

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)

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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



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)



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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.

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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

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

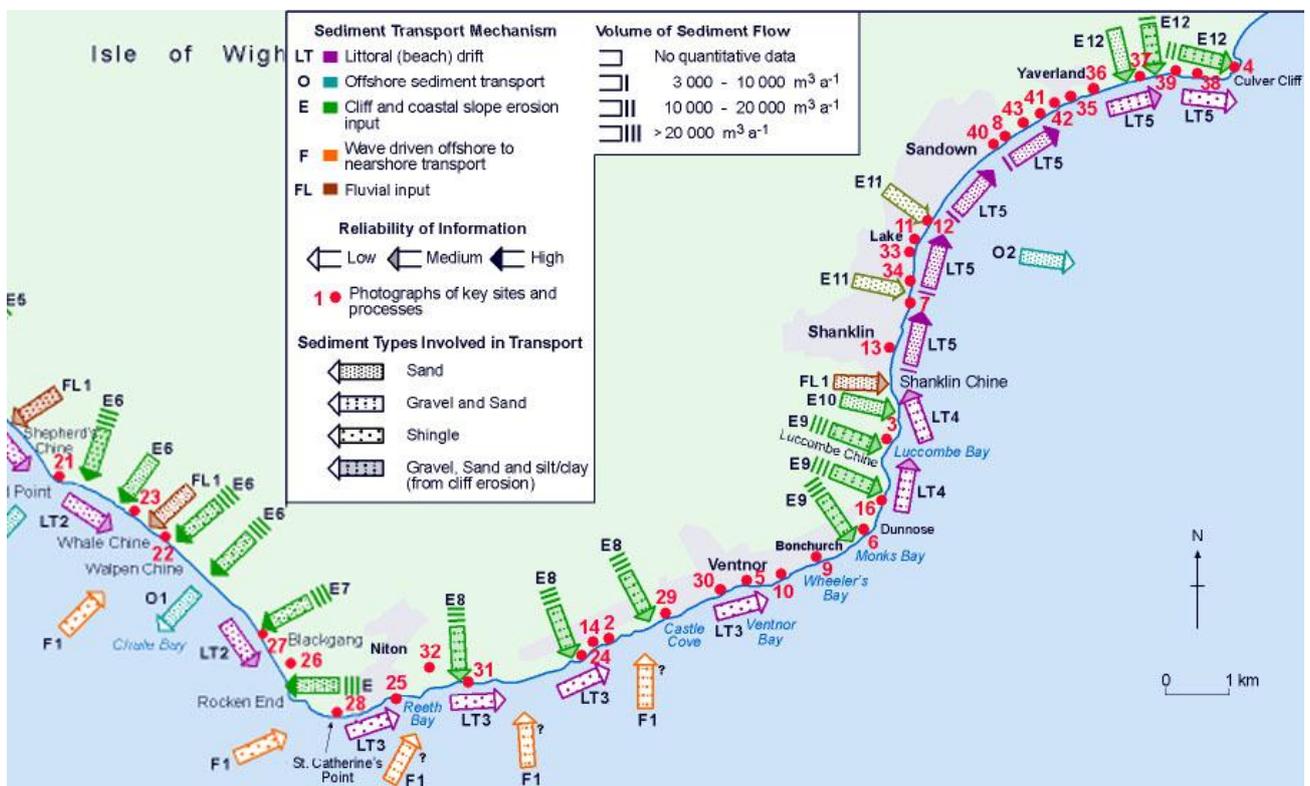
1.5 Physical Processes

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.

