intervention approach.	The wide, varied and hugely important amenity use of the estuary would be supported by the plan.

Policy Unit		Theme				
		Property & Land Use	**Nature Conservation**	**Landscape**	**Historic Environment**	**Amenity & Recreational Use**
PU6C.3	The Causeway	Widespread properties and core land use along the Western Yar valley protected under the preferred plan.	The preferred plan for a non-interventional approach will generally support the core objectives the Estuary, although the tidal flow to the south will remain restricted at this point. Freshwater habitats upstream will be maintained.	The preferred plan will support the landscape value.	Potential impacts on the Causeway itself, WWII pillbox and nearby All Saints Church.	Recreational use would generally be unaffected by the plan and the access route will be maintained.
PU6C.4	Western Yar Estuary -east	No risk to properties.	The preferred plan for a non-interventional approach will generally support the core objectives the Estuary.	The preferred plan will support the landscape value.	No implications.	The wide, varied and hugely important amenity use of the estuary would be supported by the plan. Some access points and shoreline pathways may need to be re-positioned over time. Future risk to the cycle route would require adaptation to sustain use of the important route.
PU6C.5	Thorley Brook and Barnfields Stream	HTL in the first epoch and MR in the second epoch provide opportunity to address and reduce potential tidal flood risk to localised areas of property adjacent to the proposed new tidal floodplains.	HTL in the first epoch will allow time to plan for habitat adaption. MR then NAI in the medium and longer term will restore more natural behaviour and operation of these inlets with benefits for the nature conservation interest, although some habitat change will occur.	Landscape improvements could be delivered through programme of realignment or no active intervention in the longer term.	Potential impacts on historical features near Thorley.	Potential loss of cycle route would require adaptation to sustain use of the important route.
PU6C.6	Yarmouth to Port la Salle	A large number of properties protected from flood and erosion risk under the preferred	The shoreline and its habitats will continue to be modified by the defences and natural	Landscape will continue to be dominated by open coast defences.	Variety of historical features, SM and listed buildings would be safeguarded under	Use of harbour maintained and supported. Recreational use and coastal access

Policy Unit		Theme				
		Property & Land Use	Nature Conservation	Landscape	Historic Environment	Amenity & Recreational Use
		plan. Key transport routes are maintained.	processes will be constrained.		the plan.	would also be maintained by the plan.

Location reference	**Bouldnor Copse to southern Gurnard Bay**
Management Area reference	**MA 7**
Policy Development Zone	**PDZ 7**

PREDICTED IMPLICATIONS OF THE PREFERRED PLAN

Policy Unit		Theme				
		Property & Land Use	Nature Conservation	Landscape	Historic Environment	Amenity & Recreational Use
PU7.1	Bouldnor Copse and Hamstead	No impact along the majority of the frontage. Risk to several properties near Cranmore in the medium to long term.	The preferred plan for a non-interventional approach will generally support the core objectives of all the designations.	Preferred plan will support the landscape value and NNR.	No implications. Archaeological sites and palaeoenvironmental deposits in the intertidal and offshore zone will continue to be affected by natural change.	Continued sediment supply to the system will support beaches in the area, although this coast is relatively inaccessible.
PU7.2	Newtown Estuary	Some realignment of the frontage in the medium to longer term (walkways and quays). Long term loss of the	The preferred plan for a non-interventional approach will generally support the core objectives of all the designations. There will be loss of the salt ponds with sea level rise.	Preferred plan will support the landscape value and NNR.	Impact on sites and palaeoenvironmental deposits at the mouth of the estuary. Quays and waterfront structures at Newtown and Shalfleet are historic structures. On the margin of the flood zone, much of Newtown is Scheduled Monument.	Amenity use of the natural landscape will be maintained by NAI although locallised access may require adaptation. Spits allowed room to respond to sea level rise, will help to reduce loss of beach material.
PU7.3	Thorness Bay and southern Gurnard Bay	No impact along the majority of the frontage. Risk to parts of the Thorness Bay holiday park and scattered building between Thorness and Gurnard Luck in the medium to long term.	The preferred plan for a non-interventional approach will generally support the core objectives of all the designations.	Preferred plan will support the landscape value and NNR.	No implications. Numerous archaeological and palaeoenvironmental sites in the intetidal zone of Thorness Bay will continue to be affected by natural change.	Continued sediment supply to the system will support beaches in the area.

