Directorate of Economy & Environment
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Isle of Wight Shoreline Management Plan 2

Appendix C: Baseline Process Understanding

C3: Baseline Scenarios (of future shoreline change)

- **No Active Intervention scenario**
- **With Present Management scenario**

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C3: Baseline Scenarios (of future shoreline change)
- **No Active Intervention (NAI) scenario**
- **With Present Management (WPM) scenario**

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1. Context

This task follows the guidance published by Defra (2006) on the development of Shoreline Management Plans (including Volume 1, Volume 2 and Appendix D –Shoreline Interactions and Response), to provide an understanding of shoreline interactions and responses for two baseline scenario assessments: ‘no active intervention’ and ‘with present management’ (Task 2.2).

2. Aim and Introduction

The aim of this task is to provide an understanding of how the shoreline is likely to evolve in the future and the influence that coastal management or intervention is likely to have on that behaviour. This provides the basis by which flood and coastal erosion risks are determined, to define the zone of assets within which features and issues are at risk over the next 100 years. This analysis is used by the SMP to develop and appraise the consequences of setting different shoreline management policies.

This task delivers four outputs:

- a description of the shoreline response to a scenario of ‘No Active Intervention’ (NAI). This assumes that defences are no longer maintained and will fail over time.
- a description of the shoreline response to a scenario of continuing ‘With Present Management’ (WPM). This assumes that all defences are maintained to provide a similar level of protection to that provided at present.
- maps illustrating predicted shoreline change if ‘No Active Intervention’ (NAI) occurs.
- maps illustrating predicted shoreline change if continuing ‘With Present Management’ (WPM) techniques.

The maps and scenarios describe coastal evolution over three future epochs or time periods:

1) 0-20 years (approx. 2025);
2) 20-50 years (approx 2055);
3) 50-100 years (approx. 2105).

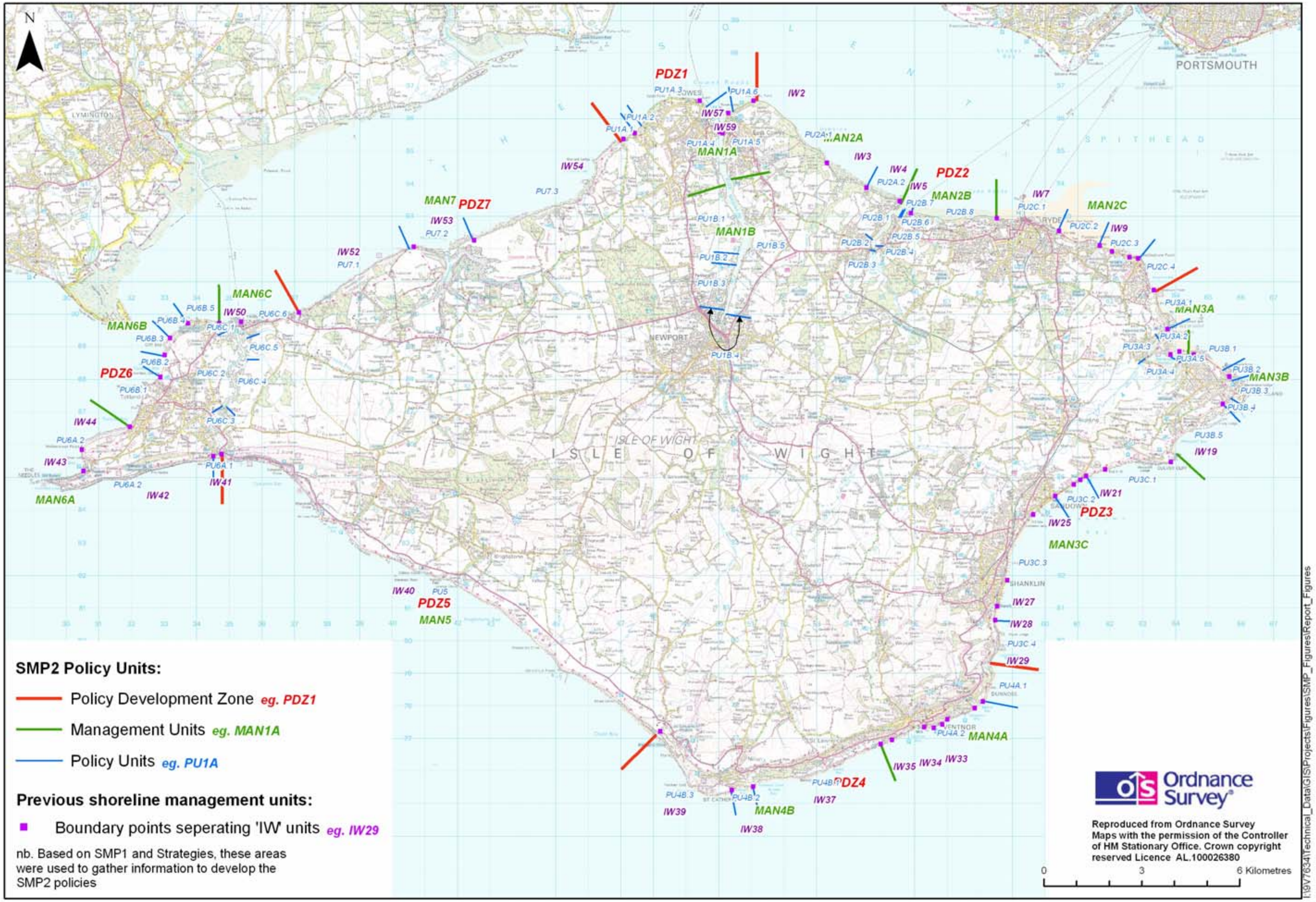
These three epochs reveal short, medium and long-term change and are examined by all SMPs in England & Wales.

3. Geographical units

To describe the variation around the Isle of Wight coast, the coastline has been divided into 58 frontages, from 260m to 18km in length. These frontages characterise likely future patterns of change, based on geomorphological units, a change in the scale of active or potential cliff retreat, areas of flood risk and development patterns. This report also assesses the longshore interactions between these frontages, for example their reliance on one another for supply of beach sediments.

Erosion at Horestone Point, February 2009

Flooding surrounding Newport Harbour, March 2008



Map showing the location of the **'IW' units (in purple)** used in the tables throughout Appendix C.

Nb. the map also shows the location of the new SMP2 ***Policy Units 'PU1A.1' (in blue)*** *developed after the completion of Appendices C, D and E and used in the Main Report.*

4. Introduction to the Baseline Scenarios

An understanding of shoreline interactions and response forms an integral part of the SMP. The Baseline Scenarios develop an understanding of how the shoreline is behaving and the influence that coastal management has upon this behaviour. This allows areas at risk from future flooding and erosion to be identified and the potential consequences of coastal management policies and structures to be understood, to inform the setting of future shoreline management policies.

Assessments are required for two scenarios:

a) **No Active Intervention' (NAI)**. This scenario assumes that defences are not maintained and will fail over time. The effectiveness of the defences will change across each time period as some fail sooner than others, depending on the residual life, for example a concrete sea wall will probably last longer than a timber revetment currently in a similar condition. This scenario takes account of the dates of defence failure defined in the Defence Appraisal (Appendix C2 of this SMP2). Residual life of current defences can also be affected by changes in beach morphology, e.g. accretion or erosion. Shoreline change following **'**defence failure is assessed over the next 100 years.

b) **'With Present Management' (WPM)**. This scenario assumes that all defences are maintained to provide a similar level of protection to that provided at present, to identify when current practices will no longer be effective over the next 100 years (as sea level rises and coastal processes change, for example). For the purposes of this SMP Appendix C3, this has been defined as the standard of the defence structure being maintained but not improved –i.e. a seawall may become affected by overtopping in future epochs.

c) **Mapping of predicted shoreline change** accompanies both scenarios described above (NAI maps & WPM maps).

The short, medium and long-term evolution of the coastline is examined, using **three epochs (0-20 years; 20-50 years; 50-100 years**). A large-scale and long-term understanding of shoreline response is necessary to assess the sustainability of management options and to take into account any long-term trends or drivers of coastal change, which may vary from short-term and local observations.

Appendix C1 –Assessment of Shoreline Dynamics- is a fundamental input to the Baseline Scenarios. As an understanding of coastal behaviour and dynamics both historically and present day, it identifies key linkages and interactions along the coast and past shoreline movement. The Baseline Scenarios take this work forward to predict the response of the coast to the failure or maintenance of coastal defences, to changes in forcing factors (waves, tides, exposure, etc.), to changes in sediment supply and storage, and it identifies erosion rates to determine the future shoreline position.

The analysis of each stretch of coast in the 'baseline scenarios' must continually consider each of the following:

- what is there? (i.e. features, geomorphology, sedimentology etc.);
- how is it reacting to circumstances around it? (i.e. long-term trends; reactivation; typical response and response to extreme events);
- why is it reacting in this manner? (e.g. is the reaction controlled by factors such as sediment supply, geological/geomorphological controls);
- where will the shoreline be? (position);
- what are the consequences elsewhere of this reaction? (e.g. features updrift and downdrift).

Under the ‘No Active Intervention’ (NAI) policy scenario, there is no expenditure on maintaining or improving existing coastal and flood defences, therefore defences will fail at a time dependent upon their residual life and the condition of the fronting beaches and inter-tidal areas.

Under the ‘With Present Management’ (WPM) policy scenario, all existing defences and management practices are continued. Defences are maintained to provide a similar level of protection over the next 100 years to that provided at present, i.e. maintaining their current height. In some cases this will require considerable investment to existing defences to maintain their integrity and effectiveness. For this assessment it is the function of the defence ‘practice’ that is be considered rather than specifics of the structure itself. The assessment should also identify if a practice becomes technically impossible in the future, for example due to rising sea levels, or when the current practice (e.g. beach recharge at the current rate) becomes ineffective. It is important to highlight the reducing standards of service offered by these defences over time. When assessing the effects of continuing ‘with present management’, the standard of the defence structure is maintained but not improved –i.e. a seawall may become affected by overtopping in future epochs. Presently redundant structures are not maintained and do not form part of this analysis. The consequences of maintaining the defences and management practices are assessed in terms of how the coastline will change, for example, narrowing and steepening of beaches in front of a seawall through coastal squeeze, leaving high vertical structures with no useable beach, or exposing the toe of the seawall.

There are standard assumptions for each defence type (e.g. seawall or timber revetment) under the WPM scenario, listed in figure 1 below.

Defence type	**Example Structure**	**Assumptions**
Linear stoppers	Seawall	• Continues to prevent cliff line retreat • Stops (reduces) sediment input • Structural integrity remains and the wall is rebuilt at a similar standard of effectiveness • Exposure may change, i.e. due to changes in beach levels • Outflanking needs to be considered for each site, but in general for significant length of seawall, assume Bullet 3 includes response to possible outflanking
	Flood wall/ embankment	• Structural integrity remains and the wall is rebuilt at a similar standard of effectiveness • Continues to minimise tidal flooding (prevent a breach) • Exposure may change, i.e. due to changes in beach levels
Linear reducers	Rock bund	• Continues to reduce erosion, although level of effectiveness may change and therefore rate of erosion may also change (could either increase or decrease) • Structure is rebuilt in a suitable location if it fails totally (unlikely)
	Timber revetment	• Continues to reduce erosion, although level of effectiveness may change and therefore rate of erosion may also change (could either increase or decrease) • Structure is rebuilt in a suitable location if it fails (i.e. not necessarily in the same position)
	Maintained shingle barrier	• Re-profiling continues until technically impossible
Cross-shore interrupters	Groyne (with seawall)	• Continues to interrupt drift but not necessarily the same amount (could both increase or decrease) • Maintenance when necessary to maintain *potential* effectiveness • Once a beach disappears, groynes may be considered to be redundant
	Groyne (without	• Continues to interrupt drift but not necessarily the same amount (could both increase or decrease)

	seawall)	• Maintenance when necessary to maintain *potential* effectiveness • Structure is rebuilt in suitable position when fails or becomes detached • No extension of the groynes • No change in groyne cross-section • Once a beach disappears, groynes may be considered to be redundant
	Reefs/ breakwaters	• Continues to interrupt drift but not necessarily same amount • Structure is rebuilt in a suitable location if it fails totally (unlikely)
	Harbour Arms	• Structural integrity remains and the structure is rebuilt at a similar standard of effectiveness
Changers	Recharge	• Continue to recharge with same amount, sediment type and timing
	Recycling	• Continue to recycle same amount, with same timing, and to and from the same locations

Figure 1: Assumptions for the 'With present management' (WPM) baseline assessment (Defra, 2006a)

5. Sea level rise

For the purpose of the assessment of these baseline scenarios/predictions, rates of future sea level rise have been taken into account, in accordance with national government guidance issued by Defra (Defra, 2006b). Defra's sea level rise guidance for South-East England is summarised in figure 2 below. All values are rounded to the nearest 0.5 millimetres per year (mm/yr).

Administrative or Devolved Region	*Assumed Vertical Land Movement (mm/yr)*	*Net Sea-Level Rise (mm/yr)*				*Previous allowances*
		1990-2025	*2025-2055*	*2055-2085*	*2085-2115*	
East of England, East Midlands, London, SE England (south of Flamborough Head)	-0.8	4.0	8.5	12.0	15.0	6mm/yr* constant
South West and Wales	-0.5	3.5	8.0	11.5	14.5	5 mm/yr* constant
NW England, NE England, Scotland (north of Flamborough Head)	+0.8	2.5	7.0	10.0	13.0	4 mm/yr* constant

*Updated figures now reflect an exponential curve, and replaces the previous straight line graph representations.

Figure 2: Sea level rise predictions published by Defra in 2006 as a supplementary note to Operating Authorities, defining the sea level rise allowances to be used in coastal management schemes and plans (Defra, 2006b).

This 2006 guidance shows an exponential increase in sea levels over future epochs (at 4mm/yr, 8.5mm/yr, 12mm/yr then 15mm/yr) replacing the previous guidance in which an linear allowance of 6mm/yr was proposed, as shown in the graph below (figure 3).

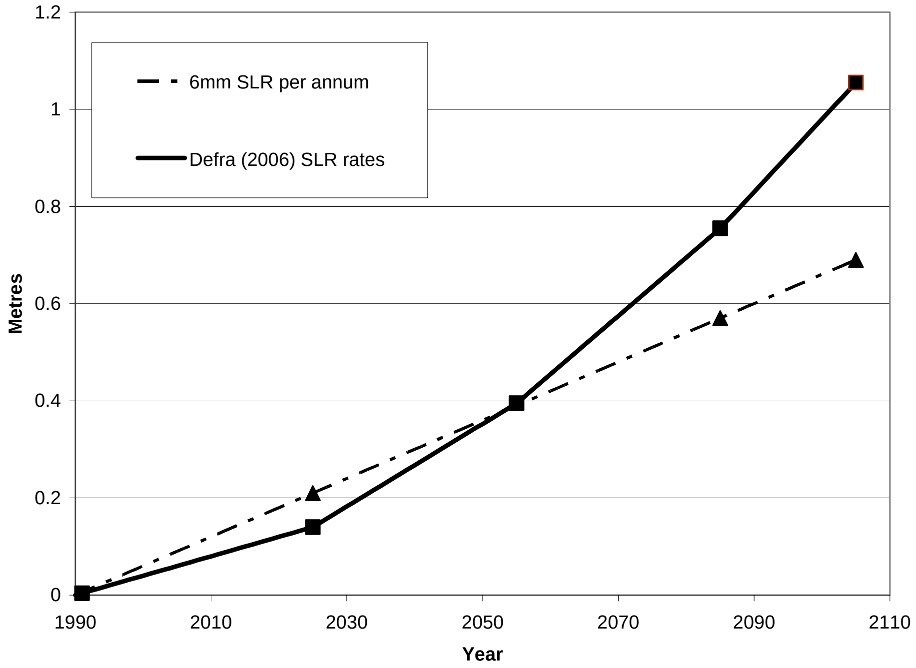


Figure 3: Graph showing sea level rise predictions published by Defra in 2006 as a supplementary note to Operating Authorities, defining the allowances to be used in coastal management schemes and plans. The new exponential curve (based 4mm/yr, 8.5mm/yr, 12mm/yr then 15mm/yr over successive future 30-year epochs, as defined in figure 2 above) replaces the previous allowance of 6mm/year. Courtesy of North Solent SMP.

Figure 4 below shows sea level rise predictions for the Isle of Wight coastline, used in the development of this Shoreline Management Plan (allowances sourced from figure 2, Defra, 2006b). The amounts of predicted sea level rise (in centimetres) are displayed as increases above the standard 1990 baseline sea level, or alternatively as increases from the start of 2009, until 2105.

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

Figure 4: Sea level rise predictions for the Isle of Wight (based on figure 2).

Further information on climate change predictions for the Isle of Wight can be found elsewhere in the Appendix C1 -Annex.

UK Climate Impacts Programme published a new set of climate change predictions for the UK on 18th June 2009 (known as UKCP09). The future coastal extremes in UKCP09 have been largely derived from work commissioned by the Thames Estuary 2100 Strategy (the TE2100 project). This research showed that current Defra guidance on sea level rise is still suitable for planning for flood risk in the tidal Thames. SMPs and Strategies have been advised to continue using the Defra 2006 allowances at the current time, this remains national government guidance. UKCIP09 can inform assessments of sensitivity within SMP2 and be considered further in Action Plans.

6. Methodology

6.1 Developing the 'No Active Intervention' and 'With Present Management' Scenarios

Appendix C also contains two other reports that are fundamental to the baseline scenarios described below. A baseline understanding of the coastal processes operating around the Isle of Wight coastline (an Assessment of Shoreline Dynamics) is provided in Appendix C1 of this SMP. Therefore this task is designed to take that knowledge forward to predict future behaviour. The first stage in completing this task was to collate all relevant baseline information for each frontage on flood and erosion risks, on past, current and future shoreline behaviour and cliff and beach characteristics. Key sources of reference included: Appendix C1 of SMP2; SMP1; the North-East Coastal Defence Strategy Study; orthorectified historical aerial photos mapping retreat; current aerial photography, Futurecoast; Draft Strategy Studies for West Wight & Sandown & Undercliff (in press); Landslide reports for Ventnor and Cowes-Gurnard; Eastern Yar Flood and Erosion Management Strategy (in press); the Branch Project 2007, the IW Strategic Flood Risk Assessment 2009, and the South-East Strategic Monitoring Programme (-see reference list for details). The information was collated and reviewed, to use the best available technical understanding alongside local knowledge and experience (including of the latest events) to define current erosion rates for the entire coastline and describe future shoreline behaviour. In areas with a long history of defence, this involves use of available information alongside adjacent conditions and informed judgement. The method used to convert current erosion rates into prediction of future erosion rates is outlined in section 6.2 below.

The second report within Appendix C which is fundamental to this task is Appendix C2 -the Defence Appraisal. This provides details of the location and residual life of each coastal defence structure currently in place around the coast, so provides a date of expected failure of each defence structure. This information is taken into account in the baseline scenarios. After the failure of the defence structure erosion may commence and the coast continue to evolve, or during the remaining life of a structure, the adjacent coast may continue to retreat and outflank it.

The Baseline Scenarios adopt a behavioural systems approach, focussing on the interactions and linkages within a system to develop an understanding of the overall framework of the coastal system functioning and the factors controlling it. The geomorphology of the frontage was studied, revealing the main processes that occur to shape the frontage and the importance of longshore interactions between the frontages. A description of future evolution was completed using a combination of these sources, geomorphological knowledge and local experience of the most recent events occurring. A series of tables were completed describing two Baseline Scenarios: 1) the consequences of undertaking 'No Active Intervention' from now on, and 2) the consequences of continuing 'With Present Management' practices. The tables are presented in the following format (figure 5, in accordance with Defra's SMP guidance, 2006a). The description is broken down into the three epochs for both scenarios.

Location	Scenario	Epoch 1: 0-20 years (present to 2025)	Epoch 2: 20-50 years (2025 to 2055)	Epoch 3: 50-100 years (2055 to 2105)
IW1 Name: East Cowes Esplanade *From: Shrape Breakwater* *To: Old Castle Point*	'No Active Intervention' scenario	Description of the coastal management practice assumed.	Description of the coastal management practice assumed.	Description of the coastal management practice assumed.
		Text describing the expected response of the shoreline during this period –both of the cliff and the beach.	Text describing the expected response of the shoreline during this period.	Text describing the expected response of the shoreline during this period.
	'With Present Management' scenario	Description of the coastal management practice assumed.	Description of the coastal management practice assumed.	Description of the coastal management practice assumed.
		Text describing the expected response of the shoreline during	Text describing the expected response of the shoreline during	Text describing the expected response of the shoreline during

		this period.	this period.	this period.

Figure 5: Standard format for describing the Baseline Scenarios

6.2 Future erosion risk

Allowing for sea level rise in the future predictions of coastal erosion rates:
The SMP reviewed a wide range of data to define the current rates of coastal erosion and cliff retreat occurring along the Isle of Wight coast using best available information, as outlined above. Consideration was then given to the most appropriate method of converting this information to produce future predicted rates of recession, allowing for sea level rise. A range of predictive models and techniques used by other SMPs were examined and tested, and a method selected that was most appropriate to the characteristics of the Isle of Wight coastline, to provide the best available prediction. An indication of the potential impact of future sea level rise on the rates of coastal erosion around the Isle of Wight coast has been provided using the Walkden and Dickson model (Walkden & Dickson, 2008, equation 6): *"This relationship is proposed as a means of rapidly estimating future equilibrium recession rates for soft rock shores overlain by a low volume (or absent) beach in which the profile is subjected to an increase in the rate of sea level rise."* , This is a well-recognised method[1] of estimating future recession rates and has been used by other SMPs around the English coast, including the Cornwall and Isles of Scilly SMP2. Cliff composition and shallow beach profiles on the Isle of Wight made this an appropriate model, also selected and applied to areas of the Isle of Wight coast by the Branch Project 2006[2] , led by the University of Southampton (Gardiner etc al, 2007 It should be remembered that even though there is no other method available that is more suitable for this issue at the level of detail that the SMP requires, it is still an estimate, the results are indicative and a degree of uncertainty should be taken into account when considering the results. Regarding the IW SMP2, historic rates of erosion can be considered to be a lower estimate of future change, Walkden & Dickson can provide a mid-range estimate (or best guess) of future change, and the Leatherman formula (also applied by SMPs, e.g. NE SMP2, 2007) would provide an upper limit of potential change.

The Walkden & Dickson model (2008, equation 6) describes the relationship between future and historic equilibrium retreat rates as follows:

$$\varepsilon_2 = \varepsilon_1 \sqrt{\frac{S_2}{S_1}}$$

Where:
$\varepsilon 1$ = Historic recession rate S1 = Historic sea-level rise

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[1] * Published in a peer-reviewed journal Marine Geology;
*A product of collaboration between the Tyndall Centre for Climate Change Research and the Defra/ EA R&D programme. (see Tyndall working Paper (http://www.tyndall.ac.uk/content/response-soft-rock-shore-profiles-increased-sea-level-rise) & see 'Understanding and Predicting Beach Morphological Change Associated with the Erosion of Cohesive Shore Platforms (2008), Final Report Defra project FD1926 (http://randd.defra.gov.uk/Document.aspx?Document=FD1926_6523_TRP.pdf)'
* Recognised by the IPCC in their Fourth Assessment Report (at the time they only had the Tydall Working Paper to refer to http://www.ipcc.ch/publications_and_data/ar4/wg2/en/ch6s6-4.html)
* Cited by the EU ENCORA Coastal Wiki: http://www.coastalwiki.org/coastalwiki/Effect_of_climate_change_on_coastline_evolution
* Applied to the coast of Accra, Ghana (Appeaning Addo K., Walkden, M., and Mills, J. P. (2008). Detection, measurement and prediction of shoreline recession in Accra, Ghana. ISPRS journal of photogrammetry and remote sensing ISSN 0924-2716 Vol. 63, no 5 pp. 543-558)
* Applied in the West Somerset Coastal Process Study
* An analytical derivation of the equation now exists, and is under review by Marine Geology.

[2] The Branch Project 2007 involved 10 partners including: Environment Agency, Natural England, Tyndall Centre for Climate Change Research (University of East Anglia and the University of Southampton), Environmental Change Institute, Hampshire County Council, Kent County Council. Regarding the south-west coast of the IW (led by the University of Southampton) on using the Walkden & Dickson formula (2008): *"This is a method of rapidly estimating future equilibrium recession rates for soft rock shores with an absent or small beach which is subject to an increase in sea level rise. Cliff composition and shallow beach profiles on the Isle of Wight make this an appropriate model. However, results are indicative as they take no account of individual cliff falls, and a level of uncertainty should be taken into account when viewing the results."*

$\varepsilon 2$ = Future recession rate $S2$ = Future sea-level rise

The paper (Walkden & Dickson, 2008) recognises that the model is designed for use *"under certain constraints.* [The equation] *describes the relationship between future and historic equilibrium retreat rates, and equilibrium conditions take some time to emerge following a change in the rate of sea level rise."* Also, [the equation] *" does not describe future recession at sites with no historic sea level rise."*

The new equilibrium rate does not occur instantaneously following a change in the rate of sea level rise. This would take approximately 1000 years, while about half of the change would occur after about 50 years. This has been taken into account by the introduction of 'epoch factors', which moderate the resulting erosion rate. The epoch factors were determined for the end of each epoch and then applied to the whole of the epoch, which is a conservative approximation. A separate set of epoch factors was determined for the North-East coast, using the available information about predicted epoch 1 and 2 erosion rates as the baseline for epoch 3 predictions.

As an example of the results of the Walkden & Dickson formula, an historic recession rate of 0.2m/yr, which would be expected to deliver 20m of coastal retreat over 100 years if conditions remain as at present, is calculated to become 32m of retreat over the next 100 years allowing for the impact of future sea level rise (using the allowances shown in figure 2 and figure 4 and the 'epoch factors' outlined above).

The results provide an estimated future recession rate, based on historic trends and future sea level rise predictions, and the results should be regarded as an indication of future change and a level of uncertainty should be taken into account when viewing the results. The recession rates provided are averages, and so cannot predict individual cliff falls. Patterns of episodic retreat behaviour (which commonly occur along the Isle of Wight coastal cliffs) are likely to deliver short-term rates which are higher or lower than these long-term averages.

Future recession rates and totals for each epoch derived from this method are listed throughout the Baseline Scenario tables in this Appendix C3, area by area (and also listed in the main SMP document, Section 4 -within each PDZ sub-section 1.5.3); recession rates were applied following the predicted date of failure of each coastal defence structure in the NAI scenario and mapping.

For the north-east coast of the Isle of Wight (from East Cowes to Whitecliff Bay) detailed work was undertaken on predicting future rates of shoreline retreat and slope reactivation as part of the North-East Coastal Defence Strategy Study (Isle of Wight Council, 2004). This provided annual rates of retreat, plus slope failure allowance, to 2050, stated as allowing for 6mm/yr sea level rise (which was the recommended allowance at the time). This detailed work was reviewed by the SMP team and remains the best available information for the North-east coast of the Isle of Wight. When comparing the future sea level rise predictions shown in figure 3 above, the 6mm/rate and the new exponential curve show a reasonable fit until 2055, but differ following this date. Therefore, to best use the work of the North-East Strategy for SMP2, the annual erosion rates predicted in the Strategy are applied as the best available information for epochs 1 and 2 (0-20 and 20-50 years), then for epoch 3 (50-100 years) the rates are inputted as baseline erosion rates into the Walkden & Dickson model described above (alongside a recalculated sea level rise allowance) to produce new predicted recession rates for epoch 3.

6.3 Future flood risk

This SMP examines likely impact of flooding from the sea over the next 20, 50 and 100 years on the coast and estuaries of the Isle of Wight. However, it does not examine the inland areas affected by flooding from rivers, groundwater or surface water). These issues are instead addressed in the Environment Agency's *Catchment Flood Management Plan* for the Isle of Wight

(CFMP http://www.environment-agency.gov.uk/research/planning/33586.aspx) and the Isle of Wight *Strategic Flood Risk Assessment* (SFRA) (Planning Service, Isle of Wight Council, 2009).

The flood zones show the areas that could be affected by flooding from the sea, if there were no flood defences in place. Tidal flood risk is examined at three future dates: 2025, 2055 and 2105. For each year, two flood zones are examined, to assess the impact of two different scale flooding events:

- 1 in 200 year flood zone: This zone shows land assessed as having a 1 in 200 or greater annual probability of flooding from the sea in any year (>0.5%);
- 1 in 1,000 year flood zone: This zone shows land assessed as having between a 1 in 200 and 1 in 1000 annual probability of sea flooding in any year (0.5-0.1%).

The SMP2 flood zones have been supplied by the 2009 Isle of Wight SFRA –Tidal Climate Change Mapping Update (courtesy of Entec UK Ltd. & Isle of Wight Council Planning Services, September 2009). The SFRA flood zone mapping (September 2009) is based upon an ArcGIS shapefile supplied by the Environment Agency 24/08/09 and subsequent revisions on the 07/09/09. Sea level rise allowances issued by Defra (Defra, 2006, see Figure 2) and PPS25 were used to determine the rate of sea level rise, using the south-east figures, and have been taken into account in the flood zones.

The SMP2 flood zone outline was created by Royal Haskoning using the 2105 1000yr Flood zone supplied by the IW Council (worst case scenario). This outline was then divided into flood compartments and attributed with new water levels as per the 'Tide Level Map' supplied from the Environment Agency. The new water levels were overlaid against the topographic dataset (2 metre resolution LiDAR) to provide a water depth grid, which was converted into a vector dataset and manually edited. These new outlines were quality checked to remove gaps/ dry islands less than 250m^2 and the outline smoothed to provide a realistic water inundation outline.

In Section 4 of the main SMP document, the introductory map for each PDZ shows the current tidal Flood Zone 3. Flood zone 3 shows the area that could be affected by a flood event that has a 0.5 per cent (1 in 200) or greater chance of happening each year. The Management Area Statement maps provided at the end of Section 4 show the current tidal Flood Zone 2. Flood zone 2 shows the area that could be affected by an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year.

6.4 Mapping of predicted shoreline change under the 'No Active Intervention' and 'With Present Management' Scenarios

Maps have been prepared to show future erosion and flood risk for the Isle of Wight SMP frontage, for both scenarios, over three time periods, included within this Appendix.

The future shoreline change has been mapped, and figures produced for each frontage, based on the scenario of 'no active intervention' (NAI) in the future and continuing 'with present management'. (WPM) The NAI maps take account of remaining life of each coastal defence structure already in place around the coast, and apply the erosion rates (shown in the Baseline Scenario tables below) from the point at which each coastal defence structure is predicted to fail (e.g. a seawall predicted to fail in 15-25 years). As these failure dates cannot be fully precise (as they are based on current condition), the erosion rate is applied from the first likely defence failure, or from year 1 if the coast is already undefended and eroding. Explanation of the further assumptions used to draw the erosion zones are listed below. Erosion zones provide an indication of which areas could be at risk under a policy of 'no active intervention' or 'with present management', but they do not convey what the coast will look like, or any loss of beach assets.

The maps also show flood risks: Areas affected by a 1 in 200 year flood in 2105 (described in section 6.3 above).

Assumptions for mapping erosion zones in the Baseline Scenarios:

- The NAI erosion maps take account of present coastal defence structures in place around the coast, and allow for their current condition and predicted residual life (during which they will delay erosion from commencing).
- In the NAI maps, for sections of coast that are currently defended, the erosion rate is applied from the first specified date of defence failure defined in the SMP2 Defence Appraisal (Appendix C2). For example, for a section of seawall predicted to fail in 5-7 years, the erosion rate is applied fully from year 5. This creates a useful 'worst case' scenario. For this reason no further buffers or initial set-backs are applied (e.g. following defence failure the coastline may initially erode faster to achieve a natural angle of repose before longer-term erosion rates stabilise, but this additional allowance has not been included, as the first date of defence failure has been used). The predicted year that a defence is expected to fail in is assumed to signify total defence failure. Therefore it has been assumed that once a defence has "failed", it will have no residual effect as a defence.
- For sections of coast that are already undefended and eroding, the erosion rates are applied from year 1.
- The erosion rate used is based on historical/current behaviour extrapolated to take account of predicted sea level rise in each future epoch (described in section 6.2 above).
- The erosion rate is applied from the failure of the front line of the current coastal defence structure (where present, under NAI) or from the toe of the coastal slope. An example of this is shown from East Cowes to Osborne on the north-east coast of the Isle of Wight. However, a common exception to this is where a clearly defined cliff or steep slope is present and already actively eroding/slumping. Here the erosion rate is applied from the current cliff top instead, to give a more accurate map of anticipated retreat and the ground that is expected to fail over the next 100 years, due to coastal erosion. Where the line of the cliff top has been used, this assumes that the cliff will retain a similar profile in future epochs, based on its underlying geology and resistance/strength. An example of this occurs along Culver Cliff on the east coast of the Isle of Wight.
- For the NAI maps, where a near-vertical cliff is fronted by a seawall and esplanade, the erosion rate is applied from the line of the current coastal defence structure, retreating gradually back through the width of the seawall and esplanade, until the retreat line reaches the base of the near-vertical cliff, at which time the erosion then continues as cliff-top recession. An example of this is found along Lake cliffs, on the south-east coast of the Isle of Wight.
- In areas with defended cliff-lines such as Lake Cliffs and Shanklin on the south-west coast, sub-aerial weathering is likely to continue gradual cliff retreat, even while the cliff-foot seawall remains in place.
- Careful consideration has been given to the issue of landslide reactivation on the NAI & WPM maps. The coastal towns of the Ventnor and Cowes-Gurnard are underlain by deep-seated landslide complexes, affected by specific areas of reactivation, and along which toe-protection (preventing coastal erosion) currently reduces the risk of landslide reactivation. Extensive research, public information and geomorphological, ground behaviour and planning guidance maps are available for the Ventnor Undercliff and Cowes-Gurnard, explaining these features fully. The Ventnor Undercliff landslide complex is the largest urbanised landslide complex in England and Wales, and one of the largest in north-west Europe. At Totland and Seagrove Bay, there are also weak cliffs or slopes which could be affected by some form of slope failure. An explanation of these ground movement phenomena is also provided in Appendix C1 of this SMP2. These phenomena are complex and difficult to predict. Therefore on the NAI and WPM maps, a buffer is marked showing areas that could –potentially- be affected by landslide reactivation or slope failure in the event of a 'no active intervention' or continuing 'with present management' scenario –NB. although a significant degree of uncertainty is attached to these predictions, it is important

to consider this risk and the role the coastal defence structures play in minimising the risk. On the NAI maps, this buffer marks a zone of failure that could be triggered by up to 100 years of coastal erosion removing support at the toe of the coastal slopes, which in some cases are marginally stable. In the Ventnor Undercliff in particular, where up to 62m of erosion and retreat of the coastal cliffs could occur over 100 years (allowing for the effects of 98cm of sea level rise), the removal of up to 62m of the lower slopes and terraces of the town could trigger ground movement in the upper terraces of the town, in the form of either an increase in settlement, or localised minor ground instability, or small-scale ground movement and damage, or specific areas of slope failure, or –the least likely- 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. The buffer in the Ventnor area is drawn to the back-scar of the Undercliff landslide complex. The western edge of the Ventnor buffer shows the change from the steeper terraces in central Ventnor to the more gentle topography moving west through St. Lawrence. In the WPM maps, these landslide buffers are also shown as the slopes are also sensitive to increasing winter rainfall in a changing climate, but it is important to note that where the coastal defences are maintained, the risk of any slope reactivation is minimised. Further information on potential landsliding is provided in the text for each frontage contained in the Baseline Scenario tables below, accompanying the maps.

- In areas where shingle spits occur at the mouth of estuaries, rollback may occur and is discussed in the baseline scenario tables. However, rollback is difficult to predict precisely, dependent of the evolving balance of sediment supply and water depth in the area the spit may retreat back into, therefore the maps show potential gradual removal of the structure from its existing location, based on retreat rates estimated from historic behaviour, to provide a first indication of potential change in the coastal system.
- The erosion zones were mapped in GIS onto the latest OS Mastermap basemapping at a scale of 1:1,000.
- All erosion rates quoted are an average for the frontage length and can mask localised trends of erosion and accretion.
- In the WPM scenario, presently redundant structures which have failed and are not maintained and do not form part of the analysis.
- All rates and predictions of future morphological development in the WPM scenario assume that WPM will continue in the adjoining lengths of coast and SMP areas.

It is important to note that the erosion zones shown on the ‘No Active Intervention’ maps are the consequences of predicting a scenario in which no further maintenance of present coastal defence structures is undertaken, allowing defences on the soft rock coasts of the Isle of Wight to progressively fail over the next 0-35 years (approx.), then erosion to continue unchecked over the remainder of 100 years. They are an estimate based on best available information at SMP (Shoreline Management Plan) scale. More information will be published in Coastal Defence Strategies, which will be published for each section of the coast in future years. It should be remembered that the NAI & WPM maps are scenarios, and the *actual* zones that will be affected by erosion over the next 20, 50 and 100 years will depend on the shoreline management policies set by the SMP and the level of national or local funding available in future years to deliver theses policies, competing against national criteria. The actual area affected by coastal erosion will also be dependent on detailed local conditions and circumstances, such as water levels in the ground and the amount of future sea level rise or storminess that occurs. A third erosion line is available as part of this SMP, contained in main SMP document (Sections 4 &5), which maps the consequences of the erosion likely to occur based on the policy set.

7. Overall Conclusions

7.1 No Active Intervention

The soft rock coasts of Isle of Wight coast are generally exposed and actively eroding, and this behaviour will continue over the next 100 years as sea level rise increases exposure and wave attack of the shoreline. The only significant area of accretion is Ryde Sands. On the southern coasts cliffs will continue to erode or reactivate, and on the northern coast the generally more gentle coastal slopes will erode and areas of tidal inundation will also occur. Under the 'No Active Intervention' scenario a legacy of historical defences will generally fail towards the end of epoch 1 (0-20 years) or early in epoch 2 (20-50 years), exposing the majority of Isle of Wight towns to the impacts of erosion and shoreline retreat over the next 100 years. Cliff retreat along areas such as the south-west coast in particular will supply essential sediments to the shoreline and the littoral drift system. Tidal flooding will impact upon the future of areas of the towns of Yarmouth, Freshwater, Cowes, East Cowes, Ryde, Seaview and Bembridge. Tidal inundation of the Western and Eastern Yar valleys (under a 'No Active Intervention' scenario) will occur if the defences at the northern and/or southern ends of both valleys fail, cutting-off the communities of Bembridge/Forelands and Freshwater/Totland, and could create three 'Isles of Wight' in the long-term. These impacts are very significant and will have to be taken into account in determining the policy. Co-ordinated decision-making will be essential along these frontages. Coastal erosion and oversteepening of coastal slopes also has the potential to promote coastal slope retreat or larger-scale reactivation of coastal landslide complexes affecting areas of the towns of Ventnor (and the villages in the Ventnor Undercliff), Cowes, Gurnard, Totland and Seagrove Bay. Coastal erosion and tidal inundation over the next 100 years will affect all the ferry transport links that the Isle of Wight relies upon.

7.2 With Present Management

The defences fronting coastal towns around the Isle of Wight will be maintained at their current standard (without improvement in standard) in this scenario and effectively prevent coastal erosion and cliff retreat. However, in future epochs (particularly over 50-100 years) the defences will be increasingly affected by wave and tidal overtopping and falling beach levels expose the toe of defences to wave attack and undermining. Significant lengths of coast will continue to erode and will gradually outflank the hard defence structures (such as seawalls). A key risk under the 'With Present Management' scenario is that -with defences maintained at their current standard- the risk of tidal flooding remains for many coastal communities. Tidal inundation already affects defended areas including Yarmouth, Cowes and East Cowes and will worsen as sea level rises by approximately 98cm over the next 100 years. The ground stability of coastal landslide complexes underlying the towns and villages of Ventnor, Niton, Cowes and Gurnard will be improved by maintaining their coastal defences, but areas may still reactivate due to their sensitivity to the impacts of increasing winter rainfall. However, toe erosion and toe weighting is essential to their stability and would minimise the risk of reactivation.

8. Key sources of reference used in the development of the Baseline Scenarios & Maps.

Nb. Please see Appendix C1 reference list and Appendix K for full details.

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Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
IW1 **Name: East Cowes Esplanade** **From: Shrape Breakwater** **To: Old Castle Point**	**No Active Intervention**	*Short description of predicted defence failure*	This 890m frontage marks the northern edge of the town of East Cowes, with an esplanade road and scattered properties protected by an aging seawall which is expected to fail in 15-25 years. Short concrete groynes fronting the seawall will fail in 10-15 years. This unit is heavily affected by the presence of the Shrape Breakwater, approx. 325m in length and attached to the land at the western boundary of this frontage, extending seawards to the north-west to shelter the harbour and channel at the mouth of the Medina Estuary. This has a residual life of 15-25 years.	Remaining sections of the seawall and Shrape Breakwater will fail at the start of this epoch, leaving the frontage undefended.	No defences.
		Description of cliff erosion/ reactivation	This frontage is characterised in the east by an Esplanade road backed by grassy public open space with scattered buildings (adjoining the main town of East Cowes), moving into thickly wooded coastal slopes in the west, also fronted by Esplanade road sea wall. No Active Intervention along this frontage will allow the defences to fall into disrepair and eventually fail. The slope would remain stable in the short term but there is potential for erosion and slope reactivation in the longer term, especially when Shrape Breakwater fails. The western 200m of this unit is relatively stable, and will erode at approx. 0.26m/yr after the seawall and sheltering influence of the Shrape Breakwater is removed in year 15, resulting in approx. 1m of erosion by year 20. The eastern 600m is at risk from reactivation of the steep slopes behind. Erosion of the ground forming the toe weighting to the adjacent coastal slope could reactivate failure planes within the coastal slope. Once the defences have failed in year 15 erosion at approx. 0.26m/yr will commence, and is soon likely to trigger a slope failure and retreat of approx. 65m.	The western 200m will continue to erode at approx. 0.26m/yr (8m retreat in this epoch, or 9m in total from year 1). This section may be affected by land slippage resulting from adjacent ground movement in the eastern section of the unit. The eastern section will continue to erode at approx. 0.26m/yr (8m retreat in this epoch, in addition to the 1m erosion and 65m reactivation at the end of epoch 1, resulting in approx. 34m retreat by year 50. Without the Shrape Breakwater and beach depletion, the coastal slip may extend westwards into the Cowes development.	The western 200m will continue to erode at approx. 0.31m/yr then 0.34m/yr (16m retreat in this epoch, or 25m in total from year 1). The eastern section will continue to erode at 0.31m/yr and 0.34m/yr (16m retreat in this epoch), resulting in up to 90m of coastal retreat over 100 years.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			The Esplanade and seafront properties in the east of the frontage are at risk from tidal flooding, and overtopping of the defences already occurs.		
		Description of beach evolution	Currently accreting, a narrow shingle/coarse clastic beach fringes the cliff foot and defence structures, widening westwards and terminating at the Shrape Breakwater, with weak net westerly littoral drift. Shingle foreshore levels increase in a south-westerly direction, with a narrow muddy intertidal foreshore. Old Castle Point, at the western limit of this unit, functions as a drift divide and the unit effectively functions as a closed embayment. Littoral drift divergence means around Old Castle Point means the area is especially sensitive to variations in the local sediment supply and susceptible to sediment starvation. Accretion against the eastern side of Shrape Breakwater since its construction in 1936/37 (and similar smaller structures) indicates a long-term trend for net westward littoral drift along this East Cowes Esplanade frontage (in contrast with the general trend in surrounding units). The Strategic Monitoring Programme shows this beach has been stable from 2004-09, with some slight accretion in the centre of the unit. Erosion in this unit could be reduced if beach accretion continues and limits the extent of slope failure, but beach levels are likely to drop following failure of the Shrape Breakwater.	Erosion will start to supply significant sediment to the local beaches in slope reactivation occurs. Loss of the Shrape Breakwater at the end of the previous epoch is likely to result in loss of sediment to the west, which may impede navigation in Cowes Harbour (dependent on the impact of the loss of the sheltering breakwater on the process interactions at the estuary mouth).	Sediments will be yielded from the reactivated and eroding cliffs, but will be removed from the beach by littoral drift to the west.
	With present management	*Short description of predicted defence failure*	The seawall, concrete groynes and Shrape Breakwater will be maintained at their current standard without improvement.	The maintained seawall, groynes and breakwater will continue to prevent erosion.	The maintained seawall, groynes and breakwater will continue to prevent erosion.
		Description of cliff erosion/ reactivation	Maintenance of the defences will prevent coastal erosion and slope reactivation, but tidal flooding of the esplanade and adjacent properties during extreme water level events will still occur if the seawall is maintained at its current standard.	Seawall maintenance will reduce the likelihood of slope reactivation, although increasingly frequent overtopping will occur and may have a destabilising influence. Tidal flooding of the Esplanade will continue in the west of the frontage.	The seawall will be frequently overtopped and several seafront properties inundated by tidal flooding. Outflanking of the seawall from the east by a further approx. 7m will occur (up to

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			Outflanking of the seawall from the east by 2m will occur as erosion increases in the breaches in the failed seawall in the adjacent unit to the east, plus a potential 30m reactivation in the adjacent unit will further offset the coast line.	Outflanking of the seawall from the east by a further approx. 4m will occur (up to 36m in total, including slope failure).	43m in total, including slope failure).
		Description of beach evolution	Foreshore narrowing will occur in front of the seawalls. Sediment supply is limited by the nearby littoral drift divide at Old Castle Point and there will be no direct sediment input from this frontage.	Beach levels will generally fall and expose the seawall to wave attack, but sediment will accumulate in the western corner of the unit, trapped by the Shrape Breakwater.	Foreshore narrowing is likely to continue due to limited sediment supply.
IW2 **Name: Osborne Bay** **From: Old Castle Point** **To: Barton Wood (southern edge)**	**No Active Intervention**	*Short description of predicted defence failure*	This 3,198m frontage of coastal slopes is generally backed by woodland, agricultural and parkland. The remains of an un-maintained seawall in the east below Norris Castle is breached in a number of places, erosion occurring in the embayments and is becoming separated from the coastal slope and Moving south-east, some short concrete and sheet pile defences are present within Osborne Bay, expected to fail in 15-25 years (concrete) and 18-26 years (steel sheet piling. Beyond a brief stretch of undefended coast the remains of some groynes fronting Barton Wood have a minimal effect.	No defences	No defences
		Description of cliff erosion/ reactivation	This unit is a relatively inaccessible section of the Isle of Wight Coast, characterised by large private estates surrounding Norris Castle and Osborne House running down to thickly wooded and occasionally grassed coastal slopes. Acceleration in erosion is likely in areas where no defences currently exist, forming small embayments which would outflank the remaining sections of seawall over the next 20 years. Erosion rates of 0.12 to 0.9m/yr are occurring, depending on the location. Steep slopes are suffering from undercutting in places and are mantled by inactive shallow landslides which may be reactivated in the next	Erosion and cliff retreat will continue, with potential for reactivation at the end of epoch 1 or in epoch 2. At Osborne beach, slow recession or relatively stable beach accumulation may occur where the coastal slopes are less steep and there has been less historical change. Moving west to east, approx. erosion rates and totals for epoch 2 (and in total since year 1) are as follows: • Old Castle Point to Norris Castle: erosion at 0.12m/yr = additional 4m (36m in total). • Eastern Copse: erosion at 0.9m/yr = additional 27m (110m in total).	Erosion and cliff retreat will continue at increased rates due to the impacts of sea level rise and increased wave attack. Moving west to east, approx. erosion rates and totals for epoch 2 (and in total since year 1) are as follows: • Old Castle Point to Norris Castle: erosion at 0.14 then 0.15m/yr = additional 7m (43m in total). • Eastern Copse: erosion at 1.06 then 1.16m/yr = additional 55m (165m in total). • Norris Wood: erosion at 1.06 then 1.16m/yr = additional 55m (100m in total).

Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			20 years. Continuing erosion of the narrow depleted foreshores is likely to reactivate shallow landslides on the steepest sections of the coastal slopes, generating significant recession of the erosion line within several embayments that could develop as landslide complexes. The woodland vegetation of these slopes, however, may bind the superficial layers and delay the onset of these reactivations. Breaches of the now dilapidated defences at Norris Castle have recently reactivated old mudslides. Moving west to east, combined approx. erosion and retreat totals for epoch 1, following defence failure, are as follows: • Old Castle Point to Norris Castle: erosion at 0.12m/yr plus 30m reactivation = 32m. • Eastern Copse: erosion at 0.9m/yr plus 65m reactivation = 83m. • Norris Wood: erosion at 0.9m/yr = 18m. • Pier Wood scar: erosion at 0.32m/yr plus 125m reactivation (existing slide scar) = 131m. • Norris Drive/Osborne Bay: erosion at 0.2 following defence failure in yr 15-18 onwards = 0.2 to 0.4m. • Barton Wood: erosion at 0.2m/yr following defence failure plus 60m reactivation (in steeper slopes) = 64m • Barton Hard: 0.24m/yr following defence failure = 5m.	• Norris Wood: erosion at 0.9m/yr = additional 27m (45m in total). • Pier Wood scar: erosion at 0.32m/yr = additional 10m (141m). • Norris Drive/Osborne Bay: erosion at 0.2 = additional 6m (6.4m). • Barton Wood: erosion at 0.2m/yr = additional 6m (70m in total). • Barton Hard: 0.24m/yr following defence failure = additional 7m (12m in total).	• Pier Wood scar: erosion at 0.38 then 0.41m/yr = additional 20m (161m). • Norris Drive/Osborne Bay: erosion at 0.24 then 0.26m/yr = additional 12m (18.4m). • Barton Wood: erosion at 0.24 then 0.26m/yr = additional 12m (82m in total). • Barton Hard: 0.28 then 0.31m/yr following defence failure = additional 15m (27m in total).
		Description of beach evolution	Old Castle Point (the western limit of this unit) functions as a drift divide between minor sediment transport sub-cells, with weak south-east littoral drift of sand interrupted by areas of boulder and other coarse clastic accumulations. The foreshore at Norris Castle is extremely narrow and depleted of sediment. This location is typical of a zone of littoral drift divergence. Within Osborne Bay there are several minor headlands (flanked by narrow depleted	Slope recession will deliver sediments to littoral system throughout the frontage. Sediments yielded should predominantly be clays with relatively small quantities of beach forming sands and limestones. Wave energy is low so that landslide debris could remain protecting the slope toe for lengthy periods following initial failures. Most recession therefore results from the 'one-off' reactivation rather than from ongoing processes.	Increased erosion rates will deliver sediments to littoral system throughout the frontage as erosion cuts back further into the steeper slopes. Over the longer term, recession should deliver sediments to the littoral system and provide relative stability to the centre of the unit through a modest beach at Osborne.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			foreshore) and bays, allowing minor sand and shingle beach accumulations. Inter-tidal foreshores between Old Castle Point and Ryde are generally likely to suffer losses in width, due to future sea-level rise inundating mean low water levels more rapidly than compensating erosion at mean high water can occur, constrained by slowly-reactivating coastal slopes. The narrow, boulder-strewn foreshore becomes sandier in the eastern 400m of the unit, and continuing erosion of the narrow foreshore will contribute to slope reactivation. Large slope reactivations have the potential to contribute significant amounts of sediment to the coastal system, which may interrupt the overall trend for narrowing. Transient beach accumulations could provide a relatively stable frontage to help slow recession in front of Norris Wood.		
	With present management	*Short description of predicted defence failure*	The majority of defences appear abandoned. Maintenance and renewal would delay the onset of slope reactivation.	The majority of defences appear abandoned. Maintenance and renewal would delay the onset of slope reactivation.	The majority of defences appear abandoned. Maintenance and renewal would delay the onset of slope reactivation, but the standard of protection may not be sufficient to prevent slope failure.
		Description of cliff erosion/ reactivation	Recent management of this section of coast has been 'No Active Intervention but monitor', under which the consequences of future change would be the same as under the 'No Active Intervention' Scenario as the breached seawall allows erosion and reactivation of the coastal slopes to accelerate. However, remnant defences are present in several locations, which if maintained, would produce a patchwork of slope recession scarps north of Osborne Bay defences and potential slope failure south of Osborne Bay in the	Slope erosion and reactivation would continue as outlined in the 0-20 year epoch, with increasing potential for slope failure in the south of the unit. Outflanking would affect the remaining sections of defences by up to 141m, if slope failures enhance retreat rates.	Slope erosion and reactivation would continue as outlined in the 20-50 year epoch, with likely slope failure in the south of the unit. Outflanking would affect the remaining sections of defences by up to 161m, if slope failures enhance retreat rates.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			defence is insufficient to prevent slope failure. Outflanking would affect the remaining sections of defences by up to 131m, if slope failures enhance retreat rates.		
		Description of beach evolution	See No Active Intervention scenario above. Maintenance of the defences in central and southern Osborne Bay would result in foreshore narrowing.	See No Active Intervention scenario above. Maintenance of the defences in central and southern Osborne Bay would result in foreshore narrowing, and reduce sediment supply into the littoral drift system to the south-east.	See No Active Intervention scenario above. Maintenance of the defences in central and southern Osborne Bay would result in increasing foreshore narrowing.
IW3 **Name: King's Quay** **From: Barton Wood (southern edge)** **To: Woodside (western edge)**	**No Active Intervention**	*Short description of predicted defence failure*	2,049m low-lying undefended frontage. A stone masonry wall and earth embankment forms a causeway across the estuary, due to fail in 5-7 years.	No defences	No defences
		Description of cliff erosion/ reactivation	This inaccessible tidal inlet is surrounded by low wooded cliffs and coastal slopes of mainly convex form, with slope angles of between 18^{o} and 25^{o}. There is localised active toe erosion creating notches and debris accumulations. The low cliffs to the west of the inlet will continue to gradually erode at rates of 0.24m/yr (5m in epoch 1), although immediately west of the inlet mouth they have potential for reactivation of a slip system if the toe weighting supporting the slope is eroded by wave action (approx. 53m recession). The King's Quay inlet is protected by narrow sand and gravel spits that are vulnerable to overwashing, recession and breaching. The spits may become naturally maintained by increases in sand and gravel supply following local cliff re-activations updrift, although there would be a time lag. The most likely future evolution is for continued landward migration of the spits. Siltation and infilling of the estuary will lead to migration backwards of the spits into the estuary (potentially at 1m/yr).	Continued erosion of the low cliffs is expected to continue at approximately 0.24m/yr in the west providing an additional 7m retreat (12m in total since year 1, or up to 65m retreat where slope reactivation occurs) and 0.28m/yr in the east providing an additional 8m retreat during this epoch (or 14m in total since year 1, or up to 64m where slope reactivation occurs). Migration of the spits into the estuary is expected, and saltmarsh erosion should the spits breach. Cliff reactivations on the adjoining frontages could supply fresh sediments to build the spits or result in growth of new twin spits on the foreshore in front of the existing ones. Tidal inundation of the creek will continue. The area of the meandering tidal inlet potentially affected by tidal flooding is fairly steeply defined and the flooded profile of the valley is not expected to increase greatly in	Continued erosion of the low cliffs is expected to continue at approximately 0.28 then 0.31m/yr in the west (an additional 15m retreat) and 0.33 then 0.36m/yr in the east (an additional 17m retreat). Maximum retreat over 100 years will be 27m in the west (or 80m where slope reactivation has occurred) and 31m in the east (or 81m where slope reactivation has occurred). Sediment supply by littoral drift from adjacent units to the north-west may counteract the trend of rollback or loss of the spits, although sea level rise will increase their vulnerability and demand for sediment supply, if they are still in operation. Tidal inundation of the creek will continue. In the longer term (>100 years), continuing sedimentation may decrease the tidal prism of the inlet to a point where it could become susceptible to closure by sediments drifting across the spits. The

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			Erosion of the cliffs east of the inlet will occur at 0.28m/yr (6m in total), although in the far east of the unit Rock Point has potential for cliff reactivation and retreat of 50m and increased sediment supply to the eastern spit. The main issue in this unit is the ingress of tidal flooding up to Palmers Brook and near Woodhouse Copse in all epochs.	area/ extent between 2025 and 2105.	estuary would then alter to become a fresh or brackish water lagoon and marsh.
		Description of beach evolution	The upper beach is generally coarse clastic, with muddy-sandy intertidal foreshore with intermittent exposures of clays and limestone. The small stream from King's Quay estuary discharges across the foreshore. This inlet is defined by the small sand and gravel spits that protect its entrance. They are vulnerable to overwashing, recession and potentially breaching as sea level rises. The eastern spit has already retreated by 30–50m into the estuary since 1972. These spits are vital to the estuary saltmarshes as they provide protection from direct wave action from the East Solent. Spit maintenance depends upon continued sand and gravel supply by local cliff erosion. Spit orientation is indicative of weak sediment transport both eastwards and westwards into the entrance. Spit evolution and sediment supply is described above. Retreat of both the MHW & MLW mark and steepening of the foreshore is anticipated.	Spit evolution and sediment supply is described above. Retreat of both the MHW & MLW mark and steepening of the foreshore is anticipated.	Spit evolution and sediment supply is described above. Retreat of both the MHW & MLW mark and steepening of the foreshore is anticipated.
	With present management	*Short description of predicted defence failure*	No defences	No defences	No defences
		Description of cliff erosion/ reactivation	See 'No Active Intervention' scenario above. Erosion in this unit may outflank minor defences in adjacent units by approx. 5m in the west and	See 'No Active Intervention' scenario above. Erosion in this unit may outflank minor defences in adjacent units by approx. 12m in	See 'No Active Intervention' scenario above. Erosion in this unit may outflank minor

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Predicted change for: Years 20-50 (to approx. 2055)	Predicted change for: Years 50-100 (to approx. 2105)
			by 6m plus 50m in the east (if slope reactivation at Walishill copse occurs).	total in the west and by up to 64m in total in the east.	defences in adjacent units by approx. 27m in total in the west and by up to 81m in total in the east
		Description of beach evolution	See 'No Active Intervention' scenario above. The north-east coast of the Isle of Wight (the principal source of sediment supply), is relatively undefended and or defended at a low standard, therefore adjacent 'With Present Management' policies are not expected to significantly affect this unit.	See 'No Active Intervention' scenario above.	See 'No Active Intervention' scenario above.
IW4 **Name: Woodside** **From: Woodside (western edge)** **To: Wootton estuary mouth**	**No Active Intervention**	*Short description of predicted defence failure*	1,185m frontage, mainly undefended, with approx. 180m of adhoc concrete structures, timber walls, timber slipways and landing stages at the west of the unit with residual life of 8-12 years.	No defences	No defences
		Description of cliff erosion/ reactivation	This unit is characterised by low north-facing cliffs which are convex in form with scattered development amongst wooded costal slopes. No Active Intervention would result in erosion of the frontage, leading to reactivation of slip planes in the cliff line if the stabilising toe weighting was eroded away by wave action. East of Walishill Copse there is potential for slope reactivation of 50m within 20 years, triggered by erosion of an average of 0.28m/yr (resulting in 6m erosion by year 20 in the east where the coast is undefended, or 3m following defence failure in year 8). This may place properties at risk during the first epoch. Moving east, faster erosion of 1m year may occur around Woodside caravan park and holiday village, resulting in 20m erosion over the next 20 years. Slower erosion of an average of 0.3m/yr (or 6m over 20 years) is anticipated along the western half of the Woodside frontage, plus 40m slope reactivation near the end of the first 20 years.	Without defences, continued recession and potential to reactivate existing scarps are likely to place seafront properties around the caravan park and holiday village at risk within 50 years. In the developed area east of Walishill Copse erosion at an average of 0.28m/yr will continue (resulting in an additional 8m of retreat over years 20-50, or 61m in total since year 1). Around Woodside caravan park and holiday village erosion will continue at approx. 1m/yr (resulting in an additional 30m of retreat over years 20-50, or 50m in total since year 1). A small area in the centre of the unit may be affected by tidal flooding (behind the redundant concrete structures). The western half of the Woodside frontage will continue to erode at approx. 0.3m/yr (resulting in an additional 9m of retreat over years 20-50, or 55m in total since year 1).	In the longer term, reactivation of the coastal slopes around Woodside caravan park and holiday village is probable as recession cuts back further into steeper slopes. In the western half of the frontage, over time a full eroding cliff of approx. 15m height will form, supplying new sediments to nourish the shore and Wootton Hard.

Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
		Description of beach evolution	The sandy-silty foreshore extends to the base of the coastal slope, overlain by large clasts west of Woodside Bay holiday village, with occasional shingle backshore (of boulder-size material). A small outcrop of limestone forms a detached platform, exposed below mid-tide level, north east of Woodside Point. Cliff recession should supply additional sediments to the beach. This may impact upon Wootton Creek to the east, and further downdrift.	Continued cliff recession will supply additional sediments to the beach. And downdrift to Wootton Creek. Inter-tidal foreshores are generally likely to suffer losses in width, due to future sea-level rise inundating mean low water levels more rapidly than compensating erosion at mean high water can occur, constrained by slowly-reactivating coastal slopes.	Increasing cliff recession will supply sediments to the beach and eastwards. This may impact significantly upon Wootton Creek. Inter-tidal foreshores may suffer further losses in width as sea-level rises.
	With present management	*Short description of predicted defence failure*	Mainly undefended frontage, with approx. 180m of concrete structures, timber walls, timber slipways and landing stages at the west of the unit to be maintained at their current standard without improvement.	Mainly undefended frontage, with approx. 180m of concrete structures, timber walls, timber slipways and landing stages at the west of the unit to be maintained and replaced at their current standard without improvement.	Mainly undefended frontage, with approx. 180m of concrete structures, timber walls, timber slipways and landing stages at the west of the unit to be maintained and replaced at their current standard without improvement.
		Description of cliff erosion/ reactivation	Maintenance of the defence structures will prevent erosion in front of the developed area at the west of the frontage, but the rest of the unit will continue to erode and reactivate in line with the 'No Active Intervention' scenario outlined above. The defences will be outflanked, by up to approx. 56m in the west (if slope reactivation is triggered) and by approx. 20m in the east.	Overtopping, wave attack (due to low beach levels) and outflanking are likely to compromise the performance of the defence structures and weaken the coastal slopes behind. The defences will be outflanked, by a total of up to 64m in the west and by approx. 50m in the east (since year 1).	The defence structures are unlikely to be sufficient to prevent slope failure, as they will be more frequently overtopped, subject to wave attack and higher sea levels, and increasingly outflanked. The defences will be outflanked, by a total of up to 81m in the west and by approx. 111m in the east (since year 1).
		Description of beach evolution	At Woodside, defences will hold the mean high water mark, but the foreshores immediately in front are likely to erode and narrow, although increasing sediment supply could lead to flattening of the foreshore due to advance of mean low water.	If foreshores fronting the defences narrow the defences will be exposed to wave attack. Tidal overtopping of defences may occur. Sediment supply from the undefended eroding coast to the west will be supplied by weak littoral drift.	The defences will be exposed to increased wave attack and overtopping as sea level rises, even if foreshore levels are maintained by sediment supply from the west.
IW5 **Name: Wootton Creek** **Boundaries:**	**No Active Intervention**	*Short description of predicted defence failure*	2km inlet backed by the villages of Fishbourne and Wootton, containing a patchwork of small defence elements (various forms of masonry, concrete and timber defences.) covering a frontage of 5,646m inside the Creek. The majority of the frontage is defended. Waterfront properties have constructed private defences. The defences will progressively fail during the	Any short sections of defence remaining will be lost early in this epoch.	No defences

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
Wootton estuary mouth (west & east)			first and second halves of the epoch. Defences will be undermined or flooded and eventually fail. A few minor fragments of defence structures may last into the second epoch, vulnerable to outflanking and destabilisation, but by the end of epoch 1 (in 20 years time) the vast majority of the Creek banks will be undefended.		
		Description of cliff erosion/ reactivation	Wootton Creek estuary is a sheltered inlet extending inland 2km south-west to the village of Wootton, where the tidal flow is partially controlled by a road bridge structure, behind which the Old Mill Pond extends over 1km further to the south. There is a small spit on the east side of the mouth, and Wootton Hard on the western side. The spits represent the inner limit of wave action. Within the estuary, the coastline has been defended historically. The twin spits at Wootton Creek have migrated into the estuary and this trend is likely to continue. Over the next 100 years the mouth of the estuary and coastal frontage will be at risk from coastal erosion if the existing defences are allowed to fail. There is evidence of historic spit migration and foreshore lowering. On the western side of the mouth of Wootton Creek are north-facing low cliffs between 5 and 10m high, rising to 15m at Woodside Point. Basal undercutting is confined to a restricted area adjacent to the point of attachment of the Wootton Hard spit, where there is an abrupt change of coastline orientation. Woodside Point is expected to erode slowly at approx. 0.14 m/yr on the headland, and the inner shore at 0.4m/yr, after defences fail, allowing up to 3m & 8m or retreat respectively by year 20 on the undefended sections (less on the defended sections, though erosion is expected to commence by the end of the epoch). On the eastern side of the mouth of Wootton	The western entrance to the Creek will continue to erode at approx. 0.14m/yr (on the point) and 0.4m/yr (Wootton Hard). Further erosion of 5m & 12m is therefore anticipated during this epoch (or 8m & 20m in total since year 1). This will reduce protection from wave attack. The eastern spit has migrated landwards some 30m since the mid-1940s. The foreshore east of the tidal channel has undergone 12m retreat of the same datum line between 1938 and 1972 (0.3 ma^{-1}), accelerating to 0.5 ma^{-1} during 1972–1985. Retreat at 0.4m/yr may continue following failure of the remaining sections of defences (resulting in an additional 12m of retreat during this epoch where the frontage was already undefended, or up to 16m in total over 50 years). Within the estuary the western shore of Wootton Creek has the potential for recession if landward erosion of the waterline occurs, e.g. when it becomes more exposed to wave action or when the current defence structures fail. Without defences, within 50 years there is a low, but significant, risk that further landward migration or break up of the inner spits could permit wave penetration to erode the western shore and reactivate the steep slopes with consequent risk to properties. Furthermore, if all retaining structures fail at	At Woodside Point erosion at approx. 0.18m/r then 0.19m/yr (as sea level rises) will cause additional retreat of 9m over years 50-100, or 17m in total since year 1. In the longer term, the tip of Woodside Point could be affected by significant recession (of up to 30m) should toe erosion trigger reactivation of landslide features recorded on historical 1:2,500 maps of 1887 and 1946 Continued erosion of the inner shore of Woodside Point (Wootton Hard) will result in reduction in the protection against wave penetration into the inner estuary. Erosion at 0.47m/yr then 0.52m/yr (as sea levels rise) will result in a further 24m of retreat in years 50-100, or 44m in total since year 1. The eastern spit is likely to migrate further into the estuary, and will be very vulnerable to sediment supply. Break-up of the spit would greatly reduce the wave protection of the inner estuary. Retreat of the eastern entrance at approx. 0.47 then 0.52m/yr as sea level rises could result in an additional 24m of retreat during this epoch, or up to 40m in total over 100 years, in the area where the defences failed first). Inside the Creek, slopes are steep and there is potential for slope failure that would have serious effects on properties.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			Creek, between the ferry terminal and the eastern boundary of this unit, the undefended low cliffs exhibit past and currently active basal undercutting fronted by small debris stores of clay and limestone boulders. Retreat at 0.4m/yr may occur following defence failure in year 10-25 (resulting in up to 4m of retreat over the next 20 years). Properties near Wootton Bridge are currently prone to limited flooding every 5 years or so. With sea-level rise and possible increased wave energy within the estuary due to the possible change of geomorphological form at the mouth of the estuary, the probability of flooding here will increase with time.	Wootton Bridge, the inlet would become tidal for at least a further 1km inland, increasing the tidal prism by up to 20%. This could generate increased tidal currents and further exacerbate erosion problems of the banks and the spits. Increasing levels of tidal flooding will affect a number of properties near Wootton Bridge, and throughout the Creek, the current defence line will be inundated and overtopped.	Tidal flooding will frequently affect properties near Wootton Bridge, and inundate the low-lying coastal margins throughout the Creek.
		Description of beach evolution	There is a narrow low-angle backshore of coarse clastic material, succeeded seawards by a muddy clay foreshore. Inside the creek, grassy slopes (gardens) often run down to the water's edge, with private defences fronting the muddy edge of the channel. The twin spits at Wootton Creek have migrated from the outer estuary towards the inner estuary and this trend is likely to continue. A small proportion of eastward moving sediment is diverted into the inlet by littoral drift along the western shore which supplies the shingle spit of Wootton Hard. The majority of sediment is transported eastward into the inlet or to barrier-like banks on the lower foreshore, before being driven onshore to resume beach drift towards Ryde. Fluvial transport into the inlet has been intercepted since approx. 1830 by the dam that impounds Wootton Mill Pond, now forming the main coastal road crossing, Wootton-Fishbourne. However, this fluvial input would be small. The entrance to Wootton Creek has been dredged on several occasions to maintain a navigable channel for car ferries.	Littoral drift into the Creek mouth may increase from slope erosion and reactivation to the west. Erosion of the outer shore of the Creek will supply limited sediments to the shore. The spits are likely to retreat into to Creek or breach if sufficient sediment is not supplied into the Estuary mouth. Limited fluvial transport into the Creek could also recommence on failure of the retaining structures forming Wootton Road bridge. This is a key transport link connecting the two largest towns of the Isle of Wight (Newport and Ryde) so the consequences of loss would be serious.	Littoral drift into the Creek mouth is likely to increase from increased rates of coastal slope and cliff erosion to the west. Erosion of the outer shore of the Creek will continue to supply limited sediments to the shore. The spits are likely to be vulnerable to sediment supply sufficient to counteract rising sea levels.

Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			The Strategic Monitoring Programme has monitored beach levels along profile lines on the outer southern side of the creek since 2007, covering the area as far inland as the outer face of the southern spit. From 2007 to 2009 beach levels have been relatively stable (less than 5% reduction in cross-sectional area), although an exception to this is accretion occurring on the seaward face of the southern spit.		
	With present management	*Short description of predicted defence failure*	The patchwork masonry, concrete and timber defences could be maintained at their current standards of effectiveness, although practically, these are a sequence of private defences, so a coordinated approach would be difficult.	Masonry, concrete and timber defences would be maintained and replaced.	Masonry, concrete and timber defences could be maintained and replaced.
		Description of cliff erosion/ reactivation	Erosion of the majority of the shores of the outer and inner Creek would be prevented by maintaining defences, although small undefended frontages would be eroded and outflank adjacent defences. Tidal flooding near Wootton Bridge (overtopping of the current defence line) will continue.	The entrance spits are still likely to recurve into the estuary, increasing wave penetration into the Creek. Tidal flooding near Wootton Bridge (overtopping of the current defence line) will increase (in frequency or inundation level). Throughout the Creek, the current defence line will be periodically inundated and overtopped. Maintenance of Wootton Bridge will retain the key Newport-Ryde road transport link and continue to restrict flows into Wootton Old Mill Pond.	The entrance spits are still likely to recurve into the estuary, increasing wave penetration into the Creek, and they will be vulnerable to retaining sediment supply sufficient to keep pace with the rise in sea levels. Tidal flooding will frequently affect properties near Wootton Bridge, and inundate the low-lying coastal margins throughout the Creek. Inundation may increase the potential for slope failure and property damage inside the Creek.
		Description of beach evolution	Around Wootton Creek, defences will hold the mean high water mark, but the foreshores immediately in front are likely to erode and narrow.	Littoral drift from the north-east may deliver additional sediments derived from nearby coastal erosion into the mouth of Wootton Creek. Foreshore narrowing in front of the defences will continue.	Littoral drift from the north-east is likely to deliver additional sediments derived from nearby coastal erosion into the mouth of Wootton Creek. Foreshore narrowing in front of the defences will continue.
IW6 **Name: Quarr & Binstead**	**No Active Intervention**	*Short description of predicted defence failure*	2,815m frontage which is largely undefended. Near the centre of the unit there are some privately owned short sections of defence generally in the form of walls, slipways and timber structures providing access to the shore,	No defences	No defences

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
From: Wootton estuary mouth **To: Ryde Golf Course, Pelhamfield**			and a concrete/stone masonry/timber breast work wall extends along the centre of the frontage. The defences are generally expected to fail in 10-15 years or less (except for very short sections in 15-25 years). The eastern and western lengths of the frontage are undefended.		
		Description of cliff erosion/ reactivation	This is a generally rural frontage with low eroding soft cliffs in the west and slopes subject to shallow landsliding to the east. Near the centre, a small infilled valley with small lagoon/pond. In the west Quarr Abbey is surrounded by grassland and woodland and in the east the residential areas of Binstead and Pelhamfield are surrounded by woodland and mainly separated from the coast by Ryde Golf Course. The shoreline to the east of Wootton Creek is set back compared to that to the west of the Creek, implying faster erosion and retreat of this frontage. No Active Intervention would result in continuing erosion of this sparsely developed frontage. The natural regression of the shoreline will resume when the existing defences collapse during the first epoch. Erosion could result in shallow landslides and slumping of the coastal slopes, and could result in the flooding of a small lagoon near Quarr Abbey Farm. In the west of this frontage along Fishbourne Copse and Quarr Abbey, small-scale rotational sliding and cliff toppling is currently active and the foreshore and undefended cliffs (up to 8m in height) will erode at approx. 1m/yr, resulting in 20m of retreat over 20 years. Cliff foot debris includes large detached tilted inter-joint blocks of Bembridge Limestone; some retain soil cover, indicating the dynamic nature of contemporary cliff development. Basal debris stores show small-scale cliffing as well as squeezing/liquefaction of clays.	West of the central inlet, active erosion of the low clayey cliffs of Fishbourne Copse is expected to continue at approx. 1m/yr, resulting in a further 30m of retreat during this epoch (or 50m in total since year 1). The small central inlet could cause a change in the position of the shoreline if the lagoon barrier breaches due to tidal flooding. In the eastern half of the frontage erosion at 0.4m/yr will continue, resulting in 12m of retreat during this epoch (or 20m in total since year 1, of 90m where slope reactivation and retreat has occurred). Retreat will be approx. 4m less where the onset of erosion was delayed by the slow failure of defences in epoch 1. Shallow landslides are likely to reactivate and extend inland, if failure did not occur in epoch 1. Therefore retreat may place several properties on the outskirts of Pelhamfield at risk.	The coastline would continue to erode and adjust naturally to sea level rise. Modest acceleration of retreat is expected, alongside potential tidal flooding of the small pond/lagoon. West of the central inlet, cliff erosion at approx. 1.18 then 1.29m/yr will result in a further 61m of retreat during this epoch (or 111m in total since year 1). East of the central inlet erosion at 0.47m/yr then 0.52m/yr will result in 24m of retreat during this epoch (or 44m in total since year 1, of 114m where slope reactivation and retreat has occurred). Retreat may therefore place several properties on the outskirts of Pelhamfield at risk.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			An infilled valley with a small lagoon/pond near Quarr Abbey Farm is vulnerable to tidal flooding and erosion of the lagoon barrier over the next 20 years, with adjacent coastal erosion to the east at 0.4m/yr (8m retreat over 20 years). The coastal slope east of Quarr Abbey rises in elevation from 5–6m to 15m at Pelhamfield. Toe erosion of the relic coastal slope and some reactivating slips are apparent eastwards towards Binstead behind dilapidated defences. There is potential for significant reactivation of the coastal slope in the centre and east of the unit, with retrogressive shallow failures already threatening the seaward parts of the extensive gardens of several properties. Recession of 0.4m/yr is anticipated on the undefended coast or following defence failure later in epoch 1, plus a potential reactivation event causing faster recession within 20 years (approx. 70m slope reactivation and retreat).		
		Description of beach evolution	There is a wide mud, gravel and boulder-strewn foreshore becoming increasingly wide and sandy to the east and subject to continual erosion. At low tide large shingle bank is visible. Littoral drift is expected to continue eastwards at least to Binstead Hard. East of this location the relatively abrupt change of foreshore composition from silty clay to sand and sandy silts implies a connection with Ryde Sands to the east -an acknowledged sediment sink and sediment convergence zone. Cliff reactivations will supply predominantly fine sediments to the Solent. Eastern parts of the frontage are dependent on Ryde Sands for shelter from wave attack from Spithead. . Numerous archaeological features such as peat beds an ancient submerged oak forest are being revealed and uncovered in the foreshore, testifying to the increasing erosive regime	Fine sediment input from cliff retreat will continue and contribute to the eastwards littoral drift system. However, inter-tidal foreshores are generally likely to suffer losses in width, due to future sea-level rise inundating mean low water levels more rapidly than compensating erosion at mean high water can occur, constrained by slowly-reactivating coastal slopes. The narrow low-lying valley near Quarr could become inundated within 30 years as sea-level rises. The tidal prisms would probably be too small to maintain a permanent inlet so a brackish lagoon or marsh subject to periodic inundation would be most likely to form. Historical trends of significant retreat of the mean low water mark and foreshore narrowing are likely to continue along this	Continued erosion with modest acceleration should supply sediment to nourish the foreshore.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			following a removal of protective muds and silts. Over the shorter term, recent beach profile surveying through the Strategic Monitoring Programme reveals stable beach levels overall from 2007-09 along this frontage, except for slight erosion occurring at the western edge of Fishbourne Copse.	frontage.	
	With present management	*Short description of predicted defence failure*	The deteriorating defences in the centre of the frontage would be maintained and replaced. Frontages in the west and east of the unit would remain undefended.	The deteriorating defences in the centre of the frontage would be maintained, but may not be sufficient to prevent slope reactivation. Frontages in the west and east of the unit would remain undefended.	The deteriorating defences in the centre of the frontage would be maintained, but may not be sufficient to prevent slope retreat. Frontages in the west and east of the unit would remain undefended.
		Description of cliff erosion/ reactivation	Along the majority of the frontage, cliff retreat and reactivation will occur in line with the 'No Active Intervention' scenario outlined above. Where defences were maintained, outflanking of the defences will rapidly occur, especially following reactivation of the coastal slopes in the east of the frontage. Outflanking of up to approx. 20m will occur in the west where erosion is relatively rapid, and up to 78m in the east where erosion is likely to trigger slope failure and retreat.	Along the majority of the frontage, cliff retreat and reactivation will occur in line with the 'No Active Intervention' scenario outlined above. Where defences are maintained, outflanking of the defences will rapidly increase to approx. 50m (in total) in the west where erosion is relatively rapid, and up to 90m (in total) in the east. Overtopping of the defences is likely to occur, and low foreshore levels will expose them to wave attack.	Along the majority of the frontage, cliff retreat and reactivation will occur in line with the 'No Active Intervention' scenario outlined above. Where defences were maintained, outflanking of the defences will rapidly increase to up to 111m in the west and up to 114m in the east. The defences will also be increasingly destabilised by overtopping and wave attack, which may trigger failures in the slopes behind.
		Description of beach evolution	See the 'No Active Intervention' scenario above. In addition, flattening of the foreshore is likely to occur in front of the defended sections under a 'With Present Management' scenario due to no movement in mean high water and advance in mean low water. Adjacent cliff erosion and reactivation will supply significant sediments to the shore and east towards Ryde Sands.	See the 'No Active Intervention' scenario above. In the defended section flattening of the foreshore is likely, although the local cliff erosion updrift will continue to supply sediment.	See the 'No Active Intervention' scenario above. In the defended section narrowing and lowering of the foreshore is likely, although increased rates of cliff erosion updrift will continue to input sediment into this frontage which may counteract this trend.
IW7 & IW8 **Name: Ryde, Appley and Puckpool**	**No Active Intervention**	*Short description of predicted defence failure*	4.1km frontage of continuous defences fronting the town of Ryde, a key residential and holiday resort fronted by Ryde Sands (the largest sediment accumulation on the Isle of Wight coast).	Defences along the majority of the frontage will have deteriorated and failed during the previous epoch. The remaining short sections of defence in this epoch are likely to be a concrete ramp fronting the hovercraft terminal, a wall near the western end of the	No defences. Assets at risk include seafront shops and hotels, roads and railway line, residential properties and built recreational land. The loss of hovercraft and ferry facilities would

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
From: Pelamfield **To: East of Puckpool Point**			Stone masonry and concrete seawalls along the entire frontage have residual lives of generally 10-15 years, with the walls and revetments surrounding Ryde Harbour and sections of wall fronting parts of Pelhamfield in the east and Puckpool in the west lasting 15-25 years. Several short curvilinear breakwaters and straight groynes fronting the boating lake in the east will assist in retaining beach sands for 5-10 years.	boating lake and the seawall immediately west of Puckpool expected to fail in 25-35 years, leaving the entire frontage undefended.	be strategically important to the island.
		Description of cliff erosion/ reactivation	This unit covers the main frontage of Ryde town, one of the largest settlements on the Isle of Wight, including a long seafront esplanade from Ryde to Puckpool and beyond, railway and transport links and intensive development and coastal assets. *Ryde town:* Defences along the majority of the frontage will fail in the second half of the epoch, allowing wave attack to promote erosion of the exposed shoreline. Wave attack already occurs –for example on the seawalls to the west of Ryde Pier. At Pelhamfield and western Ryde, the coastal slope is less steep such that a low eroding cliff is likely to form. Along the Ryde frontage, reclamation of the backshore occurred during the 19th century, isolating the former cliff line from wave attack. Subsequently, the cliff/coastal slope was partly regraded and incorporated into the urban area of Ryde. This is an extremely difficult area to evaluate, for much of the esplanade is built forward onto the beach and Ryde Sands. Much of the area is built-up and would degrade to form potentially protective rubble as erosion progressed at approximately 0.4m/yr after defences fail (allowing up to 4m of erosion by year 20 along the majority of the frontage). Accretion at Ryde Sands, fronting the unit, may reduce the potential rate of erosion. Erosion of the coastal slope fronting the low-lying boating lake could trigger 80m of shoreline retreat/realignment near the end of the first	*Ryde town:* After failure of the defences slip planes in the coastal slope may be reactivated. If accretion of Ryde Sands does not protect the frontage, erosion will occur at approx. 0.4m/year, resulting in an additional approx. 12m of coastal retreat during this epoch, or 16m in total since year 1 (or 96m of retreat in the east near the boating lake). The esplanade, a section of the railway line and points of the coastal road will suffer erosion during this epoch. Should the coast erode at Ryde in a similar manner to that of adjacent frontages, then the steep slopes in front of St Cecilia's Abbey (at the western limit of this frontage) would be at risk of reactivation. The centre of Ryde is at risk from overtopping and tidal flooding along the Esplanade and extending inland across The Strand along Monktonmead Brook (following the route of the railway). The flood risk zone extends inland to Ryde St. Johns Station. Increasingly large numbers of residential properties, businesses Road and rail infrastructure are at risk. *Appley to Puckpool:* If accretion of Ryde Sands does not protect the frontage, erosion will continue at approx. 0.5m/yr as the remaining sections of defence fail and the coastal slope of Appley Park is at risk of slip	Erosion is likely to increase to rates of 0.47m/yr then 0.52m/yr as sea level rises, resulting in approx. 24m of recession during this epoch, affecting the railway line and coastal road. It is anticipated that the sea would eventually erode back to the foot of the old cliff, which forms the inshore boundary of the reclaimed land. Erosion could have potential to trigger reactivation of the coastal slope in the east of the unit. Cliffs could form around St. Cecelia's Abbey, but recession may be limited due to protection afforded by continued accretion of Ryde Sands. Tidal flooding will affect seafront properties along the lower reaches of St. Thomas Street, extending eastwards along the Esplanade and Strand as far east as the former boating lake. Flooding could also extend inland along Monktonmead Brook to Ryde St. Johns Station and include lower Monkton Street, Marymead Close, Hill Road W, across Rink Road and Park Road and affect the northern end of St. Johns Wood Road. *Appley to Puckpool:* In the longer term, the potential for reactivation of the Appley Park coastal slope increases as erosion cuts back further into the steep slopes at rates of 0.59m/yr then 0.65m/yr as sea

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			epoch. A significant risk increasing through this epoch and beyond is clear potential for tidal overtopping affecting the esplanade properties, and extending inland following failure of the coastal defence line. Large numbers of residential properties and businesses are at risk. *Appley to Puckpool:* Erosion will begin at breaches in the seawall towards the end of the epoch at a rate of approx. 0.5m/yr (allowing a maximum of 8m of erosion at the section of seawall likely to fail first, on the east of the Puckpool promontory, which is exposed by low beach levels to undermining of the concrete wall, leading to voids under the promenade). The pedestrian seafront promenade will be severed and amenity assets along the Appley & Puckpool frontage at risk. Accretion at Ryde Sands, fronting the unit, may reduce the potential rate of erosion.	failure. An additional 15m of erosion will occur during this epoch, up to 23m since year 1, or less where the defences were stronger. Erosion may result in the loss of land and recreational amenities along the promenade and in Appley Park, the loss of the trunk sewer, Appley Tower, St Clare's Cottage and Puckpool Battery (Scheduled Monument), and public safety issues.	levels rise, resulting in an additional 31m of retreat from year 50-100, or up to 54 in total from year 1. At Puckpool Point, the Fort embankment and structure and would be undermined and lost to erosion, diminishing this minor headland.
		Description of beach evolution	Ryde Sands is a regionally significant sediment sink, the largest on the Isle of Wight and the product of convergence of littoral and nearshore sediment transport from south east and west. The current trends apparent at Ryde Sands illustrate their essential role in the future of the Ryde town frontage. The largest source of sediment supply is probably from the south east. The exceptionally wide intertidal zone of Ryde Sands widens progressively eastwards and is composed of well-sorted sands, fragmented by widely spaced shallow sub-parallel shallow runnels that drain the sands as the tide falls. At it's widest point, near Appley, the sand banks extend up to 2km in width, from where the width of the intertidal zone diminishes eastwards past Puckpool towards Nettlestone Point. The net littoral drift direction is westwards, but there is probably some offshore	Under an accreting regime, the upper beach at Ryde Sands would be likely to build up in front of defences providing natural protection against storm wave action and the effects of sea level rise. The upper beach at Ryde Sands would be likely to provide natural protection against storm wave action and the effects of sea level rise. Under an eroding regime at Ryde Sands, the foreshore in front of the defences would gradually narrow and lower exposing the defences to increasing levels of wave energy. Beaches could be lost and replaced by strips of foreshore exposed only at mid to low tide. The upper foreshore would be relatively exposed and wave action would begin to cut through the reclaimed land of Ryde Esplanade, which would supply additional sediments to the shore.	No Active Intervention would in time, allow the intertidal area to realign naturally with sea level rise. Under an accreting regime, the upper beach at Ryde Sands would be likely to continue to provide protection against storm wave action and the effects of sea level rise, and a thin strip of dunes could form in the medium to long term (50-100 years). Ryde Sands is sensitive to wave climate and will be vulnerable to the rising sea level and increased storminess. Erosion and loss of the foreshore sands would lower beach levels and increase rates of erosion of the stabilised sediments underlying Ryde Esplanade and the coastal slopes.

Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	**Years 20-50 (to approx. 2055)**	**Years 50-100 (to approx. 2105)**
			to onshore sediment transport generated by refracted waves created by the change in coastline orientation at Nettlestone Point. Ryde Pier (built in 1870) is not an impediment to longshore transport. A channel is dredged from time to time to provide access to Ryde Marina. Developments such as the hovercraft terminal and Ryde Harbour have sterilised a small proportion of mid-shore/backshore sediments, and interrupt some east to west littoral drift, although this is not significant to the overall scale of sand that has accumulated in the intertidal area. The seawalls hold the beach in place and prevent significant sand accumulating on the coastal road and assets, which may occur following seawall failure towards the end of the epoch. Any change in the controlling forces such as the local wave climate could result in longshore migration of the bank and diminish the protection afforded to upper foreshores. It remains uncertain whether Ryde Sands continues to accrete, or whether it could be subject to the foreshore erosion that is common to much of the Solent. The Strategic Monitoring Programme shows beach levels to the west of Ryde Pier show no significant change from 2004-09. To the east of Ryde Pier, from 2004-09, there has been significant accretion along the profile in front of Ryde Harbour, and slight erosion in front of the boating lake. At Puckpool beach levels have been relatively stable (less than 5% change in cross-sectional area). Under a 'No Active Intervention' scenario in which defences fail and erosion increases sediment input to nearly coasts Ryde Sands may experience sediment surplus and accretion.	Sediment input by littoral drift from the south-east and west will continue as adjacent shorelines erode and reactivate.	Sediment input by littoral drift from the south-east and west is likely to increase as adjacent shorelines erode and reactivate.
	With present	*Short*	The continuous frontage of stone masonry and	A continuous frontage of seawalls,	A continuous frontage of seawalls,

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
	management	*description of predicted defence failure*	concrete seawalls, revetments and groynes would be maintained at their current standard without improvement.	revetments and groynes will be maintained and replaced.	revetments and groynes will be maintained and replaced.
		Description of cliff erosion/ reactivation	The combination of maintained defences and the wide dissipative intertidal sand banks will maintain the shoreline in its current position and prevent erosion from commencing.	Maintenance of the defences will prevent shoreline erosion, although sections will be vulnerable to overtopping and encroaching tidal flooding.	Defences will continue to maintain the shoreline and prevent erosion. In the longer term, the risk of tidal flooding in central Ryde remains, dependent of the standard of the weakest point of the maintained defence line.
		Description of beach evolution	Under a 'With Present Management' scenario there would be no direct sediment input to the frontage, which would be reliant on ongoing sediment supply by convergence of littoral drift from the south-east and the west. As defences are maintained and prevent sediment input to nearby shores, Ryde Sands may suffer sediment starvation and potential erosion. However, the quantity of sediment stored at Ryde Sands is testament to significant sediment supplies to this drift convergence zone and relative stability in recent decades, so littoral drift may compensate for lack of local sediment input under a regime of the present a hard defence line being maintained.	The consequences of both an eroding and accreting sediment regime are outlined under the 'No Active Intervention' scenario above. If sediment supply diminishes as defences are maintained from Seagrove Bay around to Ryde, foreshore narrowing is likely and falling beach levels will increasingly expose the defence line to wave attack.	The consequences of both an eroding and accreting sediment regime are outlined under the 'No Active Intervention' scenario above. If sediment supply continues to diminish as defences are maintained from Seagrove Bay around to Ryde, preventing any additional input to the sediment transport system as sea level rises, foreshore narrowing is likely to continue and falling beach levels will increasingly expose the defence line to wave attack and overtopping.
IW9, IW10 & IW11 **Name: Springvale, Seaview Duver and eastern Seaview** **From: East of Puckpool Point**	**No Active Intervention**	*Short description of predicted defence failure*	1,304m low-lying defended frontage, part of the continuous defence line fronting adjacent units to the west and south-east from Ryde to Seagrove Bay. At *Springvale* a stone masonry wall with a concrete toe contains a series of storm gates and has a residual life of 25-35 years, fronted by a short rock groyne which is due to last 15-25 years. 578m At *Seaview Duver* the frontage previously suffered damage from two sources: poor condition of the existing seawall and ineffective drainage of the low lying hinterland. However,	Without maintenance, the seawalls of Springvale and Seaview Duver may begin to fail in 25-35 years time, exposing the frontage to erosion and significant flood risk. The eastern Seaview frontage will already by undefended following defence failure in epoch 1.	No defences

Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
To: Nettlestone Point			the coastal defences were reconstructed in 2003/2004. A reinforced concrete seawall and rock revetment were built, and intertidal lagoon behind and the outfalls were improved. The seawall barrier to the lagoon is in very good condition, but without maintenance, it could be at risk in 25-35 years. The outfalls will cease to function without maintenance and increase risk of flooding surrounding the intertidal inlet constructed behind the wall. Along the *Seaview* seafront, privately owned defences provide a coast protection function and take a different form, with the narrow, low walkway backed by property boundary walls that, despite frequent gate openings, provide additional protection against overtopping. The densely developed village of Seaview is behind. The stone masonry wall is in significantly poorer condition than the Springvale and Seaview Duver frontages and is expected to fail in 10-15 years. In common with those frontages to the west, this section forms the end of the west-east costal orientation and is also low–lying with seafront properties at tidal flood risk.		
		Description of cliff erosion/ reactivation	This frontage is low-lying ground fronted by a rows of seafront properties, at both flood and erosion risk. *Springvale:* This frontage in the east of the unit is characterised by a string of properties linked by the coastal road. Defences will remain in place through the first epoch. *Seaview Duver:* In the centre of the unit is a low-lying intertidal lagoon protected by a low barrier on which the coastal road and properties are also situated. Defences will remain in place through the first epoch. *Eastern Seaview:* This frontage is the developed centre of Seaview village, with a footpath and	*Springvale:* The defence would deteriorate and fail. Erosion will commence through the weak coastal barrier at approx. 1m/yr (resulting in a maximum of 25m of recession bye year 50). No Active Intervention will result in the loss of the seafront assets including the seafront public highway, residential and commercial properties and a pumping station due to erosion and inundation by tidal flooding. *Seaview Duver:* No Active Intervention will result in the deterioration and eventual failure of the existing defences later in the epoch and erosion at approx. 1m/yr (up to 15m erosion during this epoch if the defence fails in year 35) with potential overwashing	*Springvale:* The rate of erosion is likely to increase as sea level rises to 1.18m/yr then 1.29m/yr, resulting in an additional 61 of coastal retreat from years 50-100, or approx. 86m since defence failure in year 25. *Seaview Duver:* Surrounding the likely inlet breach, erosion at 1.18m/yr then 1.29m/yr through the weak sediments may result in an additional 61 of coastal retreat from years 50-100, or up to 86m retreat over 100 years (following defence failure in epoch 2). *Eastern Seaview:* In the longer term, erosion of the Bembridge limestone

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			row of properties forming the seafront, with the coastal road and village behind. No Active Intervention will result in the deterioration and failure of the existing defences in epoch 1. Erosion of the Bembridge limestone headland is likely to begin at approximately 0.6m/year after failure of the defences in year 10-15. By the end of the epoch up to 6m erosion could occur.	and breaching forming an open tidal inlet. The brackish lagoon would resort to a saline lagoon/inlet. Properties on the seafront and the edges of the inlet would be at risk from tidal flooding without tidal flows controlled by the barrier. No Active Intervention will result in the loss of the seafront assets including the seafront road, residential and commercial properties. *Eastern Seaview:* Erosion will continue at approx. 0.6m/yr, resulting in an additional 18m of retreat over years 20-50, or 24m in total since defence failure in year 10 By 2055 the seafront properties and the western section of Bluett Avenue behind will also be at risk of tidal flooding, alongside Saltern's Road.	headland is expected continue, although it is likely to remain a defined headland. Erosion rates are likely to increase as sea level rises to approx. 071m/yr then 077m/yr, creating up to 37m of erosion from 50-100 years, or 61m in total over 100 years (since defence failure in year 10). This will result in the loss of residential properties and an outfall. The tidal flood risk zone expands eastwards into the edge of Seaview, potentially affecting additional properties at the western ends of Bluett Avenue and Fairy Road.
		Description of beach evolution	There will be no direct sediment input into this frontage over the next 20 years and the beaches will be reliant on littoral drift moving west into the frontage throughout this epoch. East of Puckpool Point, the backshore consists of an occasionally interrupted low shingle berm, and a wide foreshore zone. This berm develops into a wider and more elevated feature near Springvale, where it sealed the exit of a former embayment at Seaview Duver. At Springvale, the intertidal zone is approximately 480m wide, narrowing progressively eastwards to Nettlestone Point. The net littoral drift direction is westwards, but there is probably some offshore to onshore sediment transport generated by refracted waves created by the change in coastline orientation at Nettlestone Point. Which is a relatively resistant controlling feature formed of Bembridge Limestone. The foreshore has areas of exposed 'rock ledges' and the foreshore around the headland is somewhat volatile and variable in level. Over the five-year period from 2004-09 the Strategic Monitoring Programme	It is anticipated that No Active Intervention would lead to limited increase in sediment yield from the low-lying land. Foreshore narrowing is likely to be exacerbated by rising sea levels. Before the new defences were built at Seaview Duver the defence was of insufficient height to prevent occasional overtopping. This suggests that barrier beach migration will continue to operate following defence failure when high onshore wind velocities, waves and tides combine.	At Seaview Duver the currents generated at a new tidal inlet could disrupt shoreline sediment transport and generate a small ebb tidal delta of sediment on the lower foreshore, although the tidal exchange is likely to be quite small. Accelerated beach erosion downdrift at Springvale, Appley & Ryde could result. Consequently, the inlet could be unstable and periodically re-seal and breach, perhaps seasonally. Properties on the seafront and the edges of the inlet would be increasingly at risk from tidal inundation. The littoral drift sediment supply may increase in the event of large scale slope reactivation and retreat in Seagrove Bay and Priory Bay to the south-east.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			shows the beach levels along this frontage have been relatively stable (less than 5% change in cross-sectional area). Foreshore narrowing is likely to occur in front of the defence line of Springvale and Seaview Duver over the next 25 years whilst the defences remain.		
	With present management	*Short description of predicted defence failure*	The stone masonry and concrete seawalls fronting Springvale and Seaview Duver are currently in very good condition and will be maintained at their current standard without improvement. The wall fronting eastern Seaview is of a lower standard but will be maintained and replaced if current management practices continue.	The seawalls forming a continuous frontage will be maintained and replaced.	The seawalls forming a continuous frontage will be maintained and replaced.
		Description of cliff erosion/ reactivation	If present management practices continue there will be no significant differences in epoch 1 from the 'No Active Intervention' scenario, with the exception of the eastern Seaview seawall with will be repaired and maintained, and erosion will be prevented.	The maintained seawalls will continue to prevent shoreline erosion and retreat. Overtopping and tidal flooding remains a risk for the Seaview frontage in the south. Lowering foreshore levels will expose the defences to wave attack.	The coastal defences will require replacement and will continue to stabilise these barriers to prevent inundation of the low-lying land behind. Sea level rise will increase the risk and adverse consequences of overtopping and tidal flooding.
		Description of beach evolution	Foreshore narrowing and falling shingle beach levels are likely to occur in front of the defence line. There will be no direct sediment input into this unit, which will be dependent on littoral drift from the south-east.	With present management continuing, foreshore narrowing is likely to be exacerbated by rising sea levels, static upper shore defences and littoral drift minimised by defence maintenance in adjoining units updrift.	Foreshore narrowing is likely to be exacerbated by rising sea levels. Low beach levels are likely to expose the defences. Slope reactivation and retreat in Priory Bay could supply some additional sediments to the shorelines to the north.
IW12 **Name: Seagrove Bay** **From: Nettlestone Point**	**No Active Intervention**	*Short description of predicted defence failure*	1,436m defended frontage backing Seagrove Bay, facing east. The stability of the slope and coastal development is dependent on the seawall at the toe. Around Nettlestone Point short sections of defence have a residual life of 5-7 years, but moving south the majority of the frontage from the High Street to Pier Road is protected by a	Remaining sections of seawall in the central and southern sections of the unit will deteriorate and fail by year 35, leaving the frontage undefended and exposed.	No defences

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
To: Horestone Point			continuous line of stone masonry and concrete seawalls which are generally expected to fail in 10-15, or 15-25 years in the centre. Following short sections of variable condition defences fronting southern Pier Road properties, the Esplanade at Seagrove Bay at the south of this unit is protected by a concrete sea wall faced with stone masonry and three rock groynes constructed in 2000 which is not expected to fail until year 23-35.		
		Description of cliff erosion/ reactivation	Nettlestone Point (the northern limit of this frontage) marks a change in coastline orientation from west-east to north-south along this frontage, facing east. The shallow bay of Seagrove Bay is backed by a largely developed coastal slope rising to 30m in height. The coastal slope at Seagrove Bay has a long history of land slippage. This is mainly caused by the presence of the underlying Osborne beds which is a clay of high-plasticity with a clay content of approximately 70%. Significant ground movements were observed in the area in 2002/03. The toe of the rotational slip surfaces some 35 metres seaward of the seawall. Once the defences fail it is estimated that the coastal slope will erode at approximately 0.1-0.3m/year, resulting in approx. 1.5 to 3m of erosion in northern and central Seagrove Bay by the end of this epoch (following defence failure). In the central part of Seagrove Bay the factor of safety against slope failure was calculated to be less than one, with current low beach levels.	When the remaining sections of defences fail, erosion is likely to form low cliffs in most of the bay area., with erosion rates of 0.1-0.3m/yr resulting in an additional approx. 9m of erosion over years 20-50 (or less where the defences remained in the first few years of this epoch), or up to approx. 12m erosion since the majority of defences in the bay failed in epoch 1. Within a few years of failure of the defences the increasing toe erosion of the slopes will reactivate the failure planes causing landslips of between 15 and 100m, which could occur in epoch 2 or epoch 3.	Erosion will continue throughout the frontage at rates of approx. 035m/yr then 0.39m/yr as sea level rises, with the potential for a further 18m of coastal erosion during this epoch. However, the coastal slope at the southern and central parts of the bay is likely to reactivate with major slides. Over a 100 year period, a large number of residential properties will be lost, along with infrastructure assets. Within a few years of the progressive failure of the unmaintained defences (in years 10-35) the increasing toe erosion of the slopes and antecedent winter rainfall will reactivate failure planes causing landslips of between 15 and 100m, which could occur in epoch 2 or epoch 3. A 100m slope failure zone is shown in the 'No Active Intervention' maps for the third epoch, but this reactivation could occur in epoch 2.
		Description of beach evolution	A recent trend of lowering beach levels has been observed in the Seagrove Bay area. Beach levels are volatile and vary with time possibly in a cyclical manner. The current low beach levels are allowing waves with more energy to attack the dilapidated seawall. Low beach levels will precipitate the failure/breach of the seawall by undermining of the foundations. The mobile	Erosion of the shoreline will release some sands and limestones although the majority of supply would be clays. These sediments would feed local beaches, and may be supplemented by additional littoral drift input from the south from slope failure in Priory Bay.	Sediment released by coastal erosion will pass around the headland to the north (Nettlestone Point) under natural littoral processes. Under a No Active Intervention scenario temporary stabilisation of the slope will occur following slope failure/breach of the

Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			beach and the ground immediately behind the seawall serves as a toe weighting to help keep the slope in a stable condition. The embayment of Seagrove Bay has formed by erosion of soft clayey strata between rocky headlands. The headlands partly intercept littoral transport, encouraging moderately wide sandy beaches in the north and centre of the bay and depletion in the south of the bay. Sediments yielded by the commencement of cliff erosion are likely to contribute to local foreshores, before contributing to drift inputs north-west towards Ryde Sands. Over the five-year period from 2004-09 the Strategic Monitoring Programme shows the beach levels in the north and centre of this frontage have undergone slight to significant erosion (respectively) while at the southern limit of the unit (just to the north of Horestone Point the beach level has accreted slightly.		seawall event due to the slump material from the failure acting as toe weighting. A failure cycle will be established as, in time, erosion of the slump material will occur and remove the toe weighting and thus reduce the slope stability causing further failures to occur.
	With present management	*Short description of predicted defence failure*	The seawalls and defences fronting the length of Seagrove Bay will be maintained and replaced at their current standards of effectiveness.	The defence line will be maintained by replacement of seawalls and rock groynes.	Seawalls and rock groynes will be maintained and replaced.
		Description of cliff erosion/ reactivation	Maintaining the seawalls will hold the shoreline in its current position and retain current assets and land use in Seagrove Bay.	With present management practices continuing, the coastal slopes behind Seagrove Bay are likely to remain inactive. Defences in the centre and north of the bay may be subject to overtopping.	With present management practices continuing, the coastal slopes behind Seagrove Bay are likely to remain inactive. Defences in the unit may be increasingly affected by overtopping. Whilst maintaining seawalls and preventing toe erosion minimised the risk of slope reactivation, increasing winter rainfall could also trigger slope failure in the longer term, which could breach or collapse the seawall and expose the ground behind it to erosion.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
		Description of beach evolution	Maintaining seawalls would prevent cliff sediment inputs from feeding the local beach within the bay, but the volumes of sands and gravels are small so it is thought that he defences would not have a significant impact on the supply pathway around Nettlestone Point to Ryde Sands. Gradual narrowing of the foreshore is likely to occur with some loss of amenity and, increasing the exposure of defences to wave attack.	Gradual narrowing of the foreshore is likely to occur with loss of amenity and increasing the exposure of defences to wave attack. Littoral drift from the south may increase due to slope failure in Priory Bay.	Foreshore narrowing is likely to continue, exposing the defences to wave attack. Any beach sediment accumulating in the unit will be transferred northwards by littoral drift towards Ryde Sands.
IW13 **Name: Priory Bay** **From: Horestone Point** **To: St Helens Old Church**	**No Active Intervention**	*Short description of predicted defence failure*	1,490m of wooded coastal slopes around Horestone Point and Priory Bay. Fragmented coastal defence structures within Priory Bay are largely redundant, a testament to past shoreline change, and they will not prevent slope failure.	No defences	No defences
		Description of cliff erosion/ reactivation	In the undefended south of Seagrove Bay, rotational failures are likely to resume in the first epoch. Horestone Point is actively eroding, with large trees being undermined and falling across the beach at the point. In Priory Bay the sloping cliffs are up to 34m in height, with an increase in slope gradient southwards. There is evidence of basal erosion and shallow translational sliding, with a major semi-rotational failure affecting the cliff line near the change of coastline curvature in the south. There is potential for significant slope reactivation in future epochs. No Active Intervention will result in continued erosion of Horestone Point, Priory Bay and Nodes Point. As existing defences have already failed in part at the south of Priory Bay, slope instability is likely to reactivate leading to major slips. The eroding headlands will also increase sediment supply. The whole of this unit is at risk from reactivation of the slip planes in the coastal slope which could lead to mass failure of the slope.	Erosion will continue at 0.3m/yr in the north and centre of the bay, resulting in an additional 9m of coastal retreat during this epoch (or up to 115m or 55m coastal slope retreat in total since year 1 where slope reactivation has occurred). Erosion will continue at 0.4m/yr in the south of the bay, resulting in an additional 12m of coastal retreat during this epoch (or up to 150m coastal slope retreat in total since year 1 where slope reactivation has occurred). At first the slope failures and retreats will accentuate the two headlands as the toes of failures extend seaward, but later erosion would reduce their definition as debris is eroded and transported.	The activity of these cliffs is anticipated to increase due to sea level rise and the increased winter rainfall. The coastal slopes around Horestone Point may develop into a large rotational landslide complex extending some distance inland. In the longer term, Horestone Point is expected to reduce as a headland. The central cliffs of Priory Bay will continue to be affected by active cliff erosion Erosion at 0.35m/yr then 0.39m/yr in the north and centre of the bay will result in an additional 18m of coastal retreat during this epoch (or, in total, up to 133m coastal slope retreat in the north and 73m retreat in the centre of the bay since year 1, where slope reactivation has occurred). In the south of Priory Bay and the frontage around Node's Point to St. Helens Old Church, development of major landslides

Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			Erosion rates of 0.3m/yr are expected at Horestone Point and in the northern and central sections of the Priory Bay, resulting in 6m of coastal retreat over the next 20 years, undermining the toe of the coastal slopes. Additionally, potential slope reactivation and retreat of 100m around Horestone Point and 40m in the centre of the bay may occur at the end of epoch 1. In the south of the bay and around Nodes Point erosion at 0.4m/yr will cause 8m of retreat of the toe of the coastal slopes, likely to trigger slope failure extending over an area up to 130m inland.		are expected, with reduction of Nodes Point as a headland, which should supply new sediments to nourish the shore and in time contribute to St Helens Duver. Erosion at 0.47m/yr then 0.52m/yr in the south of the bay will result in an additional 24m of coastal retreat during this epoch (or up to 174m coastal slope retreat in total since year 1 where slope reactivation has occurred).
		Description of beach evolution	The upper beach is a coarse clastic berm and the foreshore a low sandy intertidal slope, narrowing slightly in a northward direction. An offshore bar is exposed at low tide within Priory Bay creating a sheltered, shallow pool running along the bay, open at its northern end. Sand derives from local cliff erosion and output from Bembridge Harbour, and sediment supply from the eroding cliffs will continue through all three epochs. The embayment of Priory Bays formed by erosion of soft clayey strata between rocky headlands. The headlands partly intercept littoral transport, encouraging moderately wide sandy beaches in the north and centre of the bay and depletion in the south of each bay. Node's Point acts as a littoral drift divide, with transport directed northwards along Priory Bay to Seagrove Bay and southwards towards St Helens Duver. As this is a sediment recirculation area, erosion in Priory Bay will affect both Seagrove Bay to the north and St. Helens Duver to the south, which are strongly dependent upon this frontage. The Strategic Monitoring Programme shows beach levels along this frontage have been relatively stable from 2005-09, with slight accretion occurring in the centre and south of	Some sands and limestones would be yielded from erosion of the coastlines of Seagrove Bay and Priory Bay although the majority of supply would be clays. Sediments yielded by cliff erosion are likely to contribute to local foreshores and resist narrowing trends, as well as supplying the shorelines to the north and south.	Continued erosion and landsliding will supply sediments to the coastal system. Reduction of Nodes Point as a headland should supply new sediments to nourish the shore and in time contribute to St Helens Duver.

Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	**Years 20-50 (to approx. 2055)**	**Years 50-100 (to approx. 2105)**
			Priory Bay.		
	With present management	*Short description of predicted defence failure*	Largely undefended frontage of Horestone Point, Priory Bay and Nodes Point. Remnant defence structures within Priory Bay are ineffective. Continuing with Present Management means continuing to allow natural evolution to occur.	No defences	No defences
		Description of cliff erosion/ reactivation	See 'No Active Intervention' scenario above. Outflanking of the defences in neighbouring units will occur by 6m in the north and 8m in the south, although slope reactivations could increase these offsets of the cliff line to over 100m.	See 'No Active Intervention' scenario above. Outflanking of the defences in neighbouring units will continue to approx. 15m in the north and 20m in the south (in total), although slope reactivations could increase these offsets of the cliff line to well over 100m.	See 'No Active Intervention' scenario above. Outflanking of the defences in neighbouring units will continue to approx. 33m in the north and 44m in the south (in total), although slope reactivations could increase these offsets of the cliff line to well over 100m.
		Description of beach evolution	See 'No Active Intervention' scenario above. No change in the foreshore in Priory Bay is anticipated with present management continuing, although Seagrove Bay to the north and St Helens Duver to the south are expected to undergo narrowing of the foreshore.	See 'No Active Intervention' scenario above.	See 'No Active Intervention' scenario above.
IW14 **Name: St Helens Duver** **From: St Helens Old Church** **To: Bembridge Harbour entrance Groyne**	**No Active Intervention**	*Short description of predicted defence failure*	924m defended frontage along St. Helens Duver sand spit. Defences form a barrier between the beach and the dunes of St Helens Duver, whilst the seaward edge of the foreshore is terminated by the (dredged) navigation channel leading to the entrance to Bembridge Harbour. The principal defence on to the seaward face of the Duver consists of a sea wall and groyne field of variable age and condition. The seawall is constructed of concrete and stone masonry walls and steel sheet piling. The residual life of the current defences was assessed in accordance with SMP guidance and the seawalls fronting the Duver are generally expected to fail in 15-25 years, with the northern section near St. Helens Old Church in 10-15 years. The groynes are primarily of timber/metal construction, expected	No defences	No defences

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			to fail in 10-20 years. Towards the southern end of The Duver is a length of sea wall that is currently in poor condition (expected to fail in 5-10 years) with a high risk of defence undermining by erosion from wave attack. Most of the groynes are in fair to good condition although some groynes towards the southern end are in poor condition with loss of beach through lowering/flattening in these locations. The beach forms a vital link in the defences of the Duver as it acts to reduce wave energy impacting on the wall. It is noted that the poorer wall condition is coincident with the lowest beach levels. There is periodic undermining of the concrete toe of the defences due to fluctuations in sediment levels, with corroded steel sheet piling, voids in the promenade and recent signs of rotation of the structure. The informal sea defence embankment on the harbour side of the Duver is owned by the National Trust and is on the inner bank of the mill pond. The defences protecting the Duver are likely to fail and expose the spit to erosion at the end of the first epoch (in approx. 10-25 years time).		
		Description of cliff erosion/ reactivation	The Duver is a sand spit formed at the mouth of Bembridge Harbour, which provides shelter for Bembridge Harbour from surface waves. It is attached to the land at its northern end, and is composed of unconsolidated soils and dune sands stabilised only by a thin vegetation cover. A small number of residential properties are located on the seaward face of the spit along a promenade protected by the seawall (and groyne field) with an access road, parking and a café. Commercial properties consisting of marine service industries are located on the harbour side of the Duver spit. The area also is home to important habitats. The area to the front of the Duver is part of the Solent Special Protection Area (SPA) and is an important location for over-wintering wildfowl, such as Brent Geese.	St Helens Duver and Bembridge Point are parts of a complex system around the mouth of Bembridge Harbour with sedimentary interactions likely to occur between the different morphological components of the system during this epoch. Renewal of shoreline erosion and retreat of the seaward face of the Duver following significant failure of the seawall will cut into the vegetated dunes behind. Dune recession may triggering a southward extension of the Duver (although is unlikely to seal the entrance to the harbour). Retreat (beginning following defence failure) may expose some areas of sediment that are more susceptible to erosion due to their unconsolidated nature. Under this scenario	With no defences in place the entire Duver frontage is predicted to be subject to erosion, with peak retreat rates of 25m over 100 years mid-way down the Duver (an estimate prepared by the Eastern Yar River and Coastal Erosion Strategy in 2008, estimating shoreline position based on longshore processes). Alternatively, with the groyne field remaining in place the peak retreat over 100 years is reduced to 7.5m between the two most northerly groynes and at the southern tip of the Duver. The groynes help maintain the current position of the Duver, and without these groynes the frontage will be susceptible to erosion and much of the sediment making up the upper part of the beach will be lost.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			If a 'No Active Intervention' management policy is adopted for the Duver frontage, then areas of the frontage will be subject to retreat over the next 100 years. The main areas of peak erosion are the southern tip of the Duver and in between the groynes. However, if the defences were removed then the entire frontage will retreat, with the peak retreat being three times higher than under a 'do nothing' strategy. While the existing groynes and wall remain, retreat of the shoreline would be localised between the groynes towards the southern tip of the Duver. Once the sea defences are gone (later in epoch 1), the entire frontage would slowly retreat. Wave overtopping of the Duver currently occurs. A significant number of properties are at risk from tidal flooding, with the main risk wave overtopping of the Duver seawall. The principal tidal flood risk occurs on the front and at the southern end, though there is still potential for flood waters to encroach from the tidal mill ponds to affect properties at the northern end of the Duver. Tidal flooding encroaching from the rear of the Duver (Bembridge Harbour) is likely to affect the access road running along the Duver by 2025.	the shoreline may be more prone to erosion and recession may proceed at a greater rate than anticipated. Following defence failure thinning of the Duver will place various amenities and businesses along the seaward margin and tip of the Duver at risk from any change in morphology and access. The most likely impact of retreat of the Duver would be to increase exposure inside the harbour to any wind generated waves and low frequency swell waves from the east. The waves within the harbour are locally generated wind waves. The flood risk zone expands in future epochs to affect a greater number of commercial and also residential properties	There is limited risk of breach (development of a permanent channel through The Duver), due to the nature and availability of sand material behind the seawall. If wall failure occurs at some point in the future, the sand in the dune system will be introduced to the beach and a semi-natural system is likely to develop. The Duver would evolve over time by changing its shape, but it will remain as a protective feature for the Bembridge Harbour. Over the longer term this may result in a natural shift in the location of the harbour entrance. It should be noted that the statements above assume that the Bembridge Harbour perimeter defences are maintained in-situ. Major differences in future evolution would occur at the shoreline and in the nearshore zone if the Eastern Yar valley were allowed to flood. Increased overtopping of the Duver will occur. The 1in200 year tidal flood zone encroaches across the Duver from Bembridge Harbour in several places by 2105, based on altitude and sea level rise allowances. Increasing risk of inundation will interact with the erosion occurring on the western side of the Duver and storm events to govern the long-term evolution of area. If a breach in the spit did occur, it could form an eventual second entrance to Bembridge Harbour allowing higher energy waves to penetrate.
		Description of beach evolution	The present day spit is protected by a seawall and its stored sediments are no longer available to nourish the foreshore. The dominant wave-	Loss of the defences is likely to increase the amount of sediment available for transport southwards, leading to an increase in the	Over the next 100 years, deterioration or loss of St Helens Duver due to erosion and flooding could have significant

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			driven sediment transport of sand and gravel is to the south along the Duver and to the west along Bembridge Spit. Bembridge Harbour is a local drift convergence zone from the north and south. At the harbour entrance the transport of fine to medium sands can be driven by tidal currents alone. The harbour shows weak flood dominance, with a net transport of sediment into the harbour. The active flood and the ebb tidal deltas are of similar sizes, with a larger relic ebb delta also present. The foreshore is predominantly sand with some shingle and, although relatively stable, the level is low. The foreshore appears to be lowering and flattening. Sediment input will increase following collapse of the defences later in the first epoch, but failure of the groynes will reduce the capacity of the shoreline to retain the sediments. The results of the Strategic Monitoring Programme from 2004-09 show beach levels along St. Helens Duver have been undergoing moderate accretion in the north, are stable or slightly accreting in the centre and undergoing slight erosion in the south.	amount of material building up on the tip of the spit. This could provide more material into the channel. Studies to date suggest that there is limited direct sediment connectivity between the Bembridge Spit and The Duver and that the intermediary flood and ebb tidal deltas provide the pathways between the two areas. Consequently the retreat of The Duver is unlikely to impact directly on the Bembridge Spit. The Duver is especially vulnerable to interference because it is supplied by such a short littoral drift pathway.	impacts on the adjacent frontages of Bembridge Harbour to the west and Bembridge Point to the south. Larger-scale failure of defences within the Harbour (along Embankment Road) would be likely to increase currents within the Harbour entrance channel due to major flooding of the reclaimed eastern Yar valley, leading to an increase in the erosive regime affecting St. Helens Duver. Sediments would probably be deposited within an enlarged ebb tidal delta and be unavailable to the shoreline. The amount of recession is difficult to estimate as it is uncertain how quickly a new stable equilibrium configuration would develop with the new inlet regime and how much sediment would need to be contributed by the relict dune store.
	With present management	*Short description of predicted defence failure*	The defences outlined under the 'No Active Intervention' scenario above would be maintained at their current standards of effectiveness. The seawall and groyne fields would be maintained and reconstructed along the length of St. Helens Duver.	The seawall and groyne fields will be maintained and replaced.	The seawall and groyne fields will be maintained and replaced.
		Description of cliff erosion/ reactivation	Maintenance of the defences will continue to hold the shoreline in its current position and preserve the stabilised dunes and assets along St Helens Duver. Erosion and retreat will be prevented. Overtopping and increasing flood risk will continue.	Maintaining the seawall will protect the properties, businesses and road access at risk of erosion, and shelter Bembridge Harbour behind, but it would not protect properties from increased risk of flooding with sea level rise. Overtopping of defences is likely to occur more frequently.	The maintenance of the seawall will continue to prevent erosion but it and a number of properties and businesses are likely to be overtopped and inundated by regular flooding. The seawall will also be vulnerable to low beach levels, and increasingly outflanked by ongoing erosion at Node's Point to the north.
		Description	The foreshore in front of defences would	The unconsolidated foreshore in front of	Foreshore narrowing and low beach levels

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
		of beach evolution	continue to narrow and lower, exposing the seawalls to wave attack. Sediment input from the unit would be prevented, assisting the lowering of beach levels. Towards the end of the epoch, slope reactivation and retreat in Priory Bay could supply additional sediments to the frontage by littoral drift.	defences would continue to narrow and lower, destabilising the defences and exposing them to wave attack. Material will be removed southwards by littoral drift to the southern tip of the spit.	would be likely to deplete the quantities of sediment retained by the groyne field which has proved important in protecting the frontage. Continuing present management practices in neighbouring frontages (including retaining Esplanade Road) is likely to allow the current sediment transport regime operating around the Harbour to continue.
IW15 **Name: Bembridge Harbour** **From: Bembridge Harbour entrance Groyne** **To: Bembridge Point Groyne**	**No Active Intervention**	*Short description of predicted defence failure*	Bembridge Harbour is a small, enclosed estuary sheltered by double sandy spits. It currently covers an area approx. 600m by 1km wide, with approx. 5,256m of frontage inside the Harbour. The key flood defence is Embankment Road, a former railway embankment forming the back of the Harbour now supporting the coastal road and coastal infrastructure, and preventing tidal inundation of upstream villages within the Eastern Yar floodplain. The embankment is approximately 10m wide at its narrowest point and approximately 1,500m long. Within the embankment are critical services including gas pipes, telephone and electric cables. The seaward face of the embankment and the margins of Bembridge Harbour are strengthened by some localised protection works such as concrete and masonry seawalls and sections of timber and rock revetment, with residual lives of generally 10-25 years. Embankment Road links St. Helens to Bembridge and forms the south east and south west border of the harbour. It is key defence against tidal flooding. If it were not in place 464 properties would be at risk from flooding from the sea at high tide. In 100 years this would rise to 613 properties (ref. Eastern Yar River and Coastal Erosion Strategy, 2009). The defence is in good condition and there is nothing to suggest it will not remain so for the next 100 years, provided it is maintained, but the	Defences around the margins of the Harbour will deteriorate and fail in epoch 1 or early in Epoch 2 (over years 10-25). Embankment Road is expected to remain and provide a flood defence, to a diminishing standard (without maintenance).	Embankment Road is likely to remain and provide a flood defence, to a diminishing standard. Lack of maintenance and sea level rise significantly increase the likelihood of breach or failure of the seawall by year 100.

Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	**Years 20-50 (to approx. 2055)**	**Years 50-100 (to approx. 2105)**
			possibility of failure of the defence must be considered under a scenario of 'No Active Intervention' including no further maintenance. At the moment, the road has a 1 in 25 chance of being overtopped in any year. In 100 years time, due to sea level rise, the road could be overtopped by sea water on a monthly basis, resulting in 260 properties being at risk of flooding. A series of concrete and masonry walls are constructed around the harbour front section of St Helens, with residual lives of 15-25 years. The mill pond embankment was once part of the defences, however the removal of the gates/sluices renders this structure ineffective and open to tidal flows.		
		Description of cliff erosion/ reactivation	Bembridge Harbour is the remnant of a much larger Estuary truncated and drained in the 1880s. The largest spit is from the north-west. At low tide the harbour almost dries, apart from a channel into the Eastern Yar river. The harbour is bordered by residential properties, houseboats, marinas and some marine industry. Embankment Road primarily protects the Eastern Yar river catchment from tidal flooding. It is predicted that one of the main impacts of climate change to this area will be by water overtopping the defences and resulting in the inundation of Brading Marshes with saline water (the largest freshwater habitat in the Solent and Southampton Water SPA). The standard of protection of the defence will decrease over time resulting in an increase in the risk that the embankment will be overtopped. Bembridge Tide-gate complex (not including the sluice) located at the western end of Embankment Road has a tidal flood defence function to prevent tidal inundation of Brading Marshes. Tidal flooding from the harbour will occur at two distinct low points along Embankment Road at Harbour Farm and at Bembridge Tide-gate. At the Tide-	Defences within the harbour are likely to be overtopped more frequently during extreme tide events increasing tidal flood risk to low-lying areas of St. Helens and Bembridge. Within the Eastern Yar floodplain, currently fluvial flooding is the dominant risk to the communities in Brading, Yaverland and Sandown. If the Culver Parade seawall at Yaverland is breached in epoch 2, or Embankment road fails within Bembridge Harbour in epoch 3, tidal inundation and flooding will become the most important risk. The wider impact on the harbour of retreat occurring along St. Helens Duver would be, firstly, increased size of tidal prism (estuarine water volume) generating stronger ebb tidal currents and potentially resulting in enlargement of the ebb tidal delta, and secondly, the Duver is likely to reduce in width as part of the retreat (including the intertidal foreshore) leading to risk of increased exposure within the harbour (dependant on development of	Sea level will rise over the next 100 years by approx. 98cm (from 2009 to 2105). This will result in increased overtopping at Embankment Road and expose the properties bounding Embankment Road to increased tidal flood risk. An increase in overtopping would be likely to lead to a permanent breach of Embankment Road within 100 years. This is likely to be caused by erosion to the back (fluvial) face of the embankment during overtopping. Although a breach is unlikely to result from a single event, a substantial loss of 'fill' material would occur over time, leading to a permanent breach of Embankment Road. This would directly expose Brading Marshes to the sea, which in turn would increase the risk of flooding to properties in Sandown, Brading and Yaverland. This would also result in a temporary loss of transport infrastructure and risk of severance of services (gas, electricity and telecoms) and local impacts to recreational potential

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			gate, the lowest point is at 3.0 metres Ordnance Datum (mAOD). St Helens is situated at the north west of Bembridge Harbour. Most of the community is built on a hill and well away from any flood risk. However, on the water's edge there is a mixture of residential, commercial and recreational facilities and some of these are at risk from flooding. The harbour walls protect some of these properties. St Helens is also sheltered by the Duver. The principal risk mechanism occurs when water levels overtop the harbour walls resulting in inundation to property behind the walls. There are 5 residential properties at risk in St Helens from tidal flooding during the 1 in 200 event in the year 2010. Due to the location on the banks of the harbour and the heavily developed nature of the frontage shoreline evolution is likely to be limited.	Bembridge Spit).	of Bembridge Harbour. A large portion of the Eastern Yar valley would become inundated. It would rapidly increase the tidal prism by at least five times, cause an increase in tidal currents and result in widening of each side and scour of the bed of the inlet channel. Much sediment would probably become deposited within an enlarged ebb-tidal delta and become unavailable to the shoreline. The amount of spit erosion is difficult to estimate as it is uncertain how quickly a new stable equilibrium configuration could develop. If a tidal breach also occurring at Yaverland in Sandown Bay, the Bembridge/Culver peninsular could become an island separated by a tidal channel.
		Description of beach evolution	Bembridge Harbour is a small estuary with a narrow entrance (surrounded by stores of sand and sediments). It is a local littoral drift convergence zone from the north and south. It is likely that little riverine sediment enters the Estuary. Tidal flow through the narrow entrance to the inlet can generate rapid currents which interrupt littoral sediment transport causing local circulation effects and associated changes in coastal configuration. There is net transport of sediment into the harbour. The Harbour is open to the sea at all states of the tide and therefore exposed to tidal surges and storm surges. St. Helens Duver and Bembridge Point spit shelter Bembridge Harbour from any swell waves, with the waves experienced within the Harbour being locally generated wind waves which are expected to have significant wave heights of less than 0.3m.	St Helens Duver and Bembridge Point are parts of a complex system around the mouth of Bembridge Harbour with sedimentary interactions likely to occur between the different morphological components of the system during this epoch. Erosion of St. Helens Duver will supply sandy sediments for deposition in the harbour approach and entrance channel. An issue on this frontage is the long-term sustainability of the Harbour, as evidence indicates that the harbour and approach channel are tending to silt up. The harbour has a history of accretion of fine sediments, with accelerating sedimentation in recent decades. Tidal currents are insufficient to remove all littoral drift material from the east from the entrance channel. Therefore, the channel refills after any dredging.	Increased erosion of St Helens Duver and the coastline to the south-east could supply additional sediments to be transported westwards for deposition on the Bembridge Point spit, encroaching on the harbour entrance channel, although increased flooding in the Eastern Yar Valley if defence failure occurs along Embankment Road may generate increased tidal currents and erosion on the inner slopes of the spit. In the unlikely event of a breach occurring in St. Helens Duver, a second entrance to Bembridge harbour could form. This would decrease the shelter for the assets and environment within the harbour and the new channel may allow significantly increased wave activity within the current harbour area. This would impact upon the flood defence afforded to the houses

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			There is no data from the Strategic Monitoring Programme inside Bembridge Harbour.		situated in the west of the harbour which are currently not subject to significant wave activity. The present equilibrium and relative stability of the cross-sectional area of the harbour mouth is likely to switch in behaviour at some point with the impact of sea level rise.
	With present management	*Short description of predicted defence failure*	Embankment Road and flood defence structures would be maintained within Bembridge Harbour. St. Helens Duver will be maintained and continue to shelter the Harbour.	Embankment Road and flood defence structures would be maintained within Bembridge Harbour. St. Helens Duver will be maintained and continue to shelter the Harbour.	Embankment Road and flood defence structures would be maintained within Bembridge Harbour. St. Helens Duver will be maintained and continue to shelter the Harbour.
		Description of cliff erosion/ reactivation	Maintaining the defences around Bembridge harbour will prevent decreasing standards of flood protection, although areas around the harbour will continue to be inundated by tidal flooding during extreme events. Implementing a maintenance regime to the Embankment would initially meet the UK Governments commitment to protect the European sites in Brading Marshes at the existing standard of protection. The integrity of the Embankment could be managed through maintenance works.	Maintaining the defences at Bembridge Harbour and St. Helens without increasing the standard of protection will still result in increasing flood risk to low-lying properties around the harbour over time. St. Helens Duver will continue to provide shelter and minimise the wave climate within the harbour. Maintenance of the defences will prevent deterioration and increasing likely hood of breach of Embankment Road, so tidal inundation of the Eastern Yar floodplain will continue to be prevented.	The standard of protection of the defences and the maintained Embankment will fall due to sea level rise. By 2110 over 50% of Embankment Road would be overtopped in a 100% AEP event (properties (ref. Eastern Yar River and Coastal Erosion Strategy, 2009). This would increase flood risk to properties fronting Embankment Road and in Brading, Sandown and Yaverland. It would also increase saline intrusion to Brading Marshes.
		Description of beach evolution	With present management practices continuing, sediment is likely to continue to be transported landward from the relict ebb tidal delta until this feature becomes fully adjusted to the present reduced-size Bembridge Harbour tidal prism. Bembridge Harbour and its entrance channels are therefore likely to continue to suffer shoaling and siltation The main areas of accretion are seaward of the southern end of Embankment Road and on the flood tidal delta inside the entrance to the harbour where between 1983 and 2008 the ground elevation has increased by up to 0.1m/yr.	Maintenance of St. Helens Duver will prevent input of additional sediment into the local harbour sediment transport system. Increasing cliff erosion and slope reactivation on undefended sections of coast to the north and south of the Harbour (under a continuing 'With Present Management' scenario) is however likely to increase sediment supply by littoral drift towards the harbour entrance.	If measured rates of accretion in Bembridge Harbour continue (0.02-0.10m per annum) these rates typically exceed the rates of sea level rise. Ongoing cliff erosion on undefended sections of coast to the north and south of the Harbour is however likely to increase sediment supply by littoral drift towards the harbour entrance, although this potential for increased sediment supply will be balanced against a general trend of foreshore narrowing in front of defences (e.g. along St. Helens Duver) and

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			Rates less than 0.05m/yr are more typical in central parts of the Harbour and elsewhere are in the order of 0.02m/yr.		increasing sea level.
IW16 **Name: Bembridge Point** **From: Bembridge Point Groyne** **To: Ducie Avenue, Bembridge**	**No Active Intervention**	*Short description of predicted defence failure*	462m frontage forming the southern spit at Bembridge harbour entrance. Bembridge Point forms the eastern arm of the harbour at Bembridge and includes a terminal groyne (residual life 2-7 years) and associated groyne field along the coast to the east. The groynes were designed to slow the rate of sediment drift from the east and originally were implemented to assist in stabilising the Bembridge spit feature in front of Bembridge Point. In addition a semi natural dune system has formed on the spit, fed by wind blown sand from the flood and ebb tidal deltas. In the groyne field to the east of the unit, the groynes also have a residual life of 2-7 years, plus a short section of stone masonry wall and rock armour protects a property with a residual life 15-25 years. The shingle forms an uneven backshore berm is partly retained by the series of old groynes, fronting a series of properties amongst the wooded coastal slopes.	No defences	No defences
		Description of cliff erosion/ reactivation	This unit is interdependent with adjacent units to the north (Bembridge Harbour and St Helens Duver). Bembridge Point is a spit structure fed by east to west longshore transport. It is characterised by a shingle frontage on its north-eastern side and by a sand frontage on its north-western side. It is currently stable and No Active Intervention is expected to result in no significant change to the frontage. Even though the Bembridge Point Groyne is in a very poor state of repair, it is regularly submerged and allows sediment to pass through it. Bembridge Point is likely to stay in the same position after the groyne collapses and disappears.	The current understanding of the processes controlling the development of Bembridge Point suggests that the spit is in dynamic equilibrium. This means that the balance of sediment inputs to outputs is such that the beach can maintain its shape. In the future this ongoing sediment supply is uncertain due to one of the key sources being eroding cliffs updrift and offshore sediment supply. Under a 'No Active Intervention Scenario' sediment input may increase in future epochs as cliffs updrift (at Bembridge, Forelands and Whitecliff Bay) continue to erode and retreat following failure of	There is increasing tidal flood risk from Embankment road to properties on Beach Road, Embankment Road and Harbour Strand. Stability of Bembridge Spit in the longer term will be dependent on the continued maintenance of Embankment Road enclosing Bembridge Harbour (i.e. maintaining the current flow regime), and the interaction between rising sea levels and the increased potential sediment supply from increased rates of cliff erosion and slope retreat to the south. The section of coast from the edge of the spit to Ducie Avenue will erode at 0.35

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			Properties behind Bembridge spit may be at risk from tidal flooding via Embankment Road. The section of coast from the edge of the spit to Ducie Avenue is likely to erode at approximately 0.3m/year (up to 6m over 20 years) and should supply new sediments, including raised beach shingle, to nourish the shore.	remaining defence structures. There is tidal flood risk from Embankment road to properties on Beach Road, Embankment Road and Harbour Strand. The section of coast from the edge of the spit to Ducie Avenue will continue to erode at 0.3m/yr (approx. 9m during this epoch, or 15m retreat in total since year 1).	then 0.39m/yr as sea level rises (approx. 18m during this epoch, or 33m retreat in total since year 1).
		Description of beach evolution	The beach levels of the spit appear stable despite the groyne being in a very poor state of repair. This suggests that currently there is sufficient input of sediment updrift to maintain the existing drift regime from east to west and that the poor state of repair of the structure has limited influence on the current stability of this part of the spit. Bembridge Point and the ebb tidal delta provides wave protection to St. Helens Duver and subsequently parts of the Embankment Road within Bembridge Harbour. There remains uncertainty as to the magnitude of the direct sediment linkages between the Bembridge Point and The Duver due to the interaction of natural change and the ongoing dredging activity on the ebb tidal delta. Any change in the height and shape of the ebb tidal delta offshore from Bembridge point is likely to alter the magnitude and distribution of wave energy along St. Helens Duver. The key management impact on the adjacent frontages would be any changes that would reduce the effectiveness of Bembridge Point and the associated ebb tidal delta in providing wave protection. Currently the terrestrial section of Bembridge Point spit appears healthy and likely to remain/extend in the short to medium term. Offshore, the ebb tidal delta appears to fluctuate in size and position and currently is exhibiting a trend of reduction in size.	St Helens Duver, Bembridge Point and Embankment Road are parts of a complex system around the mouth of Bembridge Harbour and the failure or maintenance of any one element will affect the other frontages. Erosion of the coastline to the south-east of Bembridge is likely to supply sediments to the unit by littoral drift, alongside some input from local cliff erosion and offshore sediment movements.	Increased erosion to the south-east could supply additional sediments to be transported westwards by littoral drift for deposition on Bembridge Point spit. This sediment could either accrete and encroaching into the harbour entrance channel, or be eroded due to increased flooding in the Eastern Yar Valley (with defence failure along Embankment Road) generating increased tidal currents and erosion at the harbour entrance. If a tidal breach occurred through St. Helens Duver, the increased tidal prism would have significant effects on adjacent units, as the tidal currents on the ebb and flood of the tide would be significantly increased and thus impact on the movement of the harbour entrance channel within the nearshore sandbanks and spits.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			The mouth of Bembridge Harbour is a local drift convergence zone, with localised southerly drift from Node's Point southwards to St. Helens Duver (in contrast to the larger scale anti-clockwise drift system in operation around the east coast of the Isle of Wight). To the north of Node's Point, the larger–scale trend of clockwise (northerly) drift is re-established. Over the five-year period from 2004-09 the Strategic Monitoring Programme shows the beach level to the east of the Bembridge Point Groyne has been relatively stable (less than 5%reduction in cross-sectional area).		
	With present management	*Short description of predicted defence failure*	Bembridge point groyne is a coastal protection structure. It is designed to capture sediment from the east and stabilise Bembridge spit from erosion. Although the structure is in disrepair, the system has stabilised and there is no erosion presently occurring along this frontage, and the spit is not currently maintained. The fragmented defences in the east of the frontage are deteriorating and the majority behaviour of the frontage is undefended and unmaintained.	No defences. Alternatively, if the seawall fronting the Pump Lane property is maintained, it will continue to prevent erosion, but also be slowly outflanked by erosion and be vulnerable to increasing wave attack and future overtopping.	No defences Alternatively, if the seawall fronting the Pump Lane property is maintained, it will continue to prevent erosion, but also be slowly outflanked by erosion and be vulnerable to increasing wave attack and future overtopping.
		Description of cliff erosion/ reactivation	See 'No Active Intervention' scenario above. The landward section of the unit (adjoining the spit) is likely to continue to erode, and outflanking of short sections of adjoining defences may occur by up to 0.3m/yr (or up to 6m over 20 years)	See 'No Active Intervention' scenario above. However, in contrast to the No Active Intervention scenario, the maintenance of limited defences updrift around Bembridge Point will reduce sediment supply to the frontage (although this could be offset by erosion of adjacent sections of coastline). If sediment supply reduces at some point in the future, this will reduce the ability of the Bembridge Point to maintain dynamic equilibrium. The anticipated evolution of the spit will be one of extension over the short to medium term and possible rotation into the harbour as sea levels rise. Reduction in	See 'No Active Intervention' scenario above. The landward section of the unit (adjoining the spit) is likely to erode at 0.35 then 0.39m/yr as sea level rises, outflanking short sections of adjoining defences by up to 33m over 100 years.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
				sediment supply could lead to thinning of the spit in some locations. The reduction in sediment supply will also affect the ebb tidal delta, with a reduction in size and consequent reduction in wave sheltering to The Duver and inner harbour. The landward section of the unit (adjoining the spit) is likely to continue to erode at 0.3m/yr, outflanking short sections of adjoining defences by up to 15m over 50 years.	
		Description of beach evolution	See 'No Active Intervention' scenario above.	See 'No Active Intervention' scenario above.	See 'No Active Intervention' scenario above.
IW17 **Name: Bembridge** **From: Ducie Avenue, Bembridge** **To: Lifeboat Station, Bembridge**	**No Active Intervention**	*Short description of predicted defence failure*	1,384m frontage is relatively unprotected, with short areas of aging defences. A short section of wall and timber revetment protects several properties at the northern end of the unit (due to fail in 15-25 years). Along the centre of the unit a more natural, wooded coastal slope fronts scattered properties, undefended except for various remains of timber/stone masonry groynes with residual lives of 5-7 years or less. In the south of the unit, approximately 200m of defences (steel sheet piles, gabions and principally low concrete rendered walls protect coastal properties and beach huts immediately west of the lifeboat station. These seawalls and defences are expected to fail in 15-25 years or less.	No defences	No defences
		Description of cliff erosion/ reactivation	The Bembridge coastline from Ducie Avenue to the lifeboat station is partially developed with residential properties generally set some distance back from the shoreline. Coastal erosion at a rate of approx. 0.15m per annum is likely to take place on the undefended frontages and following defence failures throughout epoch 1. The frontage is reliant on mobile beach deposits to slow the rate of	The entire frontage is likely to continue to erode at 0.15m/yr, resulting in a further 5m of retreat during this epoch (or 8m in total since year 1). Some reactivation of the cliffs may occur as erosion progresses. The cliffs are likely to reactivate relatively slowly in comparison to Forelands headland, as erosion only gradually removes supporting debris accumulations at their	Rates of erosion are likely to increase to approx. 0.18m/yr then 0.19m/yr as sea level rises, resulting in an additional 9m of coastal retreat, or 17m in total since year 1.

Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			erosion. Also, limestone ledges exposed in the shore and intertidal zone likely to provide some protection to the shoreline and slow rates of erosion, although this effect may reduce in future epochs as sea level rises. Coastal retreat of approx. 3m over 20 years will occur. The relatively resistant Bembridge Limestone ledges form a distinctive intertidal zone along this frontage and south around Foreland Point towards Whitecliff Bay, and have allowed the headland of Bembridge and Foreland to form.	toes, replenished by local erosion. No Active Intervention would allow the natural transition between the coastal woodland and the beach to continue and would allow the coastline to adapt naturally to sea level rise.	
		Description of beach evolution	Typically the foreshore is a sand and shingle bank landward of extensive limestone ledges, exposed and providing shelter at low water. The beach ridges that help protect this frontage are depleting, as the shingle is typically transported by wave action and the downdrift supply is insufficient to maintain historic beach levels. Bembridge Lifeboat Station Pier (constructed on piles in 1922 and being replaced in 2009-10) is approx. 230m in length, but does not impede sediment movement from west to east, and is a testament to the wide foreshore ledges of Bembridge Limestone. No Active Intervention is likely to result in the loss of beaches and amenity of the beach due to a lack of drift feed of suitable material from the south. Over the five-year period from 2004-09 the Strategic Monitoring Programme shows the beach levels along this frontage have been relatively stable (less than 5% increase in cross-sectional area), with slight accretion occurring on the beach to the north of the lifeboat station.	Sands and shingles yielded to the beach from the low cliffs may temporarily increase stability, but sediment supply to the frontage will be generally low.	Sands and shingle supply to the local beaches from erosion within this unit may increase slightly, but amounts will still be relatively low. Northwards littoral drift from increased cliff erosion at Forelands and from Whitecliff Bay may supplement sediment supply to this unit. Falling beach levels and sea level rise may further increase rates of coastal erosion and put several properties at risk.
	With present management	*Short description of predicted defence failure*	The seawalls and defence lines at the northern and southern margins of the unit can be maintained, but the groyne remnants along the centre of the frontage are generally redundant and not maintained, so the centre of the frontage	Hard defences are maintained and replaced in the north and south of the unit, with undefended coastline in the centre of the unit.	The seawalls are maintained and replaced in the north and south of the unit, with undefended coastline in the centre of the unit.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			will continue to be undefended.		
		Description of cliff erosion/ reactivation	Cliff erosion and retreat would continue along the centre of the frontage in accordance with the 'No Active Intervention' scenario outlined above. Maintenance of defences will prevent erosion and risk to properties in the north and south. The defended sections will be slowly outflanked, by approx. 3m over the next 20 years.	Cliff erosion and retreat would continue along the centre of the frontage in accordance with the 'No Active Intervention' scenario outlined above. The defence sections will be maintained and prevent erosion, but will be increasingly subject to overtopping and wave attack. The defended sections will be slowly outflanked, by a total of approx. over 50 years.	Cliff erosion and retreat would continue along the centre of the frontage in accordance with the 'No Active Intervention' scenario outlined above. The defences will continue to prevent erosion and will be increasingly subject to overtopping and wave attack. The defended sections will be slowly outflanked, by a total of approx. 17m over 100 years.
		Description of beach evolution	Maintenance of the defended sections would result in a consequent loss in sediment supply as erosion is prevented. Foreshore narrowing and falling beach levels in front of the defended sections are likely, exposing and destabilising the toe of the defences. Erosion and limited sediment supply will continue to occur in the centre of the frontage, although this sediment will contribute to the northwards sediment transport pathway.	Sediment input from the local cliffs will continue to be reduced by maintenance of the defence sections. Foreshore narrowing and falling beach levels in front of the defended sections are likely. Erosion will continue to occur in the centre of the frontage.	Erosion will continue to occur in the centre of the frontage. Sediment input from the local cliffs will continue but be reduced by maintenance of the defended frontages. Foreshore narrowing and falling beach levels in front of the defended sections are likely. Northwards littoral drift from increased cliff erosion at Forelands and from Whitecliff Bay may supplement sediment supply to this unit. Falling beach levels and sea level rise may further increase rates of coastal erosion.
IW18 **Name: Foreland** **From: Bembridge Lifeboat Station** **To: Crab & Lobster**	**No Active Intervention**	*Short description of predicted defence failure*	1,104m frontage of low cliffs (approx. 5m high) surrounding Foreland Point. Within the *northern* section of this frontage (from the Lifeboat Station along Fishermans Walk) there is a 150m long low concrete seawall at the base of the coastal slope. This will provide protection for another 10-15 years to the grassy cliff top open space backed by a key access road and row of properties behind. The *central* 550m section of coast around the headland from Fishermans Walk to Paddock Drive roads is undefended and the cliffs are	No defences	No defences

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
Public House (Forelands Field Road)			actively being eroded, except for an aging concrete bastion (encased in 1984) protecting the tip of the headland, also expected to fail in 10-15 years. . This provides protection by retaining a shingle beach to the south of the structure. Increased wave energy reaches the shore at this point because of the presence of 'The Run', a gap in the rock ledges. The *southern 3*00m of the unit will be protected for the next 15-25 years by a concrete wall with stepped apron and sheet piled toe, behind which exists a vegetated coastal slope and extensive housing (including Paddock Drive, Beachfield Road and Forelands Field Road). Below the Coastguard Station and the Crab & Lobster Pub, there is a small promontory in the seawall, which continues southwards protecting a short length of wooden properties, café and beach huts at the toe of the stabilised coastal cliff, slightly higher in height than the cliffs on the point. The southern end of the seawall is already being exposed and offset, marking an abrupt transition to a long stretch of undefended coastline.		
		Description of cliff erosion/ reactivation	There is a small width of recreational frontage around Bembridge Foreland behind which exists denser tourist and residential accommodation. This unit is characterised by low vertical cliffs generally subject to active erosion, with wide limestone ledges in the foreshore. The cliff tops are uniform and flat, and developed with rows of proprieties or the buildings and grounds of a large hotel complex. Littoral transport is from south-west to north-east and the shingle beaches that help protect this frontage are generally depleting. The shingle is transported along the coastline by wave action and the downdrift supply is insufficient to maintain historic beach levels. The *northern* section of this frontage will begin to	In the *northern* section, cliff erosion will continue at 0.2m/yr, resulting in a further 6m of erosion during this epoch, or 8m in total since defence failure. In the *central* section erosion of up to and average of 0.5m/yr will continue, resulting in an additional 15m of cliff retreat during this epoch, or 25m in total since year 1. There is also the likelihood of significant episodic cliff retreat. Raised beach shingle within cliffs will be supplied to beach as erosion proceeds. This erosion would result in an increase in the amount of mobile beach material moving north that after in the second epoch; due to this extra resource of mobile beach material, erosion will slow down for a time.	Erosion will continue in the *northern* section at approx. 0.24m/yr then 0.26m/yr as sea level rises (so 12m of erosion during this epoch, or 20m in total since defence failure). Erosion will continue in the *central* section at approx. 0.59m/yr the 0.65m/yr (31m of erosion during this epoch, or 56m in total since defence failure). Erosion will continue in the southern section of the unit at 0.35m/yr then 0.39m/yr (18m of erosion during this epoch, or 29m in total since defence failure). .

Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	**Years 20-50 (to approx. 2055)**	**Years 50-100 (to approx. 2105)**
			erode at 0.2m/yr following defence failure in year 10-15, resulting in approx. 2m of erosion over the next 20 years. The *central* 550m of the frontage is characterised by low cliffs which are actively eroding (except for the concrete bastion which is preventing active erosion therefore the slopes behind are vegetated). The flat, grassy cliff tops are home to the large Bembridge Coast Hotel complex. Erosion at approximately 0.3m-0.5m per year is occurring in front of the Bembridge Coast Hotel. However, in October 2001 the cliff in front of one section of the fire access road eroded by 6m and the cliff edge is currently about 1m away from the seaward edge of the road. A narrow shingle ridge at the back of the sandy beach will be lost in time due to sediment depletion through longshore drift. This would result in more rapid cliff erosion and therefore loss of land and property. Under a No Active Intervention, scenario, rapid beach erosion leading to reactivation of low cliffs is expected, with retreat at an average of 0.5m/yr. (up to 10m over the next 20 years). Raised beach shingle within cliffs should be supplied to beach as erosion proceeds. This should in the long term build the beach and provide protection to the cliff toe, and may temporarily reduce the recession rate. The southern 300m of the unit will erode at approx. 0.3m/yr following defence failure in year 15-25 (resulting in a maximum of 2m of erosion during epoch 1). The low cliffs behind the seawall are currently vegetated and supported in the centre by a small area of gabions. The sheet piling at the base of the seawall is exposed by low beach levels and ongoing beach sediment transport to the north. The sandy foreshore exposes narrow ledges of limestone bedrock.	The *southern* section of the unit will continue to erode at 0.3m/yr, resulting in 9m of retreat during this epoch (or up to 11m of erosion since year 1). .	There is potential for rates of erosion to be exacerbated throughout this unit by sea level rise and exposure of this prominent headland at the easterly tip of the Isle of Wight. The rapid erosion experienced in this unit in 2000/2001 was thought to be related to an exceptionally wet winter combined with low beach levels, showing the vulnerability of this location to a changing climate, including wetter winters.
		Description of beach	Bembridge limestone outcrops on the foreshore to form an extensive series of ledges and reefs	Cliff erosion results from the present depleted beach levels around Bembridge	In the future, cliff recession rates are likely to increase as sea level rises increasing

Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	**Years 20-50 (to approx. 2055)**	**Years 50-100 (to approx. 2105)**
		evolution	that provide protection to the cliffs against wave attack at low and mid tide. Narrow upper beaches are formed of mixed sand and shingle derived from local cliff sources. Erosion contributes significant quantities of beach-forming sand and shingle from the centre of the frontage, extending throughout the frontage by the end of the epoch. Littoral drift is the north-west. The ledges of Bembridge Limestone form wide shore platforms around this eastern section of the Isle of Wight coast due to local stratal dip. At low tide platforms of up to 500m are exposed and provide significant protection from high energy waves. Between the major ledges are depressions eroded into interbedded clay outcrops, of which The Run is the most prominent, affecting the pattern of erosion during this epoch. Over the five-year period from 2004-09 the Strategic Monitoring Programme shows there has been slight accretion of the beach off Foreland Point bastion, but to the north and south of this there has been slight erosion.	and Foreland together with the effects of sea level rise. This frontage supplies significant quantities of coarse shoreline sediments downdrift so that variations in behaviour that affect cliff erosion sediment inputs and shoreline sediment transport can have impacts on other units to the north.	the vulnerability of the cliff to wave attack. However, cliff recession rates may be slowed as reactivation progresses in this unit and in Whitecliff Bay to the south, increasing quantities of coarse sediments contributed to local beaches and enhancing their capacity to dissipate wave action.
	With present management	*Short description of predicted defence failure*	Seawalls in the northern and southern sections of the frontage would be maintained, and the central section remain undefended (with the exception of the concrete bastion).	The seawalls would be maintained and replaced at their current standards of effectiveness.	The defences would be maintained and replaced at their current standards of effectiveness.
		Description of cliff erosion/ reactivation	The defences will continue to provide protection through this epoch and beyond, preventing erosion in the north and south. The northern seawall (southern end), central bastion and southern seawall will each be outflanked by erosion of up to approx. 10m over 20 years.	The defences will continue to provide protection during this epoch, interrupting natural shoreline evolution and sediment supply to the depleted foreshore. Low beach levels will affect the stability of the toe of the seawalls by exposing them to wave attack and erosion. The maintained sections of defence will each be outflanked by erosion of up to approx. 25m in total over 50 years.	The seawalls will remain and fix the position of those short sections of shoreline. The remaining seawalls are likely to be increasingly affected by wave attack and overtopping as sea level rises. The maintained sections of defence will each be outflanked by erosion of up to approx. 56m in total over 100 years.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
		Description of beach evolution	Foreshore narrowing is likely to occur in front of the defended sections. Sediment supply in the centre of the frontage is likely to continue, but at a reduced rate.	The amount of foreshore narrowing is dependent on the rate of sediment supply to this frontage from the south by longshore drift, as well as local cliff erosion. Quantities of sediment supply could increase, as the long unprotected cliffs of Whitecliff Bay undergo erosion.	The amount of foreshore narrowing is dependent on the rate of sediment supply to this frontage from erosion and from the south by longshore drift. However, cliff recession rates may be slowed as reactivation progresses in this unit and in Whitecliff Bay to the south, increasing quantities of coarse sediments contribute to local beaches and enhance their capacity to dissipate wave action.
IW19 **Name: Whitecliff Bay** **From: To: Crab & Lobster Public House (Forelands Field Road)** **To: Culver Cliff**	**No Active Intervention**	*Short description of predicted defence failure*	The 2,831m frontage of Whitecliff Bay is mainly undefended and naturally evolving, with the exception of *ad hoc* measures which have been taken by private owners in the centre of the bay surrounding the steep beach access footpaths and two cafes below Whitecliff Bay Holiday Park. These defences are of limited effectiveness and take the form of short lengths of driven roundwood piles, gabions and vertical concrete walls and are expected to fail in approx. 5-7 or 10-20 years time.	No defences	No defences
		Description of cliff erosion/ reactivation	Foreland Fields is a 25m high relic cliff line currently reactivating, fronting a residential and agricultural area. Cliff height increases steadily to the south. Whitecliff Bay is a relatively sheltered bay with 50m high cliffs of near-vertically dipping mudstones, sandstones and Chalk undergoing rapid erosion, cliff-top recession and episodic slumping and semi-rotational cliff failures. The shoreline of the bay is set back 300m from the relatively resistant Chalk headland of Culver Cliff to the south. At Whitecliff Bay, the cliff top fields are home to the Whitecliff Bay Holiday Park properties and chalets. The important coastal path runs along the cliff tops of this spectacular bay. No Active Intervention on this frontage would allow erosion would continue and maintain the cliffs in their present retreating state. This may include the reactivation of relic backscars adjoining Foreland Fields. There is the potential for mass	• At Foreland Fields, rapid reactivation of relict cliff then recession of cliff top by up to 0.5m/yr (15m in this epoch, or 25m retreat since year 1) is likely on the undefended coastline. • In the north of Whitecliff Bay, increased frequency of episodic mudsliding and rotational failures of up to 10m blocks in one event will continue, driven by and average of 0.66m/yr erosion (approx. 20m in this epoch, or 33m retreat since year 1). • The sandy strata in the centre of Whitecliff Bay will continue to erode through rock falls and gullying at 0.5m/yr (15m in this epoch or 25m retreat since year 1). The steep cliffs behind the former defences	• At Foreland Fields formation of active eroding cliffs should supply new sediments, including raised beach shingle. This material should drift north to nourish the Foreland and Bembridge shores. Cliff retreat at 0.59 then 0.65m/yr is likely as sea level rises (31m in this epoch, or 56m retreat in total since year 1). • Increasing landslide activity and cliff recession is expected in the north of Whitecliff Bay, supplying, sediments to the shore at approx. 0.78 then 0.85m/yr (40m in this epoch, or 73m retreat in total since year 1) • In the longer term, erosion and recession in the centre of the bay

Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			movements along the whole of this frontage. • At Foreland Fields (along the 500m of the cliff line south of the beach access point at Foreland Fields) the cliff (approx. 25m high) top has a pronounced free face cut into raised beach gravels, subject to physical weathering and occasional toppling failures. Below is a hummocky degradation zone, where vegetation colonisation reveals a current stability due to lack of access by waves. Scattered beach huts and improved properties are present at the foot of the coastal cliff. The cliffs would be likely to experience erosion at their toes, eventually triggering new failures and conversion to fully active retreating profiles. Erosion at approx. 0.5m/yr in epoch 1 (10m in total) will reach back to the cliff toe and step back up to retreat the cliff top in epoch 2. • The coastal relief rises to 40m at Black Rock Point, and the strata forming the cliffs south of Black Rock are unconsolidated, mechanically unresistant, and degrade by active mass movement processes. Landslide mechanisms are complex, with falls, mudslides, mudflows and semi-rotational failures according to lithology and structure. In this area of northern Whitecliff Bay, increased frequency of episodic mudsliding and rotational failures (up to 10m blocks in one event) may occur, with erosion of the cliff top of approximately 0.66m/yr (13m over 20 years) • In the centre of Whitecliff Bay vertically dipping sandy strata are subject to rock	will rapidly reactivate and resume cliff failures. • Intensive mudsliding within the soft clays to the south will average approx. 1.4m/yr (42m in this epoch, or 70m retreat since year 1). This frontage is particularly sensitive to rainfall and groundwater infiltrating through the varying strata so will be vulnerable to increased erosion during wet winters. • Periodic rockfalls from the Chalk cliff of Culver headland will continue, with recession averaging 0.2m/yr erosion (6m during this epoch, or 10m in total since year 1).	should supply new sandy sediments to nourish the beach. Cliff retreat at 0.59 then 0.65m/yr (31m in this epoch, or 56m in total since year 1). In time, increasing beach levels could protect cliff toes and temporarily reduce retreat rates. • The southern clays will be affected by continued instability and recession, with possible acceleration of retreat as recession cuts back into higher ground. Cliff recession rates of Cliff retreat at 1.65 then 1.81m/yr (86m during this epoch or 156m retreat in total since year 1). • Slow recession of the Chalk will continue at approx. 0.24 then 0.26m/yr (12 during this epoch, or 22m retreat in total since year 1), with an increase in cliff height as recession cuts back into higher ground.

<table>
<tr><th rowspan="2">Location</th><th rowspan="2">Scenario</th><th rowspan="2"></th><th colspan="3">Predicted change for:</th></tr>
<tr><th>Years 0-20 (to approx. 2025)</th><th>Years 20-50 (to approx. 2055)</th><th>Years 50-100 (to approx. 2105)</th></tr>
<tr><td></td><td></td><td></td><td>falls and gullying. Erosion of approximately 0.5m/yr will create 10m of recession over 20 years, or approx. 5-7.5m following defence failure in the centre of the bay. Following defence failure, the steep coastal slope behind will rapidly reactivate in epoch 2.
Moving south there is likely to be intensive mudsliding within the soft Reading and London Clays (rapid erosion averaging approximately 1.4m/yr (28m over 20 years), with the cliffs particularly vulnerable to easterly swells.
The southern wall of the bay is a 50m near-vertical Chalk cliff headland, affected by slow recession through rockfalls at approx. 0.2m/yr (4m over 20 years). Basal undercutting can produce slight overhangs.</td><td></td><td></td></tr>
<tr><td></td><td></td><td>Description of beach evolution</td><td>Bembridge ledges provide relative protection from wave energy in the northern half of this frontage. There is a wide, flat beach at Whitecliff Bay, with a small backshore fringe of coarse gravel and cobbles.

Whitecliff Bay is confined to the south by the headland of Culver Cliff and to the north by the Long Ledge platform. Littoral sediment movement is from south west to north east. Black Rock Ledge intercepts littoral drift northwards, so that the beach is mostly fed by cliff erosion. There may be a minimal input of fine sand from Sandown Bay, but the Chalk headland otherwise functions as a fixed and absolute sub-cell boundary to longshore transport.

The frontage will continue to supply significant quantities of sandy shoreline sediments downdrift to the north.

Below Foreland Fields the beach level has</td><td>Cliffs immediately to the south of Foreland Fields will yield increasing amounts of sediments from cliff erosion and contribute to local foreshores to counter previous narrowing trends, eventually contributing towards drift inputs to the Bembridge frontage and the drift pathway that operates towards Ryde Sands.

Rapid erosion and slumping of the Whitecliff Bay cliffs within the near-vertically dipping sands, mud and clays will supply significant sediments to the foreshore and to the littoral transport system.</td><td>Cliffs throughout the unit will supply increasing amounts of sediments from cliff erosion and contribute to local foreshores which may counter previous narrowing trends, eventually contributing towards drift inputs to the Bembridge frontage and the drift pathway that operates towards Ryde Sands.</td></tr>
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Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			remained relatively stable from 2007-09 but to the south the beach level in Whitecliff Bay has shown slight erosion during this period.		
	With present management	*Short description of predicted defence failure*	The frontage will remain largely undefended. The current policy along this frontage is No Active Intervention but monitor, therefore it is unlikely that further defences will be constructed, so present management will continue is in effect No Active Intervention.	No defences	No defences
		Description of cliff erosion/ reactivation	The cliffs would continue to erode and reactivate in line with the 'No Active Intervention' scenario outlined above. At the northern end of the frontage, ongoing erosion will outflank the already exposed southern end of the Foreland sea wall by a further approx. 10m by year 20.	See 'No Active Intervention' scenario above. At the northern end of the frontage, ongoing erosion will outflank the already exposed southern end of the Foreland sea wall by a total of approx. 25m by year 50.	See 'No Active Intervention' scenario above. At the northern end of the frontage, ongoing erosion will outflank the already exposed southern end of the Foreland sea wall by a total of approx. 56m by year 100.
		Description of beach evolution	Sediment supply and interactions would continue in line with the 'No Active Intervention' scenario above.	See 'No Active Intervention' scenario above.	See 'No Active Intervention' scenario above.