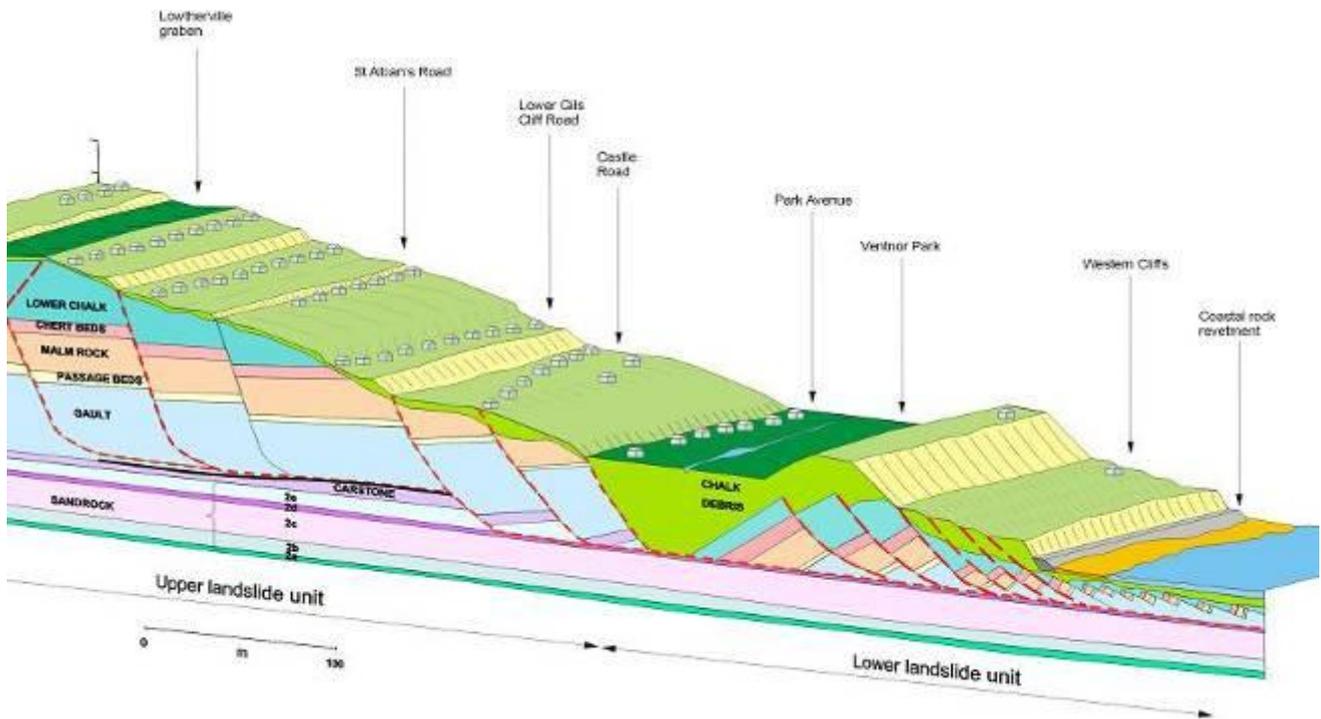


Sediment transport sources, pathways and sinks along the Ventnor Undercliff coast and at Blackgang, from the SCOPAC Sediment Transport Study, 2004.

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 groyne 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 groyne 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	64	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	64	
IW31	Bonchurch	0.40	0.46	0.61	0.71	0.77	64	
IW32	Wheeler's Bay	0.40	0.46	0.61	0.71	0.77	64	
IW33	Eastern Cliffs, Ventnor	0.40	0.46	0.61	0.71	0.77	64	
IW34	Ventnor Haven & Eastern Esplanade	0.40	0.46	0.61	0.71	0.77	64	
IW35	Ventnor Bay & Western Cliffs	0.40	0.46	0.61	0.71	0.77	64	
IW36	Castle Cove & Steephill Cove	0.40	0.46	0.61	0.71	0.77	64	
IW37	St Lawrence Undercliff	0.30	0.35	0.46	0.53	0.58	48	
IW38	Castlehaven & St. Catherines	0.60	0.69	0.91	1.06	1.15	96	
IW39	Blackgang	1.00	1.15	1.52	1.77	1.92	160	

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 it is 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