6 Action Plan

Contents

6. Action Plan

6.1 Introduction

This chapter provides an Action Plan for the Isle of Wight SMP.

This Action Plan is a very important element of the SMP, and particularly for the Isle of Wight SMP. The plan has identified that there are a number of important uncertainties and that we need to improve our understanding to support firmer policy decisions in the next SMP and beyond.

As outlined in chapter 1 the intent is to continue the partnership approach through which we have developed this SMP, including stakeholders, officers and elected members and linked to the existing coastal group. Ongoing progress meetings can actively monitor and drive the progress of the Action Plan. This will enable an ongoing process of shoreline management in the coming years, in the run-up to the next SMP in five to ten years time.

The Action Plan summarises all the specific actions that are needed to implement the plan and the policies. This includes actions by the Environment Agency and the Isle of Wight Council to develop flood and erosion risk management strategies and schemes. It also includes actions for the linked authorities, for example to incorporate the plan into the land use planning system or support adaptation of affected people, businesses and organisations.

As indicated in chapter 1, implementing SMP policies will depend on funding being available. This is not only the case for building and maintaining flood defences, but also for all the other actions needed to implement the plan. This funding may be available from the national flood and coastal erosion risk management budget, but it could also come from other national sources or from local and/or third-party funding.

6.2 SMP-wide Actions

Action Reference	Works Required	Responsibility	Priority	Target Start Date (-Target Completion Date)	Short/Medium Term Policy Implementation	Actual Start Date Completion Date	Action Status (N/O/C)[1]
0.1	Implementation of SMP policies and actions through continuation of CSG and EM involvement.	Operating Authorities	High	2011 - 2015	Short Term Action		O
0.2	Continue consultation with key stakeholders and general public in the period post adoption of SMP2; (progress the action plan; convey messages around flood and erosion risk, potential coastal change and maintain the stakeholder engagement list).	Operating Authorities	High	2011 - 2015	Short Term Action		O
0.3	Ensure that local and regional development and planning documents take account of SMP policies and flood and erosion risks. Link to IWC LDF Planning Policy and planned Flood Risk and Vulnerable Coastal Communities SPD which will set out the Council's approach to Coastal Change Management Areas (CCMAs).	Isle of Wight Council	High	2011 - 2015	Short Term Action		O
0.4	Development, monitoring and review of emergency response plans to prepare for extreme events that exceed standard.	Local Authority and Local Resilience Forums	High	2010	Short Term Action		O

[1] N = not yet commenced, O = ongoing, C = complete.

Action Reference	Works Required	Responsibility	Priority	Target Start Date (-Target Completion Date)	Short/Medium Term Policy Implementation	Actual Start Date Completion Date	Action Status (N/O/C)[1]
0.5	Continue with improvements to flood risk maps and inundation modelling to provide improved flood warning service.	Environment Agency	Medium	2011 - 2015	Short Term Action		O
0.6	Upgrade/update of Rapid Coastal Zone Assessment Survey (RCZSA) (including detailed deskbased assessment of heritage assets at risk, to be prioritised for mitigation).	English Heritage	Medium	To inform Strategies and SMP3	Short Term Study		N
0.7	Review requirements for the Strategic Regional Coastal Monitoring Programme based on policies and additional information requirements identified to improve understanding for SMP3, including in particular cliff top positions and intertidal habitats in certain locations (habitat mapping programme).	Isle of Wight Council	High	2011	Short Term Monitoring		O
0.8	Periodically (every two years) review requirements for the Strategic Regional Coastal Monitoring Programme based on analysis of data collected	Isle of Wight Council	High	2013	Medium Term Action		O
0.9	Carry out Strategic Regional Coastal Monitoring Programme (linked to above)	Strategic Regional Coastal Monitoring Programme on behalf of Southern Coastal Group	High	2011	Short Term Action		O