Location	Scenario		Predicted change for		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
IW20 ***Name: CULVER CLIFF*** ***From: Culver Cliff*** ***To: Sandown Bay Holiday Centre***	**No Active Intervention**	*Short description of predicted defence failure*	No defences are present along this 2,161m cliff line backed by cliff top grasslands and scrub, with a small number of properties located on the crest of the headland, currently approximately 60m from the Chalk cliff edge.	No defences	No defences
		Description of cliff erosion/ reactivation	The relatively resistant Chalk forms the promontory of Culver Cliff at the northern edge of Sandown Bay, jutting seawards to the east forming a sub-cell boundary and dominating the surrounding lower-lying coastlines. Near-vertical Chalk cliffs up to 90m high will continue to erode through the first epoch due to marine and sub-aerial denudation, with various accumulations of chalk debris fronting the cliffs following episodic cliff falls. The cliffs fail mainly by rock falls & toppling failures, with infrequent larger failures of 5m to 20m within single events in the past. Slope evolution by infrequent rockfall detachments of approx.15m in width (near the monument) means overall long-term recession is likely to be slow. Moving south-west the geological sequence of near-vertically dipping strata shallows and exposes a sequence of older rocks in the cliffs towards Yaverland, with the cliffs decreasing in height and resistance across successive units of sandstones and clays. The Ferruginous Sands form distinctive 44m high near-vertical sandstone cliffs in the centre of the unit which will continue to erode gradually through toppling failures and rock falls. These give way to weaker, lower clay-rich cliffs to the southwest where the Atherfield Clay outcrops, characterised by repeated semi-rotational slides and a wide zone of active coastal slope. Rapid removal of slump debris by wave action and wave attack against the base of the cliffs will continue to result in relatively rapid episodic erosion.	The relatively resistant headland will continue to be slowly eroded but is sufficiently large to continue to exert a major control on shoreline evolution on adjacent coastline. In the majority of the unit, cliff recession at approx. 0.30m/yr will result in approx. 9m of cliff top retreat during this epoch, or 14m in total since year 1. Active erosion of the sandstone and clay cliffs to the south will continue, but in spite of differences in style of cliff activity a curvilinear cliff toe plan-form is likely to be maintained, due to the 'anchoring' presence of Culver Cliff headland. The weaker cliffs and slumping slopes in the south of the unit will be particularly exposed to sea-level rise and potential toe erosion which, alongside sensitivity to episodes of intense rainfall, will undermine the coastal slopes and encourage cliff-top retreat. The clay cliffs will erode at approx. 0.61m/yr, so further cliff top retreat of approx. 18m can be expected during this epoch (or a total of approx. 27m over the first 50 years).	The relatively resistant headland of Culver Cliff will continue to be slowly eroded but is sufficiently large to continue to exert a major control on shoreline evolution to the north and south. It may begin to form a more prominent headland as weaker cliffs to the south are likely to retreat faster than the Chalk. Chalk cliff failures may be larger-scale and less frequent than more regular failures in the cliffs to the south-west. The Gault Clay layer will form a weakness within the more resistant Chalks and the Sandstones. Cliffs along the majority of the unit will continue to retreat episodically by the processes of rockfalls, toppling, sliding and slumping. Averages of approx 0.35 then 0.38yr of cliff-top retreat will result in 18m recession during this epoch (or 32m in total since year 1). Sea level rise will increase the exposure of the cliffs to marine erosion, and increased winter rainfall will further weaken the lithologically varied cliffs, a process worsening from previous epochs. The weak clay cliffs will continue to erode rapidly at an average of approx. 0.71 then 0.77m/yr, so further cliff top retreat of approx. 37m can be expected during this epoch (or a total of 64m over years 0-100).

Location	Scenario		Predicted change for		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			Long-term cliff recession is likely to be at an average of approx. 0.23m/yr along the majority of the unit. This rate allows for larger episodic failures, rather than annual failures, approx. 5m by the end of epoch 1. Cliff top retreat in the clay cliffs section in the south of the unit will continue at approx. 0.46m/yr, with retreat of approx. 9m by year 2025.		
		Description of beach evolution	A rock-cut platform is exposed in the inter-tidal foreshore surrounding the Chalk headland, and occasional rock ledges protrude amongst the sand and shingle to the south, where a thin but wide sandy foreshore is present at the foot of the cliffs, often with a narrow shingle upper beach ridge. This marks the start of the continuous sandy beaches characterising the 9km of Sandown Bay to the south. Sediment losses from cliff erosion will continue to provide significant sediment inputs (sands and clays) to the shore, and abrasion and scour of the intertidal shoreface may also contribute input to the littoral transport system. It is likely that these sediments contribute to a sediment sink offshore from Culver. The Strategic Monitoring Programme 2003/4-09 shows the beach in this unit is currently stable (in the centre) and moderately accreting (in the north) over the longer timescale, although slight erosion occurred in 2008-9, showing local variability. This beach is vulnerable to rapid changes in level during storm events due to it's exposure to storm waves and unconstrained behaviour (unlike the groyne fields affecting Sandown Bay beaches to the south).	This section of beach will continue to be fed by local cliff erosion, but could be supplemented by increased sediment drift from the south as the seawalls fail and more sections of cliff and stabilised beach begin to erode rapidly and supply additional sediment into the system. The sediment supply would depend on whether a tidal breach at Yaverland generates an ebb tidal delta which may intercept and store sediment, and whether the natural process that removes sediment seaward from the foreshore continues. If beach levels are reduced, wave attack is likely to increase erosion rates at the base of the cliffs and vary the sediment supply, also a likely effect of rising sea levels. Local variability of the beach profile and movement of beach sediments, particularly in winter storms, is likely to continue due to potential increasing storminess or increasing intensity of storms in a changing climate.	The input of sand, silt, clay and chalk sediments to the beach system will continue as the debris from cliff falls and slumps are eroded by wave action. Increased storminess (in addition to higher sea levels) would hasten the removal of debris from cliff failures. Sediment supply from the south could increase as Sandown Bay returns to an increasingly natural coastal form, with erosion and longshore transport of sediments, although this is dependent on the evolution of the low-lying Eastern Yar Valley at Yaverland to the southwest.
	With present management	*Short description of predicted defence*	No defences	No defences	No defences

Location	Scenario		Predicted change for Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
		failure			
		Description of cliff erosion/ reactivation	Cliff erosion will continue in line with the 'No Active Intervention' scenario outlined above, as the cliffs are weakened by storm wave attack, weathering and slumping.	Cliff erosion will continue in line with the 'No Active Intervention' scenario outlined above, as the cliffs are increasingly weakened and undermined by storm wave attack, weathering and slumping, although erosion rates could increase further if beach levels fall.	Cliff erosion will continue in line with the 'No Active Intervention' scenario outlined above, as the cliffs and slopes are vulnerable to the impacts of climate change including wetter winters and sea-level rise. Erosion rates could increase further if beach levels fall.
		Description of beach evolution	There will be no significant change in the foreshore of this frontage if present management techniques to the south continue. Local variability of beach levels in storm events will continue. Local sediment input from cliff erosion will continue, alongside input from longshore drift from the south, continuing the current trend.	Local feed of beach sediments from cliff erosion will continue. 'With Present Management' techniques continuing to the south and seawalls being maintained, this will reduce the potential input of long-shore drift sediments into this frontage when compared with the 'No Active Intervention' scenario (which would have seen a potential rise in input as more sediments were released to the south during this epoch). With present management techniques ongoing throughout the bay, sediment supply from longshore drift from the south will continue as the linear curved form of the Sandown Bay beaches is maintained uninterrupted by breaches.	The beach will continue to evolve as described in the 20-50 year epoch, with a potential increase in local sediment feed from cliff erosion and retreat. Erosion of Luccombe cliffs in the south of Sandown Bay will continue to feed sediment into the northwards local sediment transport system around the bay, even with seawalls maintained in the centre of the bay.
IW21 ***Name: YAVERLAND CLIFFS*** ***From: Sandown Bay Holiday Centre*** ***To: Yaverland Slipway***	**No Active Intervention**	*Short description of predicted defence failure*	No defences along this 625m slumping and eroding cliff line, topped by some holiday complex buildings surrounded by grassland. Along this frontage very occasional relic small timber and concrete structures will continue to be undermined by cliff erosion as the cliff line naturally retreats.	No defences.	No defences.
		Description of cliff erosion/ reactivation	625m cliff line of weak sandstone and clay cliffs up to 25m high will undergo active and ongoing erosion through this epoch. The beach provides only partial protection at high water allowing marine erosion to occur. Shallow translational slides and mudflows are characteristic of the Wealden shales and clays, and give an irregular, low cliff profile that frequently exhibits basal notching. Repeated	Rapid erosion and slumping of the weak clay and mudstone cliffs will continue over years 20 to 50 at approx. 0.61m/yr, especially as the weak cliffs are very vulnerable to wet winters weakening the soft strata and storm wave erosion. Failed materials will be rapidly eroded and incorporated into the beach sediment system, allowing further toe erosion and undermining of the weak cliffs to occur.	The weak cliffs will continue to erode rapidly at an average of approx. 0.71 then 0.77m/yr, and will be particularly vulnerable to marine erosion as sea level rise continues and wet winters further weaken the soft cliffs, perhaps assisted by dryer summers increasing cracking and permeability. Increased storminess could create variable local beach levels and trigger cliff failures. Further cliff top retreat

Location	Scenario		Predicted change for		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			semi-rotational slides with rapid removal of slump debris by wave action results in rapid episodic erosion, occasionally up to tens of metres in a year. Cliff top retreat will continue at approx. 0.46m/yr, with retreat of approx. 9m by year 2025. Retreat of the weak cliffs will continue to increasingly outflank the seawall in the adjacent unit to the southwest, increasing the offset of the coastline which already steps back approx.10m from the line of the seawall to this low cliff line (which is approx. 5m high) at the start of this epoch. Outflanking may increase by an additional 5m to approx. 15m in total before the seawall fails in 10-15 years.	Further cliff top retreat of approx. 18m can be expected during this epoch (or a total of approx. 27m over the first 50 years). Following failure of the seawall immediately to the south in the later stages of the previous epoch, marine erosion will attack that adjacent newly exposed land and local sediment supply affect cliff recession in this unit. However, cliffs along this unit could be exposed to additional toe erosion due to starving of sediment downdrift of an evolving tidal inlet at Culver Parade, to the south.	of approx. 37m can be expected during this epoch (or a total of 64m over years 0-100). Cliffs along this unit could continue to be exposed to additional toe erosion due to starving of sediment downdrift of an evolving tidal inlet at Culver Parade, to the south.
		Description of beach evolution	Upper shingle and lower foreshore sand and shingle beach subject to short-term fluctuations of volume and geometric form, especially due to storm wave energy. Periodic uncovering of shore platforms of in-situ clays underlying the lower beach provides evidence of long-term cliff recession. The beach is reliant on sediment supply from the south, as well as natural feed from the eroding cliffs, both of which will continue during the first epoch, alongside the local variability of form and beach levels. Sediment losses from cliff erosion will continue to provide significant sediment inputs (sands and clays) to the shore, and abrasion and scour of the intertidal shoreface may also contribute to the littoral transport system. As well as feeding the beach towards Culver Cliff, it has been suggested that these sediments contribute to the northward drift pathway that transports sediments towards Ryde Sands. The Strategic Monitoring Programme 2003-09 shows the beach at the northern edge of this unit is relatively stable, but in the centre slight erosion and to the south moderate erosion has occurred	This section of beach will continue to be fed by local cliff erosion, but could be supplemented by increased sediment drift from the south as the seawalls fail and more sections of cliff and stabilised beach begin to erode rapidly and supply additional sediment into the system. The sediment supply could gradually build the foreshore and provide slightly improved protection against wave attack at the toe of the cliffs, but would depend on whether a tidal breach at Culver Parade generates an ebb tidal delta which may intercept and store sediment to the southwest of this unit. There also seems to be a natural process in operation along this frontage that removes some sediments seaward from the foreshore. Following failure of the adjacent seawall immediately to the south, new erosion of the stabilised sediments and weak rocks forming the flat land behind is likely to increase local sediment input into this frontage during this epoch.	Beach evolution will continue as outlined in the previous epoch, with continued release of sediments into the longshore drift system throughout Sandown Bay potentially supplying beach building materials into this frontage, supplementing the local input from continued cliff erosion.

Location	Scenario		Predicted change for		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			over a 7-year period. The seawall and groyne field fronting Yaverland Car park in the unit immediately to the south will continue to influence sediment supply to this undefended frontage through this epoch. As outflanking of the end of the seawall and slipway increases, this could destabilise the structure as it deteriorates through this epoch. It is preventing erosion and controlling sediment input to this unit, so additional sediment could be released towards the end of this epoch.		
	With present management	*Short description of predicted defence failure*	No defences.	No defences.	No defences.
		Description of cliff erosion/ reactivation	Cliff erosion will continue in line with the 'No Active Intervention' scenario outlined above, as the low, soft cliffs are further weakened by storm wave attack, weathering and slumping. Cliff top retreat will continue at approx. 0.46m/yr, with retreat of approx. 9m by year 2025. Cliff erosion in this frontage will increasingly outflank the seawall in the adjacent unit to the southwest, increasing the offset of the coastline from the 10m step-back at the start of this epoch by an additional approx. 9m to approx. 19m offset by the end of the epoch, as the seawall is maintained.	Rapid erosion and slumping of the weak clay and mudstone cliffs will continue over years 20 to 50. Further cliff top retreat of approx. 18m at approx. 0.61m/yr can be expected during this epoch (or a total of approx. 27m over the first 50 years). Further outflanking of the seawall to the south could affect the stability of the structure and require further maintenance, as coastal erosion at the southern boundary of this unit may begin to extend behind the seawall and slipway. Outflanking may increase by another 18m to 37m during this epoch.	The weak cliffs will continue to erode rapidly at an average of approx. 0.71 then 0.77m/yr and will be particularly vulnerable to marine erosion as sea level rise continues and wet winters further weaken the soft cliffs, perhaps assisted by dryer summers increasing cracking and permeability. Episodic periods of retreat will occur as slumped sediments are eroded and slopes then steepened again. Cliff retreat is likely to be significantly more rapid in the winter as water levels in the ground allow more widespread slumping and weakening of the clayey cliffs. Further cliff top retreat of approx. 37m can be expected during this epoch (or a total of 64m over years 0-100). Erosion of the low cliffs will continue at the boundary between the defended and undefended coastline. This outflanking at the southern margin of the unit by an additional 37m during this epoch to a total of approx. 74m would render the eastern end of the seawall less effective if erosion

Location	Scenario		Predicted change for Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
					cuts back behind it.
		Description of beach evolution	This frontage benefits from some sediment supply from the south by longshore drift, as well as natural feed from the eroding cliffs. Maintenance of the groyne fields (as well as the seawalls) to the south would allow the sediment supplied to these undefended frontages in the north of the bay to be controlled. There will be no significant change in the foreshore of this frontage if present management techniques to the south continue. Local variability of beach levels in storm events is also likely to occur.	Sediment supply from the south by longshore drift as well as natural feed from the eroding cliffs will continue. Ongoing maintenance of the groyne fields and seawalls with foreshore narrowing to the south may affect sediment supply to these undefended frontages in the north of the bay. However, preventing a nearby tidal breach through Culver Parade by maintenance of the sea defence during this epoch will allow the northwards sediment transfer system along the bay to continue uninterrupted.	Sediment supply from the south by longshore drift as well as natural feed from the eroding cliffs will continue, as outlined in the previous epoch. Sediment supply from localised cliff retreat may increase further as the soft cliffs are particularly vulnerable to the impacts of high levels of rainfall and of sea level rise and wave attack. Increased storminess could also create variable local beach levels and trigger cliff failures or provide temporary natural defences.
IW22 ***Name: YAVERLAND CAR PARK*** ***From: Yaverland Slipway*** ***To: Isle of Wight Zoo***	**No Active Intervention**	*Short description of predicted defence failure*	This 258m defended frontage marks the abrupt change from open coastline to the north to the defended coastline to the south, fronting the towns of Sandown, Lake and Shanklin along a wide bay. This section of the bay is characterised by a concrete seawall fronting a public car park (with residential estate behind), with a steel sheet piled toe and stepped concrete apron, which has a residual life of 10 to 15 years. The seawall ends to the north-east with a concrete slipway, which is already outflanked as the soft cliffs rising to the north-east step-back approx. 10m. Several timber groynes fronting the seawall have a residual life of 10 to 20 years. Through this epoch the condition of the seawall and the groynes will slowly deteriorate, reducing the level of protection to the amenity car park and road behind. Failure of the seawall is likely before the end of the epoch. Stability of the wall also depends on an adequate beach to prevent failure by undermining.	No defences.	No defences.
		Description of cliff erosion/ reactivation	The hinterland behind the defences is relatively flat. The truncated Eastern Yar valley potential tidal floodplain curves round from the south to lie 100m inland of the coast of this unit. The	Following failure of the seawall and groynes, continued erosion of the exposed sediments and weak rocks forming the flat land behind will occur at approx. 0.46m/yr, as the natural	Erosion at approx. 0.53 then 0.58m/yr will gradually retreat the coastline inland through the flat area of land that separates the coast from the inland low-

Location	Scenario		Predicted change for		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			seawall and Esplanade are constructed upon a previously mobile barrier beach. Through the first half of this first epoch, the seawall and sandy beach will prevent coastal erosion along this frontage and allow outflanking to continue at the seawall's north-eastern end (by approx.14m in total) , although beach levels are already variable in the cells between the groynes. In the later half of the epoch, failure of the seawall would allow erosion of the land behind to commence at breaches in the seawall and extend as the effectiveness of the groyne field in maintaining beach levels also reduces, potentially exposing the toe of the seawall to further attack. Following defence failure the beach will returns to its natural angle of repose, with erosion occurring at approx. 0.35m/yr. Following seawall failure in year 10, this could amount to approx. 4m of retreat by the end of this first epoch (0-20years). More rapid erosion and realignment may occur at the north-eastern end of this frontage as erosion can attack both the south and east of exposed land area following failure of the seawall, outflanked by approx 15m by the time it fails in 10-15 years.	defences in the form of the beach level is also reduced. Approx. 14m coastline recession is estimated during this epoch (or 18m in total from year 1). A tidal breach at Culver Parade just to the south-west during this epoch may generate an ebb tidal delta. This could mean that this frontage would be the landward link of a spit forming to the south, during times of flood. The width of the spit would be the thinnest in the western half of this unit and therefore most vulnerable as it narrows by erosion on its seaward face. Seawall failure, collapse and erosion would breach the only road access to this adjacent 'spit' frontage to the south. Erosion at 0.46m/yr will gradually retreat the coastline inland.	lying Eastern Yar valley tidal floodplain that was breached and inundated in the previous epoch. An additional 27m of erosion is estimated during this epoch (or 45m in total from year 1). Through this epoch the narrow band of flat land separating the eroding coast from the low-lying floodplain behind will gradually narrow, and during this epoch both the 1in200yr and 1in1000 year tidal flood zones will have encroached to meet the eroding, retreating coastline, allowing overwashing or potentially a breach of the spit structure to occur, which could cut-off the adjacent frontage to the south as an island at times of flood or high water. This breach would depend on the rate of erosion, and if starved of the natural supply of beach sediment (trapped by the adjacent updrift ebb tidal delta), more rapid erosion could occur. At the north-eastern end of this frontage the height of the land rises gradually to the north. This area, and units to the north, are part of the Culver Cliff and Bembridge headland of East Wight that could be cut-off by the tidal breach of the Eastern Yar Valley in both the south and east.
		Description of beach evolution	The beach is composed almost entirely of medium sand. The beach is reliant on sediment supply from the dominant longshore transport system from south to north. The Strategic Monitoring Programme 2003-09 shows the beach has eroded slightly over recent years. The beach experiences seasonal (usually winter) drawdown and beach levels can be artificially depleted by the updrift groyne field. Deterioration of the groyne system through the second half of this epoch will trap fewer beach sediments, but could also allow additional	Local sediment input from the newly eroding frontage will increase sediment supply to the beach during this epoch, and increased sediment drift from the south may also commence as the seawalls fail and more sections of cliff and stabilised beach begin to erode and supply additional sediment into the system. This could gradually build the foreshore, but would depend on whether a tidal breach at Culver Parade generates an ebb tidal delta which may intercept and store sediment to the south of this frontage.	Beach evolution will continue as outlined in the previous epoch, with local input from continued erosion supplemented by continued release of sediments into the longshore drift system throughout Sandown Bay potentially supplying beach building materials into this frontage, which could be intercepted by the Culver Parade tidal breach to the south and consequent change in the form of the longshore drift system.

Location	Scenario		Predicted change for Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			sediment supply as updrift groynes also deteriorate.		
	With present management	*Short description of predicted defence failure*	The concrete seawall and wooden groyne field fronting a public car park, road and residential estate will continue to be maintained through this epoch. The seawall ends to the north-east with a concrete slipway which will be affected by ongoing adjacent erosion and outflanking.	The seawall and groynes will continue to be maintained. Further outflanking of the seawall at its north-eastern end could affect the stability of the structure and require additional maintenance as coastal erosion may begin to encroach behind the seawall and slipway. .	The seawall and groynes will continue to be maintained. Erosion of the low cliffs immediately to the north-east of this unit will continue at the boundary between the defended and undefended coastline. This outflanking of the seawall could render the eastern end of the seawall partially redundant as erosion cuts back behind it reducing stability.
		Description of cliff erosion/ reactivation	The maintenance of the seawall will hold the coastline in its current position, maintaining the current form and sediment transport system in Sandown Bay. The concrete slipway will continue to be further outflanked as the soft cliffs rising to the north-east continue to erode, increasing the offset of the coastline from the 10m step-back at the start of this epoch by an additional 9m to approx. 19m offset by the end of the epoch. With present management continuing, no coastal realignment will occur.	Erosion of the flat coastal land will not commence in this unit and therefore there will be no local sediment supply to this frontage. Outflanking of the north-eastern end of the seawall may increase by another 18m to 37m during this epoch. Overtopping of the seawall may occur, especially during storm events, and low beach levels expose the seawall to wave attack.	Erosion will continue to be prevented by maintenance of the seawall and therefore there will be no local sediment derived from this frontage, with the possible exception of the north-eastern end of the seawall, dependent on whether the design of seawall maintenance prevents erosion cutting back behind it as it is outflanked. If erosion does cut back behind the seawall, this would be likely to release sediments to the adjacent unit to the north-east, rather than onto this frontage. An additional 37m of outflanking during this epoch would make the total coastal step-back from the defended to the undefended coast approx. 74m. Overtopping of the seawall may occur more frequently and low beach levels expose the seawall to wave attack.
		Description of beach evolution	Because of the arcuate shape of Sandown Bay, the rate of littoral transport south to north diminishes northwards in response to a reduction in the obliquity of angle of dominant wave front approach, therefore the longer-term problems of retaining a wide and stable beach have been greater in the northern part of the bay (in this and adjacent units), which is also furthest removed from fresh sediment supply. It is likely that current trends will continue in this and adjacent units to the south, where some	This unit will be reliant on sediment supply from longshore drift from the south to supply and maintain beach levels, assisted by maintenance of the groyne field. Narrowing and steepening of the foreshore will occur.	In the longer term, there is a potential sediment shortfall within the bay as all seawalls are maintained. Beach evolution will be reliant on the cliffs to the south at Luccombe continuing to erode and supply the sediment transport system that feeds the beaches in this unit.

Location	Scenario		Predicted change for Years 0-20 (to approx. 2025)	Predicted change for Years 20-50 (to approx. 2055)	Predicted change for Years 50-100 (to approx. 2105)
			inter-groyne beaches have stabilised and reached an equilibrium condition whereas others may suffer depletion, affected by wave refraction from seawalls and scouring. Maintenance of the groyne field utilising the results of the Strategic Monitoring Programme may alleviate specific problems or local variability.		
IW23 ***Name: ISLE OF WIGHT ZOO - YAVERLAND*** ***From: Isle of Wight Zoo*** ***To: The Grand Hotel, Yaverland***	**No Active Intervention**	*Short description of predicted defence failure*	A seawall protected by masonry and timber groynes will provide diminishing protection to this 256m frontage during this epoch. The northern half of the seawall is approx. 1m higher than surrounding sections and is expected to fail in 10 to 15 years, with groynes failing from 10 to 20 years onwards. The southern section of seawall is likely to last to near the end of this first epoch (failing in 15 to 25 years), and the groynes fronting this section are also in good condition, with a residual life of 10 to 20 years. Therefore during the second half of the epoch, the failing groyne field will provide diminishing protection to the aging seawall.	The seawall in the northern section of this unit is likely to fail first, during the middle stages of the previous epoch, followed by the southern section of seawall in 15 to 25 years, so protection from erosion along this frontage is removed by early in this epoch, especially as outflanking occurs around any residual sections of seawall with exposure to storm waves.	No defences.
		Description of cliff erosion/ reactivation	The developed hinterland behind the defences is relatively flat, but not particularly low-lying immediately inland (up to 6m in elevation), although the truncated Eastern Yar valley potential tidal floodplain curves round from the south to lie 100-200m inland of the coast along the length of this unit. The seawall and Esplanade are constructed upon a previously mobile barrier beach. If the seawalls fail in 10-15 years time erosion of this frontage could begin to occur during the later stages of this first epoch. The beach would return to a natural angle of repose with erosion occurring at a rate of approx. 0.35m/yr. Immediately behind the seawall, the only road access along this frontage will be threatened by the first breaches in the seawall. Following	During the 20-50 year epoch, erosion will continue at approx. 0.46m/yr right along the frontage as any remaining sections of the southern seawall fail early in this epoch, so approx. 14m of coastal recession will occur (or approx. 18m since year 1). This frontage will also be severely affected by the adjacent unit to the south during this epoch if a tidal breach occurs there through Culver Parade road to the Eastern Yar Valley floodplain behind. The overwashing or breach to the south would render this area of land a spit at high water, up to 200m maximum width, with road access from the north also undermined by ongoing coastal erosion.	Erosion at approx. 0.53m/yr increasing to 0.58m/yr will gradually retreat the coastline inland approximately 27m through the relatively flat area of land that separates the coast from the inland low-lying Eastern Yar valley tidal floodplain (that was breached and inundated in the previous epoch). Total coastal erosion along this frontage over years 1-100 could be approx. 45m retreat. This area could be cut-off as an island at times of flood or high water during this epoch, due to overwashing &/or breach of the narrower 'spit' of land separating the eroding coast from the floodplain in the adjacent unit to the north-east.

Location	Scenario		Predicted change for Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			seawall failure in year 10 onwards, there would be up to 4m of retreat by the end of this first epoch (0-20years).		
		Description of beach evolution	The beach is composed almost entirely of medium sand, and beach levels can be very variable along this defended frontage with periods of low beach levels revealing the sheetpile foundations of the seawalls, although the Strategic Monitoring Programme shows that overall the beach has accreted slightly from 2004-09. The beach is reliant on sediment supply from the dominant longshore transport system from south to north. Deterioration of the groyne system through the second half of this epoch will trap fewer beach sediments, although sediment supply will begin to increase as seawalls begin to fail and breach towards the end of this epoch.	Erosion of the stabilised sediments and weak rocks forming the relatively flat land of this unit will increase local sediment input into this frontage during this epoch, alongside increased sediment drift from the south as the seawalls fail and more sections of cliff and stabilised beach begin to erode and supply additional sediment into the system. This could gradually build the foreshore, but this frontage would be immediately adjacent (downdrift) of a tidal breach at Culver Parade, which would be likely to have a greater influence on local sediment supply and storage.	Beach evolution will continue as outlined in the previous epoch, with local input from continued erosion supplemented by continued release of sediments into the longshore drift system. Beach levels and the rate of erosion will depend on whether sediment is trapped by the adjacent tidal breach updrift.
	With present management	*Short description of predicted defence failure*	The seawall protected by masonry and timber groynes will continue to provide protection to this 256m frontage in this epoch.	The seawall protected by masonry and timber groynes will continue to be maintained and provide protection from erosion.	The maintained seawall and masonry and timber groynes will continue to prevent erosion, in common with protected frontages to the north and south.
		Description of cliff erosion/ reactivation	The maintenance of the seawall will hold the coastline in its current position, maintaining the current form and sediment transport system in Sandown Bay. With present management continuing, no coastal realignment will occur.	Erosion of the flat coastal land will not commence in this unit as the seawall is maintained and therefore there will be no local sediment supply to this frontage. Overtopping of the seawall may occur, especially during storm events, and low beach levels expose the seawall to wave attack.	Erosion will continue to be prevented by maintenance of the seawall and therefore there will be no local sediment derived from this frontage. Overtopping of the seawall may occur more frequently and low beach levels expose the seawall to wave attack.
		Description of beach evolution	In common with the unit to the north-east (IW22) sediment supply from the longshore drift transport system from south to north is critical to future beach levels in this unit. Maintenance of the groyne system will continue to trap beach sands, as the sediment supply system is fed by erosion of Luccombe cliffs in the south of Sandown Bay, although foreshore narrowing may begin to occur.	This unit will be reliant on sediment supply from longshore drift from the south to supply and maintain beach levels, assisted by maintenance of the groyne field. Narrowing and steepening of the foreshore will occur in this and the surrounding frontages if present management techniques are continued as sea levels rise.	Narrowing and steepening of the foreshore will continue. In the absence of local erosion input, beach evolution will be reliant on the cliffs to the south at Luccombe continuing to erode and supply vital sediments into the sediment transport system that feeds the beaches in this unit.

Location	Scenario		Predicted change for		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
IW24 ***Name: CULVER PARADE*** ***From: The Grand Hotel, Yaverland*** ***To: The Herne Hill Groyne (Crescent Road), Sandown***	**No Active Intervention**	*Short description of predicted defence failure*	The primary aim of the seawall along this 683m frontage is protecting the low-lying headwaters of the adjacent Eastern Yar Valley from incursion by the sea, whereas the surrounding sections of seawall in adjacent units are preventing coastal erosion. At the start of this epoch the seawall prevents the sea from breaching the narrow isthmus of land which carries Yaverland Road, so also maintains the only road access along this frontage. The majority of this frontage is protected by a seawall in good condition with a residual life of 25 to 35 years that is expected to outlast this first epoch, although the groyne field fronting it is expected to fail in only 2 to 7 years, potentially increasing the exposure of the wall. Short sections of adjacent seawall at the northern and southern ends of this frontage may however fail during this first epoch (in approx. 10 to 15 years) although groynes fronting them are in good condition with a residual life of 10 to 20 years, providing some additional protection, if beach levels are maintained. If the adjoining sections of seawall breach near the end of the first epoch, this could create significant issues for this frontage providing protection from tidal flooding to the river valley behind. The concrete and masonry Herne Hill Groyne (at the southern limit of this frontage) has a residual life of 10 to 15 years, and is important in retaining significant beach sediments to the south fronting Sandown Esplanade.	The main section of seawall is expected to fail in 25 to 35 years, near the beginning of this epoch, exposing the Eastern Yar valley behind to very significant tidal flooding. The river valley, fringing and floodplain developments and access roads crossing to Bembridge and Foreland are threatened, together with inland settlements to the west towards Alverstone and north-east through towards Bembridge Harbour. During the mid and later stages of this epoch, there will be no defences in place.	No defences.
		Description of cliff erosion/ reactivation	Historical coastal recession has truncated a tributary of the Eastern Yar Valley on this frontage (the palaeo-channel has been found offshore), and sediments have migrated into the mouth of the valley in the form of a barrier beach, later strengthened by seawalls to prevent marine inundation and preserve the regular plan form of Sandown bay. This approximate coastline form	Futurecoast notes this frontage as vulnerable to an 'extreme' magnitude of change if undefended. Large numbers of residential and commercial properties and significant infrastructure will be affected by tidal flooding during this epoch following seawall breach.	The system would continue to evolve as outlined in the previous epoch, although sea level rise and increasing tidal flood levels increase the vulnerability and consequences of marine inundation of the Eastern Yar valley from the south. Increasingly large numbers of residential and commercial properties and significant

Location	Scenario		Predicted change for Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			is expected to continue through this first epoch, whilst the seawall barrier remains in place until year 25-35, although erosion may begin to occur to the north and south of this seawall in the second half of the epoch at approx. 0.35m/yr. Fluvial flooding of the Eastern Yar Valley can already (at the start of this epoch) inundate several road links across the potential tidal floodplain at the start of this epoch, including the Isle of Wight's principal east coast road at the northern end of Sandown. So this seawall plays an essential role in maintaining transport links and connecting the higher ground of Bembridge, Forelands and Culver on the east of the valley to the central Isle of Wight land area.	After the seawall fails in year 25-35, the beach barrier would rapidly be subject to overwashing, landward migration and breaching (or erosion through the barrier at approx. 0.46m/yr). A large hinterland extending into the valley of the Eastern Yar could potentially be inundated and would generate a large tidal prism that could maintain a permanent tidal inlet while the beach was in a depleted condition. If this were to occur, the inlet would generate an ebb-tidal delta of sediment immediately offshore in the bay. As the delta grew it would provide shelter to the barrier behind and enhance its stability, although it could starve the downdrift shore of sediment such that the Yaverland cliffs (to the north) could be exposed to additional toe erosion. A corresponding flood tidal delta could form within the new estuary, further depleting the shoreline of sediment. Its growth would be controlled by storm wave action that would periodically drive sediment into the inlet.	infrastructure will be inundated by tidal flooding. If the Eastern Yar Valley is also breached and inundated at Bembridge on the east coast of the Isle of Wight, the interaction of the twin breaches would affect the long-term evolution of the system and, compounded by fluvial flooding, have serious consequences for the communities living on the western side of the inundated valley floodplain, breached from both the south and the east coasts.
		Description of beach evolution	The beach is composed almost entirely of medium sand, and experiences seasonal (usually winter) drawdown. The dominant longshore transport is from south to north. The Strategic Monitoring Programme shows erosion occurred across the whole frontage in 2008-9, whereas over the longer term (from 2003/4-09) the beach in the northern part of the frontage has eroded slightly and the beach in the south is relatively stable. This trend of local variability is likely to continue, as the groyne fields increasingly deteriorate through this first epoch. There is a greater exposure to wave attack in these northern units than along Sandown Esplanade to the south, because the presence of the concrete Herne Hill Groyne at the southern margin of this unit helps maintain higher beach levels to the south of the groyne. Currently in fair	Beach levels along this frontage may fall further, and with the acceleration in the rate of sea level rise and the consequent increase in the height of the waves approaching the shoreline, the risk of seawall failure will increase with time. However, if sandy sediments are released into this frontage by the failure of the key Herne Hill Groyne to the south during the later stages of the previous epoch, this could boost beach levels and prolong the life of the seawall preventing tidal inundation. However, the groynes along the most vulnerable frontage were also lost during the early stages of the previous epoch, so do not remain to retain the available beach sands.	Beach evolution will continue as outlined in the previous epoch as the tidal breach through Culver Parade road interacts with increasing sediment supply from eroding cliff line to the south.

Location	Scenario		Predicted change for Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			condition, it could fail in 10-15 years. As this is one of the key groynes maintaining the wide amenity beaches in the centre of the bay, this failure would release significant amounts of stored sandy beach sediment into this frontage towards the end of this first epoch.	The beach in this frontage would also gain sediments from further updrift through this epoch, as seawalls to the south fail during the end of the previous epoch and the early stages of this epoch (cliffs would become fully reactivated and beach and esplanade sediments released). It is uncertain whether drift would be sufficient to prevent breach, to naturally re-seal the inlet, or whether spits might periodically extend across the inlet in association with episodes of sealing and renewed breaching. Drift would certainly be sufficient to feed the growth of spits and the tidal deltas adjacent to the inlet.	
	With present management	*Short description of predicted defence failure*	The seawalls and groyne fields will be maintained and prevent tidal inundation of the Eastern Yar valley.	Continued maintenance of the seawalls and groyne fields will be required to maintain the uninterrupted beach and sediment transport system along Sandown Bay.	The seawall and groynes will continue to be maintained, in common with the protected frontages to the north and south. This frontage will require special attention to prevent tidal inundation, as sea level rise increases the level of risk.
		Description of cliff erosion/ reactivation	With present management techniques continuing, there will be no change in the coastal alignment.	The seawall will continue to prevent tidal inundation and hold the coastline in its current position, therefore there will be no erosion or local sediment supply into this frontage. Overtopping of the seawall may occur, especially during storm events, and low beach levels expose the seawall to wave attack. It would also be necessary to continue with the present management technique of maintaining defences along Embankment Road in Bembridge to preventing breach of the same potential tidal floodplain from the east coast of the Isle of Wight.	The seawall will continue to prevent tidal inundation from Culver Parade, so there will be no change in the coastal alignment at the southern end of the Eastern Yar Valley floodplain. Overtopping of the seawall may occur more frequently and low beach levels expose the seawall to wave attack. Present management techniques could also prevent the incursion of the sea from Bembridge on the east coast of the Isle of Wight.
		Description of beach evolution	Continuation of sediment supply by the longshore drift transport system from south to north along the bay is critical to future beach levels in this unit. Maintenance of the groyne system will continue to trap sand, as the sediment is supplied by erosion of Luccombe cliffs in the south of Sandown Bay, although	This unit will be reliant on sediment supply from longshore drift from the south to supply and maintain beach levels, assisted by maintenance of the groyne field. Narrowing and steepening of the foreshore will occur.	Narrowing and steepening of the foreshore will continue. Beach evolution will be reliant on the cliffs to the south at Luccombe continuing to erode and supply the sediment transport system that feeds the beaches in this unit.

Location	Scenario		Predicted change for Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			foreshore narrowing may begin to occur.		
IW25 ***Name: SANDOWN ESPLANADE*** ***From: Herne Hill Groyne (Crescent Road)*** ***To: The southern end of Sandown Esplanade road***	**No Active Intervention**	*Short description of predicted defence failure*	Continuous seawall fronting this 1,023m section will protect Sandown Esplanade road access and amenities and the rising ground of Sandown town centre over the next 10 to 15 years. A wide beach, important for amenity and tourism use, is retained by the concrete Herne Hill Groyne at the northern limit of this unit and provides additional natural protection for the residual life of the groyne (approx. 10 to 15 years). Beach levels tend to be higher in this unit than the adjoining unit to the north due to the significant amount of sand retained by Herne Hill Groyne, such that the sea does not often reach the seawall updrift of the groyne. The northern approx. 150m of this unit has a higher retaining wall fronting Culver Parade road, interrupted and sheltered by an irregular row of small properties and beach huts in front of the road, some with low boundary walls onto the beach. The structural walls in this area are estimated to last for 15 to 25 years, with one section around a Southern Water structure lasting 25 to 35 years. From the middle of the epoch (year 10 onwards), the aging seawalls may begin to fail, especially fronting the length of Sandown Esplanade road, which is backed by a parade of 4+storey amenity and residential buildings.	The remaining sections of seawall are likely to fail by year 25 (one small section by year 35). During the majority of this epoch, the former long frontages of seawall will no longer provide protection to the town frontage.	No defences.
		Description of cliff erosion/ reactivation	This unit is backed by developed coastal slopes on rising ground, a transition from the low-lying tidal floodplain in the adjacent to the north and Shanklin cliffs in the adjacent unit to the south. The natural beach enhanced by the Herne Hill Groyne will provide protection to the ageing seawall along Sandown town seafront through the first half of this epoch. As both the groyne and seawall fail during the second half of the epoch the stabilised sediments and relatively	Early in this epoch, the remaining sections of seawall are likely to have breached and beach levels fallen following groyne failure in the later stages of the previous epoch. Therefore, this will allow erosion at approx. 0.46m/yr to contribute some sands and sediments to the local beaches and into the northwards sediment transport system. This contribution from formerly stabilised sediments and coastal slopes (approx. 14m of erosion during this epoch, or up to 18m in	Erosion of the coastal slopes will continue at approx. 0.53 then 0.58m/yr, with the actual rate of erosion controlled by the rate of input and feed of beach sediment, providing temporary increased natural protection. Erosion may begin to form low cliffs, several metres high, as the coastline retreats. An additional coastal retreat of approx. 27m could occur over this 50 year epoch, with a total of approx. 45m over 100 years.

Location	Scenario		Predicted change for Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			weak rocks forming Sandown Esplanade and the rising ground behind will be exposed to erosion (at approx. 0.35m/yr) and wave attack, and potentially begin to supply additional sediment to the beach system. Where the ground rises more steeply, slope instability problems could occur. Coastal erosion of approx. 4m could occur by the end of the epoch. The seawalls fronting the southern end of Culver Parade road in the north of this unit should prevent erosion for the first 15 to 25 years, but they front slightly steeper ground so activation of erosion may be quicker following breaching.	total since year 1) is in contrast to the adjacent units to the south, where renewed erosion of high cliffs has important potential for sediment supply.	
		Description of beach evolution	The beach is composed almost entirely of medium sand. The dominant longshore transport is from south to north. The Strategic Monitoring Programme shows the beach fronting Sandown Esplanade has been stable or slightly accreting from 2003-09, although mechanical beach cleaning may affect these results. Beach levels are currently high at the back of the beach, against the esplanade, which provides natural protection but could also allow storm wave run-up and encroachment. The Herne Hill Groyne has proved highly efficient at intercepting northwards sediment drift, leading to beach progradation and formation of Sandown Esplanade and beach on it's southern side, which is relatively uninterrupted by additional groynes, in contrast to adjacent units. Following failure the Herne Hill Groyne in approx. year 10-15, natural sediment transport to the north will increase and quantities of 'impounded' sediment will be released into the system as erosion of the stabilised land behind the former seawalls begins to occur. Loss of the Herne Hill Groyne will have a significant impact on beach levels in this unit, and may increase exposure of the seawall to	The release of impounded sediment will feed local beaches and the downdrift frontages to the north. However, groyne fields will no longer be in place to assist in retaining this sediment. Downdrift a tidal breach through Culver Parade in the adjacent unit to the north during this epoch may create an ebb-tidal delta of sediment immediately offshore in the bay. This could influence sediment storage in this unit, which would be feeding both locally-derived and longshore drift sediments northwards during this epoch.	Sediment supply from reactivated cliffs throughout the bay to the south will feed the beaches in this unit and to the north, supplemented by local erosion. Local beach levels along the northern section of this frontage may be guided by the effectiveness of the neighbouring tidal breach into the Eastern Yar valley - whether it creates a large tidal prism that can maintain a permanent tidal inlet and control sediment transfers and storage.

Location	Scenario		Predicted change for Years 0-20 (to approx. 2025)	Predicted change for Years 20-50 (to approx. 2055)	Predicted change for Years 50-100 (to approx. 2105)
			wave attack.		
	With present management	*Short description of predicted defence failure*	The seawall and groynes will be maintained through this epoch, including the Herne Hill Groyne which has proved effective in maintaining beach levels along Sandown Esplanade.	The seawall and groynes will continue to be maintained and provide protection from erosion and encourage beach retention.	The seawall will continue to provide protection from erosion and groynes be maintained.
		Description of cliff erosion/ reactivation	With present management techniques continuing, there will be no change in the coastal alignment.	The maintenance of the seawall will hold the coastline in its current position, maintaining the current form and sediment transport system in Sandown Bay. Erosion will not commence in this unit as the seawall is maintained and therefore there will be no local sediment supply from this frontage.	Erosion will continue to be prevented by maintenance of the seawall and therefore there will be no local sediment derived from this frontage.
		Description of beach evolution	Sediment supply from the longshore drift transport system from south to north will remain critical to future beach levels in this unit. Maintenance of the Herne Hill Groyne will continue to trap beach sands, as the sediment transport system is fed by erosion of Luccombe cliffs in the south of Sandown Bay, although foreshore narrowing may begin to occur.	The present regime of sediment supply northwards from Luccombe cliffs will continue, with no direct local input. Continued protection of the cliff line in the adjacent unit to the south (Lake Cliffs) will result in little additional sediment feeding into this frontage during this epoch, as would have occurred as a result of defence failure and cliff erosion under the previous (NAI) scenario. Foreshore narrowing is likely to occur.	It is unknown whether the current distribution of groynes will be sufficient to retain a wide beach along the length of Sandown Esplanade in the longer term, as beach narrowing and steepening of the foreshore is expected to occur.
IW26 ***Name: LAKE CLIFFS*** ***From: Sandown Esplanade (southern end)*** ***To: Hope Groyne***	**No Active Intervention**	*Short description of predicted defence failure*	This 2,474m frontage is characterised by a continuous seawall fronting steep sandstone cliffs approx.40m in height, protecting the continuous cliff-top development of the towns of Sandown, Lake and Shanklin. It also protects access paths and some cliff-base businesses located on the seawall. This area is also vulnerable to cliff-falls. The seawalls should provide protection through the majority of this first epoch, failing in approx. 15 to 25 years, following deterioration of the fronting groyne field in 8 to 12 years. A very short section of wall on the northern margin of the unit is likely to fail first (in 10 to 15 years). In the south of the frontage, Hope Beach is afforded some additional protection by Small Hope Groyne for the next 10-15 years, and is	The deteriorating seawalls are likely to fail at the start of this epoch (in 15 to 25 years). They will also be more exposed to wave attack following deterioration and failure of the groyne field during the first epoch. The seawalls in this unit have crest heights of 3.4 to 3.6m generally, and lengths of seawall are subject to direct wave attack at high water, so will be vulnerable to rising sea levels. By year 25 onwards, this unit will be largely undefended, although fragments of remaining defence structures may affect patterns of episodic cliff failure and retreat.	No defences.

Location	Scenario		Predicted change for		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			significantly influenced by the large concrete Hope Groyne promontory marking the southern limit of this frontage through this first epoch, which has a residual life of 15-25 years. The seawall could be at risk of collapse as a result of undermining and foundation failure following beach lowering.		
		Description of cliff erosion/ reactivation	Seawall on a narrow strip of raised beach with steep cliffs behind. Although isolated from wave activity by sea defences during the majority of this epoch, the 40m high sandstone former sea cliffs along the coastline will remain geomorphologically active, due to sub-aerial weathering and mass movement. Recession occurs by rock fall, seepage erosion and gullying. In places, this endangers cliff top and cliff foot developments and access, and various protection techniques including cliff-top regrading, drainage, timber shuttering, catch fencing, geofabric/grass matting, netting, rock bolting and talus reprofiling and removal have been implemented to manage this problem at intervals along the 3.5km cliff line of Lake and Shanklin to the south, including recent cliff stabilisation works in May 2008. While the seawall at the cliff-foot remains in the first epoch, the face of the cliff will continue to erode relatively slowly, including rockfalls and slumps onto the seawall and beach. There are likely to be numerous small-scale rock falls and some larger failures within talus accumulations that build up at the cliff toe. The system is vulnerable to heavy winter rainfall raising groundwater levels, reducing stability and promoting seepage erosion. Following failure of the seawall in year 15 onwards, erosion at approx. 0.35m/yr is anticipated (approx. 2m by 2025), although unmaintained, the northern section may fail	By the end of this epoch, the soft sandy cliffs would become exposed to marine erosion. Once undefended, the cliffs would reactivate, retreat at moderate to high rates and resume their inputs of sandy sediment to the foreshore. The cliffs would be undercut at the toe and retreat would occur at moderate to high rates by rockfall, seepage erosion and gullying processes. Resumption of cliff erosion will supply a significant amount of sediment to the littoral system. Considerable quantities of sands and clays released to the shore would nourish downdrift parts of the bay. Allowing for anticipated sea level rise, erosion at an average of approx. 0.46m/yr would result in 14m of retreat during this epoch, or approx. 16m in total since year 1.	Continued erosion of the unprotected cliffs at approx. 0.53 then 0.58m/yr will release further significant quantities of sediment (sands and clays) to the shore and nourish downdrift parts of the bay and potentially contribute to the northward drift pathway that transports sediments towards Ryde Sands. Cliff retreat of an additional approx. 27m is anticipated during years 50-100, resulting in total recession of approx. 43m over 100 years.

Location	Scenario		Predicted change for		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			earlier, from year 10 onwards. Historic cliff retreat rates of 0.2 to 0.4m/yr at Littlestairs were reported prior to their protection in the mid-1970s, and low rates of cliff top retreat through occasional rock falls will continue throughout the first epoch.		
		Description of beach evolution	There is a gently shelving nearshore and wide sandy foreshore. The beach is composed almost entirely of medium sand, with small quantities of shingle. The dominant longshore transport is from south to north. Initial groyne construction was highly successful in intercepting beach sediments and causing beach progradation. However, in recent decades beaches have lost sediments and the foreshore has lowered and narrowed. Many lengths of seawall are now subject to wave attack at high water. The Strategic Monitoring Programme has shown that, overall, beach levels in the central third of this unit have eroded slightly from 2003-09, whilst to the north and south beach levels have been relatively stable or accreted, although there is shorter scale variability and erosion occurring within this overall trend. At the southern limit of this frontage there has been significant localised accretion immediately north of Hope Groyne from 2003-09. There has been a sediment shortfall into this frontage since the majority of direct input from cliff recession was halted by construction of the cliff-foot seawall in the mid-70s. Therefore there is potential for sediment input to increase as breaches in the seawall expose the cliff line to erosion towards the end of this epoch. Also, these beaches of Lake Cliff are affected by the downdrift consequences of Hope Groyne which stores beach sands forming the wider beach of Shanklin esplanade immediately to the south of this frontage. Therefore, beach levels may be depleted during this first epoch as the groyne fields fail and therefore less sediment is retained,	Erosion of the local cliffs in this unit would result in resumption of inputs of sandy sediments to the foreshore that would nourish the depleted beaches of the bay and could increase beach widths significantly within 50 years. The initial rapid cliff recession response may be slowed in the medium term as beach accretion provides additional protection to the base of the cliff. As the beaches receive sediments from the cliffs and accrete they may adjust their profiles through a redistribution seaward of sands to build up the nearshore bed in response to rising sea-level. It would tend to cause additional recession of the upper shoreline and soft cliffs at a rate dictated by the rate of sea level rise. A lag would be expected between any change in rate of sea-level rise and a response of the cliff recession rate. Following failure of seawalls and concrete groynes along to the south along the frontage of Shanklin Esplanade at the start of this epoch (including Hope Groyne), an increase in the amount of sediment supplied to this frontage by longshore drift from north to south is likely to increase as ‘impounded’ sediment is released into the system.	As the beaches receive sediments from the cliffs and accrete they may adjust their profiles through a redistribution seaward of sands to build up the nearshore bed in response to rising sea-level. It would tend to cause additional recession of the upper shoreline and soft cliffs at a rate dictated by the rate of sea level rise. A lag would be expected between any change in rate of sea-level rise and a response of the cliff recession rate. Significant sediment is also likely to be supplied from adjacent units to the south by longshore drift as active erosion along Shanklin Esplanade continues (following failure of the seawall and release of impounded beach sediments in previous epochs).

Location	Scenario		Predicted change for Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			until sediment supply is increased by seawall breach and failure of Hope Groyne at the end of the epoch.		
	With present management	*Short description of predicted defence failure*	The seawall and groynes will be maintained through this epoch, allowing the current sediment transport system to continue. Cliff fall risk reduction and protection measures such as areas of cliff reprofiling, timber shuttering and timber catch-fencing would also need to be maintained.	The seawall and groynes will continue to be maintained to prevent reactivation of erosion of the cliff line. Protection measures such as areas of cliff reprofiling, timber shuttering and timber catch-fencing would also need to be reviewed and maintained to reduce the risks associated with cliff falls.	The seawall will continue to provide protection from erosion and groynes be maintained. Cliff fall risk reduction and protection measures such as areas of cliff reprofiling, timber shuttering and timber catch-fencing would also need to be maintained.
		Description of cliff erosion/ reactivation	The potential for large-scale coastal realignment is low if the seawall at the cliff foot is maintained, but the former 40m high sandstone sea cliffs along the coastline will remain geomorphologically active, although isolated from wave activity, due to sub-aerial weathering and mass movement. Recession occurs by rock fall, seepage erosion and gullying. Sub-aerial weathering cause 0.05-0.1m/yr recession, or less where the cliff has been stabilised.	Continued protection of the cliff line would result in little sediment feeding the potential transport pathway north around the beaches of the bay and beyond, compared with defence failure under the previous (NAI) scenario. Overtopping of the seawall is likely to occur, especially during storm events, and low beach levels will expose the seawall to wave attack. Smaller rockfall failures of the cliff line and talus slope will continue to occur and slump onto the seawall and upper beach as the sandstone cliffs are sensitive to precipitation and temperature and are affected by sub-aerial weathering.	As in the previous epoch, areas of local cliff-top retreat will occur as the exposed sandstone cliff line is weathered, but the maintenance of the seawall at the toe of the cliffs will prevent larger-scale undercutting and marine erosion. Overtopping of the seawall will occur more frequently and low beach levels expose the seawall to wave attack.
		Description of beach evolution	With present management practices ongoing, the beach will continue to lower further in front of the defences such that direct wave action is likely to strike the seawall at mid tide level and above. Over time, the turbulence generated is likely to cause scour of beach substrata and exposure/undercutting of the seawall apron leading eventually to structural damage, or a requirement for increasingly frequent and costly maintenance.	The present regime of sediment supply northwards from Luccombe cliffs will continue, with little direct local input. Foreshore narrowing is likely to occur. Beach levels/volumes can be expected to reduce as sea level rises and the seawalls come under more constant attack leading to wave reflection from the seawall and consequent beach draw down.	Narrowing and steepening of the foreshore will continue, as in the previous epoch. Beach evolution will be reliant on the cliffs to the south at Luccombe continuing to erode and supply vital sediments into the sediment transport system that feeds the beaches in this unit. Cliff failures triggered by sub-aerial weathering could contribute some temporary, occasional and localised sediment and sandy blocks to the upper beach.
IW27	**No Active Intervention**	*Short description*	Shanklin Esplanade seawalls advance 50-70m in front of the sandstone cliff line backing this	The remaining structures of Hope Groyne in the north, the former Pier apron and	No defences.