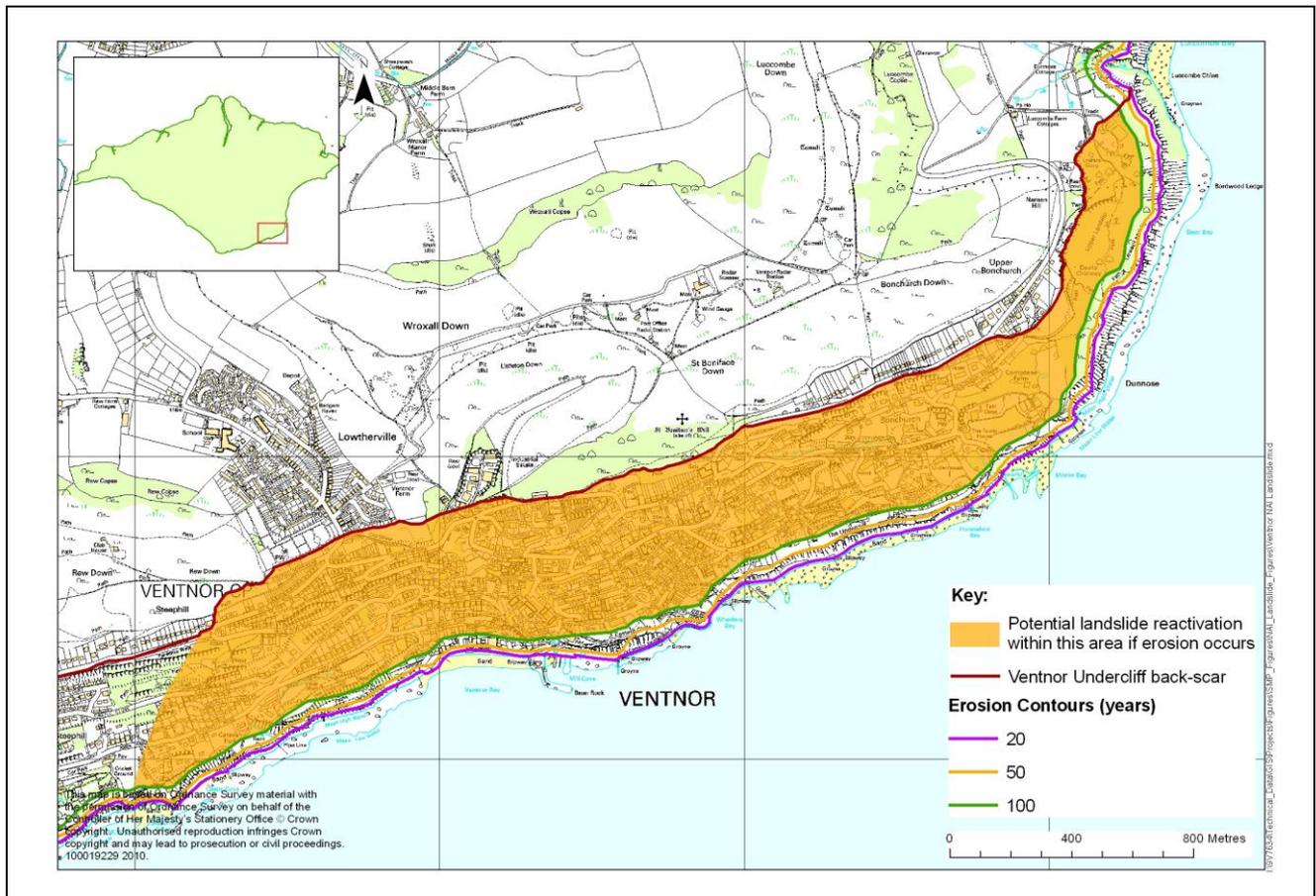
Continuous coastal defences and cliff stabilisation schemes involving re-grading and drainage protect the developed coastline. A scenario of NAI would result in the deterioration and eventual loss of these defences and would have devastating consequences for the future of the Ventnor town and surrounding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

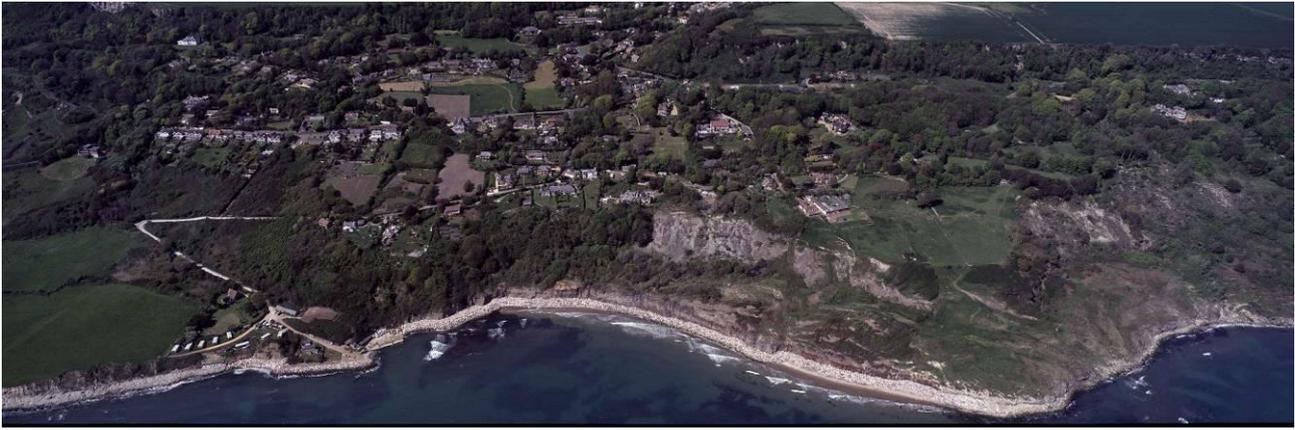
In contrast to the steeply sloping topography of central Ventnor and parts of Bonchurch the frontage from Steepphill to west of St. Lawrence is relatively gentle with a wide ancient debris apron, providing some protection to the village of St. Lawrence as erosion progresses. The close association between 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 x £1000	Number of properties:		Value x £1000	Number of properties:		Value x £1000	PV Damages (£x1000)
Location	Residential	Commercial		Residential	Commercial		Residential	Commercial		
Dunnose	0	0	0	0	1	0	0	2	30	3
Ventnor (Monks Bay to Steepphill 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 x £1000	Number of properties		Value x £1000	Number of properties		Value x £1000	PV Damages (£x1000)
Location	Residential	Commercial		Residential	Commercial		Residential	Commercial		
Dunnose	0	0	0	0	1	0	0	2	30	3
Ventnor (Monks Bay to Steepphill 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.