Action Reference	Works Required	Responsibility	Priority	Target Start Date (-Target Completion Date)	Short/Medium Term Policy Implementation	Actual Start Date Completion Date	Action Status (N/O/C)[1]
0.10	Continued management of defences in line with SMP policies.	Operating Authorities	High	2011	Short Term Action		O
0.11	Support the RHCP by providing information from the SMP and engaging with third parties on the island	Natural England, Environment Agency, Local Authority	Medium	2011	Short Term Action		O
0.12	A review of all HER data to ensure that it has correctly captured the important issues for consideration during scheme development. Additional information for the Strategies will be assessed, especially for Managed Realignment schemes and areas that will have No Active Intervention.	English Heritage and Isle of Wight Council	Medium	to inform Strategy Studies	Medium Term Study		N
0.13	Regionwide sediment transport studies to fill gaps and uncertainties identified in SMP2 (in particular Ryde Sands) in partnership with SMPs for North Solent and Poole and Christchurch	Southern Coastal Group	High	2012	Medium Term Study		N
0.14	Investigate the requirement of joint funding (including public & private funding) in certain areas with a view to gain additional funding in line with the SMP recommendations	Southern Coastal Group	High	2010	Medium Term Study		N

Action Reference	Works Required	Responsibility	Priority	Target Start Date (-Target Completion Date)	Short/Medium Term Policy Implementation	Actual Start Date Completion Date	Action Status (N/O/C)[1]
0.15	Regionwide wave climate risk studies to identify impacts of bimodal wave period conditions on design risk of all structures and beach systems; to include assessment of overtopping and breach potential. Based on uncertainties identified in SMP2 and SCOPAC studies, in partnership with SMPs for North Solent and Poole and Christchurch	Coastal Monitoring Programme on behalf of the Southern Coastal Group	Medium	2011	Short Term Action		N
0.16	Review the distinction and links between landslip and erosion	Environment Agency (National)	High	Inform Strategies	Short Term Action		N
0.17	Informing the key stakeholders and public of the implications and realistic outcomes from the SMP policies.	Isle of Wight Council	High	2011	Short Term Action		O
0.18	Review boundaries of the West Wight Coastal Defence Strategy arising from the new SMP - Consider inclusion of the Medina Estuary & Newport Harbour. Complete the Strategy. Lead issues are coastal flooding at Yarmouth, Cowes and East Cowes	Operating Authorities	High	2011	Short Term Action		Restart and completion required
0.19	Complete Sandown Undercliff Coastal Defence Strategy Study. Lead issues are cliff erosion and beach levels in Sandown Bay and potential landslide reactivation in Ventnor	Operating Authorities	High	2012	Medium Term Action		Restart and completion required

Action Reference	Works Required	Responsibility	Priority	Target Start Date (-Target Completion Date)	Short/Medium Term Policy Implementation	Actual Start Date Completion Date	Action Status (N/O/C)[1]
0.20	Ensure that any subsequent strategies, schemes and projects consider the mitigation measures listed in the South East River Basin Management Plan Programme of Measures (refer to Tables 4 and 5 of Appendix J)	Isle of Wight Council / Environment Agency	High	From adoption of the SMP	Long Term Action		N
0.21	Need to secure compensatory habitat for 30.9 hectares of coastal grazing marsh for the Solent and Southampton Water Ramsar site through the Southern Regional Habitat Creation Programme	Environment Agency (Isle of Wight Council)	High	ASAP: Habitat needs to be created by the end of 2025 when MR policy will be actioned for the second epoch.	Short Term Action		N
0.22	Consider the plan findings in respect of the outputs of UKCP09, in accordance with national guidance when available	Isle of Wight Council / Environment Agency	Medium	To inform future Strategies and Schemes	To be determined by national guidance		N
0.23	Review and extend the Action Plan in accordance with national guidance	Southern Coastal Group / Isle of Wight Council / Environment Agency	High	2011	Short Term Action		N
0.24	Discuss implications of the SMP and Strategy policies for beach levels and amenities (and resulting public and private beach management as required) with the Beach Environment Advisory Committee (BEAC).	Isle of Wight Council	Medium	2011 onwards	Medium Term Action		N