Location	Scenario		Predicted change for		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
Name: SHANKLIN ESPLANADE ***From: Hope Groyne*** ***To: Shanklin Chine***		*of predicted defence failure*	1,349m frontage. The cliff line is broken by an access road and tourism and residential development forms a level 50-70m zone behind the seawall fronted by Shanklin Esplanade road, seawall and beach. The town of Shanklin extends inland from the cliff top. At the northern end of this unit, the concrete Hope Groyne promontory plays an essential role in maintaining Shanklin Esplanade beach and road access to the remainder of this frontage to the south. Moving from the north (downdrift) to the south (updrift) of Hope Groyne, the coastline steps forward approximately 80m due to previous beach progradation along Shanklin Esplanade, through capture and storage of long-shore drift sediment and infill development behind. Hope Groyne will remain in place during much of this first epoch (the land created is currently home to an important Southern Water pumping station, car park and also protects the only access road to Shanklin Esplanade). The seawalls to the south fronting this unit are assessed to be in poor to fair condition and are likely to fail during this epoch, with residual life of approximately only 5 to 7 years in the north, rising to 10 to 15 years in the south, although this increases to 15 to 25 years immediately around the apron of the former Shanklin Pier in a small area in the centre of the frontage. Timber and stone defences approaching the transition to undefended cost to the south are expected to fail in 8 to 12 years. The concrete Osborne Groyne near the centre of the unit will provide some additional protection by assisting maintenance of beach levels through this epoch (for 15 to 25 years), although the majority of the timber groyne field will fail in 8 to 12 years, reducing sediment storage.	Osborne Groyne in the centre of the unit are all expected to fail in 15 to 25 years, so erosion is likely to increase rapidly through this epoch as the structures previously maintaining beach levels fail and sand is transported northwards along the bay by longshore drift. Exposure of these remnant concrete groynes will also have increased as adjacent seawalls to the south failed during the first epoch, allowing erosion to commence between them.	

Location	Scenario		Predicted change for Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			By the end of this epoch (year 20) the seawall protecting Shanklin Esplanade will have failed and allowed irregular and potentially rapid erosion of the sediments underlying the esplanade, between the remaining concrete groynes and hard point structures.		
		Description of cliff erosion/ reactivation	Breaching and failure of the seawalls fronting Shanklin Esplanade during this first epoch would allow erosion to commence in embayments and undermine adjacent sections of deteriorating seawall. Erosion of the level ground behind the seawalls would commence, first undermining Shanklin Esplanade road which is the only access route along the length of this frontage. The earliest breaches could occur in year 5, allowing erosion at approx. 0.46m/yr to erode up to 7m during the remainder of this epoch. Although isolated from wave activity by sea defences and 50-70m of fronting development, the approx.40m high former sea cliffs will remain geomorphologically active, due to sub-aerial weathering and mass movement. Recession occurs by rock fall, seepage erosion and gullying, along with failures in the talus slope. Recession rates of 0.08m/yr and 0.02-0.03m/yr have been reported 1907-1981. In the first epoch there are likely to be small-scale rock falls and some larger failures within talus accumulations that build up at the cliff toes. The system is vulnerable to unusually heavy winter rainfall raising groundwater levels, reducing stability and promoting seepage erosion.	Erosion of the weak sediments underlying Shanklin esplanade will continue at approx. 0.61m/yr as any remaining sections of concrete groyne and seawall fail and the entire frontage is exposed to marine erosion. An additional approx. 18m of coastal erosion may occur during this epoch, or a total of up to 25m since year 1. Periodic rock falls and some larger talus failures will continue to occur along the former sea cliffs at the back of the row of Esplanade development.	Coastal retreat through erosion of the weak sediments underlying Shanklin esplanade will continue at approx. 0.71 then 0.77m/yr as sea level rise increases the vulnerability and exposure of this coastline. Retreat of approx. 37m is therefore anticipated during this epoch, resulting in a total of approx.62m over 100 years. During this epoch, numerous small-scale rock falls and some larger failures within talus accumulations that build up at the sheltered toes of the former sea cliffs may occur as the system is vulnerable to unusually heavy winter rainfall raising groundwater levels and sub-aerial weathering. By the end of this epoch, the coast is likely to retreat to expose and reactivate the former sea cliffs behind the Esplanade.
		Description of beach evolution	The wide beach is composed almost entirely of medium sand. There is a gently shelving nearshore and wide sandy foreshore with small quantities of shingle on the upper beach. The dominant longshore transport is from south to north. The Strategic Monitoring Programme shows the beach fronting Shanklin Esplanade has been relatively stable overall from 2003-09,	Several exceptionally large concrete groynes, constructed in the late 19th Century, proved highly efficient at intercepting drift leading to beach progradation of up to 80m on which Shanklin Esplanade and its associated properties were built. Therefore following failure of these concrete groynes at the start of this	A significant amount of sediment will continue to be supplied to the beaches from local erosion in this unit and increased marine erosion of the exposed cliffs and landslide slopes of the coastline to the south around Luccombe.

Location	Scenario		Predicted change for Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			with some slight localised accretion in the south and slight erosion in the centre, although mechanical beach cleaning may affect these results. Sandy beach levels are currently relatively high in relation to the seawalls providing some additional natural defence to the seawalls, although this natural protection would be increasingly reduced during the first epoch as the groynes deteriorate and fail. Sediment supply from the marine erosion of Luccombe cliffs nearby to the south will continue to provide significant sediment input into this frontage by longshore drift, supplemented by the commencement of erosion and release of local stabilised sediments at the seawalls begin to breach.	epoch, sediment transport to the north will rapidly increase and large quantities of 'impounded' sediment will be released into the system as erosion of the land behind the former seawalls occurs.	
	With present management	*Short description of predicted defence failure*	The seawall and groynes will be maintained through this epoch, allowing the current sediment transport system to continue. The southern limit of this frontage marks the end of the main hard defences protecting Sandown Bay to the north. Shanklin Chine cuts steeply down through the near-vertical cliff line at this point, with high cliffs continuing on either side.	The seawall and groynes will continue to be maintained to prevent erosion of the shoreline along Shanklin Esplanade.	The seawall will continue to provide protection from erosion and the groynes be maintained.
		Description of cliff erosion/ reactivation	With present management techniques continuing, there will be no change in the coastal alignment. In common with the 'No Active Intervention scenario', the approx.40m high former sea cliffs will remain geomorphologically active due to sub-aerial weathering and mass movement, although isolated from wave activity by maintained sea defences and fronting development. Recession occurs by rock fall, seepage erosion and gullying, along with failures in the talus slope. Recession rates of 0.08m/yr and 0.02-0.03m/yr have been reported 1907-1981. In the first	The maintenance of the seawall will hold the coastline in its current position, maintaining the current form and sediment transport system in Sandown Bay. Overtopping of the seawall is likely to occur, especially during storm events, and low beach levels will expose the seawall to wave attack. Periodic rock falls and some larger talus failures will continue to occur along the former sea cliffs at the back of the row of Esplanade development. Protection	The unit forms the southern limit of the sequence of seawalls protecting Sandown Bay to the north, so the contrast from the hard defences along this frontage to the transitional then undefended coast to the south will be particularly marked during this epoch, as erosion continues in the transitional and undefended units, whereas the coastline position remains unchanged along this frontage. Overtopping of the seawall will occur more frequently and low beach levels expose the seawall to wave attack.

Location	Scenario		Predicted change for		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			epoch there are likely to be small-scale rock falls and some larger failures within talus accumulations that build up at the cliff toes. The system is vulnerable to unusually heavy winter rainfall raising groundwater levels, reducing stability and promoting seepage erosion.	measures such as areas of cliff reprofiling, timber shuttering and timber catch-fencing would also need to be reviewed to reduce the risks associated with cliff falls.	Numerous small-scale rock falls and some larger failures within talus accumulations that build up at the sheltered toes of the former sea cliffs may occur as the system is vulnerable to unusually heavy winter rainfall raising groundwater levels and sub-aerial weathering. Risk reduction measures would need to be reviewed to protect the back of the developments lining Shanklin Esplanade, even though the seawall fronting unit remains in place.
		Description of beach evolution	The sandy beaches in this unit will be reliant on ongoing sediment supply from the marine erosion of Luccombe cliffs nearby to the south into the northwards sediment transport system. The beaches are likely to begin to narrow and steepen in front of the seawalls, although maintenance of the groynes will assist in trapping available beach sediments.	Erosion will not commence in this unit as the seawall is maintained and therefore there will be no local sediment supply from this frontage. The present regime of sediment supply northwards from Luccombe cliffs will continue. Foreshore narrowing is likely to occur. Beach levels/volumes can be expected to reduce as sea level rises and the seawalls come under more constant attack leading to wave reflection from the seawall and consequent beach draw down.	Narrowing and steepening of the foreshore will continue, although increased marine erosion of the undefended cliffs to the south of this unit at Luccombe due to sea level rise may increase the input of available sediment to counteract some of this narrowing. Beach levels/volumes can be expected to reduce as sea level rises and the seawalls come under more constant attack leading to wave reflection from the seawall and consequent beach draw down.
IW28 ***Name: LUCCOMBE ROAD, SHANKLIN*** ***From: Shanklin Chine*** ***To: The southern end of Shanklin coastal***	**No Active Intervention**	*Short description of predicted defence failure*	Moving southwards from the end of the adjacent concrete seawall, this 464m unit marks a transition from the defended to undefended coast, beyond the southern limit of significant cliff-foot development, although cliff top development continues along this exposed cliff frontage (rows of large properties and blocks of flats etc.). A timber revetment and timber groynes will provide limited protection to the high sandstone cliffs for 8 to 12 years, also protecting access steps from the beach to the cliff top. By the end of this epoch, this frontage will be undefended and actively eroding.	No defences.	No defences.
		Description of cliff erosion/	Near-vertical sandstone cliffs approx.50m in height, increasing in height to the south. The timber revetment and groynes will minimise cliff	Active erosion and cliff recession by frequent rockfalls, toppling failures and marine undercutting will occur at a rate of	Active erosion and cliff recession at 0.53 then 0.58m/yr will be likely to increase due to sea level rise, resulting in a further 27m

Location	Scenario		Predicted change for		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
defences		*reactivation*	erosion during years 8-12, but along Knock Cliff and Appley Steps small scale but frequent rockfalls and toppling failures, due to weathering and stress relief, will be more significant than basal notching by waves. Following defence failure recession of the cliffs will accelerate at approx.0.35m/yr as the cliffs are sensitive to winter rainfall and will be subject to marine erosion when the shingle backshore berm is no longer stabilised by the low wooden revetment. Recession of approx. 4m is therefore anticipated over years 0-20.	approximately 0.46m/yr. Cliff line retreat of approx. 14m is expected from 2025 to 2055, so a total erosion of approx. 18m since year 1.	of cliff top retreat, resulting in 45m over 100 years.
		Description of beach evolution	A storm beach of coarse pebbles and shingle provides some protection to the base of the cliffs. The Strategic Monitoring Programme reveals that from 2003-09 the northern section of the beach has accreted slightly whilst the southern edge of the unit shows moderate erosion. Active erosion of the tall sandstone sea cliffs in this frontage will contribute sediment to the beach during the second half of the epoch, supplementing significant sediment supply sourced from the nearly 3km of actively eroding soft cliffs immediately to the south. Foreshore narrowing may occur until defences fail and the cliffs fully reactivate to increase local sediment supply.	Sediment will continue to be supplied to the beaches from local erosion of the exposed cliff line in this unit and by longshore drift input from the south.	A significant amount of sediment will continue to be supplied to the beaches from local erosion in this unit and increased marine erosion of the exposed cliffs and landslide slopes of the coastline to the south around Luccombe.
	With present management	*Short description of predicted defence failure*	This 464m unit marks a transition from the defended to undefended coast. The timber revetment and sequence of timber groynes will be maintained and replaced to provide limited protection to the high sandstone cliffs.	The timber revetment and sequence of timber groynes will be maintained to provide limited protection to the high sandstone cliffs. The timber revetment may need to be rebuilt in a retreated position.	The timber revetment and sequence of timber groynes will be maintained or rebuilt but will be likely to provide a reduced level of protection to the high sandstone cliffs. The timber revetment may need to be rebuilt in a retreated position near the eroded cliff base.
		Description of cliff erosion/ reactivation	The timber revetment and groynes aim to reduce marine attack of the cliff base and encourage the stability and maintenance of a back shore shingle berm. These structures will continue to provide protection through this epoch, but their effectiveness may be reduced by foreshore narrowing.	Small scale but frequent rockfalls and toppling failures due to weathering and stress relief will allow some cliff recession, although the timber structures will continue to provide protection from marine erosion through this epoch, but their effectiveness may be increasingly reduced by foreshore	Some cliff recession by small scale but frequent rockfalls and toppling failures is likely to continue, as the effectiveness of the timber defensive structures may be increasingly reduced by foreshore narrowing. Overtopping of the defences will occur more frequently and low beach

Location	Scenario		Predicted change for		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			Small scale but frequent rockfalls and toppling failures, due to weathering and stress relief, will continue to occur behind the defences. The defences are likely to be outflanked by up to 9m by continued cliff recession to the south.	narrowing. Overtopping of the defences is likely to occur, especially during storm events, and low beach levels will expose the defences to wave attack. The defences may create a cliff step-back of 27m due to continued cliff recession to the south.	levels expose them to wave attack. Slowed erosion along this frontage will be a contrast to active cliff erosion and slumping to the south, and the maintenance of the Shanklin Esplanade seawall in its original position to the north. To the south, the transition to the undefended coast could be a step-back of up to 64m, significantly weakening the cliff promontory forming this exposed frontage.
		Description of beach evolution	With present management practices continuing, cliff retreat will slowly continue, but maintained groynes immediately to the south of Shanklin Chine could intercept some drift from the south to maintain shingle upper beaches and provide some protection to the local cliff toes.	The present regime of sediment supply northwards from Luccombe cliffs will continue, supplemented by occasional local input from weathering of the cliffs. Foreshore narrowing is likely to occur.	Narrowing and steepening of the foreshore will continue, although increased marine erosion of the undefended soft cliffs to the south of this unit at Luccombe due to sea level rise may increase the input of available sediment to counteract some of this narrowing.
IW29 ***Name: LUCCOMBE*** ***From: Knock Cliff*** ***To: Monks Bay, Dunnose***	**No Active Intervention**	*Short description of predicted defence failure*	Nearly 3km (2,805m) stretch of undefended steep cliffs, except for a few minor aging timber and steel groyne structures outcropping in the beach, unconnected from the cliff foot and not retaining sediment, so not affecting active and important sediment supply or transport along this frontage. Remnant concrete rubble blocks at the base of Luccombe cliff wooden steps assist in maintaining access in the short term but are undergoing active and ongoing erosion. Instability has caused damage to properties in the cliff-top village of Luccombe, particularly in recent decades, and access to the village is via the cliff-top road access along the northern part of the frontage.	No defences.	No defences.
		Description of cliff erosion/ reactivation	The 75-100m high sandstone, mudstone and clay subject to instability caused by basal marine erosion and large-scale mass movements. The cliff line is actively eroding and retreating with increasing landsliding behaviour in the south. The cliff line is fully exposed to marine erosion	The cliffs will continue to erode and exert a major control on shoreline evolution on adjacent coastline. Erosion at approx. 0.61m/yr will result in an additional approx. 18m of cliff recession, on average, or approx. 27m in total over 50 years. Significant spatial variation and landslide	Coastal retreat by erosion and landsliding will continue. Erosion at approx. 0.71 then 0.77m/yr will result in a further approx. 37m of coastal retreat, or 64m in total over 100 years. It is important to note that significant spatial variation and landslide activity will occur along the

Location	Scenario		Predicted change for		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			throughout this frontage, which supplies essential input to the sediment transport system feeding the beaches of Sandown Bay to the north. Futurecoast notes this frontage as vulnerable to an 'extreme' magnitude of change, being undefended. Groundwater conditions, notably critical pore water pressures, are important to cliff stability. The cliffs will continue to be eroded, at a rate of approximately 0.46m/yr but are sufficiently high and extensive to continue to exert a major control on shoreline evolution on adjacent coastline in future epochs. Cliff recession will occur by marine erosion, translational slides and mudflows, and reactivation of landslide material promoting cliff top retreat. Mudslides move across successively lower benches, where they are contained as temporary stores. Despite a wide inter-tidal sandy beach at the mouth of Luccombe Chine (over 100m at maximum spring tides), basal cliff trimming and notching by waves is an active process. The area directly inland of Luccombe Chine has a well-documented history of part translational and part rotational slope failure. The cliffs in the south part of this unit are cut into landslide debris, rather than into the Gault Clay and Lower Greensand further north. At Dunnose in the south of the unit there is a sharp change in coastal orientation from north-south towards the south-west. Approximately 9m of cliff recession is anticipated over 20 years, although this is only an average and significant spatial variation and landslide activity may be reactivated.	activity will occur. Recession of the cliffs within this frontage is likely to continue or accelerate as the cliffs are sensitive to winter rainfall promoting higher pore water pressures within the landslides, and 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 of metres within specific events.	unstable coastal slopes and landslide terraces. Any acceleration of cliff recession will supply additional quantities of sands and gravels to beaches in Sandown Bay, although fresh boulder aprons formed on the foreshore would afford additional protection to the cliff toes. Cliff height and landslide potential may therefore increase through time. In the long-term (100 years or more), it is possible that coastal cliff retreat could extend sufficiently far inland and upslope to affect the in situ Chalk of the downs. This process appears most advanced at The Landslip where retreat has cut over halfway up the east flank of Bonchurch Down and the Chalk could be affected within 100 years.
		Description of beach evolution	There is likely to be no significant change in the foreshore in future epochs as natural coastal recession continues. The Strategic Monitoring Programme shows the beach at the northern	As the coast continues to retreat, the beach is likely to be characterised by occasional accumulations of boulders across the foreshore sandy and rocky, derived from	Local input of sediment from the actively eroding and slumping cliffs may increase due to the impacts of climate change, as these cliffs are sensitive to winter rainfall,

Location	Scenario		Predicted change for Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			edge of this frontage eroded slightly from 2003-09, but there is no data from the Strategic Monitoring Programme for the rest of the frontage. This unit acts as a sediment source and zone of northward transmission, the chief source of sand contributing to the beaches in Sandown Bay. The backshore and inter-tidal zone comprises wave-cut bedrock shore platforms (Yellow and Horse ledges) littered with large Greensand and sandstone boulders. Sand beaches are intermittent and contained between debris lobes derived from cliff landsliding. Within Luccombe Bay, an extensive medium sand beach and foreshore derives from the mechanical breakdown of Greensand and Chalk landslide debris in the vicinity, and from Dunnose to the west.	fresh falls, slides and toppling failures, and from the removal of less resistant clays and sands within landslip debris aprons created by previous major landslips. This unit will continue to supply essential sediment northwards to form the beaches of Sandown Bay. Larger scale slope failures may advance the base of the cliff line temporarily and, dependent on the size of the failure, control local sediment accumulation and northwards transmission, although slumped sediments are likely to be weak and exposed to rapid marine erosion. In the medium to long term, slope erosion and reactivation along the Ventnor Undercliff coastline to the south-west (as seawalls and defence structures fail) could supply additional sediments into the sediment transport system and along-shore into this frontage.	groundwater levels and sea level rise worsening toe erosion and destabilisation. This unit will continue to supply essential sediment northwards to feed the beaches of Sandown Bay. Increasing slope erosion, destabilisation and landslide reactivation along the Ventnor Undercliff coastline to the south-west could supply additional sediments into this frontage and Sandown Bay.
	With present management	*Short description of predicted defence failure*	No defences. The few fragmentary structures described under the 'No Active Intervention' Scenario above are redundant with no significant impact on coastal or beach evolution due to the large scale natural processes occurring.	No defences.	No defences.
		Description of cliff erosion/ reactivation	See the description of the 'No Active Intervention' scenario above. The cliffs of this unit will be set back approx. 9m further than the adjacent units to the north and south.	See the description of the 'No Active Intervention' scenario above. Over the medium to longer-term, there will be an increasingly marked contrast between this open, eroding coastline and the defended coastlines of Sandown Bay to the north and the Ventnor Undercliff to the south where coastlines will be held in their original position by seawalls, revetments and groynes if present management techniques are continued. The cliffs of this unit will step	See the description of the 'No Active Intervention' scenario above. The cliffs of this unit will have continued to erode over 100 years in contrast to the seawalls in neighbouring units to the north along Sandown Bay and the west along the Undercliff, with retreats of approx. 64m in contrast to their fixed positions. This is likely to trigger significant landslide activity affecting the Monks Bay frontage immediately to the west.

Location	Scenario		Predicted change for		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
				back approx. 27m further than the adjacent units to the north and south.	
		Description of beach evolution	See the description of the 'No Active Intervention' scenario above.	See the description of the 'No Active Intervention' scenario above. Significant amounts of sediment from erosion of the local cliffs will feed the beaches, but continued maintenance of the hard defences along 3.8km of the Ventnor Undercliff to south-west will minimise sediment inputs from the adjacent coastline.	See the description of the 'No Active Intervention' scenario above. This frontage will be an increasingly essential source of sediment supply to the seawall-backed beaches of Sandown Bay to the north. Continued maintenance of the hard defences along 3.8km of the Ventnor Undercliff to south-west will minimise sediment inputs from the adjacent coastline, although significant slope reactivation in the defended and undefended sections of the Undercliff to the south-west could still contribute to the local sediment transport system.
IW30 to IW36 ***Name: BONCHURCH & VENTNOR*** ***From Monk's Bay to Steephill Cove*** ***(MONK'S BAY; BONCHURCH ; WHEELER'S BAY; EASTERN CLIFFS; VENTNOR HAVEN & EASTERN***	**No Active Intervention**	*Short description of predicted defence failure*	Continuous coastal defences protect soft cliffs along this 3.8km section of the developed coastline of the Undercliff Landslide Complex. The town of Ventnor lies immediately above the defended coastal cliffs. At the start of this epoch the cliff line from Monk's Bay to Ventnor Bay is stabilised by continuous seawalls and boulder revetments. From Ventnor Bay to Steephill Cove defences are in the form of rock revetments, with seawalls also in the east of this section. Defences function directly to halt toe erosion and also to provide support to the toe of the coastal slope that is intended to reduce occurrences of instability within the relict landslides above. Several cliff stabilisation schemes involving re-grading and drainage assist coastal slope stability, in addition to the general toe protection and weighting. Previous interventions around Ventnor and Bonchurch appear to have significantly reduced the occurrences of landslide re-activations within the landward terraces. Through much of the first epoch (0-20 years), the	During the second epoch (20-50 years) any remaining sections of the seawalls and rock revetments that characterise the majority of the unit will fail at the start of the epoch (in 15-25 years), followed by the last sections of stronger defence at Wheeler's Bay, Ventnor Haven and Steephill Cove by years 25-35. This transition to an unprotected regime for the remainder of this epoch will allow coastal cliff erosion and landslide terrace reactivation.	No defences.

Location	Scenario		Predicted change for		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
ESPLANADE; VENTNOR BAY & WESTERN CLIFFS; CASTLE COVE & STEEPHILL COVE).			coastal defences will fulfil a vital role in reducing toe erosion of the landslide complex and reducing the risk of retrogressive failure upslope. The Undercliff coastline mostly has an east-north-east orientation, and the defences will prevent high-energy wave attack during storm events. From east to west: At Monk's Bay in the east of this unit a short section of reinforced concrete wall with wave return and a soft defence in the form of a recharged beach behind an offshore rock breakwater and rock groynes marks a transition from the undefended coast to the north-east and the continuous Ventnor seawalls to the south-west. Beach recharge of 17,000 cubic metres of marine dredged gravel was completed in 1992. Annual recycling of sediment which helps maintain the beach will cease under the 'No Active Intervention' scenario, with the offshore rock breakwater deteriorating from year 10, and the other rock groynes and sections of seawall failing at the end of the epoch (15-25 years). Moving westwards, continuous seawalls protect the low, weak cliffs (approx. 20m in height) from Bonchurch to Ventnor Bay, supporting the developed landslide terraces under the towns of Bonchurch and Ventnor above. The seawalls often comprise a wide stepped concrete apron or rock armour in front of a wave return wall and concrete deck, with some timber catch-fencing behind. The seawall is likely to provide toe protection and prevent erosion through this first epoch, deteriorating and failing at the end of the epoch (generally 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, prompting erosion/reactivation and some outflanking. The seawalls are fronted by occasional short groynes which will fail in 5-7		

Location	Scenario		Predicted change for		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			years. In the centre of Wheeler's Bay, at Ventnor Haven and along Ventnor Bay three separate sections of seawall are in better condition and should remain through this first epoch, although they could still be destabilised by adjacent outflanking &/or landslide reactivation. Firstly, at Wheeler's Bay the formerly pronounced bay and curved seawall was shallowed by coast protection and slope stabilisation works in 2000, to decrease the angle of the unstable slopes behind the bay and prevent seawall breech. Secondly, at Ventnor Haven rock revetments (harbour arms) were completed in 2003 to reduce wave attack to the ageing seawall behind and will also remain in place through this first epoch. Thirdly, in Ventnor Bay the low cliffs are absent and properties are located immediately behind the seawall and esplanade and rise steeply behind; the seawall is fronted by a significant pea-gravel beach, the only section of this defended frontage with significant natural protection against regular wave attack. Moving further west from Ventnor Bay, a rock revetment (constructed in 1992) will protect the low cliff line known as the Western Cliffs for 15-25 years. At the west of this unit, 441m of seawall also present at Castle Cove and Steephill Cove. The Castle Cove rock revetment and gabions will begin to fail in 15-25 years, and at Steephill Cove 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.		
		Description of cliff erosion/ reactivation	The entire frontage is formed within a zone of massive relict landslides subject to marine erosion at their toes and sensitive to large-scale reactivation. 134 pieces of ground monitoring equipment and surveys are in place throughout the Undercliff to monitor ground reactivation within the town and the roads, and detailed landslide mapping (geomorphology, ground behaviour, planning guidance) is available. 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		

Location	Scenario		Predicted change for		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			the coastal cliffs are approximately 20-30m in height, with terraces of rising ground behind (up to the back scar at approx. 100m height, approx. 400m inland). Erosion will commence progressively during the first epoch (0-20 years) following seawall failures, at a rate of approx. 0.46m/yr, resulting in approx. 2m of erosion by year 20 following a typical defence failure in year 15 (or up to 7m for the small sections which may fail first, in year 5 onwards). Erosion will occur where the seawall is breached, outflanking and undermining adjacent sections causing further failure and cliff reactivation. From years 20-50, erosion of the remaining sections of sea cliffs will fully reactivate and continue at approx. 0.61m/yr, resulting in an additional potential 18m of retreat during this epoch, or up to 25m since year 1. From 50-100 years, erosion will continue at rates of approx. 0.71 then 0.77m/yr, creating an additional 37m of retreat, or up to 62m over 100 years. However, coastal cliff recession will not progress in this simple linear pattern, as progressively removing up to 62m from the lower slopes of the landslide complex would trigger major reactivations and failures in the landslide terraces above. Erosion would trigger episodic slope failure and retreat, increasing through the second and particularly through the third epoch. Futurecoast (2002) notes that the Undercliff frontage would be subject to an extreme magnitude of change if evolution occurs unconstrained. 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. The landsliding in the Undercliff area has left a distinctive series of rotational blocks leading from shore to the rear scarp or hills. These rotational blocks are mostly composed of Upper Greensand. Much of the area within this unit has been stable (especially in the urban parts of the Undercliff) where coastal defences are present, and the consequences of the failure of the coastal defences towards the end of the first epoch or early in the second epoch will allow erosion of the low cliffs to commence and have a major effect in reducing ground stability. Over the past fifty years or so years stability of the Undercliff has reduced and ground movements have increased in frequency in parts of Bonchurch and Ventnor (and St. Lawrence and Niton in the unit to the west). For example, in Bonchurch in 1995 there was 10m cliff top retreat in one year. Although stability is related closely to groundwater conditions, it is likely that millennia of toe erosion have also critically reduced the support afforded by the lower slope. Without defences, re-activation of the relict landslides of the Undercliff is likely to persist and intensify in the future, based on several contributory factors: • Sea cliff erosion will continue and as the cliffs retreat. Vital toe support is removed and the overall coastal slope steepens. This will ‘prepare’ the slopes to potentially allow relatively small events to trigger re-activations. • Slopes are sensitive to winter rainfall, promoting higher pore water pressures within the landslides and potentially triggering re-activations of the ‘prepared’ slopes. • The relict 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. A distinctive feature of the urban Undercliff is the Lowtherville Graben, at the rear of the Undercliff in upper Ventnor. This is an area of Upper Greensand parallel to the coast that is sinking at a rate of 20mm a year between two, almost parallel fissures. The close association between ground movements and rainfall, together with the triggering effects of coastal erosion, will lead to serious implications in terms of future climate change. Climate change is predicted to increase significantly the frequency and intensity of winter rainfall causing corresponding increases in groundwater levels, which in turn will cause accelerated ground movement and increase the probability of a major landslide event at Ventnor. Also, marginally stable areas may become unstable. Increases in sea level will cause further erosion of the foreshore and sea cliffs which will cause a decline in overall stability of the landslide complex. The main consequence		

Location	Scenario		Predicted change for		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			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. Areas of potential landslide reactivation: • At Monk's Bay a Victorian seawall collapsed following severe storms in 1990/91. The slope behind Monk's Bay forms part of the Ventnor Undercliff landslide complex and the combination of coastal erosion and a very wet winter led to a rapid retrogressive failure extending some 250m back from the coastal slope with the opening of tension cracks. To avert the risk of further landsliding and serious impacts on historic listed buildings, properties, highways and other infrastructure, a coast protection scheme was carried out between 1991 and 1993 which involved the regrading, strengthening and drainage of the coastal slope behind Monk's Bay together with the construction of an offshore rock breakwater, the provision of rock groynes and beach replenishment. The section of the wall to the east backed a cliff line which was different geologically and, therefore, a short length of more traditional concrete wall with wave return was provided. The rock revetment and beach replenishment approach was pursued as this was a natural area with the foreshore designated for its inter-tidal reefs and natural environments. In the event of no active intervention, the coarse beach material would migrate eastwards and be lost by year 5. This would result in increasing wave attack at the toe of the slope leading to undermining of the slope itself and the cliff drainage system. By year 10 reactivation of the coastal slope would be likely, promoting the risk of serious landsliding affecting such historic buildings as Bonchurch Old Church (constructed in 900 AD) and numerous listed buildings in the village of Bonchurch which is also a conservation area. By year 20 the whole of the coastal slope as far back as A3055 Leeson Road could be reactivated affecting a substantial number of high value properties and other assets. Whilst this scenario could be driven by coastal erosion, it is also possible that higher winter rainfall and ground water levels could trigger larger scale movements. • Along the Bonchurch to Wheeler's Bay frontage the linear benches of Chalk and Greensand are less steeply sloping than the frontage to the east and retreat is less likely to have a significant stability implication compared to the frontages to the east and to the west. Reinforced concrete walls protect a pedestrian and vehicle promenade and a weak cliff line of chalky debris, with terraces of the town above. The length from Monk's Bay to Shore Road, Bonchurch (known as Horseshoe Bay) comprises a vertical concrete wall with wave return together with concrete groynes with rock armour protection. A row of Victorian properties are located immediately to the rear of the seawall, behind these properties the ground rises steeply up to the old church of Bonchurch (AD 900) together with other historic properties within the conservation area. The length from Shore Road westwards to Wheeler's Bay comprises a stepped reinforced concrete wall with promenade backed by a timber catch fence along the foot of the weak cliffs. The slopes behind Horseshoe Bay are marginally stable and loss of support from the toe would have a rapid retrogressive effect through this part of the Bonchurch Undercliff. • The semi-circular Wheeler's Bay comprises a coastal mudslide with Greensand and Chalky landslide debris forming headlands on either side of the bay. The over-steepened clay slope within and behind the bay was extensively developed during the Victorian period. Defences were provided originally at Wheeler's Bay in the early 1960s and some improvements were undertaken in about 1990. In January 1995 following an exceptionally wet winter landsliding commenced posing a risk to up to 100 properties on the steeply rising ground behind extending into the eastern part of the town of Ventnor. A scheme involving an advance of the coastal defence line, the placing of a rock revetment to support an infilled chalk slope at a reduced angle together with soil nailing and drainage measures was completed in the year 2000. No active intervention and increased winter rainfall will lead to dislocation and failure of the slope drainage system which will aggravate ground movement on the coastal slope behind. Breach of the rock revetment will open up the frontage for wave attack resulting in erosion of the infilled chalk slope behind and leading to slope reactivation risk to property upslope (which is developed on a series of landslide benches) rising up as far as St Catherine's Street and South Street, extending back into the eastern part of the town of Ventnor.		

Location	Scenario		Predicted change for		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			• The Wheeler's Bay to Ventnor Haven frontage protects the toe of the coastal landslide complex along the Eastern Cliffs frontage of Ventnor. It provides support for the cliff line which is composed of reconsolidated chalk and landslide debris which is extremely soft and has a high potential rate of retreat once exposed to coastal erosion. Following seawall breach and collapse attack of the chalk cliff line behind will occur. The opening up of the frontage to wave attack would promote instability in eastern central Ventnor unlocking this part of the coastal landslide system. The seawall comprises a concrete structure with protection by acropods at the eastern end and by vertical sheet piles at the western end. The seawall decking and wall itself are affected significantly by slope instability aggravated by ground water movements. The seawall contains an important public sewer which carries the flows from Bonchurch to Ventnor and its loss would not only have significant economic consequences but result in pollution affecting Bathing Waters and the South Wight SAC. The revetment is an important route for recreation and access and the loss of the revetment would impact on the local tourism economy. The cliff line supports a number of significant buildings. A number of properties have been lost historically along this frontage since Victorian times prior to the coastline being defended. There is potential loss of property and assets along the cliffs following defence failure and upslope reactivation. • The Ventnor Eastern Esplanade frontage benefited from the provision of a rock revetment in front of the Victorian seawall in 1994 which protects the unimproved section of Victorian wall inside the Haven. Under a no active intervention scenario storm damage and sea level rise will result in overtopping with implications for developments on the Eastern Esplanade and the effective use of Ventnor Haven. Significant overtopping could also affect the high value infrastructure contained within the Lion Point pumping station (on the western harbour arm) which manages sewage flows for the whole of the town of Ventnor. • Ventnor Bay and the Western Cliffs (Ventnor Eastern Esplanade to the western end of the western cliffs at Flowers Brook): This is most heavily developed and steepest part of the town of Ventnor. Taking account of the marginal stability of the coastal slopes, evidence of historical building damage and the general vulnerability of the frontage, the existing coastal defences, which have been largely refurbished in recent years, provide essential protection against coastal erosion and cliff instability. The Ventnor Bay seawall was reconstructed in 1994 and fulfils a vital role in terms of protecting the steepest and most high value part of the Ventnor town frontage. Landsliding during the wettest winter in the last 140 years in 1960/61 resulted in significant road and property damage with loss at the western end of the Esplanade and at Bath Road. The seawall, which comprises a reinforced concrete structure with stone-facing, has a further line of support and protection comprising a raised timber revetment, which is buried beneath the beach. The existing structure protects seafront properties, public services and infrastructure as well as protecting central Ventnor from landslide risk and retrogressive failure. In the event of a 'No Active Intervention' scenario a breach of the Ventnor Bay wall in the second epoch could lead to a rapid reactivation of the slope behind which comprises beach material and then soft landslide debris. Following the loss of the Esplanade properties the steeply rising ground, which is supported by a number of stone facings (not designed retaining structures) could lead to an increase in ground instability, localise 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. Along the frontage to the west, known as the Western Cliffs, a rock revetment which was placed in 1992 along the foot of the soft chalky cliff line of reconsolidated chalky and Greensand debris. Rapid rates of erosion were experienced prior to this revetment being put in place. Sea level rise and overtopping will assist failure of the rock revetment at the end of the first epoch and result in further loss of support for the Western Cliffs. Failure of the Western Cliffs or seafront could envelop the rock revetment and seawalls, and the defences along the Western Cliffs are considered essential for the stability of the significant areas of the town behind. Erosion of the cliffs (removal of toe weighting) and increasing ground water levels (due to increased winter rainfall) will trigger instability with implications for the heavily developed terraces of the landslide complex rising behind. The breach and loss of coastal defences along Ventnor Bay and the Western Cliffs would open up of the whole frontage to wave attack during the second epoch and erosion of the coastal slopes may lead to the reactivation of the whole of the Ventnor Esplanade crescent (bounded by Esplanade on the seaward side and Belgrave Road on the landward side and extending eastwards to the Cascade and westwards to Bath Road). The loss of this support could be sufficient to reactivate the		

Location	Scenario		Predicted change for		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			whole of the central Ventnor area extending as far back as the Lowtherville Graben at Newport Road, Upper Ventnor. • Castle Cove and Steephill Cove are small bays are backed by coastal slopes which have been affected by varying degrees of instability over time. At Castle Cove, following the failure of the coastal slope in 1993/94, a major coast protection scheme comprising a rock revetment, rock groynes, and a reconstructed chalk coastal slope together with slope drainage and slope strengthening measures were completed. The rock revetment provided a maintenance access route for pedestrians and vehicles between the rock revetment itself and the toe of the coastal slope. The coastal slope now supports important insects and plant life. At Steephill Cove the Victorian defences were upgraded in 1992 with further works being completed in 2006. A gradual deterioration in the condition of the rock revetment would lead to commencement of erosion and undermining of the reconstructed slope at Castle Cove. Slope failure could cause seaward displacement of the revetment. When defence is breached and the slope undermined it is anticipated that landsliding would start to pose a risk to properties located along the top of the slope and could gradually affect the hinterland towards Castle Close. The 100 year risk line could extend further back to include both Castle Close and Castle Court and extending close to the rear scarp of the Undercliff. 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 development in the area.		
		Description of beach evolution	At the start of the first epoch, there is virtually no input of sediment directly into the coastal system from this defended frontage. Sediment input from the local cliffs will commence on defence failure in 15-35 years and supply large quantities of sediments to the shoreline. The littoral drift is mostly west-south-west to east-north-east along the Undercliff, and the eroding and reactivating St. Lawrence Undercliff to the east may supply additional sediment into this frontage. Foreshores are typically spreads of Upper Greensand rocks and boulders providing foreshore platforms (boulder aprons) of variable width, with narrow, occasional frontages of gravel beach sediments, for example at Ventnor Bay and Steephill Cove. The Strategic Monitoring Programme shows Ventnor beach levels have been relatively stable from 2004-09, with slight erosion occurring in the east (adjacent to the western harbour arm). Slight erosion has also occurred on Steephill Cove beach from 2004-09. Monk's Bay beach in the east of this unit was created by beach recharge so it will be lost progressively through the first epoch after sediment recharge and recycling ceases. Landslide and rockfall events have determined the dimensions of the scattered debris aprons, likely to have resulted from past landslide debris lobes, from which finer sediments have been removed. The defence line is generally unprotected by beaches and is therefore subject to high-energy wave attack during storm events, which can lead to a significant loss in any available beach material over a relatively short time period. Local beach levels may be fed by cliff erosion and reactivation in the second and third epochs, but dependent on the quantity of supply, the sediments may also be lost offshore and to the east. Pocket beaches will migrate landward as the cliffs erode and over time this process gradually extends the widths of the boulder aprons. Large-scale re-activations of landsliding would considerably increase the delivery of sediments to the local shoreline and potentially supplement supply of sand north-eastwards to Sandown Bay. Major landslides within the Undercliff are likely to generate significant seaward extending lobes of debris and reinforce the protection afforded at the slope toes by the boulder aprons.		
	With Present Management	*Short description of predicted*	The 3.8km stretch of coastal defence structures described under the 'No Active Intervention' scenario (seawalls and rock	Maintenance of the seawalls and rock revetments from Monk's Bay to Steephill Cove will continue.	Maintenance of the seawalls and rock revetments will continue.

<table>
<tr><th rowspan="2">Location</th><th rowspan="2">Scenario</th><th rowspan="2"></th><th colspan="3">Predicted change for</th></tr>
<tr><th>Years 0-20 (to approx. 2025)</th><th>Years 20-50 (to approx. 2055)</th><th>Years 50-100 (to approx. 2105)</th></tr>
<tr><td></td><td></td><td>defence failure</td><td>revetments) will continue to be maintained, and replaced.

Beach sediments will continue to be provided at Monks Bay, although current levels of annual sediment recycling may become insufficient over the next 20 years.

Landslide reactivation by coastal erosion will be prevented, but wet winters will also be critical to coastal slope stability.</td><td>Beach sediment recycling (at previous levels) at Monk's Bay is likely to be insufficient to continue to stabilise the coastal slope behind.

Landslide reactivation will be effectively minimised by continued toe protection of the coastal cliffs, but movements of the landslide terraces or coastal slopes behind could still destabilise the seawalls or cause breaches.</td><td>Previous levels of beach recharge at Monk's Bay will no longer be sufficient to prevent loss of the beach sediments, erosion and slope destabilisation.

Reactivation of the developed landslide terraces behind the low coastal cliffs will be minimised by continued toe protection, but movements of the landslide terraces could still destabilise the seawalls, as the system is especially vulnerable to groundwater levels and increased winter rainfall.</td></tr>
<tr><td></td><td></td><td>Description of cliff erosion/ reactivation</td><td colspan="3">With continued maintenance of the seawalls and revetments fronting this unit, toe erosion of the cliffs cut into the landslide complex would be prevented, and slope reactivation behind the defence line minimised. This ongoing maintenance and replacement of defences would have increasingly important stabilising effects through the future epochs (0-20 years, 20-50 years and 50-100 years), as sea levels rise and stability of the slopes gradually declines. The predicted increase in future winter rainfall will still have an important destabilising effect on the landslide complex, and is likely to promote reactivation of ground movement in some areas with episodic slumps or slides occurring which could overrun or affect sections of the seawall and rock revetment. 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. The rock revetment marking the eastern end of the defences at Monk's Bay already marks a step-back to the naturally eroding coast, with the current offset of approximately 30m likely to increase to approximately 94m over the next 100 years, as erosion continues on the adjacent coast towards Luccombe. This offset may be reduced by landslide debris slumping forwards as the cliff retreats. Beyond the western margin of this defended frontage erosion of the unprotected cliffs west of Steephill Cove would outflank the defences by up to 48m over 100 years. The seawalls fronting the majority of the unit will be vulnerable to overtopping in future epochs and low beach levels will expose them to wave attack.

The present management practices of sea cliff stabilisation and toe weighting around Ventnor and Bonchurch appear to have significantly reduced the occurrences of landslide re-activations within these parts of the Undercliff. If continued, these measures could considerably delay re-activations such that the eastern section of the Undercliff around Ventnor might remain relatively stable for >100 years, whereas western parts (in the adjacent unit to the west) could in future become increasingly active.

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 development in the area.</td></tr>
<tr><td></td><td></td><td>Description of beach evolution</td><td colspan="3">Throughout the three epochs, there will be no sediment input from direct local cliff erosion into the coastal system from this defended frontage. However, some sediment inputs may occur, particularly in later epochs, from localised cliff slumps or reactivations which may temporarily cover or affect the defence line. The littoral drift is mostly west-south-west to east-north-east along the Undercliff, and continued erosion and reactivation of the cliffs in the adjacent frontage to the east may significantly increase sediment supply into this unit.

Foreshores are typically characterised by sandstone rocks and boulders providing foreshore platforms (boulder aprons) of variable width, with</td></tr>
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Location	Scenario		Predicted change for		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			narrow, occasional frontages of gravel beach sediments, for example at Ventnor Bay and Steephill Cove. The Strategic Monitoring Programme shows Ventnor beach levels have been relatively stable from 2004-09, with slight erosion occurring in the east (adjacent to the western harbour arm). Slight erosion has also occurred on Steephill Cove beach from 2004-09. The foreshores in front of defences are likely to lower and narrow relatively slowly due to the resistant nature of the boulder aprons. The sub-tidal bed may, however, be free to erode such that toe support would gradually be reduced. The defence line is likely to remain largely unprotected by beaches and is therefore subject to high-energy wave attack resulting from storm events, which can lead to a significant loss of limited available sediments over a relatively short time period. Monk's Bay beach in the east of this unit was created by beach recharge so as at present an annual re-distribution of the coarse beach material will be required as natural processes tend to move the material in an easterly direction where it accumulates against the rock groyne and migrates over the top of the groyne to continue round towards Luccombe and Sandown Bay. The beach is likely to be progressively lost later in the first or during the second epoch as sediment recycling (at previous levels) becomes insufficient to retain the beach.		
IW37 ***Name: ST LAWRENCE UNDERCLIFF*** ***From: Steephill Cove(western edge)*** ***To: Puckaster Cove***	**No Active Intervention**	*Short description of predicted defence failure*	The St. Lawrence Undercliff is a 4.5km length of coastal cliffs formed in landslide debris below Ventnor Botanic Gardens and (moving westwards) the shallow bays of Orchard Bay, Sir Richard's Cove, Woody Bay and Binnel Bay. The Undercliff coastline has an east-north-east orientation. Development on the coastal cliffs and coastal slopes behind is more scattered than in the town of Ventnor in the unit to the east. The coastal slopes are often wooded with relatively few properties located on the seaward side of the A3055 main coastal road. Apart from some development immediately to the east of Undercliff Glen Caravan Park, further west there are small groups of properties located at Mirables and The Orchard. The entire length of the St. Lawrence Undercliff is undefended, except for a 65m length of stone masonry wall and concrete ramp within Orchard Bay with a residual life of 15-25 years, which will fail towards the end of this epoch.	No defences. Any remnants of defence in Woody Bay will fail at the start of this epoch.	No defences
		Description of cliff erosion/ reactivation	Deep-seated landslide phenomena are similar along this frontage to those described in the Bonchurch and Ventnor unit to the east. The entire coastline is cut into the massive relict landslides (a zone 500m to 750m in width), subject to marine erosion at the toe and sensitive to large-scale reactivations retreating back up slope. Coastal slope reactivations will generally occur more rapidly in this unit than the defended frontage of Ventnor and Bonchurch.		

Location	Scenario		Predicted change for		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			Around St Lawrence the Undercliff frontage comprises an extensive debris 'apron' which act as a buffer zone between the coastline and coastal developments and infrastructure, which are generally set further back. The topography is generally of a gentle nature, with scattered development. The presence of increasing amounts of Chert and Upper Greensand blocks such as those outcropping at Woody Bay and Sugarloaf Hill provide a more resilient coastline. Moving west the coastline west of St Lawrence towards Niton comprises a series of coastal mudslides with the appearance of a Gault Clay escarpment. Along this frontage there is a varied cliff line of approx. 20-30m in height in the east, rising to 50m above Binnel Bay. Cliff foot erosion is active and ongoing. Erosion will continue throughout the first epoch (0-20 years) at a rate of approx. 0.35m/yr, resulting in approx. 7m of cliff retreat by year 20. From years 20-50, erosion will continue at approx. 0.46m/yr, resulting in an additional approx. 14m of retreat (or up to 21m since year 1). From 50-100 years, erosion will continue at rates of approx. 0.53 then 0.58m/yr, creating an additional approx. 27m of retreat (or approx. 48m over 100 years). The increasing rates of recession reflect the impacts sea level rise on the soft rock coastline. However, coastal cliff recession will also trigger significant reactivations and failures in the landslide terraces above. Futurecoast (2002) notes that the Undercliff frontage would be subject to an extreme magnitude of change if evolution occurs unconstrained. Without defences, re-activation of the relict landslides of the Undercliff is likely to persist and intensify in the future, based on several contributory factors: • Sea cliff erosion will continue and as the cliffs retreat. Vital toe support is removed and the overall coastal slope steepens. This will 'prepare' the slopes to potentially allow relatively small events to trigger re-activations. • Slopes are sensitive to winter rainfall, promoting higher pore water pressures within the landslides and potentially triggering re-activations of the marginally stable slopes. • The landslide blocks 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. In addition to active coastal erosion, the western Undercliff within this unit is potentially more vulnerable to an increase in winter rainfall than the unit to the east, leading to an increase landslide activity characterized by major events. In recent decades there has been a tendency towards reactivation of specific landslide units on the lower slopes that then have had "knock-on" effects upslope such that instability has progressed now almost to the toe of the landward backscar developed in Chalk and Greensand 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 approx. 300-400m inland, below the backscar, which is also affected by rockfalls. This coastal road is already stepped and patched 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, which will need to be diverted inland through the villages inland of the backscar. It is likely that millennia of toe erosion have also critically reduced the support at the landslide toes. The scenarios for coastal erosion and landslide reactivation are addressed moving from east to west along this 4.5km unit: • In contrast to the steeply sloping topography of central Ventnor and parts of Bonchurch (to the east), the frontage from Steephill to west of St Lawrence is relatively gentle with a wide ancient debris apron. As a result it is anticipated that coastal change along this frontage will take place in a typical coastal erosion scenario for an undefended frontage, although there would potentially be a detrimental effect on development and infrastructure further upslope. • Moving west of St Lawrence, particularly from Old Park westwards to Reeth Bay, there is a more complex geological situation. A series of complex mudslides extend inland from the coast to reach the line of the A3055 Undercliff Drive. The frontage has been subject to ongoing movements, particularly over the last 20 years, with an increased frequency of reactivation over the last 10 years.		

Location	Scenario		Predicted change for Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			Coinciding with wet winters this has led to significant landslide events taking place at Undercliff Glen Caravan Park, Mirables, the Orchard frontage and at Beauchamp House where the dramatic failure occurred in spring 2001 severing the main coastal road. This part of the Undercliff frontage benefits from minor protection provided by Puckaster Point and is slightly less exposed to south-westerly storm waves than the Reeth Bay frontage to the west. The close association between ground movements and rainfall, together with the possible effects of coastal erosion as sea levels rise, leads to serious implications in terms of future climate change. In the long term, re-activation of landslides would lead to the initiation of new failures within in-situ geological materials and renewed recession of the backscar. The likely timescale for such events is difficult to estimate (probably >100 years), 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. 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.		
		Description of beach evolution	Erosion of the cliff face yields a mixture of clay, sand, marl, Chert and Chalk to the foreshore. The foreshore is typically characterised by sandstone rocks and boulders providing foreshore platforms (boulder aprons) and with narrow, occasional frontages of gravel beach sediments. The littoral drift is mostly west-south-west to east-north-east. The Strategic Monitoring Programme has no data on the trends along this frontage. Previous landslide and rockfall events have determined the dimensions of basal debris aprons as large boulders of resistant Lower Cretaceous sandstones have remained on the foreshore in extensive residual aprons. These aprons armour the shoreline and dissipate wave energy, although the coastline is subject to high-energy wave attack during storm events, which can lead to a significant loss in beach material over a relatively short time period. 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. These beaches are adjusted to incident wave approach and exhibit weak west to east littoral drift. There appears to be little exchange between adjacent bays, but by-passing may take place when there are oblique south-westerly long period waves. 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. Tidal currents may play a minor role in moving finer grained material. Pocket beaches migrate landward as the cliffs erode and over time this process gradually extends the widths of the boulder aprons. Large-scale reactivations of landsliding would considerably increase the delivery of sediments to the local shoreline and potentially supplement supply of sand eastwards to Sandown Bay. Sediment may also be supplied into this frontage from the Reeth Bay and Blackgang unit to the west which will be undergoing rapid erosion. Major landslides may generate significant seaward extending lobes of debris and reinforce the protection afforded at the slope toes by the boulder aprons.		
	With present management	*Short description of predicted defence failure*	No defences along this 4.5km frontage, except for a short 65m length of stone masonry wall and concrete ramp within Orchard Bay which will be maintained.	No defences, except for a short 65m length of coastal defence within Orchard Bay which will be maintained and outflanked.	No defences, except for a short 65m coastal defence within Orchard Bay which will be maintained and increasingly outflanked, although threatened by adjacent erosion encroaching behind this short frontage.
		Description of cliff erosion/ reactivation	Continuing with present management practices would result in few changes to the largely undefended St Lawrence Undercliff when compared with the 'No Active Intervention' scenario described above. This western section of the Undercliff will become increasingly active through the epochs as coastal erosion increases and slope stability declines.		

Location	Scenario		Predicted change for Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			Cliff erosion will continue throughout the epochs at the rates described above. Erosion at the eastern and western margins of the unit will outflank the adjacent hard defences by approximately 48m over 100 years (7m in epoch 1, plus 14m in epoch 2, plus a further 27m in epoch 3). A similar amount of erosion will outflank the 65m of defences within Orchard Bay if they are maintained, although by the third epoch particularly there is a risk of adjacent erosion encroaching in behind the narrow defended section. Episodic larger-scale slope reactivations are likely to cause coastal evolution at faster rates than just the coastal cliff retreat.		
		Description of beach evolution	As outlined under the 'No Active Intervention' scenario above, erosion of the local cliff faces will yield a mixture of clay, sand, marl, Chert and Chalk to the foreshore. The foreshore is typically characterised by sandstone rocks and boulders providing foreshore platforms (boulder aprons) and with narrow, occasional frontages of gravel beach sediments. The littoral drift is mostly west-south-west to east-north-east. No significant change in the character of the foreshore is anticipated as natural retreat of the cliffs continues under this scenario. Large-scale re-activations of landsliding would considerably increase the delivery of local sediments to the shoreline and potentially supplement supply of sand eastwards to Sandown Bay. Sediment supply into this frontage by longshore drift from the west would be restricted by the rock revetment being maintained in Reeth Bay, but the scale of coastal landsliding and retreat anticipated at Blackgang (just slightly further to the west) may still supply large amounts of sediment to these Undercliff shores to the east. However, this would be dependent on whether landslide lobes encroaching on the foreshore trap beach sediments updrift or divert them offshore.		
IW38 ***Name: CASTLEHAVEN*** ***Reeth Bay cliffs, to the limits of the coastal defences***	**No Active Intervention**	*Short description of predicted defence failure*	The 785m Reeth Bay frontage is protected by rock revetment and slope drainage measures, constructed in 2004 to address rapid coastal slope failure. Without further maintenance, the central rock armour revetment will continue to reduce cliff toe erosion throughout this first epoch (25-35 years). Additional concrete and rock structures at the western margin of the Bay are likely to fail from 10-25 years. An extensive system of drainage pipes and siphon drains was provided in roadways in the hinterland in order to reduce ground water levels to the summer mean. The drainage system, which forms an essential component to the coastal protection scheme in terms of reducing slope instability, 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.	The rock revetment will fail in the first half of this epoch (in 25-35 years) allowing active erosion of the cliff behind to restart.	No defences.