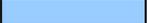
- Where there is a difference between With Present Management and the Preferred Policy this distinction is made in showing two different lines:

 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.

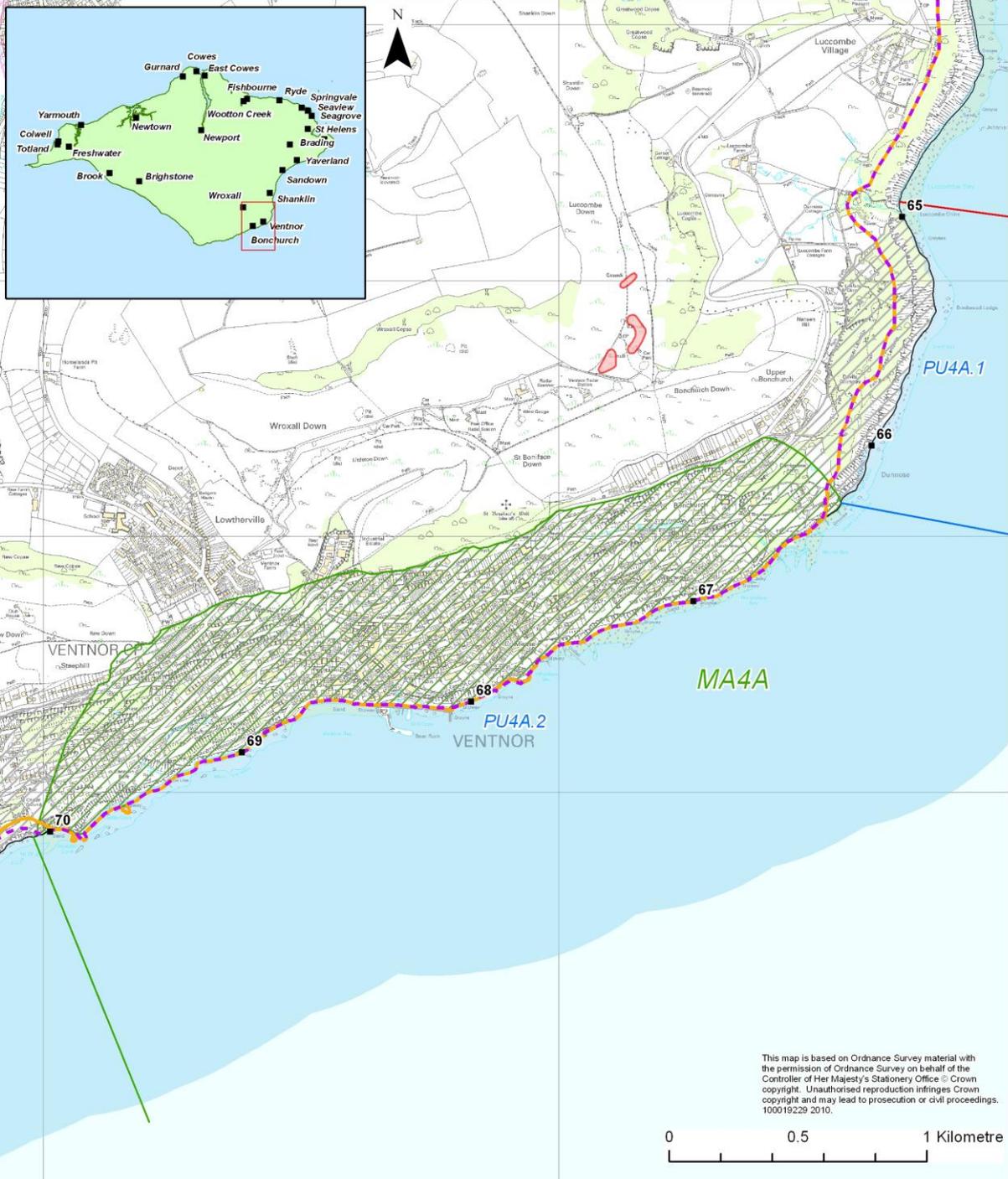
 Indicate where over the 100 years the policy would allow increased risk of flooding.

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



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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 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

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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			Comment
		to 2025	to 2055	to 2105	
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.

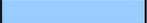
- Where there is a difference between With Present Management and the Preferred Policy this distinction is made in showing two different lines:

 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



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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 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



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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.
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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.