6.3 Actions for PDZ1 to PDZ7

PDZ1 Cowes and the Medina Estuary

Action Reference	Works Required	Responsibility	Priority	Target Start Date	Short/Medium Term Policy Implementation	Actual Start Date Completion Date	Action Status (N/O/C)[2]
1.1	Production of Scheme to deliver HTL policy along Cowes and East Cowes in future epochs (this could include areas of managed realignment). This would follow the West Wight Strategy.	Environment Agency	High	2015	Short Term Action		N
1.2	Continue / increase monitoring of saltmarsh and mudflat areas along the Medina Estuary. This needs to inform understanding of the intertidal areas' flood defence function, the sustainability of the earth embankments, and its habitat function. To be integrated with Regional Habitat Creation Programme.	Environment Agency, Natural England	High	Start ASAP	Short Term Action		N
1.3	Further studies to investigate transfer to No Active Intervention at Gurnard Luck: the viability of the policy; future morphology of the Gurnard Luck; the feasibility of regulated tidal exchange; flood risk of undertaking NAI; define the standard,	Isle of Wight Council/Environment Agency	High	Linked to West Wight Strategy Study	Short Term Action		N

[2] N = not yet commenced, O = ongoing, C = complete.

Action Reference	Works Required	Responsibility	Priority	Target Start Date	Short/Medium Term Policy Implementation	Actual Start Date Completion Date	Action Status (N/O/C)[2]
	and prepare a management plan for maintaining the sluices. Assessed as being a feasible site in the Isle of Wight Mitigation Strategy (Atkins, 2006).						
1.4	Research opportunities/implications for habitat creation within Dodnor Creek adjoining the Medina Estuary.	Natural England	Medium	ASAP	Short Term Action		N

PDZ2 Ryde and North-east Coastline

Action Reference	Works Required	Responsibility	Priority	Target Start Date	Short/Medium Term Policy Implementation	Actual Start Date Completion Date	Action Status (N/O/C)[3]
2.1	Develop multi-agency Advisory Note for Wootton Creek (with the Isle of Wight Council, Natural England, Environment Agency and local representatives) to assist landowners in managing their private frontages.	Isle of Wight Council, Natural England, Environment Agency	High	2010/2011	Short Term Action		N
2.2	Develop collaborative approach to achieve HTL policy for Epochs 2 and 3 along the Ryde frontage.	Isle of Wight Council, Environment Agency.	Low	2020	Medium Term Study		N
2.3	Seek funding for study on erosion impacts at Fishbourne	Isle of Wight Council	High	2011	Short Term Action		N
2.4	Further studies to investigate Managed Realignment at the Old Mill Pond: i.e. the viability of the policy; future morphology of the pond; the feasibility of regulated tidal exchange and intertidal habitat creation; exact saline consequences on Briddlesford Copse SAC of undertaking managed realignment; define the standard and prepare a management plan for maintaining the sluices.	Natural England / Environment Agency	High	ASAP	Short Term Action		O
2.5	When new defences or maintenance works are	Isle of Wight Council /	Medium	When existing defences need maintenance	Medium Term Action		O

[3] N = not yet commenced, O = ongoing, C = complete.

Action Reference	Works Required	Responsibility	Priority	Target Start Date	Short/Medium Term Policy Implementation	Actual Start Date Completion Date	Action Status (N/O/C)[3]
	required at Nettlestone Point ensure that these are created out of rocky material to provide colonisation opportunities for rocky shore communities with sea level rise	Environment Agency					

PDZ3 Bembridge and Sandown Bay

Action Reference	Works Required	Responsibility	Priority	Target Start Date	Short/Medium Term Policy Implementation	Actual Start Date Completion Date	Action Status (N/O/C)[4]
3.1	Implement maintenance plans to St Helen's Duver in line with the Eastern Yar Strategy	Isle of Wight Council	High	2011	Short Term Action		N
3.2	Develop a Beach Management Plan for Sandown Bay.	Operating Authorities	High	Linked to the completion of the Strategy Study (action 0.19)	Short Term Action		N
3.3	Commission study to look at the joint tidal and fluvial risk at Culver Parade and how that is managed to deliver the HTL policy in the near future, or through potential realignment and habitat recreation in longer term planning.	Natural England	Medium	2020	Medium Term Study		N

[4] N = not yet commenced, O = ongoing, C = complete.

PDZ4 Ventnor and the Undercliff

Action Reference	Works Required	Responsibility	Priority	Target Start Date	Short/Medium Term Policy Implementation	Actual Start Date Completion Date	Action Status (N/O/C)[5]
4.1	Develop strategy/business case for funding for defence scheme at Ventnor.	Isle of Wight Council	Medium	2015	Medium Term Study		N
4.2	Communication strategy for coastal adaptation at Castlehaven.	Isle of Wight Council	Medium	To inform SMP3	Medium Term Study		N
4.3	Continued long-term ground-movement monitoring and instrumentation within the landslide complex, assessing coastal slope reactivation to assist management of defences.	Isle of Wight Council	High	Continued	Medium Term Monitoring		O
4.4	GPS monitoring programme for central Ventnor to determine surface ground movement patterns (initial 10 years of data being collected to 2016)	Isle of Wight Council	High	Continued	Medium Term Monitoring		O
4.5	Consider potential to remove any surplus man-made defences below vegetated cliffs within PDZ 4 (e.g. Luccombe Cliffs).	Isle of Wight Council	Low	First epoch	Short – medium Term Action		N

[5] N = not yet commenced, O = ongoing, C = complete.

PDZ5 South-west Coastline

Action Reference	Works Required	Responsibility	Priority	Target Start Date	Short/Medium Term Policy Implementation	Actual Start Date Completion Date	Action Status (N/O/C)[6]
5.1	Realignment of Military Road	Isle of Wight Council and all partners	High	2011	Short Term Action		N
5.2	Take decision about potential actions based on the results from the study to determine the erosion processes on the Chines	Isle of Wight Council	Low	2013	Medium Term Study		N

[6] N = not yet commenced, O = ongoing, C = complete.

PDZ6 West Wight

Action Reference	Works Required	Responsibility	Priority	Target Start Date	Short/Medium Term Policy Implementation	Actual Start Date Completion Date	Action Status (N/O/C)[7]
6.1	Develop Scheme for Freshwater Bay to HTL over the next 100 years as part of the West Wight Coastal Defence Strategy Study.	Isle of Wight Council, Environment Agency	Medium	2015	Medium Term Action		N
6.2	Develop Scheme to deliver HTL policy along Yarmouth and surrounding communities in future epochs (this could include areas of managed realignment). This would follow the West Wight Strategy.	Isle of Wight Council, Environment Agency, Natural England	Medium	2015	Medium Term Action		N
6.3	Develop plan for short and medium term policies leading to MR at Thorley Brook to allow time for habitat adaptation and to assess/address consequences of tidal inundation for the properties and infrastructure at the margins of the floodplain (A specific programme of action for monitoring, consultation and studies to improve predictions of intertidal developments and understanding of the impact of loss and gain of intertidal foreshore on flood	Natural England (& Operating Authorities)	Medium	Needs to be complete to implement the MR policy in 2025	Short Term Action		N

[7] N = not yet commenced, O = ongoing, C = complete.

Action Reference	Works Required	Responsibility	Priority	Target Start Date	Short/Medium Term Policy Implementation	Actual Start Date Completion Date	Action Status (N/O/C)[7]
	defence and habitats. The increased knowledge will inform the timing, location and extent of the saline intrusion up the lower reaches of Thorley Brook and Barnfields Stream for the MR in the second epoch and thus optimise defence sustainability and to compensate for the expected deterioration of intertidal habitats and loss of freshwater habitats).						

PDZ7 North-west Coastline

Action Reference	Works Required	Responsibility	Priority	Target Start Date	Short/Medium Term Policy Implementation	Actual Start Date Completion Date	Action Status (N/O/C)[8]
7.1	Adapt footpaths around Newtown Estuary (e.g. the footpath landward of the saline lagoons in Newtown Estuary)	National Trust & Isle of Wight Council	Medium	By the end of the first Epoch (e.g. 2025) prior to when the current defences are likely to start failing	Short Term Action		N

[8] N = not yet commenced, O = ongoing, C = complete.