Location	Scenario		Predicted change for Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			Whilst the coastline to the east has very limited development along the coastal frontage, the Castlehaven frontage has significant development and assets forming the eastern approach to the village of Niton.		
		Description of cliff erosion/ reactivation	Deep-seated landslide phenomena are similar in scale along this frontage to those described in the units to the east. The entire coastal cliff line is cut into the massive relict landslides, which form a zone 600m in width behind the coastline. The coastal cliffs and slopes are vulnerable to further marine erosion at the toe, and are sensitive to groundwater levels in the slopes, with the potential for further large-scale reactivations retreating back up slope. The unstable cliffs and slopes forming Reeth Bay (up to 30m in height) will be protected from active toe erosion in the centre and east of the bay throughout this first epoch, but at the western edge of the bay, erosion of the slopes at approx. 0.69m/yr will begin in year 10-15 (or year 15-25 in the far west) when the marginal defences fail, so allowing a maximum of approx. 7m of erosion to occur in the west of the unit by year 20. Failure of the slope drainage system would result in an increase once again in slope instability, which could lead to damage and loss of properties and overwhelming of the rock revetment by the landslide mass behind, pushing the revetment seawards and once again opening up the frontage to wave attack. The slumped coastal slopes (sands, muds and clays) have not been reprofiled due to the important habitats in the area and remain exposed to water infiltration and weathering above the rock revetment.	Prior to construction of the rock revetment in 2004, the removal of toe support by erosion of the coastal slope was sufficient to destabilise the landslides of the slope above and a zone of instability migrated inland, controlled by groundwater conditions, especially resulting from severe winter rainfall in 1994 and 1995 when the unstable upper scarp migrated some 95m inland over an 18 month period. When the rock revetment reaches the end of its life during this epoch (in 25-35 years, following the failure of the slope drainage system in epoch 1), significant reactivation of the Castlehaven landslide terraces behind will occur, extending back into the developed areas. Erosion and retreat of the weak coastal cliffs and slopes at 0.91m/yr may result in approx. 27m of coastal retreat during this epoch, (or up to 34m of retreat in total from years 1-50). There is clear potential for larger-scale slope reactivation to be triggered which would retreat the upper scarp further inland at a much faster rate than the sea cliffs retreat.	Cliff recession at 1.06m/yr then 1.15m/yr may retreat the coastline by approximately 55m during years 50-100 (or up to 89m in total since year 1). However episodic slope failure and ground reactivation is likely to extend much further back inland to the Undercliff Drive road by the end of this epoch.
		Description of beach	There is a boulder, shingle and sand foreshore, and littoral drift is mostly west-	Following defence failure, natural evolution of the coastal cliff will resume, and input	Increasing frequency/scale of episodic landslide failures triggered by coastal

Location	Scenario		Predicted change for		
			Years 0-20 (to approx. 2025)	**Years 20-50 (to approx. 2055)**	**Years 50-100 (to approx. 2105)**
		evolution	south-west to east-north-east. The Strategic Monitoring Programme shows the beach levels in front of the rock revetment have undergone slight to moderate erosion from 2004-09. The foreshore may narrow in front of the defence during the first epoch, during which time there will be no direct sediment input from toe erosion of the protected cliffs in the majority of the bay, but some slope erosion will begin occur in the east of the bay towards the end of the epoch. In addition, smaller scale slumps and slides may encroach over the revetment to provide some limited sediments to the shore. The eroding St. Catherine's and Blackgang frontage to the west has potential to supply sediments along the coast into this unit, but the sands and silts eroding from Blackgang landsliding may be intercepted by old or new debris lobes along the St. Catherine's shoreline preventing significant longshore transport, dependent on the rate of sediment supply (the St. Catherine's Point coastline is currently generally rocky rather than sandy).	large quantities of sediment into the bay and potentially eastwards along the St. Lawrence Undercliff. Within Reeth Bay episodic landslide failures retreating the coastal slope as well as ongoing cliff toe erosion and slumping will supply beach sediments. Sediment input from adjacent units to the west may increase as the rate of erosion and sea level rise trigger more widespread coastal slope failure and reactivation, extending upslope towards the backscar west of St. Catherine's Point.	erosion and high winter rainfall will supply large quantities of sediment to the shoreline within Reeth Bay. The scale of coastal landsliding and retreat anticipated at Blackgang (to the west) may still supply large amounts of sediment to these Undercliff shores to the east. However, this will be dependent on whether landslide lobes encroaching across the foreshore at Blackgang or around St. Catherine's Point trap beach sediments updrift or divert them offshore.
	With present management	*Short description of predicted defence failure*	The rock revetment, coastal defence structures and slope drainage system will be maintained to continue minimising coastal slope failure and retreat.	The rock revetment, coastal defence structures and slope drainage system will be maintained or replaced to continue minimising coastal slope failure and retreat.	The rock revetment, coastal defence structures and slope drainage system will be maintained to continue minimising slope failure and retreat, although the system will be very vulnerable to the worsening impacts of climate change in the form of increasing winter rainfall raising groundwater levels.
		Description of cliff erosion/ reactivation	As outlined in the 'No Active Intervention' scenario, deep-seated landslide phenomena (similar in scale along this frontage to those described in the units to the east) govern the future evolution of the coast, with some delays due to the management practices in place. However, present management practices will not change the long-term evolution of the area over hundreds of years, due to the scale of the	Continued protection of the unstable cliffs and slopes forming Reeth Bay will prevent toe erosion of the cliffs and minimise landslide reactivation behind. Slumps from the weakened cliff face may encroach over the rock revetment in places, especially during wet periods. Increasing or intensive periods of winter rainfall are likely	Some slope failure and retreat is likely to continue within the weak coastal slopes behind the Bay, although this will be minimised by the continued presence of the toe rock revetment and seawalls. Continuation of the previous system of slope drainage may no longer be sufficient to reduce winter groundwater levels, increasing the likelihood of large-scale slope

Location	Scenario		Predicted change for		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			natural phenomena occurring in the area. In the short to medium term, management practices will affect the evolution of the coastline. The unstable cliffs and slopes forming Reeth Bay (20-30m in height) will be protected from active toe erosion throughout this first epoch if current coastal management practices continue (rock revetment, repair or rebuilding of the sea walls and slope drainage). Minor slumps from the cliff face may encroach over the rock revetment in places. Erosion of the adjacent undefended coast may begin to form a step-back or offset at the edges of this defended unit.	to reduce the stability of the slopes, especially towards the end of the epoch, so slope stability will be dependent on the slope drainage system continuing to remove sufficient water from the ground. Erosion or slope reactivation along the adjacent coast will continue outflanking and cliff offset at the edges of this unit.	reactivation. Erosion and slope failure along the adjacent coast will continue outflanking and cliff offset at the edges of this unit. This increasing coastal slope retreat and offset to the east and west may assist in destabilising the sides of the Reeth Bay landslide complex, although erosion is largely prevented in the centre of the bay, although overtopping by storm waves may occur. 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 development in the area.
		Description of beach evolution	As outlined in the ‘No Active Intervention’ scenario, the boulder, shingle and sand foreshore may narrow as the defences are maintained. Minimal direct sediment inputs from occasional small scale slumps over the revetment will not provide significant sediment inputs. Beach levels may continue the current longer-term trend of erosion, although the current annual variability with areas of accretion may also continue to occur. The eroding St. Catherine’s and Blackgang frontage to the west has potential to supply sediments along the coast into this unit (littoral drift is mostly west-south-west to east-north-east), but the sands and silts eroding from	There will continue to be minimal direct sediment inputs from occasional small scale slumps over the revetment. Foreshore narrowing is likely and low beach levels may occur. If a larger scale slope reactivation occurred behind the defences during this epoch, additional sediment could be supplied. Sediment input from adjacent units to the west may increase as the rate of erosion and sea level rise trigger more widespread coastal slope failure and reactivation, extending upslope towards the backscar west of St. Catherine’s Point.	Foreshore narrowing is likely as the rock revetment and defences are maintained, but beach levels will vary dependent on whether the evolving coastal morphology to the west supplies or traps the large quantities of sediments entering the west-south-west to east-north-east littoral drift system. Beach levels will also be dependent whether the coastal slopes are destabilised to the point at which larger-scale slope reactivation begins to occur (supplying additional sediments) as already occurring rapidly within the landslide complex to the east and west of Reeth Bay.

Location	Scenario		Predicted change for Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			Blackgang landsliding may be intercepted by old or new debris lobes along the St. Catherine's shoreline preventing significant longshore transport.		
IW39 ***Name: ST. CATHERINE'S POINT & BLACKGANG*** ***From: Reeth Bay (west)*** ***To: Chale Terrace, Blackgang***	**No Active Intervention**	*Short description of predicted defence failure*	No defences are present along this 3.4km length of coast around the southernmost tip of the Isle of Wight (St. Catherine's Point), which includes the very active Blackgang landslide. Blackgang marks the western end of the Undercliff Landslide Complex (running from Luccombe in the east). The large-scale of the natural processes of erosion and landsliding occurring means that coastal defence structures would be technically unfeasible, undesirable and ineffective at this very exposed location. There is a cluster of properties in the west around Blackgang Chine Theme Park (which is adapting to coastal retreat) but the coastal slopes to the east are undeveloped. The open, undefended character of the coast continues in the 16.7km neighbouring unit to the west, the south-west coast of the Isle of Wight.	No defences	No defences
		Description of cliff erosion/ reactivation	The whole of this frontage comprises an undefended actively eroding cliff line. 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. The entire coastal cliff line is cut into the massive relict landslides, which form a zone 200-700m in width behind the coastline. The coastal cliffs and slopes are vulnerable active marine erosion at the toe, and are sensitive to groundwater levels in the slopes. They will be affected by further large-scale reactivations retreating back up slope towards the back-scar of the landslide complex (approx. 100m in height).	Between years 20 and years 50 increased erosion and landslide reactivation is expected due to increased coastal erosion arising from sea level rise and the effects of higher ground water levels. 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. Coastal cliff recession of approx. 0.91m/yr along the St. Catherine's frontage will lead to a further 27m of cliff retreat during this epoch (20-50 years), or 41m in total since year 1, although reactivation of the landslide system behind may promote a wider zone of	The frequency of major events (cliff falls and landslide re-activation) will increase over the next 100 years. All cliffs and coastal slopes within this frontage are sensitive to heavy winter rainfall promoting higher pore water pressures within the landslides and potentially triggering re-activations, or new failures if recent trends for wetter winters continue. Coastal cliff recession of approx. 1.06m/yr then 1.15m/yr along the St. Catherine's frontage will lead to a further 55m of cliff retreat during this epoch (50-100 years), or 96m in total since year 1, although reactivation of the landslide system behind may promote a wider zone of coastal slope

Location	Scenario		Predicted change for		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			The eastern part of the frontage comprises an undefended eroding low cliff of rather more resistant Chalk and Greensand debris approx 10-15m high, dominated by boulder-sized blocks of Upper Greensand. The cliffs front a wide gently sloping zone formed by debris aprons, backed by steep cliffs, with the back scar approx. 700m inland. A rate of erosion of approximately 0.69m/yr between Reeth Bay and Watershoot Bay will result in an average of approximately 14m of retreat in epoch 1, although short-term retreat rates are locally very variable. Some degree of protection will also be provided for the frontage during the first epoch by the lobe of the 1928 Great Cliff Fall from Gore Cliff at Rocken End. To the west of St Catherine's Point the cliffs change to softer sands and clays, but these are just the front line of an extremely active zone of rapidly slumping coastal slopes and landslide benches over a zone approx 600m in width at Gore Cliff reducing to 250m near Blackgang. Particularly west of St Catherine's Point the frontage is exposed to aggressive marine erosion resulting in very rapid rates of coastal erosion and cliff top landsliding and retreat. Cliff elevation varies between 70m and 110m, with a further 60m to 80m added where there is a rear scarp developed in Upper Greensand. The cliffs from Rocken End to Blackgang are cut into Upper Greensand and Gault Clay overlying interbedded sandy and clayey Lower Cretaceous strata, and to the east are cut into the Lower Cretaceous Atherfield Clay, Sandrock and Ferruginous Sandstone strata in the west near Chale. The coastal slopes are made up of a complex pattern of mass movement forms arranged within a cascading sequence of landslide systems. This area	coastal slope activity. The episodic nature of landslide re-activation and movement from Gore Cliff to Blackgang means 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 of 10 to 30m within single events. At Chale, the cliffs are already fully re-activated so that continued toe erosion is likely to result in continuation of the episodic high rates of retreat that appear characteristic of recent decades. Episodic coastal slope recession of at average of approx. 1.52m/yr along the Gore Cliff to Blackgang frontage will lead to a further 46m of coastal slope failure during this epoch (20-50 years), or 69m in total since year 1. Slope reactivation and active retreat at the top of the coastal slope may reach the backscar below the Blackgang viewpoint car park by the end of this epoch, after which rockfalls and the unpredictable retreat of the backscar may begin to occur. At Gore Cliff, rockfalls from the backscar will continue and are likely to become more extensive through this epoch.	activity. By year 100 the 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 further recession of the rear scarp of the Undercliff. This will necessitate further retreat of development. Episodic coastal slope recession of at average of approx. 1.77m/yr then 1.92m/yr along the landslide terraces from Gore Cliff to Blackgang frontage could lead to a further 91m of coastal slope failure during this epoch (50-100 years), or up to 160m in total since year 1.

Location	Scenario		Predicted change for		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			around Gore Cliff, Blackgang and Chale Terrace is subject to large-scale mud and debris slides, rockfalls and translational slides. Material directly from the cliffs and debris slumps down over the often saturated landslide benches, particularly below Blackgang. The scale of the coastal processes and slope retreat here is the most rapid on the Isle of Wight, and active movement already extends upslope to promote rockfalls from the backscar at Gore Cliff. Recession will be episodic, but average coastal cliff recession rates of 1.15m/yr can be anticipated over the next 20 years, leading to 23m retreat. Much larger rates of erosion of over 25m over a single winter have previously been recorded. Nearly 300m of cliff retreat has taken place since approximately 1880.		
		Description of beach evolution	The high rates of erosion and retreat along this frontage are a consequence of the underlying weak geology and the exposure of this area of coastline to wave attack with a south-westerly fetch of up to 150km and refracted waves from the Atlantic of a much greater fetch. Deep water immediately offshore may also contribute. The Strategic Monitoring Programme has no data on the beach evolution trends along this frontage. The high-energy wave attack resulting from storm events can lead to a significant loss in beach material over a relatively short time period. The prevailing wind and the greatest waves come from the south-west. The littoral drift is mostly west to east. No significant change in foreshore is anticipated along this naturally retreating coastline. Sediment is supplied to the foreshore in the form of quantities of landslide debris, some of it of boulder size, and by longshore drift from the west, but beach formation is modest and the cliff toe therefore remains exposed to	Large amounts of sediment will be delivered to the foreshore from active cliff erosion and retreat throughout this frontage and by longshore drift from the neighbouring eroding south-west coast. This sediment forms part of the anti-clockwise sediment transport system that operates around the south of the Isle of Wight. Landslide lobes encroaching across the foreshore at Blackgang or around St. Catherine's Point may trap beach sediments updrift or divert them offshore.	Large and increasing amounts of sediment will be delivered to the foreshore from active cliff erosion and retreat throughout this frontage, with ongoing supply from cliff erosion and episodic increased supply when larger-scale slope failures occur. Significant quantities of sandy sediments will also be supplied by ongoing cliff line erosion in the long unit to the north-west. This forms part of the anti-clockwise sediment transport system that operates around the south of the Isle of Wight. Landslide lobes encroaching across the foreshore at Blackgang or around St. Catherine's Point may trap beach sediments updrift or divert them offshore.

Location	Scenario		Predicted change for		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			marine erosion. Rocken End, made up of landslip debris, retains a beach composed of fine gravel described as "pea" gravel. The majority of the material is removed from the shoreline and its fate is uncertain. Sands may contribute to the nearshore bed and suspended sediments could be transported westwards, or be moved greater distances along the Channel. The debris lobe created below the 1928 Great Cliff Fall at Gore Cliff has retained beach sediments updrift and starved beaches downdrift, so this pattern of foreshore change may continue in future epochs.		
	With present management	*Short description of predicted defence failure*	No defences	No defences	No defences
		Description of cliff erosion/ reactivation	As above, see the 'No Active Intervention' scenario.	As above, see the 'No Active Intervention' scenario.	As above, see the 'No Active Intervention' scenario.
		Description of beach evolution	As above, see the 'No Active Intervention' scenario.	As above, see the 'No Active Intervention' scenario.	As above, see the 'No Active Intervention' scenario.

Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
IW40 ***Name:*** **SOUTH-WEST COAST** ***From:*** **Chale Terrace, Blackgang** ***To:*** **Afton Down, Freshwater**	**No Active Intervention**	*Short description of predicted defence failure*	No defences	No defences	No defences
		Description of cliff erosion/ reactivation	This 16.7km section of coast is characterised by eroding soft rock cliffs of moderate height (approx. 10-30m high) undergoing rapid erosion and cliff retreat, which will continue throughout all three epochs. Behind the cliff line of clays, marls, shales and sandstones, the south-west coast is flat and undeveloped, characterised by agricultural land with only scattered properties, but the A3055 main road and coastal footpath follow the line of the coastal cliffs, forming part of the 'round the island' route. At Brook the road will be lost by cliff retreat during the first epoch, followed later by adjacent sections. The cliffs maintain near-vertical profiles with occasional narrow ledges. Atherfield Point, and its offshore ledges, result from an outcrop of a more resistant unit within the Lower Greensand. Wave abrasion of the cliff toe occurs throughout this sector, sometimes dissipated by wide shore platforms. A distinctive feature of the coastline is the presence of a number of deeply incised coastal valleys, or Chines, that interrupt the continuity of the cliffs. Over time coastal erosion has shortened the distance from the source of the Chines to the sea, so the Chines will be further shortened in future epochs if retreat at their landward extents does not keep pace with increasing coastal erosion rates. *From Chale to Brook:* Simple cliffs characterised by steep vertical faces with cliff instability processes driven by direct wave action, undercutting and impacts of ground water. Cliff collapses tend to occur along joints within 'in-situ' bedrock, with debris rapidly removed by marine	Retreat of the soft cliffs will continue, with sea-level rise or downcutting of shore platforms creating conditions for acceleration of cliff retreat. *From Chale to Brook:* Cliff recession at approx. 1.14m/yr will occur, resulting in a further 34m of retreat over years 20-50, or 52m in total since year 1. *From Brook to Compton Chine:* Cliff recession at approx. 0.76m/yr will occur, resulting in a further 23m of retreat, or 34m in total since year 1. *From Compton Chine to Freshwater:* Cliff recession at approx. 0.46m/yr will occur, resulting in a further 14m of retreat, or 21m in total since year 1. The cliff top piles and rock anchors supporting the coastal road over Afton Down will fail during this epoch, releasing additional some additional Chalk sediment to the shoreline, but due to the height of the cliffs (70m) and the high exposure to marine attack, this will not alter the overall pattern of recession significantly. A tidal breach through Freshwater Bay at the western end of this frontage, towards the end of this epoch, may change local patterns of sediment accumulation at the western end of this unit, but the majority of the south-west coast downdrift will remain unaffected as it has its own significant local sediment supply from the eroding cliffs.	Retreat of the soft cliffs will accelerate, with increases in rainfall and the frequency or intensity of storms likely to trigger failures. *From Chale to Brook:* Cliff recession at approx. 1.33m/yr then 1.44m/yr will occur, resulting in a further 69m of retreat over years 50-100, or 120m in total since year 1. *From Brook to Compton Chine:* Cliff recession at approx. 0.88m/yr then 0.96m/yr will occur, resulting in a further 46m of retreat, or 80m in total since year 1. *From Compton Chine to Freshwater:* At Afton Down cliff recession will continue to cut into the southern flanks of the Chalk ridge, so cliff height will increase as recession progresses. Cliff recession at approx. 0.53m/yr then 0.58m/yr will occur, resulting in a further 27m of retreat, or 48m in total since year 1. Increasing tidal flows through the Western Yar valley could have some impact on tidal currents and sediment movements at the north-western end of this unit, but the tidal breach would be constrained on the south coast by the presence of high Chalk cliffs either side of the inlet.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			action. Cliff recession at approx. 0.86m/yr will occur, resulting in 17m of retreat over the next 20 years. *From Brook to Compton Chine:* Cliffs between 10-20m in height comprising both complex and simple cliff systems, sometimes forming 'terraced' undercliffs. Episodic failure of the strata is triggered by toe erosion and seepage erosion, with cliff retreat at approx. 0.58m/yr resulting in 12m of erosion over the next 20 years. *From Compton Chine to Freshwater:* Sea cliffs in Lower and Middle Chalk up to 70m in height at an angle of repose of 55-70^0, cut into the 125m high Afton Down behind. The cliffs adopt a simple linear form and fail mainly by rock falls of variable magnitude. The cliffs are fronted by variable accumulations of Chalk debris according to recent cliff-falls, exposed to wave attack. Retreat of the cliff top at Afton Down has created a problem for the A3055 road which has been supported within the cliff top in 2003 by in two sections by piles and ground anchors –however the cliff face will continue to erode slowly exposing the piles through the first epoch (0-20 years). Continued cliff recession will induce shallow slides within upslope head deposits that could affect sections of the main road and large tension cracks landward of the cliff top will be an indication of incipient large-scale toppling failures perhaps involving cliff top losses of 5-15m within single events. Average cliff retreat at 0.35m/yr will result in loss of 7m over the next 20 years.		
		Description of beach evolution	*From Chale to Compton Chine:* The soft cliffs will continue to supply large quantities of sediment (predominantly sand and clay) to the shoreline, transported to other areas. Significant sand and shingle beaches right along this frontage have migrated landward at the cliff toe as the coast is	Wave attack of the eroding and retreating cliffs will continue to supply essential sands and sediments to the shoreline and the south-eastwards sediment transport system. An unusual feature of this coastline is the	Increasing cliff recession rates and slumping will supply increasing amounts of sediments to the beaches and shorelines to the south-east. Relatively resistant headlands such as Atherfield Point and Hanover Point may become

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			eroded, exposing a widening dissipative shallow nearshore or gently sloping shore platform. The majority of the sediments delivered by cliff erosion are removed from the shoreline and will not provide protection against wave attack for the base of the cliffs. This frontage (the south-west coast of the Isle of Wight) is exposed to high wave energy, principally from the south-west (from the English Channel & Atlantic). This unit supplies the longshore drift sediment transport system south-eastwards, clockwise around the Isle of Wight, and is though to be essential to sediment supply on the beaches around the eastern coasts of the Island and beyond. Sediments are removed from the shoreline by wave action and may contribute to the nearshore bed and suspended sediments. From 2004 to Spring 2009 slight to moderate erosion has been recorded on the beach in Compton Bay. *From Compton Chine to Freshwater:* Rock falls from the Chalk cliff of Afton Down will release flint nodules, but otherwise most cliff erosion products will be removed in suspension by wave action. Flints released from the erosion of cliffs between Freshwater Bay and Compton Down are supplied to beaches downdrift to the south-east. A wide offshore zone in the north of Compton Bay helps dissipate wave energy but the Chalk yields very little sediment suitable for beach building, so that protection against breaking waves is slight.	key geological interest of the eroding cliffs, maintained by the ongoing erosion, cliff retreat and sediment movements on the beaches (particularly following storms) continually revealing fossils and dinosaur remains of unique scientific interest from the Wealden strata. Almost the entire south-west coast of the Isle of Wight is undefended, so the sediment supply and sediment transport system will evolve naturally (to the south of the sediment sub-cell divide at the Needles). The majority of sediment forming the beaches in this unit comes from local cliff erosion, rather than input from the north-west.	more pronounced with faster erosion in the bays between them. The coastal slopes of Compton Bay will be affected by increasing slope failures and cliff top retreat. The Afton Down cliffs will continue to supply small quantities of flints to the foreshore which may drift south-east into Compton Bay.
	With present management	*Short description of predicted defence failure*	No defences	No defences	No defences
		Description of cliff erosion/ reactivation	Cliff behaviour will be the same as the 'No Active Intervention' scenario above. Almost the entire south-west coast of the Isle of Wight is undefended, so the sediment supply	Cliff behaviour will be the same as the 'No Active Intervention' scenario above. Seawall maintenance within Freshwater Bay beyond the western end of this unit would	Cliff behaviour will be the same as the 'No Active Intervention' scenario above. Seawall maintenance within Freshwater Bay would prevent tidal currents altering

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			and sediment transport system will evolve naturally (to the south of the sediment sub-cell divide at the Needles).	prevent flooding and inundation of the Western Yar valley, maintaining the shape of the coastline and coastal currents in their current form.	at the western end of this unit.
		Description of beach evolution	See the 'No Active Intervention' scenario above.	See the 'No Active Intervention' scenario above.	See the 'No Active Intervention' scenario above.
IW41 ***Name: FRESHWATER BAY*** ***From: Central Freshwater Bay, to the limits of the coastal defences.***	**No Active Intervention**	*Short description of predicted defence failure*	Freshwater Bay is a small low-lying embayment flanked by high Chalk cliffs, with 309m of coastal defences in the centre of the Bay preventing breaching of the barrier behind the beach and averting risk of a tidal connection developing between the West Yar estuary and Freshwater Bay. Defences generally consist of a reinforced concrete bull-nosed seawall with steel sheet-piled toe. Sections of the wall will fail in 10-15 and 15-25 years time.	Any remaining sections of seawall will be increasingly outflanked by erosion from the seawall breaches and fail at the start of this epoch. For the majority of the epoch, there will be no defences.	No defences.
		Description of cliff erosion/ reactivation	Freshwater Bay is a small low-lying embayment surrounded by high Chalk cliffs, formed where coastal recession has truncated a narrow valley, and a seawall in the centre of the bay protects the flat land of the Western Yar Estuary behind. The Western Yar is effectively an estuary whose freshwater catchment has been destroyed by historic coastal erosion. Without flood protection works the river would be open to the sea at both ends, and there is the potential for large scale inundation of properties in the town of Freshwater behind from the north and south. With no further maintenance or intervention, the coastal defences at Freshwater are predicted to fail from year 10 onwards, allowing erosion to begin at approx. 0.35m/yr (up to 3.5m in this epoch following defence failure) through the narrow barrier behind.	By year 20 undermining and breach of the seawall is expected, which may allow occasional sea flooding of headwaters of Western Yar in storm conditions. From years 20-50 the remaining sections of seawall will have fail and erosion at approx. 0.46m/yr advance through the barrier behind (approx. 14m during this epoch, or 16.5m since year 1) which will breach the barrier and lead to regular marine inundation and potential undermining of adjacent valley-side properties and flooding of upper Western Yar valley. Roads behind the bay and areas along Afton Road and School Green Road will be at risk.	From years 50-100 ongoing sea level rise and tidal inundation has the potential to separate the western headland of Freshwater, Tennyson Down, Totland and Colwell (west of the Western Yar valley) as a separate island from the rest of the Isle of Wight.
		Description of beach evolution	A shingle beach has accumulated within Freshwater Bay, a medium to steep, storm beach of flint cobbles with massive chalky accretions at western end of the Bay. Swell waves approach this coastline with minimal refraction, creating a substantial reflective beach	A tidal breach will overtop and destabilise the beach at Freshwater Bay, encouraging lowering of beach levels and potential opening of a channel in front of any breach. It is uncertain whether a breach would seal	Marine inundation of the Western Yar valley linking Freshwater and Yarmouth will destabilise any areas of remaining beach cobbles around Freshwater Bay, although beach materials may still be supplied into the inlet from erosion of

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			that affords significant cliff toe erosion within the perimeter of the bay. However, a near-vertical cliff profile is likely to be maintained. The Strategic Monitoring Programme reveals that the western section of the beach has shown significant erosion from 2003-2009 while the eastern section has remained stable. Over years 0-20, gradual lowering of beach levels due to sea level rise and increased storminess may expose the seawall increasingly to wave attack and undermining, although adjacent cliff erosion to the west will supply some flints and cobbles into the embayment. The groynes in the bay have already reached the end of their life at the start of the epoch, which will encourage transport of material to the eastern end of the bay and further contribute to undermining of the walls	naturally, temporarily, or whether the whole Western Yar valley could flood to lead to regular tidal flows occurring between the West Solent and Freshwater Bay.	Tennyson Down cliffs.
	With present management	*Short description of predicted defence failure*	309m of seawall protecting the town of Freshwater and the upper reaches of the Western Yar from marine inundation would be maintained and replaced.	Seawalls protecting the town of Freshwater and the upper reaches of the Western Yar from marine inundation would be maintained and replaced. Overtopping, especially towards the end of the epoch, has the potential to weaken the structure and the narrow land barrier behind.	Seawalls protecting the town of Freshwater and the upper reaches of the Western Yar from marine inundation would be maintained and replaced. More frequent overtopping will occur, generating flood risk to the coastal road behind the defences and properties.
		Description of cliff erosion/ reactivation	With maintenance of the current defences at Freshwater Bay at their current standard of protection, the present beach configuration would be maintained and flooding of the Western Yar valley from the south would be prevented.	With maintenance of the current defences at Freshwater Bay, the present beach configuration would be maintained and significant flooding of the Western Yar valley from the south would be prevented. Flood risk due to overtopping or tidal inundation from the north could still remain.	This scenario would maintain the existing flood protection from Freshwater Bay, but the risk and frequency of flooding, especially overtopping, would increase with rising sea levels, as would the risk of tidal inundation from the north (from Yarmouth).
		Description of beach evolution	Maintenance of the seawalls is not expected to have a significant affect on existing coastal processes. Foreshore narrowing may begin to occur, but the width of the beach could be maintained due to the pronounced embayment of the Bay retaining flints and cobbles released from Chalk cliff erosion to the west.	Foreshore narrowing is likely to occur in front of the defences, but beach levels may be maintained by additional beach feeding from neighbouring cliff erosion within the perimeter of the bay and from Tennyson Down.	Foreshore narrowing or beach lowering may occur due to sea level rise and increasing storminess, although beach levels could be maintained by additional beach feeding from neighbouring cliff erosion.

Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
IW42 ***Name:*** **TENNYSON DOWN & THE NEEDLES** **The Chalk headland from Freshwater Bay to the southern edge of Alum Bay, including the Needles**	**No Active Intervention**	*Short description of predicted defence failure*	7.3km length of high, near vertical Chalk cliffs surrounding Tennyson Down which is open and undeveloped, including the Needles rocks at the western tip of the Isle of Wight. No defences. Fragments of masonry and concrete structures in the west of Freshwater Bay are not performing a significant coastal defence function.	No defences	No defences
		Description of cliff erosion/ reactivation	Very steeply northward dipping Chalk sea cliffs developed by erosion of the Purbeck–Needles–Culver Chalk ridge. The Chalk cliffs of the Tennyson Down headland (up to 147m high) exert an important control on wider shoreline evolution, forming the resistant western tip of the Isle of Wight and providing shelter from dominant south-westerly wave climate to the north-western coast of the Island from the Needles and Cliff End, and to the northern and southern shores of the Solent. The cliffs adopt a simple linear form and fail mainly by rock falls of variable magnitude following over-steepening of the profile by toe erosion. Flint nodule bands present within the cliffs are released by erosion, but otherwise most cliff erosion products are removed in suspension by wave action. Cliff recession will continue at an average of approx. 0.29m/yr over the next 20 years (resulting in up to 6m of cliff top retreat). Along Tennyson Down large tension cracks will continue to appear landward of the cliff top, indicative of incipient large-scale toppling failures perhaps involving cliff top losses of 5-15m within single events.	Cliff retreat will continue, at approx. 0.38m/yr, causing a further 11m of cliff retreat over thirty years, or 17m in total since year 1. The recession process will be episodic with major cliff falls and long intervening periods of little activity. Erosion follows a cycle of basal undercutting, localised cliff falls that generate temporary accumulations of scree at the cliff toe, sub-aerial weathering whilst marine erosion removes the debris at the toe, allowing further undercutting to begin.	Episodic cliff retreat will take place at up to approx. 0.44m/yr then 0.48m/yr, as sea level rise attacks the base of the unprotected Chalk cliffs. Recession of approx. 23m over fifty years is anticipated, or 40m in total since year 1.
		Description of beach evolution	The narrow shoreline has a rocky foreshore with flint cobbles, with semi- continuous feed from fresh Chalk cliff fall debris, which will continue in future epochs. The cliffs are fronted by variable accumulations of Chalk debris according to recent cliff-falls and generally descend directly to deep water (without a significant shore platform),	Sediment supply from fresh Chalk cliff fall debris will continue and increase, supplying flints and gravels to the beaches of Scratchell's Bay, .Freshwater Bay and Alum Bay.	Sediment supply from fresh Chalk cliff fall debris is likely to increase as sea level rise and wave attack at the cliff base increases the rate of undermining and erosion of the cliffs. Retreat of the headland may create new

Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			with high energy wave attack on the southern face allowing break-down of cliff fall debris more rapidly than on the northern face. The Needles marks a key sediment divide with sediment transport moving north-east and south-east along this peninsula to the northern and southern coasts of the Isle of Wight. Therefore there are no adjacent units which influence the episodic cliff retreat characterising this unit in future epochs. The cliffs on the south side of Tennyson Down and West High Down will continue to supply small quantities of flints to the foreshore of Scratchell's Bay where an inaccessible shingle beach has accumulated, and some of which may enter Freshwater Bay or Compton Bay to the west. Erosion of flints from the northern side of the headland will supply small quantities of flints which are the main input of fresh gravels to Alum Bay beach (in the unit to the north). The headland controls the direction of tidal flows exiting from Hurst Narrows such that it influences the configuration of seaward parts of the Shingles Bank.		'Needles' stacks, as some of the previous stacks erode and topple, leaving a sequence of the base of former sea stacks just underwater (a hazard to shipping).
	With present management	*Short description of predicted defence failure*	No defences	No defences	No defences
		Description of cliff erosion/ reactivation	See 'No Active Intervention' scenario above. The Needles marks a key sediment divide with sediment transport moving north-east and south-east along this peninsula to the northern and southern coasts of the Isle of Wight. Therefore there are no adjacent units which can influence the episodic cliff retreat characterising this unit.	See 'No Active Intervention' scenario above.	See 'No Active Intervention' scenario above.
		Description of beach	See 'No Active Intervention' scenario above.	See 'No Active Intervention' scenario above.	See 'No Active Intervention' scenario above.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
		evolution			
IW43 ***Name: ALUM BAY*** **Alum Bay beach, backed by cliffs**	**No Active Intervention**	*Short description of predicted defence failure*	No defences occur along this 559m length of naturally evolving cliffs, with the exception of two small structures -a concrete and sheet-piled structure at the base of the Chairlift and some limited rock armour at the base of timber access steps, both of which will fail during this first epoch.	No defences	No defences
		Description of cliff erosion/ reactivation	Alum Bay is a west-facing bay cut into soft Palaeocene and Eocene sand and clay sediments. The geological strata dip steeply northward and overlie the older Chalk. Composed of interbedded cycles of clay, silt and sand the 60m high cliffs form generally steep profiles that erode readily by rock fall, gullying, translational slides and occasionally mudsliding (immediately north of the Chalk. The extremely limited outcrops and rapid variations create the famous multi-coloured cliffs and sands of Alum Bay, giving rise to the holiday park located on the cliff top. Over the next 20 years, increased marine erosion and cliff face weathering is likely to cause cliff retreat at approx. 0.35m/yr (or 7m in total).	Cliff retreat will continue, at an average of approx. 0.46m/yr, although local variation will occur through the steeply dipping clay silt and sand cliffs, as adjacent failing units undermine each other.	Erosion will continue and increase to rates of approx. 0.53m/yr then 0.58m/yr, creating cliff top retreat of approx. 27m between years 50-100, or 48m in total since year 1.
		Description of beach evolution	A steep and relatively narrow shingle beach provides partial protection at the cliff toe. Flint nodules within the Chalk cliffs to the west will be released by erosion and supplied to the beach in Alum Bay. Alum Bay, Totland Bay and Colwell Bay to the North each behaves as a relatively independent pocket beach, principally fed by sediment inputs from erosion of the local cliffs. Sands, clays and occasional grit and pebble horizons are supplied to the foreshore by cliff falls, flows and mudslide, but much of the material yielded is too fine to remain on beaches and is transported seaward. Limited littoral drift is to the north, towards Headon Warren and Totland Bay, although foreshores linking the bays are rocky.	Significant sediments will be released by erosion and retreat of the cliffs, although increased beach steepening of the rocky shore is likely to occur.	Active cliff erosion will increase sediment supply to the local beach, and increase flint sediment inputs from the short section of eroding Chalk to the west.
	With present	*Short*	No defences occur along this 559m length of	No defences	No defences

Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
	management	*description of predicted defence failure*	naturally evolving cliffs, with the exception of two small structures -a concrete and sheet-piled structure at the base of the Chairlift and some limited rock armour at the base of timber access steps, both of which will fail during this first epoch. These structures are provided for access and do not play a significant role in coastal protection, therefore their future maintenance cannot be assumed.	No defences	No defences
		Description of cliff erosion/ reactivation	See 'No active intervention' scenario above.	See 'No active intervention' scenario above.	See 'No active intervention' scenario above.
		Description of beach evolution	See 'No active intervention' scenario above.	See 'No active intervention' scenario above.	See 'No active intervention' scenario above.
IW44 ***Name:*** **HEADON WARREN** **From: Alum Bay (northern edge)** **To: south of Widdick Chine, Totland Bay**	**No Active Intervention**	*Short description of predicted defence failure*	No defences along this 1954m frontage of active and undeveloped coastal slopes.	No defences	No defences
		Description of cliff erosion/ reactivation	Northward of Alum Bay, at Headon Warren, the topography rises considerably to a headland of 120m fronted by a series of complex landslips and partially active scarps forming coastal slopes within a near-horizontal interbedded sequence of clays, sands and thin limestones, facing west and northwards. The cliff toe is sensitive to marine erosion and overall recession rates can be rapid. A wide multiple bench and scarp morphology has developed and failures occur both by mudsliding over the benches and periodic deep-seated failures of backing scarps. The soft limestones are of significance as they break down into boulders that afford some short-term protection to the cliff toes and have resulted in emergence of Hatherwood Point as a local headland. Retreat events are episodic and are interspersed between prolonged inactive periods at the cliff	Marine erosion will continue to cause toe erosion of the coastal slopes at approx. 0.46m/yr, which together with cliff face weathering will promote conditions of instability, therefore the cliffs will continue to erode episodically through landsliding behaviour. Retreat of 14m is likely to occur during this epoch, or 21m in total since year 1. Cliff top retreat at the southern edge of Totland (at the northern boundary of this unit) is likely to endanger cliff top properties –see the unit below for more information.	At Headon Warren the upper cliff will become subject to re-activation of landsliding in the longer-term future. This could potentially occur at some point within the next century, although debris material from previous failures will provide a degree of protection at the cliff toe. Erosion will continue at a rate of approx. 0.53m/yr followed by 0.58m/yr, causing coastal retreat of approx. 27m during this fifty year epoch, or approx. 48m in total over 100 years. Cliff top retreat at the southern edge of Totland (at the northern boundary of this unit) is likely to endanger cliff top properties –see the unit below for more information.

Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			top, during which detached blocks are transported down to the shore on the lower sloped. Episodic seaward movement of landslide lobes can temporarily advance the shoreline. Coastal retreat at an average of 0.35m/yr is anticipated (or a total of 7m retreat over 20 years).		
		Description of beach evolution	A wide range of sediment grades will be supplied to the shore by coastal slope failure, although fine sands, silts and clays are susceptible to rapid suspended transport offshore. Limited coarse sands and gravels contribute to beach volume. Limestone boulder aprons at the shoreline significantly will interfere with drift, although some sands and gravels drift north-eastwards into Totland Bay.	The narrow, rocky shore will continue to be supplied by local erosion and increasing slumping of the coastal slopes. The unconstrained shoreline will continue to evolve naturally.	Sea level rise may result in gradual narrowing of the rocky foreshore, although larger scale activation of slumping and landsliding is likely to increase sediment supply to the shore periodically. Episodic seaward movement of landslide lobes may temporarily advance the shoreline and interrupt the limited sediment transport to the north-east.
	With present management	*Short description of predicted defence failure*	No defences	No defences	No defences
		Description of cliff erosion/ reactivation	See 'No Active Intervention' scenario above.	See 'No Active Intervention' scenario above.	See 'No Active Intervention' scenario above.
		Description of beach evolution	See 'No Active Intervention' scenario above.	See 'No Active Intervention' scenario above.	See 'No Active Intervention' scenario above.
IW45 ***Name:*** **TOTLAND & COLWELL** **From:** **Totland Bay (from south**	**No Active Intervention**	*Short description of predicted defence failure*	1973m of seawalls, promenades and cliff drainage schemes help to stabilise the reactivating developed coastal cliffs in Totland Bay and southern Colwell Bay. The solid defences commence at Widdick Chine, Totland, and extend northwards continuously into Colwell Bay. The defences comprise sequence of concrete seawalls with steel sheet-piled toes, often with wave return and stepped concrete	Any sections of seawall remaining between the breaches will fail at the start of this epoch, after which time, the frontage will be undefended.	No defences

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
of Widdick Chine) **To:** **Colwell Bay (Sea View Road)**			apron. Residual life of the seawalls along the frontage is often 15-25 years, but in central Totland Bay there are sections which are showing cracking and rapid deterioration which may fail in as little as 5-7 years and 10-15 years. Timber groynes will provide some additional protection along the frontage for 8-12 years or 10-20 years, dependent on condition. North of Totland Pier to Warden Point a small area of rock groynes and some rock armouring are present (residual life 15-25 years). The northernmost defences in Colwell Bay comprise a timber boarded breastwork with rock fill behind and limestone/gravel infill providing support to the base of the coastal slope (residual life 15-25 years).		
		Description of cliff erosion/ reactivation	Totland Bay and Colwell Bay are two north-eastward facing embayments backed by eroding soft rock cliffs and occupied by narrow pocket beaches of sand and shingle. The cliff line comprises partially vegetated cliffs of weak sands and clays, some of which are characterised by hydrogeologically-driven slumping failures; the cliff height reduces from 30m-25m in Totland Bay to 5m towards central Colwell. Warden Point, a local headland that is defined by the presence of resistant limestone foreshore reefs, separates the bays. The cliffs of Totland and southern Colwell Bays presently form relatively steep, partly vegetated slopes following protection of their toes by defences. Although the intention has been to stabilise the cliffs, in many places this has not been achieved fully because significant landsliding has occurred within the slopes above the seawalls, resulting in some cliff top recession, which will be subject to rapid retreat after the seawalls fail in 15-25 years, and some sections will be exposed when sections of the seawall within Totland Bay continue to	Complete destruction of the remaining sections of seawall along this frontage at the start of the epoch will result in reactivation of cliff instability and undermining of the weak sand and clay cliffs along the whole frontage. The erosion rates of approx. 0.76m/yr during this epoch continue retreat at the cliff top, assuming the form of the cliffs remains similar. The undefended coastal cliffs in northern Colwell Bay provide a useful example of the behaviour that can be anticipated. Further cliff recession of 23m is therefore likely to occur during this thirty year epoch from 20-50 years, resulting in 26m to 32m of erosion in total since year 1. Cliff recession will pose risks to cliff top development, particularly in the south of the bay near the limit of the coastal defences.	Complete reactivation of coastal slopes with episodic landsliding and ongoing retreat of the sea cliff line into developed cliff top frontages. Cliff top properties will be affected during this epoch. Retreat rates of approx. 0.88m/yr then 0.96m/yr will result in approx. 46m of erosion from 50-100 years, or approx. 72-78m in total over 100 years.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			deteriorate and may fail in 5-7 years and 10-15 years. Prior to seawall failure, slumps will occur onto the seawall. Following seawall breach, erosion at 0.58m/yr will lead to between 3m and 9m of coastal retreat over the next 20 years dependent on when the different sections of seawall fail. By the end of epoch 1 or early in epoch 2 any stabilised cliff foot sediments will be lost and there will be a reversion to 'natural' cliff line retreat and reactivation of cliff instability providing sediment input.		
		Description of beach evolution	Gently sloping sandy (and in parts clay) foreshore. Beaches have suffered losses of sediment and lowering and narrowing over the past century, and deep water often extends to the toes of the seawalls. The Strategic Monitoring Programme records that in the shorter term, from 2004-2009, the beaches in this unit are generally stable or accreting, although there is erosion in the centre of Totland Bay (south of the Pier). Through the first epoch the frontage will be characterised by a gradual steepening in beach levels leading to increased exposure of the sheet-piled toes to the seawalls along this frontage. There will be no direct sediment inputs into this frontage whilst the seawalls remain. Once erosion commences after seawall breech and failure, additional sediment input may benefit adjacent areas. Totland Bay and Colwell Bay behaves as a relatively independent pocket beaches, principally fed by sediment inputs from erosion of the local cliffs, with some sediment feed from Headon Warren to Totland Bay. Much of the material yielded is too fine to remain on beaches and is transported seaward. Limited littoral drift is to the north.	Toe erosion of the exposed cliffs will promote conditions of instability, exacerbated by generally declining beach levels. Increases in sediment supply to the foreshore will result, but this is unlikely to enhance beach volumes significantly because most of the cliff materials are sand and clay and mechanisms exist for rapid removal seaward of these sediment grades.	Increasing rates of cliff retreat will supply increasing quantities of sediments to the shore as sea level rises, although this may not be sufficient to counter trends of declining beach levels.
	With present management	*Short description*	The seawalls, groynes and slope drainage will be maintained and rebuilt at their current standards.	The defences will continue to be maintained and rebuilt.	The defences will continue to be maintained and rebuilt at a similar

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
		of predicted defence failure			standard, although are likely to be insufficient to prevent cliff slumping and reactivation.
		Description of cliff erosion/ reactivation	Maintenance and replacement of the seawalls and defences will prevent widespread erosion and reactivation of the cliff line. Smaller scale slumps will occasionally deposit material from the cliff onto the seawall and beach. At the southern end of the unit, ongoing erosion and undefended cliff retreat over the next twenty years is likely to cause retreat of approx. 7m retreat adjacent to the line of the maintained defences. At the northern end of the unit, coastal retreat of approx. 12m will occur over the next twenty years, offsetting the coastline from the defended to undefended coast.	Widespread reactivation of the cliff line will be prevented, but the cliffs will become increasingly vulnerable to slumping and some areas of reactivation may occur. Overtopping of the seawall is likely to become more frequent towards the end of the epoch. With present management practices continuing, the defences will reduce the frequency of landsliding events within the backing sea cliffs, but are unlikely to completely eliminate instability where high groundwater levels are a factor. Periodic slope failures will therefore still occur. The fronting beaches will continue to narrow along defended frontages resulting in increasing exposure of defences to wave energy. In combination, these potentially increasing stresses from landward and seaward could significantly reduce stability of the structural defences and consequently trigger further landslides within the sea cliffs, leading to cliff top retreat and increasing damage to the structures. It is likely that shoreline stability cannot be sustained at these locations with current management practices so that significantly improved defences or an alternative management approach would be required in the short to medium term (20 to 50 years). At the southern end of the defences continued cliff retreat of a further approx. 14m is likely to occur (approx. 21m in total since year 1). Coastal slope failure will place properties at risk at the southern limit of the current defence line.	Cliff toe erosion and widespread reactivation of the cliff line will be minimised by the seawall and defences, but increasing winter rainfall and frequent overtopping of the seawalls will have an increasingly adverse impact on cliff stability. At the southern end of the defences continued cliff retreat of a further approx. 27m is likely to occur (approx. 48m in total since year 1). Coastal slope failure is likely to affect cliff top properties. At the northern end of the unit, coastal retreat of a further approx. 46m will increase the offset of the coastline to a total of approx. 80m from the defended to undefended coast.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
				At the northern end of the unit, coastal retreat of a further approx. 23m will increase the offset of the coastline to a total of approx. 34m from the defended to undefended coast.	
		Description of beach evolution	If defences are maintained, there will no freely eroding cliffs along the frontage and no direct sediment inputs to the beaches (with the exception of minor slumps of the coastal slope, which would not provide any significant sediment input). The rate of sediment movement northwards along this frontage is very slow. Continuing to 'hold the line' will not change the existing situation. Low beach levels and foreshore narrowing are likely. This frontage will benefit from small sediment inputs from the south-west, but sediment transport will be hindered by groynes and may be prevented completely by Warden Point.	The fronting beaches will continue to narrow along defended frontages resulting in increasing exposure of defences to wave energy.	Foreshore narrowing will continue in front of the defences and low beach levels expose the weakened defences. This frontage may benefit from increased sediment inputs derived from slope failure along Headon Warren to the south-west, but sediment transport will be hindered by groynes and may be prevented completely by Warden Point.
IW46 ***Name:*** **CENTRAL COLWELL BAY** **From: Colwell (Sea View Road)** **To: the southern end of Fort Albert coastal**	**No Active Intervention**	*Short description of predicted defence failure*	757m frontage which is generally undefended, with some development along the cliff top. A field of timber groynes with rock stubs have now been rendered ineffective through cliff retreat.	No defences	No defences
		Description of cliff erosion/ reactivation	Colwell Bay is characterised by eroding low clay cliffs (15-25m) showing consistently rapid retreat. Coastal slopes in clays and sands at 20-30^0 are prone to slumping and shallow slides. The unprotected cliffs of central and northern Colwell Bay are composed of soft permeable strata overlying impermeable clays in a classic landslide-generating sequence. Rapid seepage erosion, simple landslides and occasional deeper-seated failures are the main recession mechanisms. A wider degradation zone and	Ongoing recession of the soft cliffs will affect cliff top developments. Further cliff recession of 23m is likely to occur during this thirty year epoch from 20-50 years, resulting in 34m of erosion in total since year 1.	Rates of coastal retreat will increase due to the impact of sea level rise and wave attack. Retreat rates of approx. 0.88m/yr then 0.96m/yr will result in approx. 46m of erosion from 50-100 years, or approx. 80m in total over 100 years. Loss of the headland protection of Fort Albert in the unit to the north would increase erosion in Colwell Bay.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
defences			increased propensity for mudsliding is evident closer to Fort Albert. **T**he presently active cliffs will continue to erode rapidly, at an average rate of approx. 0.58m/yr, resulting in 12m of cliff retreat over the next 20 years. Episodes and areas of even faster retreat may also occur.		
		Description of beach evolution	Gently sloping sandy beach is backed by eroding cliffs. Colwell Bays behaves as a relatively independent pocket beach, receiving sediment inputs from erosion of the local cliffs within the bay. Much of the material yielded is too fine to remain on beaches and is transported seaward. Beaches have suffered losses of sediment and lowering and narrowing over the past century, although the Strategic Monitoring Programme records that from 2004-2009 the beaches in this unit are generally stable. The presently active cliffs will continue to erode rapidly resulting in ongoing sediment supply to the foreshore, but this is unlikely to enhance beach volumes significantly because most of the cliff materials are sand and clay and mechanisms exist for rapid removal seaward of these sediment grades.	Local cliff retreat will continue to input fine sediments to the beach, but beach levels may still fall, reinforcing wave attack and cliff retreat. Sediment supplies from the renewal of erosion and retreat of the cliffs of Totland Bay and southern Colwell Bay (in the unit to the south) is likely to supplement local sediment input.	Increased sediment supply from local cliff recession will continue to input fine sediments to the beach, but beach levels could still fall if the majority of sediments are lost offshore, or due to the impact of sea level rise. Increased sediment supplies from the erosion and retreat of the cliffs of Totland Bay and southern Colwell Bay (in the unit to the south) will supplement local sediment input and supply beach materials.
	With present management	*Short description of predicted defence failure*	Undefended retreating cliff, fronted by several timber groynes currently detached from the cliff toe. These structures are redundant; therefore present management is essentially the same as the 'No Active Intervention' scenario.	No defences	No defences.
		Description of cliff erosion/ reactivation	The frontage will continue to evolve as outlined in the 'No Active Intervention' scenario outlined above. **T**he presently active cliffs will continue to erode rapidly, at an average rate of approx. 0.58m/yr, resulting in 12m of cliff retreat over the next 20 years. Episodes and areas of even faster retreat may also occur. The cliffs along this frontage may also erode more rapidly as they will be	Ongoing recession of the soft cliffs will affect cliff top developments. Further cliff recession of 23m is likely to occur during this thirty year epoch from 20-50 years, resulting in 34m of erosion in total since year 1. At the southern and northern ends of the unit, coastal retreat will increase outflanking of the adjoining defences to a total of	Rates of coastal retreat will increase due to the impact of sea level rise and wave attack. Retreat rates of approx. 0.88m/yr then 0.96m/yr will result in approx. 46m of erosion from 50-100 years, or approx. 80m in total over 100 years. At the southern and northern ends of this unit, further coastal retreat of up to 46m will increase the outflanking of adjacent

Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	**Years 20-50 (to approx. 2055)**	**Years 50-100 (to approx. 2105)**
			further starved of sediments due to maintenance of the updrift defences in Totland and particularly in southern Colwell Bay. The enhanced sediment supply arising from erosion of the cliffs within this unit would only partly enhance beach volumes because most of the cliff materials are sand and clay and mechanisms exist for rapid removal seaward of these sediment grades. At the southern and northern limits of the unit, coastal retreat of approx. 12m over the next twenty years will offset the coastline and outflank the adjoining seawall and rock revetment.	approx. 34m.	defences to a total of approx. 80m.
		Description of beach evolution	The presently active cliffs will continue to erode rapidly resulting in ongoing sediment supply to the foreshore, but this is unlikely to enhance beach volumes significantly because most of the cliff materials are sand and clay and mechanisms exist for rapid removal seaward of these sediment grades.	Local cliff retreat will continue to input fine sediments to the beach, but beach levels may still fall, reinforcing wave attack and cliff retreat. Continued maintenance of the seawalls in Totland and Colwell Bay to the south will prevent erosion and littoral drift input of sediment into this frontage.	Increased sediment supply from local cliff recession will continue to input fine sediments to the beach, but beach levels could still fall if the majority of sediments are lost offshore, or due to the impact of sea level rise. Continued maintenance and replacement of the seawalls in Totland and Colwell Bay to the south will prevent erosion and littoral drift input of sediment into this frontage.
IW47 ***Name:* FORT ALBERT** **From: southern to northern end of coastal defences around Fort Albert (Cliff End)**	**No Active Intervention**	*Short description of predicted defence failure*	Fort Albert at Cliff End (at the northern end of Colwell Bay) is an 809m defended frontage between two undefended units, protecting a prominent and distinctive headland characterised by residential development at the top and base of the weak coastal cliffs. An access road slopes steeply down the 25m high coastal slopes. Fort Albert is protected by lengths of (from south to north): masonry seawall (5-7 year residual life), rock armour (15-25 years residual life), steel sheet piling around the Fort itself (26-60 years residual life) and concrete seawall in the north (10-15 years residual life). Although the majority of defences will fail towards the end of the first epoch, the steel and concrete walls around the Fort itself are in a good condition and will remain for approx. into epoch 2. Sections of the cliffs at Fort Albert have been artificially drained.	The concrete structure of Fort Albert could fail early in this epoch (with no further maintenance).	No defences.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
		Description of cliff erosion/ reactivation	Fort Albert (Grade II* Listed Building) was built in 1856 and is located on the end of a promontory, and has now been converted into apartments. Coastal slopes in clays and sands at 20-30^0 are prone to slumping and shallow slides. Just to the south of Fort Albert frontage, a wider degradation zone and increased propensity for mudsliding occurs in the northern Colwell Bay cliffs. In this epoch there will be a gradual deterioration in the condition of the seawalls and steel sheet-piled defences leaving rock armour as the only form of protection later in the epoch, although Fort Albert itself is unlikely to be affected during this epoch. This will expose the shoreline and subsequently the foot of the coastal slopes to erosion at a rate of 0.58m/yr, resulting in approx. 3m to 9m of erosion in the first epoch, dependent on when the defences failed.	These processes will continue with the complete break-up of the remaining sections of seawall, promoted by wave attack and by undermining of the sheet-piled toe, with displacement of much of the rock armourstone, and potential loss of the Fort itself. Collapse of the walls and reversion to a natural soft cliff would be a major change, with potential destabilisation of the coastal slope and impacts on the adjacent coastline to the north and south which, to a degree, have been controlled by this prominent headland. Erosion of the foot of the coastal slopes will continue at approx. 0.76m/yr during this epoch, with further cliff recession of approx. 23m likely to occur during this thirty year epoch from 20-60 years (or 26m to 32m of erosion in total since year 1). Fort Albert itself could be affected from year 26 onwards when erosion could begin, but the structure may last into the third epoch.	Areas of the cliff top properties near the margins of the former defences would be at risk first over 100 years, due to the retreat of the top of the cliff as the cliff maintains its slope while its toe erodes, and erosion encroaches in from the undefended coast to the north and south. Erosion at approx. 0.88m/yr then 0.96m/yr will cause a further retreat of approx. 46m over years 50-100 (up to 78m over 100 years). Loss of the headland protection of Fort Albert would increase erosion in Colwell Bay.
		Description of beach evolution	Gently sloping sandy beach. The Strategic Monitoring Programme records that from 2004-2009 the beach to the south of the Fort Albert defences is relatively stable whilst the beach to the north of the Fort (in front of the seawall) has shown significant erosion, although shorter term variability also occurs. The north of the Fort is likely to see beach lowering and gradual exposure of the piled toe before the defences fail. Breaches in the seawall will begin to supply impounded sediment into the short frontage.	Failure of the defences and erosion of the stabilised platform at the base of the cliff, followed by cliff foot erosion, will supply some beach sediments into this unit, although these may be lost offshore and into the adjacent unit by weak northwards drift.	Cliff erosion will supply sediments to the local shoreline, but may not be sufficient to retain an effective beach. The base of the cliff is likely to be subject to wave attack.
	With present management	*Short description of predicted defence failure*	The 809m defended frontage around Fort Albert will be maintained, with seawalls and rock revetment repaired and replaced at a similar standard to at present.	Defences will be maintained and replaced, but are likely to be exposed by low beach levels.	Defences will be maintained and replaced, but will become increasingly vulnerable to sea level rise.
		Description	Maintenance of the seawalls and defences will	Cliff toe erosion will be prevented and will	Cliff toe erosion will be prevented but the

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
		of cliff erosion/ reactivation	preserve the distinctive headland of Fort Albert and prevent active cliff toe erosion. Slumps of the weak cliffs are likely to occur behind the rock revetment in the south. Outflanking will occur at the southern and northern margins of the defences where erosion continues and the cliff lines begin to increasingly curve back away from the cliff toe defences (these zones already mark transitions to a more active coastal slope). Outflanking of up to approx. 12m is anticipated to the south, and approx. 7m in the north.	minimise but may not eliminate further slumps and reactivations within the soft rock coastal slopes behind the defences. Outflanking will increase at the southern and northern margins of the defences, where continued erosion will begin to cut back into the margins of the coastal slopes behind the defences as the adjacent coastal slopes are increasingly active. Outflanking of a further approx. 23m in the south during this epoch would take the total setback there to approx. 34m, and an additional 14m in the north would take the total step back there to approximately 21m.	coastal slope may destabilise due to encroaching coastal slope erosion from the north and south and increased winter rainfall raising ground water levels. Outflanking will increase at the southern and northern margins of the defences, where continued erosion will increasingly cut back into the margins of the coastal slopes behind the defences. Erosion of a further approx. 46m in the south during this epoch would take the total setback there to approx. 80m, and an additional 27m in the north would take the total step back there to approximately 48m.
		Description of beach evolution	Foreshore narrowing and lowering in front of the defences would be expected to continue. The frontage will be reliant on sediment supply from the eroding cliffs of Colwell Bay in the unit to the south. Weak littoral drift to the north-east occurs.	Foreshore narrowing and lowering in front of the defences will continue. Low beach levels will increase the vulnerability and exposure of the seawalls and revetment, which may also be vulnerable to episodes of overtopping. The frontage would be reliant on sediment supply from the eroding cliffs of Colwell Bay in the unit to the south, and the seawalls maintained in the south of Colwell Bay will prevent additional sediment supply during this epoch.	Foreshore narrowing and lowering in front of the defences would be expected to continue. Sea level rise, low beach levels, declining slope stability due to winter rainfall, adjacent erosion destabilising the coast slopes, more frequent wave attack and overtopping of the defences may trigger slope failures and supply limited quantities of sediment to the shore, but the principal control on the shoreline will be the sediment supply from Colwell Bay to the south and the offset caused by outflanking, which may trap potential sediment supply into the unit.
IW48 ***Name:* FORT VICTORIA COUNTRY PARK** **From: northern end of Fort Albert coastal**	**No Active Intervention**	*Short description of predicted defence failure*	No defences. 742m length of undefended wooded and undeveloped coastal cliff and coastal slopes.	No defences	No defences
		Description of cliff erosion/ reactivation	Coastal slopes in clays and sands at 20-30^{0} prone to slumping and shallow slides, rising to a 38m low headland inland of the frontage. Eroding soft rock cliffs and foreshore debris lobes are continuous from Fort Albert to Fort Victoria. The clayey materials of the cliffs degrade by mudsliding and simple translational slides, creating a shallow actively retreating	In some areas the soft clays at the cliff toe appear to be eroded faster than the rate of supply of material from mudslides, thus lower slopes can be oversteepened and controlled by shallow failures. Aggressive toe erosion is leading to progressive reactivation of relict landslides upslope, so that the scale of landsliding is likely to	Increased rates of erosion, slope failure and retreat will occur, at approx. 0.53m/yr then 0.58m/yr, leading to a further 27m of retreat during this epoch (or approx. 48m coastal retreat in total over 100 years). North of Fort Albert extensive reactivation of the coastal slope can be expected

Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
defences **To: Fort Victoria**			coastal slope. The cliffs between Fort Albert and Fort Victoria (Sconce Point) will continue to recede through mudsliding and toe erosion, with trees slumping forward onto the foreshore on the beach south of Fort Victoria. Erosion at an average of approx. 0.35m/yr will cause 7m of coastal retreat over the next 20 years.	increase in future as the full slope becomes active. Coastal erosion at approx. 0.46m/yr will lead to a further 14m of retreat during this epoch, or 21m in total since year 1.	promoting rapid cliff retreat.
		Description of beach evolution	Gently sloping sandy beach with scatterings of small boulders. The Strategic Monitoring Programme records that from 2003-2009 the beach to the south of Fort Victoria has shown areas of accretion and erosion, with no overall dominant trend. Input of sediment from active cliff erosion along this frontage during this epoch will supply predominantly clays with some sands and soft limestones to the shoreline, with small quantities of gravel. Strong tidal currents are effective in removing clayey debris that accumulates at the cliff toe with fresh material largely from being transported offshore in suspension. This coast is more sheltered from wave erosion than areas to the west, but is swept by rapid tidal currents of Hurst Narrows so relatively little beach material will accumulate. Sediment drift operates from west to east, but is weak due to limited fetches and shortages of shoreline sediments. Small to moderate quantities of fine sediments yielded by erosion of cliffs between Cliff End and Sconce Point are likely to be transported eastwards in suspension and potentially be available for transport into the Western Yar estuary.	Input of sediment from active cliff erosion during this epoch is expected to increase as erosion rates increase cliff stability declines. Fine sediments will be transported offshore or transferred north-eastwards, although some debris from cliff failures will contribute to local beach levels.	Input of sediment from active cliff erosion during this epoch is expected to increase through this epoch as the coastal slopes destabilise and cliff toe erosion triggers more frequent failures. Fine sediments will be transported offshore or transferred north-eastwards, although some debris from cliff failures will contribute to local beach levels.
	With present management	*Short description of predicted defence failure*	No defences	No defences	No defences

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
		Description of cliff erosion/ reactivation	With present management practices continuing, the cliff behaviour described above under the 'No Active Intervention' scenario above will continue to occur. During this epoch approx. 7m of retreat adjacent to the defended coastal cliff at Fort Albert at the southern limit of the frontage will increase offset of the cliff top and cliff toe. At the northern limit of the unit the transition from undefended to defended coast at Fort Victoria is on flat grassy ground and a short stretch of timber structures provides some transition the hard defences, but the current offset of approx. 5m at the southern end of the hard seawall and defences may increase by 7m to approx. 12m by the end of this epoch.	See 'No active intervention' scenario above. Outflanking or offset of the cliff top and cliff toe at fort Albert will increase by approx. 14m during this epoch to 21m in total, creating a curved cliff profile linking the defended and undefended sections. At Fort Victoria, outflanking a further 14m may occur, increasing the step-back of the low coast to approx. 26m.	See 'No active intervention' scenario above. Outflanking or offset of the cliff top and cliff toe at fort Albert will increase by approx. 27m during this epoch to 48m in total, as erosion encroaches from the north of the adjacent defended frontage. At Fort Victoria, outflanking a further 27m may occur, increasing the step-back of the low coast to approx. 53m.
		Description of beach evolution	See 'No active intervention' scenario above. Due to the weak north-easterly drift, the majority of sediment along this frontage will derive from local cliff erosion and slope retreat within the unit, therefore will be largely unaffected by the seawalls maintained to the south-east.	See 'No active intervention' scenario above. Maintaining the promontory of Fort Albert will reduce additional sediment that may have been supplied into this unit during this epoch as the stabilised coast reactivated and small quantities of impounded sediment were released, but locally derived sediment will supply the beaches.	See 'No active intervention' scenario above.
IW49 ***Name:* FORT VICTORIA & NORTON** **From: Western edge of Fort Victoria** **To: Norton Spit**	**No Active Intervention**	*Short description of predicted defence failure*	1088m frontage backed by a ribbon of development and local coastal access road through gentle wooded coastal slopes, lower in profile than the unit to the south-west. A patchwork of ageing defences and short groynes are present along the majority of the shoreline. In summary, at the southern limit, low timber breastwork will fail in 5-7 years, and moving north-eastwards around Sconce Point a series of continuous concrete and masonry seawalls will fail in approximately 5-7 years or 15-25 years. Moving east a short undefended section is protected by a shingle ridge, giving way to rock-filled gabions with short residual lives (some as	Remaining sections of un-maintained seawall will fail at the start of this epoch, leaving the frontage undefended and exposed to erosion.	No defences.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			little as 1-3 years). These rock structures front the most vulnerable section of the adjacent local coastal access road and ground movement in the gentle slopes is affecting the road surface. A more robust seawall fronts Norton Grange, with a residual life of 15-25 years. Destruction of groynes is anticipated throughout the frontage		
		Description of cliff erosion/ reactivation	Fort Victoria is an L-shaped defensive structure which marks a relatively abrupt change in coastal orientation from north-eastwards to eastwards towards Yarmouth. In the west the coastline is flat and grassy, giving way to the east to a shallow coastal slope in clays where much of the frontage is heavily wooded. Further east the land is low lying and gives way to a dune frontage at Norton Spit. As the coastal defences deteriorate and collapse over the next 20 years due to wave attack and undermining, erosion at approx. 0.35m/yr will be triggered in the breaches, with up to 5m of erosion occurring at the first locations of defence failure, with the majority of the frontage exposed to erosion by the end of the epoch, or soon after. In the adjacent unit to the east, a breakwater has been built eastward from the tip of Norton Spit to protect Yarmouth Harbour and the Western Yar estuary entrance.	From Sconce Point to Norton continuing foreshore erosion may in the long term cut into the relict coastal slope eventually triggering formation of low eroding cliffs over 30 to 50 years. This process is likely to be slow due to the low wave energy. Erosion at 0.46m/yr will cause coastal retreat of approx. 14m during this epoch, or up to 19 since year 1, resulting in the erosion of property and recreation beach, and further destabilising the local access road.	Continued erosion is likely to trigger some slope movements with erosion rates of approx. 0.53m/yr then 0.58m/yr resulting in an additional 27m of coastal retreat affecting additional properties (or retreat of approx. 46m in total over 100 years).
		Description of beach evolution	A narrow sand and shingle foreshore is exposed during mean low water in front of the coastal defences. A relatively wide shingle beach exists towards Norton, with deeper water fronting the Norton Grange seawall to the east. The Strategic Monitoring Programme records that the beaches around Fort Victoria have been stable overall from 2003-2009, with the exception being some accretion near the eastern edge of the unit. Where defences remain during the first epoch, the upper shore would be held static by the structures, but slow rates of foreshore lowering	Sediments will be supplied to the local beaches by renewed coastal retreat through the flat ground and gentle coastal slopes. Failure of the costal defences around Sconce Point (Fort Victoria) may allow increased northwards transmission of sediment from the actively eroding cliffs of Fort Victoria Country park to the south. Renewed erosion of this frontage may release shingle material into the system and could have a beneficial effect on Norton Spit to the east.	Increased rates of sediment will be supplied by erosion, and may remain on the local beach or be transported eastwards towards North Spit and Yarmouth. Tidal breach and marine inundation from the south coast to the north coast of the Island along the Western Yar valley could significantly affect the sediment regime within this adjacent frontage in the longer term.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Predicted change for: Years 20-50 (to approx. 2055)	Predicted change for: Years 50-100 (to approx. 2105)
			and narrowing would continue due to sediment starvation. Weak littoral drift generally operates north eastward along the whole coast, but coast protection structures severely restrict drift transport at Fort Victoria. Local sediment input from the stabilised coastal platform and coastal slopes will increase as sections of the seawall fail over the next 20 years. From Fort Victoria to Yarmouth Harbour entrance the drift direction is presumed to be eastward, but beach levels are low and transported volumes are extremely limited, although the eastwards alignment of Norton Spit indicates that historically net drift has been eastward.		
	With present management	*Short description of predicted defence failure*	The series of seawall, groynes and gabions and timber revetment fronting Fort Victoria and Norton will be maintained and renewed.	The series of seawall, groynes and gabions and timber revetment fronting Fort Victoria and Norton will be maintained and renewed. There will be a risk of overtopping of defences, particularly later in the epoch.	The series of seawall, groynes and gabions and timber revetment fronting Fort Victoria and Norton will be maintained and renewed. Increased overtopping of the defences is likely to occur, increasing the risk of slope weakening behind the defences and breaching.
		Description of cliff erosion/ reactivation	Maintaining the line of defences will prevent renewal of erosion right along the frontage, but erosion and retreat can still occur at the undefended section in the centre of the unit, although this may be minimised by the presence of the shingle beach. Damage to the coastal access road is evidence of some slope movement occurring behind the current defences, and further damage to the road is likely. At the southern limit of the unit the transition from undefended to defended coast at Fort Victoria is on flat grassy ground and a short stretch of timber structures provides some transition the hard defences, but the current offset of approx. 5m at the southern end of the hard seawall and defences may increase by 7m to approx. 12m by	Maintaining the line of defences will prevent renewal of erosion right along the frontage. Ground movements in the gentle coastal slope are affecting the road and may cause breaches of the fronting defences to occur, rendering the current gabions insufficient to prevent coastal change, although they could be reconstructed. South of Fort Victoria, outflanking a further 14m may occur, increasing the step-back of the low coast to approx. 26m. Erosion of the undefended section in the centre of the unit may occur at approx. 0.46m/yr, causing outflanking of up to 21m by the end of this epoch.	Maintaining the line of defences will prevent renewal of erosion right along the frontage, although some slope movements may still occur, but not to the scale of adjacent units to the south-west. At Fort Victoria, outflanking a further 27m may occur, increasing the step-back of the low coast to approx. 53m. Erosion of the undefended section in the centre of the unit may continue at approx. 0.53m/yr then 0.58m/yr, causing outflanking of up to 48m by the end of this epoch, which may extend eastwards if the sections of rock gabions are insufficient to prevent coastal reactivation.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			the end of this epoch. Erosion of the undefended section in the centre of the unit may occur at approx. 0.35m/yr (outflanking adjacent defences by up to 7m over 20 years).		
		Description of beach evolution	Foreshore narrowing is likely to occur in front of the maintained seawalls and defences. The upper shore would be held static by the structures, but slow rates of foreshore lowering and narrowing would continue due to sediment starvation. Coast protection structures severely restrict drift transport from the south at Fort Victoria.	Foreshore narrowing is likely to occur in front of the maintained seawalls and defences. A small amount of fine sediment may be supplied by the erosion breach in the centre of the frontage but beach levels are expected to be low, exposing the defences to wave attach and occasional overtopping.	More frequent overtopping of defences with rising sea level together with low beach levels will increase the likelihood of breaches in the coastal defences, which were not designed to be sufficient for the coastal processes operating during this epoch.
IW50 ***Name:*** **YARMOUTH ESTUARY** **Western Yar Estuary, from Norton Spit to Yarmouth Castle**	**No Active Intervention**	*Short description of predicted defence failure*	Yarmouth Harbour is located at the mouth of the Western Yar Estuary. To the west of the harbour, Norton Spit is a natural feature which has been stabilised by timber breastwork and extended by a rock armour breakwater to provide shelter to the harbour behind (the harbour channel opens to the Solent at the far eastern end of the breakwater). Without maintenance, the stabilisation of the spit and breakwater are due to fail in 10-20 years time. To the east of the harbour, around the western edges of the town of Yarmouth (from the Castle to the Thorley Brook) a series of seawalls (masonry and concrete) and revetments (rock armour and gabions) have residual lives of 15-25 years, with the exception of two sections of steel sheet piling within the ferry terminal which will last for 26-60 years. Within the Yar Estuary scattered short lengths of wall and embankments will last for a maximum of 15-25 years. Defences are critical to the functioning of the commercial harbour and marina, which provides cross-Solent ferry services vital to the communities of the West Wight.	Failure of the remaining (outflanked) sections of steel sheet piling around the ferry terminal is likely. No defences present along the majority of the frontage.	No defences
		Summary of flood and erosion risk	The Western Yar Estuary is protected by a narrow sand and gravel spit extending east from Norton. The town of Yarmouth and ferry terminal were originally built upon a shorter former counterpart spit on the low-lying eastern bank.	Loss of remaining coastal defences on the frontage is likely, alongside increasing inundation of low lying areas of Yarmouth town as a result of rising sea levels.	Increasing rise in sea levels may leave parts of the frontage under standing water at high water. Widespread inundation of the Western Yar estuary and adjacent land will occur regularly.

<table>
<tr><th rowspan="2">Location</th><th rowspan="2">Scenario</th><th rowspan="2"></th><th colspan="3">Predicted change for:</th></tr>
<tr><th>Years 0-20 (to approx. 2025)</th><th>Years 20-50 (to approx. 2055)</th><th>Years 50-100 (to approx. 2105)</th></tr>
<tr><td></td><td></td><td></td><td>Yarmouth Castle is a Scheduled Monument. The defences and a large number of residential and non-residential properties are low-lying and vulnerable to flooding. A swing bridge carries the main road from Newport to West Wight across the Estuary mouth. The Western Yar Estuary runs inland 3km almost due south from Yarmouth towards Freshwater, with approx. 9.1km of frontage within the breakwater and estuary. There are extensive mudflats, marshes and reed beds. The Estuary almost dries at low water and effectively ends at the tide flaps under the Causeway bridge, beyond which there are reed beds.

Norton Spit & breakwater: Norton Spit has retreated landward over the past century and is stabilised with a breakwater extension which provide protection from wave attack to the Western Yar outer estuary, but without maintenance, these structures may fail in 10-15 or 10-20 years time. Norton Spit is depleted and would be likely over the forthcoming 30 years to become subject to landward migration such that it would increasingly recurve into the estuary and possibly breach. This process may be slowed by sediment inputs released from updrift as recession processes within cliffs re-activate. However, the spit could migrate and breach before this potential sediment supply becomes fully active. Any breach in the spit could allow greater wave penetration into the Western Yar estuary and wave heights attacking the frontage will increase.

Yarmouth Town & Harbour: There is very significant and increasing risk to the western areas of the town of Yarmouth from increasing levels and frequency of tidal flooding. Tidal flooding already occurs at occasionally, inundating the ferry terminal, marshalling area and roads leading to the town square. In</td><td>Later in this epoch there is the risk of tidal breach through Freshwater Bay at the southern end of the estuary causing marine inundation from both ends of the Western Yar.</td><td>Damage to properties, the main public highway and services will occur.

Tidal breach through Freshwater Bay and marine inundation along the valley could potentially create a separate island of the West Wight peninsula, and both main road links across the valley will be lost or compromised by erosion and flooding.</td></tr>
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Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			addition to the risk of marine inundation, some areas will become exposed to erosion. With no further maintenance or intervention the sea walls surrounding the town and harbour are expected fail in 15-25 years time, with some limited sections fronting the ferry terminal lasting longer, well into the second epoch. Following seawall collapse erosion will occur. An indicative erosion rate of 0.12m/yr increasing due to the impacts of sea level rise to 0.15, 0.18 and 0.19m/yr in future epochs is illustrated on the No Active Intervention mapping, due to the relative shelter of the inlet. Progressive erosion following failure of the hard defences in the vicinity of the harbour mouth is shown, but in essence, by the end of the first epoch (0-20 years) or early in the second epoch (20-50 years) the defences and sheltering structures protecting the mouth of the estuary are expected to have failed, opening up the estuary behind to wave attack, combined with widespread increasing flood risk. The ferry terminal would be unsafe should sections of the sea wall collapse from 15 years onwards through the second epoch. *Thorley Brook:* The low-lying valley of Thorley Brook runs parallel to the shore on the landward side of Yarmouth town. It will be increasingly inundated from the main estuary following failure of a seawall between the two in 15-25 years, increasing the risk of tidal flooding to parts of the south and east of the town.		
		Summary of estuary response	Morphology of the mouth of the Western Yar estuary indicates littoral drift towards the inlet on both sides, forming Norton Spit in the west (fronted by a sloping beach in fine sand), and very weak net westward drift over the sector to the immediate east of the inlet mouth (in contrast to the general pattern of eastward drift along the north-west coast of the Isle of Wight. The dominant flow in the Yar Estuary is during the ebb tide and it has been estimated that its	There is potential impact on the tidal prism and dynamics of the whole estuary due to changes to the estuary entrance following collapse of the breakwater and increased inundation of Thorley Brook. Increased sands and sediments may be transported into the estuary mouth once it is opened to wave attack.	There is potential impact on the tidal prism and dynamics of the whole estuary due to changes to the estuary entrance following collapse of the breakwater. Tidal breach through Freshwater Bay and marine inundation along the valley could alter the tidal regime around Yarmouth Harbour.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			sediment carrying potential is five times that of the flood. Fluvial transport from the Western Yar catchment is negligible with predominantly marine clays having partially infilled the estuary, although dominant flushing effect of the ebb current rapidly removes fine-grained sediments previously transported into the mouth. It is reported that sand can be transported into Yarmouth Harbour by strong northerly gales. The entrance to the Western Yar has been dredged on several occasions to maintain a navigable channel for car ferries. There is potential impact on the tidal prism and dynamics of the whole estuary due to changes to the estuary entrance following collapse of the breakwater. Since this is a coastal plain type estuary with relatively steeply sloping margins saltmarsh within the estuary is likely to be sensitive to future climate change and sea-level rise unless vertical accretion can compensate.		
	With present management	*Short description of predicted defence failure*	Seawalls around Yarmouth town and Estuary would be maintained and replaced at their current standard.	Seawalls around Yarmouth town and Estuary would be maintained and replaced at their current standard.	Seawalls around Yarmouth town and Estuary would be maintained and replaced at their current standard.
		Summary of flood and erosion risk and estuary response	Full details can be found under the 'No Active Intervention' scenario described above. Maintenance of the existing breakwater and seawalls would maintain the present form and operation of the Estuary and prevent wave attack within the Estuary, but would not reduce the present and increasing risk of flooding to Yarmouth Town centre, where defences levels are already overtopped.	Maintenance of the existing breakwater and seawalls would prevent wave attack within the Estuary, but would not reduce high and increasing risk of flooding to Yarmouth Town centre. Rising sea levels and marine inundation may also impact upon saltmarshes within the estuary. Maintenance of the seawall barrier at Freshwater Bay will prevent tidal inundation of the Estuary from the south and maintain the operation of the Estuary in its current form, leading into the Solent on the north coast of the Isle of Wight.	The breakwater and seawalls will continue to prevent wave attack within the Estuary, but would not reduce the regular inundation of Yarmouth Town centre by tidal flooding. The breakwater will prevent wave attack within the Estuary but rising sea levels are likely to affect the morphology and environments within the Estuary. The seawall barrier at Freshwater Bay will continue to prevent tidal inundation of the Estuary from the south and maintain the operation of the Estuary in its current

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
					form, leading into the Solent on the north coast of the Isle of Wight.
IW51 ***Name:*** **YARMOUTH TOWN & BOULDNOR** **From: Yarmouth Castle** **To: Port La Salle**	**No Active Intervention**	*Short description of predicted defence failure*	1946m unit fronting the seaward face of the town Yarmouth and coastal development eastwards to Port La Salle, including a section supporting the main coastal road (from Newport to West Wight). Around Yarmouth Castle (a Scheduled Monument) stone walls and buttresses form their own coastal defence. Between the Pier and Yarmouth Common there is a mixture of vertical stone or concrete walls front residential properties. From Yarmouth to Bouldnor a series of seawalls have residual lives (without any further maintenance) of 15-25 years in general. Some sections of recent wall and steel sheet piles are in better condition and will last into the second epoch (which runs from 20-50 years), and there are also short sections will fail first, in 10-15 years. It is important to note that the central section (where the main road is supported on an embankment adjacent to the coast) is in poor condition and could fail in 5-10 years. Along the Port la Salle frontage development is protected by (west to east): steel sheet-piling (generally 26-60 years residual life), rock armour (10-20 years residual life) and concrete wall (15-25 years residual life) and gabions (6-10 years residual life).	Any remaining sections of defences will be outflanked and are likely to be lost during this epoch.	No defences
		Description of cliff erosion/ reactivation	There is current and increasing significant flood risk in west of this unit affecting the centre of the town of Yarmouth. In addition to the flood risk, the shoreline is likely to retreat at moderate rates of erosion as the foreshore is narrow and provides limited protection. The majority of defences along the frontage will deteriorate and fail during the first epoch (over the next 20 years), with breaches in the seawall leading to more widespread failure	The problems along this frontage will be exacerbated by sea level rise. Flood risk in the west of the town increases and the stability of the coastal slopes will be significantly reduced, resulting in upslope movements impacting on the public highway and adjacent properties. Coastal erosion at approx. 0.46m/yr will create approx. 14m of coastal retreat during this epoch, or up to 19m in places since year 1.	There is likely to be regular flooding affecting properties and significant slope instability problems along the whole gently sloping peninsula on which Yarmouth is built, and in Port la Salle to the east. Coastal erosion at approx. 0.53m/yr then 0.58m/yr will create approx. 27m of coastal retreat during this epoch, or up to 46m in places since year 1. Immediately east of Yarmouth there is the

Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			and commencement of erosion at approx. 0.35m/yr. This will result in up to 5m of coastal erosion by year 20 in the areas where the defences failed first. Areas of the developed coastal slope are subject to small-scale instability problems. At Port La Salle slope instability would put houses at risk. The principal road A3055 runs along the top of the coastal embankment at Bouldnor within this unit. Collapse of the seawalls and reversion to a natural soft cliff would be a major change, but would not be detrimental to adjacent management units.	As erosion of the shoreline continues over years 20-50 through the coastal road, there is increasing potential for a breach through the foreshore just east of Yarmouth, enabling the creation of a small tidal inlet at Thorley Brook. The low-lying valley of Thorley Brook runs parallel to the shore just inland of the town of Yarmouth, extending eastwards from the Western Yar Estuary. If a breach occurs, shoreline sediments could become entrained by tidal currents generated at the new inlet and become flushed seaward. Loss of A3054 road (which is the main link between West Wight and Newport) and also the coastal footpath link would result. Traffic would be seriously disrupted following any breach event.	possibility that shore erosion over the forthcoming 50 to 100 years could cut through into the lowland valley of Thorley Brook to produce a small new tidal inlet. This potential link to the Western Yar estuary would leave the town of Yarmouth as an island at high tide.
		Description of beach evolution	Weak littoral drift generally operates north eastward along the north-west coast of the Isle of Wight, with the exception of local reversals on the eastern entrances to inlets. Littoral drift is from both sides towards the inlet of the Western Yar, although this is a very localised and minor reversal in the east. A littoral transport divergence is difficult to locate because of the small volume and rate of sediment movement and is likely to be a partial, and probably transient, boundary. East of the harbour mouth and the solid structural defences there is a medium to gentle sloping sand, shingle and boulder beach on a clay sub-base fronting the George Hotel. Historically the foreshore at Yarmouth has lowered and narrowed in front of seawall defences, and foreshore narrowing is likely to continue to occur whilst the defences remain in place during the first epoch. In the shorter term, the Strategic Monitoring Programme records that from 2003-2009 the beaches fronting Yarmouth town showed slight accretion, but to the east the	Renewed erosion along the majority of the frontage will supply sediments to the local foreshore and may be transported to the units to the east by the weak north-eastwards littoral drift system.	Increasing rates of erosion along the entire frontage will supply sediments to the local foreshore and may be transported to the units to the east by the weak north-eastwards littoral drift system. Tidal breach and marine inundation from the south coast to the north coast of the Island along the Western Yar valley could significantly affect the sediment regime within this adjacent frontage in the longer term.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			beaches were stable overall, with slight erosion in front of the central section of the vulnerable Bouldnor road. There will be no direct sediment input into the frontage until breaches in the seawall allow erosion to commence later in the epoch.		
	With present management	*Short description of predicted defence failure*	2km of continuous seawalls and defences fronting the seaward face of the town Yarmouth and coastal development eastwards to Port La Salle will be maintained and replaced (at current standards of protection) if current management practices continue.	The seawalls and defences fronting the unit will be maintained and replaced.	The seawalls and defences fronting the unit will be maintained and replaced.
		Description of cliff erosion/ reactivation	The maintenance of the defence line will prevent renewal of erosion and retreat along the coastline, but will not prevent tidal flooding in the west of Yarmouth. The eastern end of the defence line at Port la Salle marks the transition to an undefended eroding cliff line, so step-back or offset of the coast will occur at the eastern edge of the unit by up to 7m if the current defence gabions are maintained in their current position.	Maintenance of the seawalls will prevent erosion and a marine breach through to Thorley Brook would therefore be prevented, but the defences themselves would become increasingly exposed to wave action and overtopping, especially towards the end of the epoch. Tidal flooding will remain a significant risk. At the eastern end of the defence line outflanking of the defences by a further 14m may occur during this epoch (or up to 21m in total since year 1).	The seawalls will prevent erosion and a marine breach through to Thorley Brook, although overtopping of the maintained defences will become more frequent during this epoch. Tidal flooding will be an increasing risk. At the eastern end of the defence line outflanking of the defences by a further 27m may occur during this epoch (or up to 48m in total since year 1).
		Description of beach evolution	Foreshore narrowing in front of the defences is likely to occur due to limited sediment supply.	Foreshore narrowing in front of the defences is likely to continue due to very limited sediment supply.	Foreshore narrowing will continue as renewal of erosion prevents further sediment supply and sea levels rise. The presence of the Western Yar Estuary is likely to prevent significant sediment supply along the shoreline from the west.
IW52 ***Name:*** **BOULDNOR COPSE & HAMSTEAD** **From:** **Port La Salle**	**No Active Intervention**	*Short description of predicted defence failure*	4.2km frontage of slumping coastal slopes and cliffs. No defences.	No defences.	No defences.
		Description of cliff erosion/ reactivation	Cliffs developed within the predominantly clayey strata of the Bouldnor Formation (Solent Group) rise from beach level at Bouldnor village to 61m at Bouldnor Cliff and 35m at Hamstead Cliff	Continued instability and rapid mudsliding is seasonal and controlled by precipitation, groundwater availability and porewater pressures as well as toe erosion and wave	Increased erosion and higher winter rainfall are expected to promote a significant increase in coastal landsliding activity at Cranmore and Hamstead.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
To: Hamstead Point, Newtown Bay			before declining steadily east to the Newtown Harbour inlet. The coastal slope exhibits complex morphology and degrades by mudslides, relatively shallow multiple translational slides and infrequent deep-seated rotational slides. Erosion of the cliff-toe and cliff-foot debris will continue or intensify in the future such that the cliffs are likely to remain unstable and actively eroding. Erosion at approx. 0.35m/yr will create approx. 7m of cliff top retreat over years 0-20. Cliff top recession process often involves high-magnitude low-frequency failures that can result in loss of between 5 and 25m within single events associated with intense mudsliding downslope.	attack causing slope steepening and destabilisation. Erosion at approx. 0.46/yr will create an additional approx. 14m of cliff top retreat over years 20-50 (or 21m in total since year 1).	Erosion at approx. 0.53m/yr then 0.58m/yr will create an additional approx. 27m of cliff top retreat over years 50-100 (or 48m in total since year 1).
		Description of beach evolution	The coast between Bouldnor and Newtown Harbour is characterised by sediment inputs from local coastal erosion (sediment input from updrift is negligible). A gently sloping foreshore in clay deposits with a thin covering of sand and some fine to medium shingle is present. Weak littoral drift operates north eastward along the coast. The upper foreshore has retreated in accordance with cliff recession along the majority of this frontage, but mean low water appears to have moved back more rapidly so that the foreshore has narrowed. The high eroding cliffs in this unit and near Thorness Bay to the north-east are important sources of fresh fine grained sediment within the Solent. Coarser sediments will drift predominantly eastwards along the foreshore and contribute to spits and to embayments defined by minor headlands. Cliff recession yields significant sediment volumes, but much is clay and silt so only a small proportion of total cliff input is stable on the beach. Wide, low gradient mixed sediment inter-tidal zones are	Increases in sediment supply to beaches due to the acceleration of freely eroding cliffs would be unlikely to generate substantial protective beaches because most of the cliff materials are clay and mechanisms exist for seaward removal of these sediment grades. Instead, there may be very local increases in beach accumulation at Hamstead Duver (the western spit at Newtown, in the adjacent unit to the east). Renewal of erosion along the Yarmouth and Bouldnor frontage in the unit to the east could supply some limited sediments into this frontage, but erosion of the low Yarmouth coastline provides negligible sediments in comparison with the high eroding cliffs in this unit.	Large quantities of primarily fine sediments are contributed to the West Solent by cliff erosion within this frontage. This constitutes the major direct input of fresh sediments to the Solent and may be of critical importance to its sediment budget and maintenance of intertidal features.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			characteristic. Drift is not continuous along this unit, but is intercepted periodically by lobes of landslide debris that surge across the beach from the cliffs above. Obstructions are removed gradually by marine erosion so as to permit a long term drift. Sediment accumulates against the western side of such lobes with scour to the east, a combination indicative of eastward drift. At Bouldnor Cliff, mudslides converge to form a major mudslide lobe that extends periodically across the foreshore during surging phases and suffers marine erosion thereafter. Old boulder arcs on the foreshore are the residue of previous mudslides.		
	With present management	*Short description of predicted defence failure*	No defences	No defences	No defences
		Description of cliff erosion/ reactivation	See 'No Active Intervention' scenario above for details. With present management practices continuing in adjacent frontages, the western edge of this unit will continue to mark the transition from defended to undefended coast, so step-back or offset of the coast by up to 7m will occur if the current defence gabions are maintained in their current position.	See 'No Active Intervention' scenario above for details. At the western edge of the unit the adjacent defence line may be outflanked by a further 14m during this epoch (or up to 21m in total since year 1).	See 'No Active Intervention' scenario above for details. At the western edge of the unit the adjacent defences may be outflanked by a further 27m during this epoch (or up to 48m in total since year 1).
		Description of beach evolution	See 'No Active Intervention' scenario above for details. The coast between Bouldnor and Newtown Harbour is characterised by sediment inputs from local coastal erosion. Sediment input from updrift is negligible, and this trend would continue when seawalls are maintained along the Yarmouth frontage to the west preventing the renewal of erosion.	See 'No Active Intervention' scenario above for details.	See 'No Active Intervention' scenario above for details.
		Short	Newtown Estuary is a significant undefended,	No defences	No defences

Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
IW53 ***Name:*** **NEWTOWN ESTUARY** **Newtown Estuary & spits, from Hamstead Point to Brickfield Farm House**	**No Active Intervention**	*description of predicted defence failure*	undeveloped and naturally evolving inlet. Within Newtown Estuary, the vast majority of the frontage (amounting to a length of 28km) is undefended, but a few scattered short sections of masonry wall and timber breastwork at Shalfleet Quay, Newtown Quay (saltworks) and on the upper reaches of Shalfleet Lake have residual lives of a maximum 15-25 years, generally less. Two entrance spits perform a natural coastal defence function, sheltering the branches of the Estuary behind forming a natural harbour.		No defences
		Summary of flood and erosion risk	Newtown Estuary occupies a low-lying valley complex, with narrow twin gravel spits protecting five main diverging branches of the estuary behind, extending over 3km inland. Habitats of saltmarsh and mudflats are bordered by Oak woodlands, and the villages of Newtown (much of which is a Scheduled Monument), Porchfield and Shalfleet. Heights of tidal inundation into the Estuary behind will gradually increase. Weak littoral drift generally operates north eastward along the whole coast with the exception of local reversals on the eastern entrances to inlets. Littoral drift is from both sides towards the inlet of Newtown Harbour. The eastern spit is relatively depleted compared to the western spit. The western spit at Newtown (Hamstead Duver) has retreated and recurved partially into the harbour. A relict spit is located behind the active one. The western spit is rather more stable than the eastern spit because it is sustained by a modest sediment supply from the cliffs to the west (the eastward alignment of this spit providing clear evidence of long term eastward	Increased erosion of neighbouring cliffs may feed additional sediments into the system, potentially replenishing the spits, however increased wave action and storm frequency could also promote even faster retreat and assist breaching and failure in the east and also in the west spit, opening up the Estuary to increased wave action, particularly the eastern side and the vulnerable saltmarsh and mudflat habitats. Erosion or retreat of the gravel western spit may continue at approx. 0.91m/yr for years 20-50 (resulting in up to 27m of potential additional retreat, or 41m since year 1). Any remaining sections of the eastern gravel spit could recede at 0.94m/yr (resulting in up to 28m of additional retreat over years 20-50, or 43m since year 1). Rising sea levels will open the whole frontage to more aggressive wave attack leading to extensive flooding of the National Nature Reserve and increased salt penetration on adjacent farmland with impacts on the bordering woodlands. Tidal flood risk may inundate the road link to	Rising sea levels will mean that significant amounts of the frontage could be under standing water throughout the year.

Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			drift). It would be likely to remain static, or slowly migrate into the harbour inlet. A historical retreat rate of 0.6m/yr (BRANCH project) for the western spit will translate to 0.69m/yr potential retreat over years 0-20 (14m in total). The eastern spit at Newtown entrance has a history of sediment depletion and has receded landwards. High tides overtop the eastern spit and may form a small new inlet subject to tidal flows at high water. Breaches in the eastern Newtown Spit will be unlikely to seal naturally due to limited sediment supply, possibly resulting from the proximity of the local drift reversal and divide. The eastern spit may continue to roll back south eastwards away from the prevailing wave direction, but is likely to submerge when it reaches the deeper water channel behind. The gravel spit climbs eastwards into low land rising to 11m in height near Brickfield Farm House; active is erosion occurring on both the outside and inside of the spit, providing fine sediments into solution. Historical retreat at 0.62m/yr (BRANCH project) for the gravel section of the eastern spit will translate to 0.72m/yr potential erosion or retreat over years 0-20 (approx. 14m in total). Erosion of the low peninsula forming the eastern section of the harbour arm will continue at the rate of the adjacent coast in this and future epochs (approx. 0.46m/yr over years 0-20 along the outside of the arm, with slower erosion rates on the sheltered inside of the arm). The effect of erosion or retreat of the spits will primarily be to permit increased wave penetration into the harbour with implications for the erosion of saltmarshes and mudflats.	Newtown village from the south (near Fleetlands Farm), the channel approaching Porchfield and cross the Porchfield-Shalfleet road at Clamerkin Bridge. .	
		Summary of estuary response	The estuarine processes are expected to continue in a similar pattern in future epochs. At Newtown Estuary sediment mobility is greatest at the harbour entrance, with fine silt and clay accumulating as mudflats and marsh sediments	The functioning and morphology of the Harbour would be affected by the retreat or loss of the entrance spits, with wave penetration into the harbour increasing the potential for erosion on previously sheltered	The functioning and morphology of the Harbour would be affected by the loss of sheltered caused by the significant widening of the entrance channel through loss of the entrance spits, or recurving or

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			within the inner estuary. The bed of the main channel is composed of coarse pebbles and ebb tidal currents exceeding 0.5ms^{-1} can result in offshore flushing of coarse sediments, fed by gravel driven by wave action along the spits flanking the harbour entrance. A proportion of the sediment stored in inter-tidal flats and saltmarsh is presumed to derive from input by the small rivers discharging into Newtown Harbour. Most input however, is likely to have been transported by the flood tide, and originate from cliff, platform and shoreface erosion of suspended sediment from the adjacent open coastline. Supply of both gravels and suspended sediments may increase over the next 20 years and particularly through future epochs.	frontages and the potential opening of a second entrance channel through a breach in the eastern spit. Additional sediment may be supplied by erosion of the Bouldnor cliffs to the east of Newtown Harbour, although there is significant sediment lost offshore.	roll back into the estuary. Sediment supply from the east may increase from erosion of Bouldnor cliffs, although there is significant sediment lost offshore.
	With present management	*Short description of predicted defence failure*	Maintenance of the short sections of defences within the harbour would not have an overall impact on the behaviour of the system as a whole, or mitigate the increasing flood risk around the Estuary.	No defences	No defences
		Summary of flood and erosion risk	See ‘No Active Intervention’ scenario above.	See ‘No Active Intervention’ scenario above.	See ‘No Active Intervention’ scenario above.
		Summary of estuary response	See ‘No Active Intervention’ scenario above.	See ‘No Active Intervention’ scenario above.	See ‘No Active Intervention’ scenario above.
IW54 ***Name:*** **THORNESS BAY** **From: Newtown Bay** **To: Gurnard Bay**	**No Active Intervention**	*Short description of predicted defence failure*	6.1km stretch of undefended, relatively undeveloped slumping coastal slopes and cliffs.	No defences	No defences
		Description of cliff erosion/ reactivation	East of Newtown Harbour there are simple low cliffs developed in clays of the Bouldnor Formation. Abundant landslide debris and fallen trees on the beach indicate rapid recession. Topography rises rapidly eastwards to a height of 57m near Burnt Wood and Thorness Bay Holiday Park with corresponding change in cliff landslide activity. There is a wide degradation zone characterised by shallow multiple	Erosion and slope reactivation of the coastal cliffs will continue, at a rate of approx. 0.61m/yr, resulting in an additional 18m of cliff top recession (or 27m in total since year 1). Tidal flood risk extends up to 900m inland in two adjacent inlet zones, crossing the Porchfield to Northwood road. Retreat	Increased coastal erosion and slope reactivation will continue, at a rate of approx. 0.71 then 0.77m/yr, resulting in an additional approx. 37m of cliff top recession from years 50-100 (or 64m retreat in total over 100 years).

Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			translational landsliding and transport of debris in mudslides that form lobes across the foreshore. Thorness Bay is a small low lying valley floor. The cliffs between the Thorness and Gurnard rise to 28m and comprise clays and marls of the Bouldnor formation overlying Bembridge limestone at beach level. Mudslides and shallow translational slides create debris accumulations on the foreshore. The limestones outcrop as foreshore reefs forming Gurnard Ledge, also undergoing erosion. The landform assemblage is comparable to that at Bouldnor and Burnt Wood, but smaller in scale. Erosion of the cliff toe and debris is likely to continue or intensify into the future such that the cliffs are likely to remain unstable and actively eroding. Erosion at a rate of approx. 0.46m/yr will result in 9m or cliff retreat over the next 20 years.	within low-lying Thorness Bay could form a small intertidal area controlled by the topography, similar in scale to the present King's Quay inlet on the north-east coast. The tidal prisms would be small and marginal in stability and potentially subject to episodes of periodic closure and breaching.	
		Description of beach evolution	There is a mixed, mud, sand and boulder foreshore that becomes increasingly wide to the east of Newtown. The foreshore is interrupted periodically by lobes of landslide debris that surge across the beach from the cliffs above. Weak littoral drift operates north eastward along the coast. Sediment supplied to the foreshore (predominantly from local cliff erosion) is clay, with some gravels. Erosion of in-situ gravel-bearing deposits exposed on the foreshore also contributes sediment to the beach. Cliff recession yields significant sediment volumes, but much is clay and silt so only a small proportion of total cliff input is stable on the beach. The high eroding cliffs are an important source of fresh fine grained sediment within the Solent. Net north-eastward drift between Brickfield Farm and Gurnard is indicated by eastward deflection	Increases in sediment supply to beaches due to the acceleration of freely eroding cliffs would be unlikely to generate substantial protective beaches because most of the cliff materials are clay and mechanisms exist for seaward removal of these sediment grades. Instead, there may be very local increases in beach accumulation in Thorness Bay.	Large quantities of primarily fine sediments are contributed to the West Solent by cliff erosion. This constitutes the major direct input of fresh sediments to the Solent and may be of critical importance to its sediment budget and maintenance of intertidal features.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			of stream mouths by small, mixed sediment bars at Thorness and Gurnard. Drift is fed by local cliff erosion. A considerable quantity of gravel is stored on the upper and mid foreshore within Thorness Bay, where it has formed a barrier across the stream and its low marshy valley. Gurnard Ledge functions as a partial impediment to drift tending to assist coarse sediment retention within Thorness bay, causing depletion of the beaches to its northeast.		
	With present management	*Short description of predicted defence failure*	No defences	No defences	No defences
		Description of cliff erosion/ reactivation	See 'No Active Intervention' scenario above. At the eastern end of the unit, the cliffs fall in height to the promontory of Gurnard Luck. Differential erosion from the undefended to defended coast may create an offset of approx. 9m over 20 years.	See 'No Active Intervention' scenario above. At the eastern end of the unit the offset from the undefended to defended coast may increase by approx. 18m to 27m in total over 50 years.	See 'No Active Intervention' scenario above. At the eastern end of the unit the offset from the undefended to defended coast may increase by approx. 37m to 64m in total over 50 years.
		Description of beach evolution	See 'No Active Intervention' scenario above.	See 'No Active Intervention' scenario above.	See 'No Active Intervention' scenario above.
IW55 ***Name:* GURNARD LUCK** **Marsh Road, Gurnard** **From: Marsh Cottage promontory** **To: Lower Church Road**	**No Active Intervention**	*Short description of predicted defence failure*	574m length of masonry and concrete walls and timber breastwork bordering the low-lying developed area of Gurnard Luck, surrounding the outlet of the small river in the west of the frontage. Collapses in the ageing sea defences are already occurring, and sections of the repaired frontage are expected to fail in 5-7 years (the section in the centre of the bay), 10-15 years, 10-20 years and 15-25 years, so by the end of the first epoch (year 20) the majority of defences will have failed, with initial breaches extending to expose the majority of the frontage to erosion.	No defences	No defences
		Description of cliff erosion/	Low lying dunes backed by marshland, with the coastal strip either side of the coastal road developed with improved chalets and residential	Total loss of all remaining defences and regular flooding as a result of sea level rise will occur. Tidal flood risk extends up to	Coastal retreat and flooding will continue. The whole Gurnard Luck frontage could be under standing water at high water.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
junction		*reactivation*	buildings. Formerly a bar extending across what was a small coastal inlet with a marsh behind. Moving east vegetated and developed clay slopes are prone to instability, continuing into the adjacent unit. Gurnard Luck suffers from regular flooding from a complex combination of both fluvial and coastal sources. Over the next 20 years there will be total undermining and collapse of all existing coastal defences. Increased erosion of coastal land will occur as well as increased susceptibility for sea flooding in extreme conditions. Erosion at up to approx. 0.35m/yr could retreat the coast by up to 5m (approx.) in the first areas of defence failure. Coastal overtopping waters flow away from the frontage, past a row of properties over Marsh Road then descends into a low-lying marsh. During coastal flood events, this marsh can store flood waters for whole storms unless the surge level is about 30cm above the lowest point in the defence, then total inundation occurs to match sea surge level. Gurnard Luck stream drains through this unit and exits to the sea after passing through flapped culverts under a road bridge. The Luck can only drain during low tide conditions, and excess waters overflow into the Marsh. The Marsh quickly fills during fluvial events; however it does provide a valuable source of storage. The flap gates are likely to stick in a closed position after 10-20 years of no maintenance. After the gates fail, Gurnard Luck stream will divert and flow over Marsh Road to the east of the bridge and exit to the sea at a low point in the defences, flooding Marsh Road properties.	1.5km inland following the route of Gurnard Luck stream to Ruffin's Copse. Erosion, slope failure and retreat of the cliffs in the east will occur, on the margins of a larger potential landslide reactivation. Erosion at approx. 0.46m/yr will retreat the coast by a further 14m (or up to 19m since year 1).	Increased erosion, slope failure and retreat of the cliffs in the east will increase the likelihood of larger-scale landslide reactivation (discussed in the Gurnard & Cowes Esplanade unit). Erosion at approx. 0.53m/yr then 0.58m/yr will potentially retreat the coast by a further 27m (or up to 46m since year 1). Retreat within Gurnard Bay could form a small intertidal area controlled by the topography similar in scale to the present King's Quay inlet on the north-east coast. The tidal prisms would be small and marginal in stability and potentially subject to periodic closure and breaching episodes.
		Description of beach	A shingle, sand and cobble beach fronts the defence line. Weak littoral drift operates north	Erosion will supply the formerly stabilised sediments to the beach within this unit, and	Increasing rates of erosion due to sea level rise and wave attack will continue to

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
		evolution	eastward along the coast. The Strategic Monitoring Programme records that from 2003-2009 overall the beach fronting Gurnard Luck was stable in the south-west, but showed moderate accretion in the north-east. There is currently no significant direct sediment input to the frontage, although limited sediment will be supplied following sea wall breach and erosion commencing. However, the low-lying frontage will not contribute significantly to sediment supply, in comparison with retreat of surrounding cliff lines.	sediment supply from the south-west may increase as slope retreat and reactivation occurs in adjacent units, dependent to the profile of failures or debris lobes controlling longshore sediment transport.	supply formerly stabilised sediments to the beach within this unit. Sediment supply by littoral drift from the south-west may increase as slope retreat and reactivation increases in adjacent units, dependent to the profile of failures, embayments or debris lobes controlling the patterns of longshore sediment transport.
	With present management	*Short description of predicted defence failure*	The series of masonry and concrete walls and timber breastwork would be maintained and replaced at their current standard, if current management practices continue.	The series of masonry and concrete walls and timber breastwork would be maintained and replaced.	The series of masonry and concrete walls and timber breastwork would be maintained and replaced.
		Description of cliff erosion/ reactivation	Maintenance of the line of coastal defences will prevent breach and erosion of the frontage commencing, but will not reduce the significant flood risk in the area without improvements in the standard of protection. Overtopping of the defences will continue. At the western and eastern ends of this unit, retreat at the transition from the defended to undefended coast would create offsets of approx. 9m in the west and 7m in the east over 20 years.	Erosion of the frontage will be prevented, but this scenario still has a high residual risk of flood inundation and impact on people and property, including possible loss of life during extreme flood events when the flood defences would be increasingly overtopped. At the western and eastern ends of the end of the unit the offset from the undefended to defended coast may increase by approx. 18m in the west (to 27m in total over 50 years) and 14m in the east (to 21m in total over 50 years).	Frequent flooding will continue with regular overtopping of the defences and marine inundation. At the western and eastern ends of the end of the unit the offset from the undefended to defended coast may increase by a further 37m in the west (to approx. 64m in total over 100 years) and a further 27m in the east (to 48m in total over 100 years).
		Description of beach evolution	Foreshore narrowing will occur in front of the defences as the beaches are starved of local sediment supply as erosion and retreat of the beach is prevented.	Foreshore narrowing is likely in front of the defences as sea levels rise, although additional sediment could be supplied by littoral drift from the south-west.	Foreshore narrowing and low beach levels are likely to increasingly expose the defences to wave attack, as the beaches are starved of local sediment supply. Potential increase in sediment supply by littoral drift from the south-west may mitigate some of this trend for narrowing or loss of beach materials.
	No Active	*Short*	2.7km frontage of weak coastal slopes	Remaining sections of seawalls will fail at	No defences.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
IW56 ***Name:*** **GURNARD & COWES ESPLANADE** **From:** **Gurnard Bay** **To: the Royal Yacht Squadron, West Cowes**	**Intervention**	*description of predicted defence failure*	underlying the towns of Cowes and Gurnard, with continuous seawalls, with the exception of Gurnard Cliff in the east of the unit. At Gurnard Cliff, the wooded and developed coastal slope is undefended, with minor fragmented exceptions such as a groyne with a residual life of 15-25 years. From Gurnard north-eastwards around Egypt Point and eastwards to Cowes (along an Esplanade road) a continuous series of concrete seawalls have residual lives of 15-25 years (10-15 years in the south of Gurnard). The seawall from Gurnard to south of Egypt Point is fronted by short groynes which are expected to fail in 10-20 years. Groynes are generally absent west of Egypt Point.	the start of this epoch, after which, there will be no defences.	No defences.
		Description of cliff erosion/ reactivation	In Cowes and Gurnard the coastal slopes rise to approx. 30-35m in a slope risk zone (before plateauing at approx. 40-45m over the Cowes peninsula). This mainly urban residential area is at risk from erosion and significant landslide reactivation. Many of the existing seawalls will collapse in 15-25 years, allowing erosion to commence at approx. 0.35m/yr (with approx. 2m of initial erosion possible by the end of the epoch). Beach steepening, scour and potentially ground movement may accelerate deterioration and collapse of the defences. A few properties are also at risk from flooding. At Gurnard Cliff partly-active wooded clay coastal slopes rises up to 35m in height. The coastal slope continues eastwards to West Coves, but to the east of Gurnard slipway, it becomes less steep, and is protected at its toe by continuous seawalls and an esplanade. The coastal slopes above the shoreline retain relict landslides. Slope morphology reveals numerous irregularities, indicating past and active seepage erosion and the presence of relic deep-seated	The toes of the coastal slopes will be eroded at rates of approx. 0.46m/yr (allowing approx. 14m of retreat during this epoch, or up to 16m since year 1). *Gurnard Cliff:* This epoch will see reactivation of the whole of the coastal slope, posing a risk to properties above on Solent View Road. Erosion could trigger landslide reactivation, therefore a wider potential reactivation zone is shown on the maps of the 'No Active Intervention' scenario. *Gurnard to Cowes:* Increased scour on the foreshore is likely to encourage instability on the Princes' Esplanade frontage where the landslide extends out to sea under the seawall. Failure of the seawall will affect the public highway, adjacent properties and public open space. By the end of the epoch erosion and increasingly frequent marine inundation would be likely to have promoted increased instability through loss of toe	Rates of coastal erosion will increase to approx. 0.53 then 0.58m/yr as sea level rises, resulting in a further 27m of retreat during this epoch (or approx. 43m over 100 years). *Gurnard Cliff:* Complete re-activation of the coastal cliffs and slopes below Solent View Road. Erosion could trigger landslide reactivation, therefore a wider potential reactivation zone is shown on the maps of the 'No Active Intervention' scenario. Gurnard-Cowes: Coastal erosion at the toe of the coastal slope could trigger landslide reactivation at 2m/yr, therefore a wider potential reactivation zone is shown on the maps of the 'No Active Intervention' scenario. Complete reactivation of the coastal slope between Egypt Point and the Royal Yacht Squadron may occur. The morphology of the active cliffs at

Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			and shallow landslides. At Gurnard Bay and from Egypt Point east to Cowes the coastal slopes are heavily developed, separated by an unstable wooded area, where evidence of ground movement is evident in the esplanade road and at joints in the seawall. The seawall and esplanade road are overtopped and inundated at extreme high tide events. *Gurnard Cliff:* Gurnard Cliff is characterised by active deep-seated landslides developed within the Bembridge and Osborne Marls. Coastal mudslides have resulted in undermining and recession of the cliff top, active settlement of the cliffs and translational movement of debris to the foreshore and mudslide lobes. Poor drainage, increased rainfall, beach steepening and increased toe erosion will promote active landsliding and could result in rapid retrogression upslope towards cliff top development. At the foot of the active slope, cliff toe erosion and retreat may outflank the adjacent defences at Gurnard Luck to the west and Gurnard Bay to the east by up to 7m before those defence structures fail towards the end of the epoch. *Gurnard to Cowes:* To the east the low lying shoreline is backed by a marginally stable slope composed of degraded coastal slopes and deep-seated coastal landslides. Seawalls are expected to deteriorate and fail in 15-25 years, with significant opening of joints with displacement of wall sections due to slope instability between Gurnard and Egypt Point, allowing erosion to commence. From Gurnard to Egypt point the esplanade shows signs of ground movement and between Egypt Point and West Cowes the upper coastal slopes exhibit evidence of instability. Although the full slope re-activation process could involve relatively long timescales the initial ground movements could occur quite rapidly following the onset of toe erosion.	support of the coastal slope behind. Over 30 to 100 years, toe erosion will remove support and destabilise the relict landslides on the slopes above. The frontage from Gurnard to the Royal Yacht Squadron is most exposed to wave attack and also supports the steepest slopes, suggesting that it may be the most vulnerable to future re-activation. Although the full slope re-activation process could involve relatively long timescales the initial ground movements could occur quite rapidly following the onset of toe erosion. Erosion could trigger landslide reactivation at 2m/yr, therefore a wider potential reactivation zone is shown on the maps of the ‘No Active Intervention’ scenario. Marine inundation of the esplanades will occur at high water events causing flood risk.	Thorness may provide an analogy for the type of morphology that could ultimately form, although a lengthy time period of 50 to 100 years could be required for such a transition. The full re-activation process could involve rapid but intermittent inland migration of the active cliff scarp by up to 200m. It should be noted that although the full re-activation process could involve relatively long timescales the initial ground movements could occur quite rapidly following the onset of toe erosion. Areas affected would be highly localised and related to the distribution of relict landslides on the slopes. Although toe erosion would prepare the slopes for instability, the re-activation events themselves would most likely be triggered by high groundwater levels.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			Overtopping and marine inundation of the esplanades will occur more frequently, with flood risk to seafront properties in the east of the frontage.		
		Description of beach evolution	At Gurnard Cliff a beach of shingle, sand, and limestone boulders is present but areas of soft clay are exposed within the thin foreshore sediments. From Gurnard to Cowes (where some seawalls have been in place since 1894) no contemporary sediment supply occurs directly into the frontage. From Gurnard Bay eastwards beaches comprise sandy gravels becoming coarse gravel and cobbles under the seawall, and are very depleted around Egypt Point, but widen eastwards to Cowes. From Egypt Point eastwards a significant raised shingle storm beach is present at a higher level in front of the Queens Road esplanade and Green, and shingle can be pushed back onto the gentle slopes behind. The Strategic Monitoring Programme records that from 2003-2009 the narrow beaches fronting Gurnard and Cowes Esplanades were relatively stable (showing no consistent trend in change in cross-sectional area). Weak net eastwards littoral drift occurs along the depleted beach from Gurnard around Egypt Point. Concrete rubble groynes at Egypt Point selectively intercept sediments, but quantities are small because of the presence of protection structures and a lack of available material. Foreshore narrowing and lowering of beach levels is likely to continue over the next 20 years, until failure of the seawalls opens up breaches (and eventually the entire frontage) to erosion at the end of this epoch or soon after, supplying limited sediments directly to the narrow and depleted foreshores. Littoral drift into the unit from the south-west is limited.	Erosion of the entire frontage and re-activation of cliff recession will supply predominantly fine sediments to the Solent. Weak net eastwards littoral drift will supply limited sediments into the area so beach levels are likely to remain low.	Faster rates of erosion of the toe of the coastal slopes and slope reactivation could supply increased quantities of sediment directly to the local beaches, and littoral drift from the south west may increase as slopes reactivate and retreat along the north-west coast of the Isle of Wight. However, slope reactivation and failure may encroach onto the foreshore and divert sediment offshore.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
	With present management	*Short description of predicted defence failure*	At Gurnard Cliff, the coastal slope would remain undefended at the cliff toe. From Gurnard to Cowes the existing coast protection would be sustained by maintaining and replacing the existing seawalls at their current standard without improvement.	At Gurnard Cliff, the coastal slope would remain undefended at the cliff toe. From Gurnard to Cowes the concrete seawalls and groynes would be maintained and replaced at their former standard of effectiveness.	At Gurnard Cliff, the coastal slope would remain undefended at the cliff toe. From Gurnard to Cowes the concrete seawalls and groynes would be maintained at their former standard of effectiveness.
		Description of cliff erosion/ reactivation	At Gurnard Cliff, significant slope reactivation and retreat would continue in line with the 'No Active Intervention' scenario outlined above, with cliff toe erosion and retreat outflanking the adjacent defences at Gurnard Luck to the west and Gurnard Bay to the east (by approx. 7m by the end of the epoch). From Gurnard to Cowes, maintenance of the seawalls will prevent exposure and erosion of the toe of the coastal slopes, minimising landslide reactivation. The seawalls would continue to be overtopped with increasing regularity, and may be destabilised by ground movement. Flood risk to properties in the east of the frontage will remain and increase.	With present management practices continuing, landsliding processes could still be re-activated due to rainfall increasing the pore water pressure in the cliffs. The seawalls would prevent erosion but (in their current form) will be overtopped regularly which may destabilise the slopes behind. Flood risk to seafront properties in the east of the frontage will remain and increase.	Very frequent, serious overtopping will occur, inundating roads and infrastructure. Tidal flood risk to seafront properties between Queens Road and the esplanade will increase. Overtopping along large sections of the frontage may assist in saturating and destabilising the coastal slopes at risk of landslide reactivation. Seawalls maintained at current standards will not be sufficient to prevent risk of significant reactivation of landsliding within the coastal slopes, as the seawalls will be overtopped, subject wave attack and may be destabilised by underlying ground movement. Slope failure could be triggered by high groundwater levels so ground conditions will worsen with predicted increases in winter rainfall. Maintenance of the seawalls will however significantly reduce the risk of landslide reactivation by continuing to prevent coastal slope toe erosion and undermining.
		Description of beach evolution	Foreshore narrowing and lowering of beach levels will occur in front of the seawalls, exposing them to wave attack. There will be no direct sediment input into the frontage and littoral drift into the unit from the south-west is limited.	Foreshore narrowing and lowering of beach levels will continue in front of the seawalls, exposing them to wave attack and undermining. There will be no direct sediment input into the frontage (unless significant landslide reactivation occurs) and littoral drift into the unit from the south-west is likely to remain limited.	Foreshore narrowing and lowering of beach levels will continue in front of the seawalls, exposing them to wave attack and undermining. Increased slope failure at adjacent Gurnard Cliff may supply some additional sediments to the area, but this is not likely to be sufficient to counteract the lowering trend along the length of this frontage.

Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
IW57 ***Name:*** **COWES PARADE & HARBOUR** **West Cowes** **From: the Royal Yacht Squadron** **To: Floating Bridge**	**No Active Intervention**	*Short description of predicted defence failure*	2278m defended frontage along Cowes Parade and Cowes town centre. A masonry wall fronts Cowes Parade which will fail in 15-25 years. Moving southwards a series of short sections of concrete and masonry seawalls and steel sheet piles protect individual properties along the waterfront. Unmaintained, the sections of seawall will generally fail in 15-25 years, and the steel sheet piling in 26-60 years. This unit forms the western mouth of the Medina Estuary. For most of the frontage vertical walls rise from the silt of the river bed. Low-lying coastal land on both sides of the Medina Estuary is heavily developed. The defences and parts of the town are low-lying and vulnerable to flooding. Defences maintain the channel to allow commercial operation of the harbour and estuary. The southern limit of this frontage is the key transport link of the Floating Bridge (or Chain Ferry) vehicle and passenger river crossing.	Collapse and of remaining sections of seawall is likely early in this epoch, followed by deterioration and failure of areas of steel sheet piling through the epoch as these areas are isolated or outflanked.	No defences along the majority of the frontage. Steel sheet piling in front of Shepards Wharf marina is expected to last for 30-70 years.
		Description of cliff erosion/ reactivation	This urban area is at risk from both coastal flooding and erosion. This stretch of coast is intensively used and many properties have their own slipways with a variety of defence types, and heights with varying conditions. The average defence height is currently about 2.4m though some places are as low as 2.2mOD. With no further intervention or maintenance the patchwork of defence structures will breach, erosion will set in and flooding will increase. Erosion at 0.35m/yr may result in scattered patches of recent erosion by the end of the epoch. There is flood risk to a large number of properties on the High Street south of the Parade and the shoreline assets running along to the floating bridge.	Rising sea levels will significantly increase flood risk with increasing numbers of properties and businesses at risk, including along the High Street and the lower sections of St. Mary's Road and Cross Street. Erosion will continue at approx. 0.46m/yr where defences have failed, with a total of approx. 14m retreat possible during this epoch. However, patterns of shoreline change will be controlled by remaining hard defence points along the frontage.	Rising sea levels will significantly increase flood risk, with flooding of East Cowes and Cowes town centres on most tides. Erosion of exposed frontages will continue at approx. 0.53m/yr then 0.58m/yr, with a further approx.27m of shoreline retreat possible during this epoch. However, the most significant risk to the frontage will be extensive tidal flooding.
		Description of beach evolution	There will be no direct sediment input into this frontage until defences start to fail later in the epoch, and defences generally rise from the silt	The wave climate at the mouth of the Medina is relatively moderate; therefore, the initial impact is likely to be an increase in the	Continued erosion will supply limited quantities of sediment to the shoreline; however sediment levels along this

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			of the river bed with no fronting beach sediments. Very limited sediment may be released following seawall breaches. Cowes Harbour entrance represents a drift convergence boundary, although very small quantities of sediment moved by littoral transport, together with the Shrape breakwater retaining sediments to the north, makes this little more than a notional feature.	frequency of flooding as a result of sea level rise and increasing adverse weather conditions. However, breach and failure of the Shrape Breakwater (running offshore from East Cowes) will allow increased wave penetration into the estuary and exposure of the shoreline of this unit to wave attack. Failure of the Shrape Breakwater will also release quantities of stored sediment into the harbour mouth and entrance channel, and could divert or weaken the tidal regime across a wider entrance to the estuary. Sediment levels along this frontage are expected to remain negligible, with limited sediment input from patchy erosion following defence failure.	frontage are expected to remain negligible, with fine sediments removed by the tidal flows of the Medina Estuary.
	With present management	*Short description of predicted defence failure*	The present patchwork of concrete and masonry seawalls and steel sheet piles could be maintained at their current standards of effectiveness. The majority of defences along this frontage are privately owned.	Concrete and masonry seawalls and steel sheet piles will be maintained and replaced at their current standards.	Concrete and masonry seawalls and steel sheet piles will be maintained and replaced at their current standards.
		Description of cliff erosion/ reactivation	Maintaining the existing sea walls without improving the current standard of protection will prevent shoreline change due to erosion but will not reduce the current and future levels of flood risk. Tidal inundation already affects Cowes High Street, and the flood risk zone will expand in future epochs and the area will be at high flood risk.	Maintaining the existing sea walls without improving the current standard of protection will prevent shoreline change due to erosion but will not reduce the high flood risk. Overtopping and tidal flooding of the High Street and roads behind will become increasingly frequent, with large numbers of residential commercial and industrial properties affected. Maintaining the shoreline in its current position will help to preserve the harbour entrance channel and retain the commercial operation of the estuary and the important cross-Solent ferry links.	Rising sea levels will result in extensive tidal flooding overtopping the defence structures and inundating the low-lying centre of the town. Increasing numbers of residential commercial and industrial properties will be affected. The seawalls will continue to prevent erosion from changing the shoreline position, but the frequency of flooding may effectively trigger the abandonment of areas. Maintaining the shoreline in its current position will help to preserve the harbour entrance channel and retain the commercial operation of the estuary, although the cross-Solent ferry links are located in the flood risk zones.
		Description of beach	No significant change in the shoreline is anticipated if present management practices	No significant change in the shoreline is anticipated if present management practices	No significant change in the coastal regime is anticipated if present

Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
		evolution	continue. Continuing the use of vertical walls in this location is acceptable because of the low energy wave climate.	continue. There would be no sediment inputs into the frontage from local erosion or significant inputs from adjacent units.	management practices continue. There would be no sediment inputs into the frontage from local erosion.
IW58 ***Name:*** **MEDINA ESTUARY** **Upstream of the Cowes Floating Bridge**	**No Active Intervention**	*Short description of predicted defence failure*	The Medina Estuary is 6.8km in length from Newport to Cowes, and is long relative to the mouth width (of 500m narrowing quickly to 100m). At the northern end of this unit (just south of the Floating Bridge) lie approx. 1.5km lengths of defences fronting Cowes and East Cowes (generally marine industries benefitting from the waterfront location). Defences are a mixture of seawalls with residual lives from 5 to 35 years, and steel sheet piling with residual lives of up to 30-70 years. Significant amounts of the frontage of West Cowes will deteriorate and the defences fail during this first epoch. In East Cowes, the majority of defences will last into the second epoch, with the central sections below Yarborough Road are the first expected to fail at the end of epoch 1. The central reaches of the Estuary are generally undefended, with the exception of the Stag Lane and Dodnor Land frontages of the west bank (concrete walls and steel sheet piling generally failing in 10-15 years or less (with very short sections lasting longer) and at Island Harbour (an inlet on the east bank, with outer banks failing from 5-7 years, but inner seawall and embankment lasting 25-35 years and beyond) and some other short fragments. The central section of the western bank is therefore likely to be largely undefended by the end of this epoch (20 years). Around Newport Harbour and Little London approx. 750m of both banks of the river are protected by masonry and concrete seawalls and steel sheet piles generally expected to fail in 10-15 years or 18-26 years respectively. By the end	The remaining lengths of defended frontage along East Cowes and Island Harbour are likely to deteriorate and fail through this epoch. The rest of the Estuary banks will be undefended during this epoch.	It is likely that there will be no defences remaining (although fragments of isolated steel sheet piles could remain at East Cowes and Island Harbour).

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			of epoch 1 (0-20 years) or early in epoch 2 (20-50 years), the defences surrounding and containing Newport Harbour will have failed, affecting property and infrastructure.		
		Summary of flood and erosion risk	The Medina Estuary extends 6.8km from its tidal limit at Newport Harbour northwards to Cowes and East Cowes. It lies in a wide shallow valley with a gentle incline on either side. At low water a single, relatively wide but shallow channel remains. The lower reaches and mouth are lined by docks, boatyards and marinas. There are narrow intertidal mudflats on either side of the middle and upper estuary, largely bordered by agricultural land and woods and the upper estuary forms the developed area of Newport Harbour. Upstream of the Floating Bridge, the Medina Estuary narrows and is sheltered from wave attack. There is significant flood risk to approximately 1.5km of commercial and residential properties lining each bank of the Medina fronting Cowes and East Cowes, just upstream of the Floating Bridge. There is also flood risk at Folly Lane, Island Harbour, Stag Lane and to a number of commercial and residential properties surrounding Little London and Newport Harbour (which is already inundated, alongside adjacent infrastructure, at extreme high tide events). Within the estuary erosion of the banks and saltmarshes is variable, but occurs predominantly within the middle and upper reaches of the Estuary.	Flood risk remains the main risk to the developed areas and habitats of the Medina Estuary. The frequency of inundation and flood levels are likely to increase, as remaining sections of defence are increasingly overtopped and the scale of property damage increases, particularly affecting commercial properties and marine industries.	Sea level rise of approx. 98cm from 2009 to 2105 will result in increased tidal flood frequency and increasing depth of tidal flooding. Regular inundation of significant areas of Cowes, East Cowes, waterside developments along the estuary margins, Island Harbour, Newport Harbour will occur.
		Summary of estuary response	The Medina Estuary inlet operates as a natural littoral transport boundary as its dominant ebb tidal flow generates net offshore flushing of incoming shoreline sediments, although there is very little incoming littoral drift due to widespread shoreline stabilisation and drift interception. The	The sediment supply into the mouth of the Medina could increase as defences fail along the Cowes-Gurnard and East Cowes frontages, supplying additional sediment to the shoreline and into the weak sediment transport system. Sediment input from the	The sediment supply into the mouth of the Medina is likely to increase as coastal erosion and potential slope reactivation and failure occurs on the coastlines adjacent to the mouth of the Estuary.

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			Shrape breakwater limits the amount of suspended sediment entering the Estuary and shifts the ebb tidal flow westward into the centre of the inlet. These patterns of behaviour may begin to alter in later epochs as defences fail and potential sediment supply from neighbouring coastlines increases. The majority of intertidal sediments along the length of the Medina are cohesive and consist of a wide range of sediment sizes, with the majority silt, followed by fine sand, and some clays and gravel. In Cowes Harbour the main channel is generally composed of silt to sandy silt, changing to gravel through the constriction of the Floating Bridge. Fluvial sources of sediment are considered to be relatively insignificant and are likely to continue to contribute little to the coastlines on either side of the mouth. The entrances to the Western Yar and Medina estuaries have been dredged on several occasions to maintain navigable channels for car ferries. The hydrodynamics of the Medina Estuary are similar to those of the Solent with a double high water feature. It has a tidal range of 4.2m.	east will also increase on the failure of the Shrape breakwater, potentially releasing stored sediments. The tidal flows of the Medina will redistribute this sediment, dependent on the balance between the quantity and type of sediment supply and current strength.	The tidal flows of the Medina will redistribute this sediment, dependent on the balance between the quantity and type (size) of sediment supplied and current strength as the morphology of the Estuary reverts increasingly to its natural form.
	With present management	*Short description of predicted defence failure*	The seawalls and steel sheet piling protecting and constraining the estuary frontages along Cowes, East Cowes, sections of the central estuary, Island Harbour and Newport Harbour will be maintained at their current standards of effectiveness. The majority of the central Estuary will remain undefended.	The seawalls and steel sheet piling protecting the developed frontages will be maintained and replaced. The majority of the central Estuary will remain undefended.	The seawalls and steel sheet piling protecting the developed frontages will be maintained and replaced. The majority of the central Estuary will remain undefended.
		Summary of flood and erosion risk	Maintenance of the defences will hold the shoreline in its present position and prevent collapse and undermining of the borders of the estuary, maintaining commercial harbours and operations at Cowes and Newport. However, there would continue to be significant flood risk to approximately 1.5km of commercial and residential properties lining each bank of the	Maintenance of the defences will hold the shoreline in its present position and prevent collapse and undermining of the borders of the estuary, maintaining a navigable and commercial channel through Cowes and East Cowes into the central and upper Estuary. Defences at East Cowes and Island Harbour will also be renewed and replaced under this scenario, maintaining	Sea level rise of approx. 98cm from 2009 to 2105 will result in increased tidal flood frequency and increasing depth of tidal flooding. Regular inundation of significant areas of Cowes, East Cowes, waterside developments along the estuary margins, Island Harbour, Newport Harbour is likely as the majority of defence levels are likely to be insufficient as they were not

Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
			Medina fronting Cowes and East Cowes, just upstream of the Floating Bridge. There is also flood risk at Folly Lane, Island Harbour, Stag Lane and to a number of commercial and residential properties surrounding Little London and Newport Harbour. The risk of overtopping is dependent on the variable crest heights of current defences, which do not form a continuous line or consistent standard of protection. Within the estuary erosion of the banks is variable, but occurs predominantly within the middle and upper reaches of the Estuary while defences remain near the Estuary mouth.	access to and use of the shoreline. Flood risk remains the main risk to the developed frontages of the Medina Estuary. The frequency of inundation and flood levels are likely to increase as sections of defence are increasingly overtopped and the scale of property damage increases, particularly affecting commercial properties and marine industries.	designed to protect against the prevailing conditions on a 50-100 year timescale.
		Summary of estuary response	The Medina Estuary inlet operates as a natural littoral transport boundary as its dominant ebb tidal flow generates net offshore flushing of incoming shoreline sediments, although there is very little incoming littoral drift due to widespread shoreline stabilisation and drift interception. The Shrape breakwater limits the amount of suspended sediment entering the Estuary and shifts the ebb tidal flow westward into the centre of the inlet. The maintenance of the defences within the Estuary and particularly in adjacent units (Gurnard and Cowes Esplanade, Cowes Parade and Harbour and East Cowes Esplanade) will continue this pattern of behaviour, preventing the commencement of erosion input to the local weak littoral drift system and starving the Estuary mouth of sediments from neighbouring shorelines. Fluvial sources of sediment are considered to be relatively insignificant and are likely to continue to contribute little to the coastlines on either side of the mouth. The entrance to the Medina Estuary has been dredged on several occasions to maintain a navigable channel for car ferries.	The maintenance of the defences within the Estuary and particularly in adjacent units will continue to prevent erosion and supply of littoral drift sediment from converging in the estuary mouth. The Shrape breakwater in particular will continue to help prevent sediment encroaching into the Estuary mouth from the east –important in maintaining a navigable and commercial channel to the upper Estuary.	The maintenance and replacement of the defences within the Estuary, the Shrape breakwater and particularly in adjacent units will continue to control and minimise sediment input and supply, assisting the maintenance of a navigable and commercial channel to the upper Estuary. Rising sea levels and increasing storminess may affect the behaviour and interactions of the Estuary system at the mouth and will impact upon the intertidal habitats of the central Estuary.
IW59	**No Active Intervention**	*Short description of predicted*	This 917km frontage forms the eastern mouth of the Medina Estuary and is similar in character to the western mouth (see unit IW58 Cowes Parade	Remaining sections of seawall will fail early in this epoch, with the exception of the sections of steel sheet piles fronting the	No defences along the majority of the frontage.

Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
***Name:* EAST COWES OUTER HARBOUR** **From: Floating Bridge, East Cowes** **To: Shrape Breakwater**		*defence failure*	& Harbour). For most of the frontage a variety of vertical walls rise from the silt of the river bed. Low-lying coastal land on both sides of the Medina Estuary is heavily developed. The southern limit of this frontage is the key transport link of the Floating Bridge (or Chain Ferry) vehicle and passenger river crossing. Moving northwards from the Floating Bridge a series of concrete and masonry seawalls and steel sheet piles protect properties and businesses along the waterfront. Unmaintained, the sections of seawall will generally fail in 15-25 years, and the steel sheet piling in 26-60 years. At the northern end of this unit East Cowes promenade is a brickwork wall with concrete buttresses and encasement, with short concrete groynes at intervals along the frontage. It is expected to fail in 10-15 years. The promenade behind provides road and footpath access to the coast. The East Cowes (Shrape) Breakwater consists of a concrete wall with concrete braces on the southern side, expected to fail in 15-25 years.	commercial site on Castle Street which may remain for approximately 25-30 and 30-70 years.	Any remaining remnant structures will be outflanked and regularly inundated.
		Description of cliff erosion/ reactivation	This urban area is at risk principally from coastal flooding. With no further intervention or maintenance the defence structures in the north and south of the frontage will breach at the end of epoch 1. Erosion at 0.12m/yr may result in scattered patches of recent erosion by the end of the epoch (up to 0.6m in total by year 20). There is flood risk to a large number of properties in the town centre and along seafront roads. Overtopping and tidal flooding already occurs (for example at the Car Ferry terminal frontage). The wave climate at the mouth of the Medina is relatively moderate due to the shelter of Shrape breakwater, however, there is likely to be an increase in the frequency of flooding.	Defences in the centre of the unit will deteriorate and fail progressively. Exposure of the shoreline will increase following failure of the Shrape breakwater. An increase in the frequency of flooding is likely as a result of sea level rise and increasing adverse weather conditions. The flood risk area covers the town centre, Albany Road Castle Street, Ferry Road, York Avenue, Dover Road and Well Road and Clarence Road. Erosion will continue at approx. 0.15m/yr where defences have failed, with a total of approx. 5m retreat possible during this	Rising sea levels will significantly increase flood risk, with flooding of East Cowes and Cowes town centres on most tides. Erosion will continue at approx. 0.18m/yr then 0.19m/yr, with a further approx. 9m of shoreline retreat possible during this epoch (or 15m in total since year 1). However, the most significant risk to the frontage will be extensive tidal flooding.

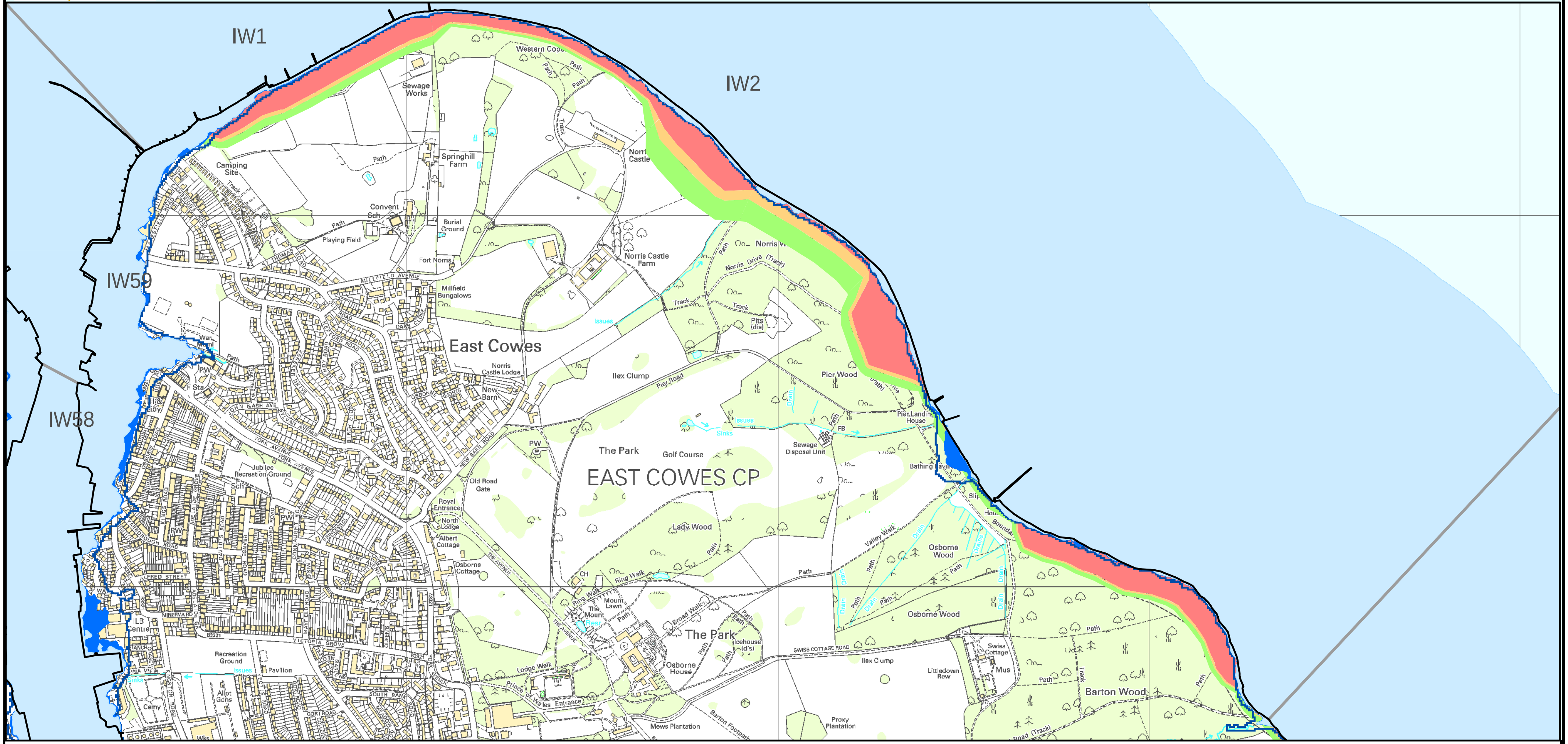
Location	Scenario		Predicted change for: Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
				epoch (6m in total since year 1). Shoreline change will be controlled by remaining hard defence points along the centre of the frontage.	
		Description of beach evolution	This frontage comprises the eastern mouth of the Medina Estuary. For much of the frontage vertical walls rise from the silt of the river bed. Westwards directed, but very weak, littoral drift occurs from a drift divergence at Old Castle Point towards the Shrape breakwater. The Shrape Breakwater prevents sediment input into Cowes Harbour and into this frontage; however, falling beach levels and lack of significant accretion against the breakwater indicate low drift rates. Cowes Harbour entrance therefore represents a drift convergence boundary, although the very small quantities of sediment moved by littoral transport towards the Medina entrance, together with the Shrape breakwater, makes this little more than a notional feature. There will be no direct sediment input into this frontage until defences start to fail later in the epoch, and defences generally rise from the silt of the river bed with no fronting beach sediments.	Failure of the Shrape Breakwater will release quantities of stored sediment into the harbour mouth and entrance channel, and could divert or weaken the tidal regime across a wider entrance to the estuary. Sediment levels along this frontage are expected to remain negligible, with limited sediment input from patchy erosion following defence failure.	Continued erosion will supply very limited quantities of sediment to the shoreline, however sediment levels along this frontage are expected to remain negligible, with fine sediments removed by the tidal flows of the Medina Estuary.
	With present management	*Short description of predicted defence failure*	The present concrete and masonry seawalls and steel sheet piles could be maintained at their current standards of effectiveness.	Concrete and masonry seawalls and steel sheet piles will be maintained and replaced at their current standards.	Concrete and masonry seawalls and steel sheet piles will be maintained and replaced at their current standards.
		Description of cliff erosion/ reactivation	Maintaining the existing sea walls without improving the current standard of protection will prevent shoreline change due to erosion but will not reduce the current and future levels of flood risk. Tidal inundation already encroaches into the developed area. The flood risk zone will expand in future epochs and the area will be at high flood risk. Maintaining the Shrape breakwater will prevent wave overtopping of these walls.	Maintaining the existing sea walls without improving the current standard of protection will prevent shoreline change due to erosion but will not reduce the high flood risk. Overtopping and tidal flooding of the town centre and seafront roads will become increasingly frequent, with large numbers of residential commercial and industrial properties affected.	Rising sea levels will result in extensive tidal flooding overtopping the defence structures and inundating the low-lying centre of the town. Increasing numbers of residential commercial and industrial properties will be affected. The seawalls will continue to prevent erosion from changing the shoreline position, but the frequency of flooding

Location	Scenario		Predicted change for:		
			Years 0-20 (to approx. 2025)	Years 20-50 (to approx. 2055)	Years 50-100 (to approx. 2105)
				Maintaining the shoreline in its current position will help to preserve the harbour entrance channel and retain the commercial operation of the estuary and the important cross-Solent ferry links.	could trigger the abandonment of areas. Maintaining the shoreline in its current position will help to preserve the harbour entrance channel and retain the commercial operation of the estuary, although the cross-Solent ferry links are located in the flood risk zones.
		Description of beach evolution	No significant change in the shoreline is anticipated if present management practices continue. Continuing the use of vertical walls in this location is acceptable because of the low energy wave climate.	No significant change in the shoreline is anticipated if present management practices continue. There would be no sediment inputs into the frontage from local erosion or significant inputs from adjacent units.	No significant change in the shoreline is anticipated if present management practices continue. There would be no sediment inputs into the frontage from local erosion or significant inputs from adjacent units.

Isle of Wight Shoreline Management Plan 2

1:15,000

0 50 100 200 300 400 500 Meters



Key:

IW units (used in Appendix C) tables

Indicative erosion zone up to 2025 if 'No Active Intervention' occurs (i.e. if existing coastal defences are allowed to fail)

Indicative erosion zone up to 2055 if 'No Active Intervention' occurs

Indicative erosion zone up to 2105 if 'No Active Intervention' occurs

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

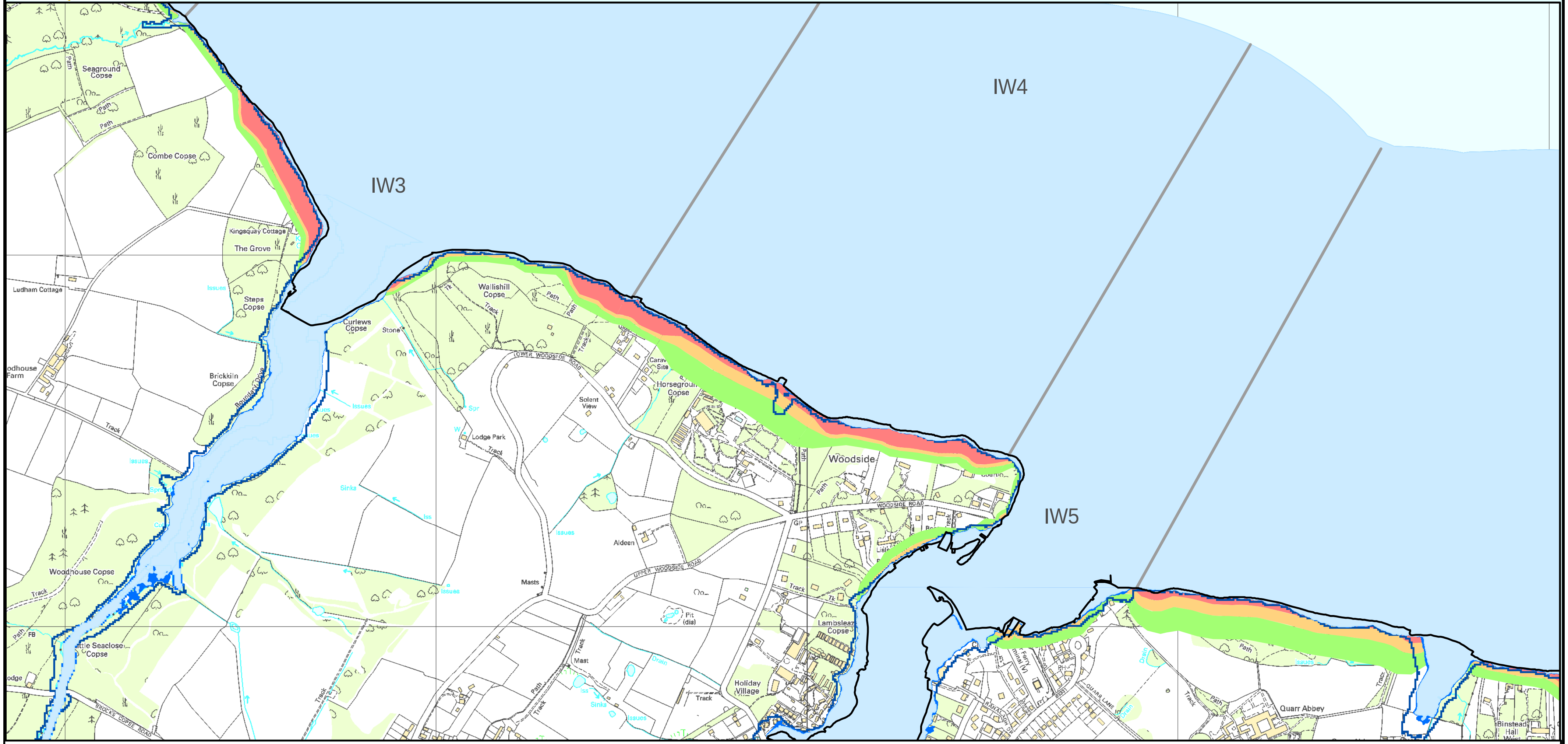
2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Erosion Mapping: No Active Intervention scenario

East Cowes and Osborne (PU 1A.6 & 2A.1)

Isle of Wight Shoreline Management Plan 2

1:15,000



Key:

! IW units (used in Appendix C) tables

Indicative erosion zone up to 2025 if 'No Active Intervention' occurs (i.e. if existing coastal defences are allowed to fail)

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2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Erosion Mapping: No Active Intervention scenario

Kings Quay and Woodside (PU 2A.1 & 2A.2)

Isle of Wight Shoreline Management Plan 2

1:15,000

Meters
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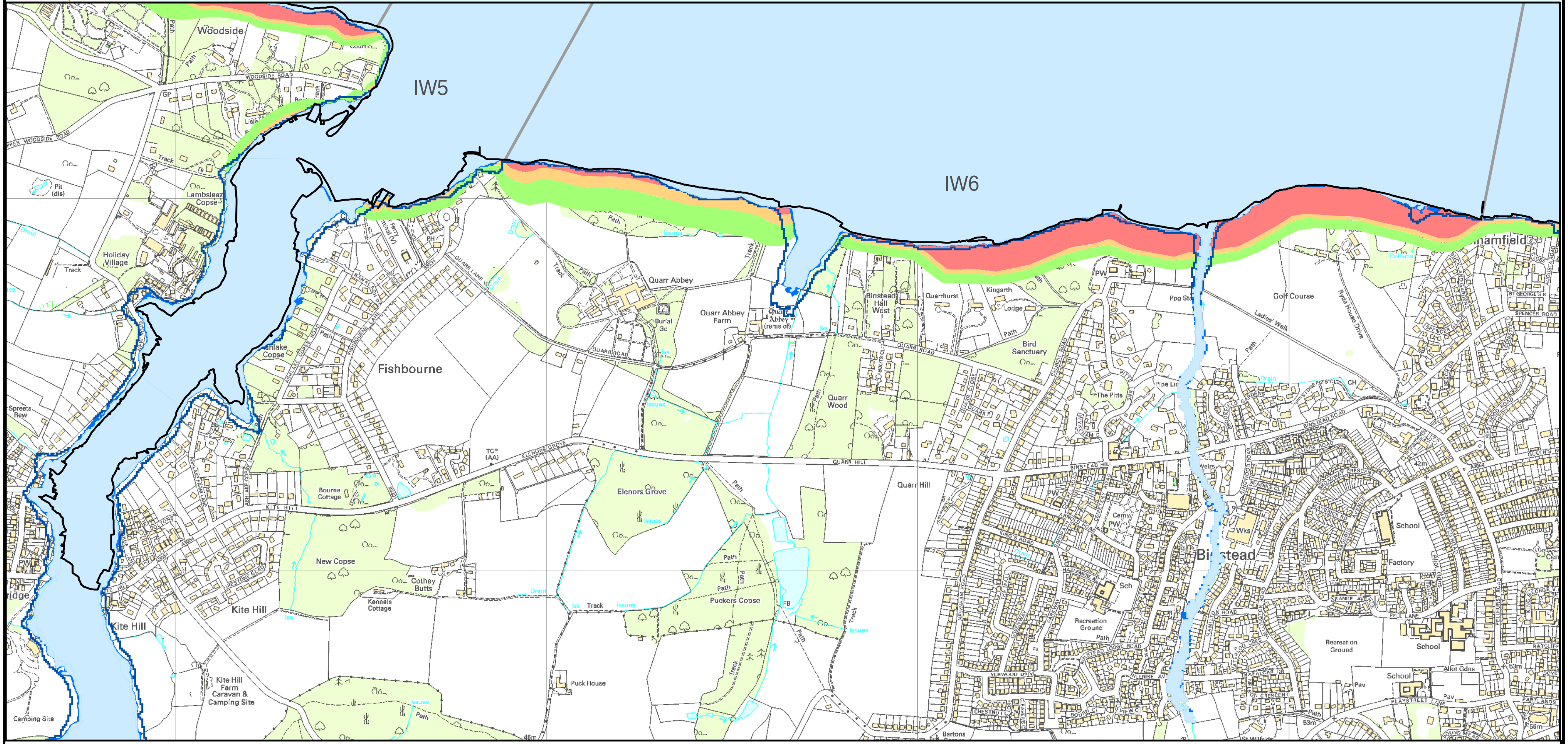

Key:

IW units (used in Appendix C) tables

Indicative erosion zone up to 2025 if 'No Active Intervention' occurs (i.e. if existing coastal defences are allowed to fail)

Indicative erosion zone up to 2055 if 'No Active Intervention' occurs

Indicative erosion zone up to 2105 if 'No Active Intervention' occurs

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2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

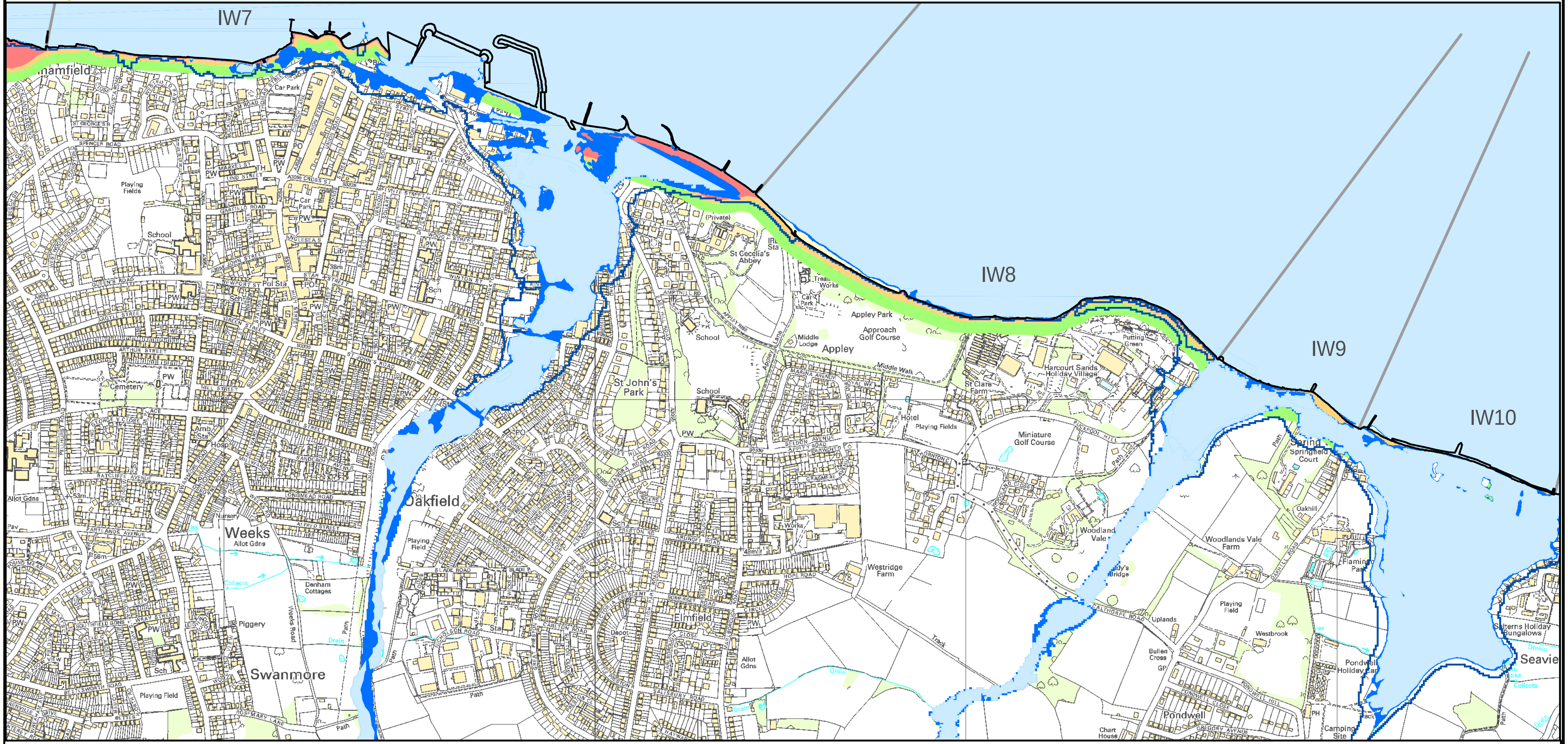
Erosion Mapping: No Active Intervention scenario

Wootton Creek and Quarr (PU 2B.1 to 2B.8)

Isle of Wight Council

Isle of Wight Shoreline Management Plan 2

1:15,000



Key:

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	Indicative erosion zone up to 2025 if 'No Active Intervention' occurs (i.e. if existing coastal defences are allowed to fail)
	Indicative erosion zone up to 2055 if 'No Active Intervention' occurs
	Indicative erosion zone up to 2105 if 'No Active Intervention' occurs
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	2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency
	2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Erosion Mapping: No Active Intervention scenario

Ryde to Seaview Duver (PU 2C.1 to 2C.3)

Isle of Wight Shoreline Management Plan 2

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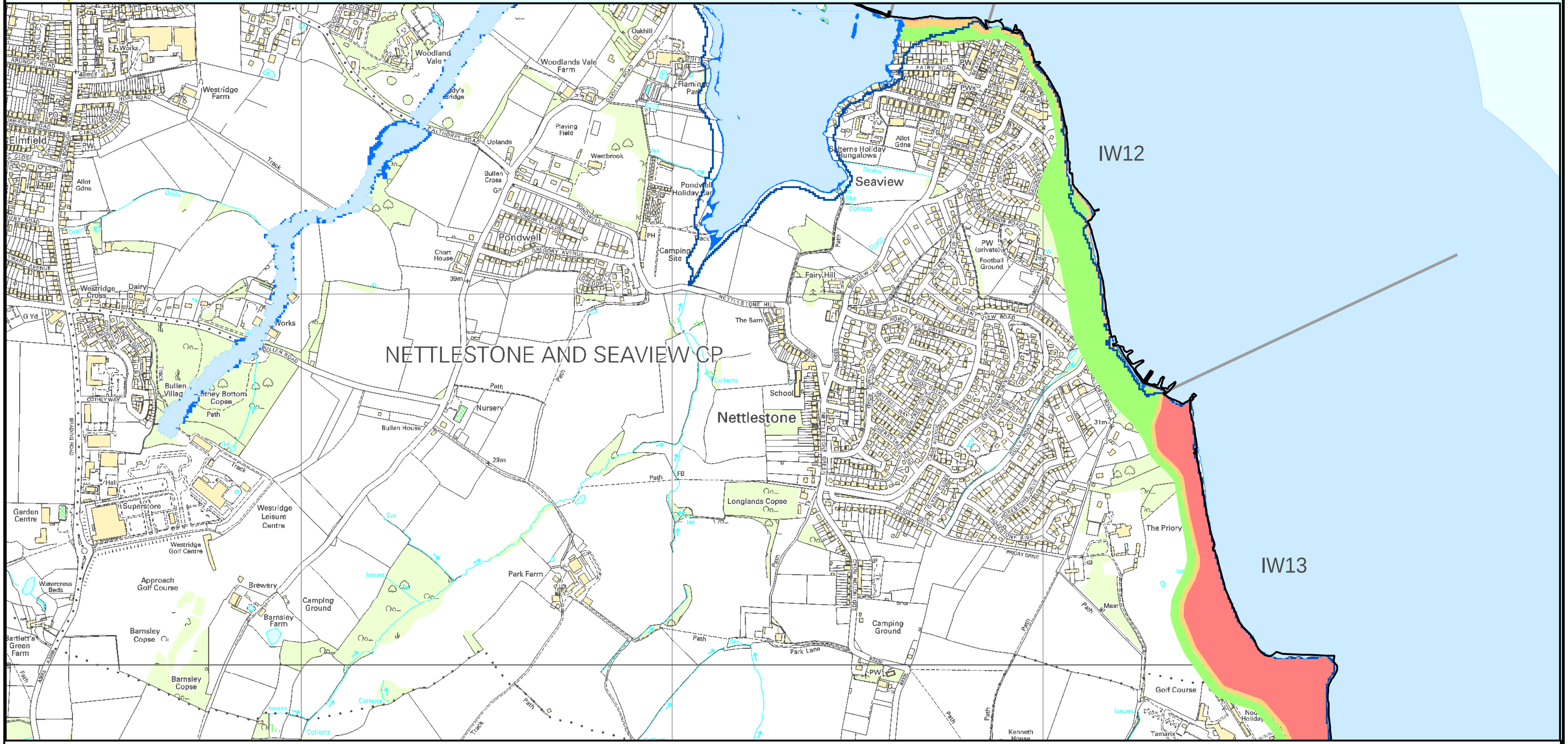

Key:

- IW units (used in Appendix C) tables
- Indicative erosion zone up to 2025 if 'No Active Intervention' occurs (i.e. if existing coastal defences are allowed to fail)
- Indicative erosion zone up to 2055 if 'No Active Intervention' occurs
- Indicative erosion zone up to 2105 if 'No Active Intervention' occurs
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- 2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency
- 2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Erosion Mapping: No Active Intervention scenario

Seaview and Priory Bay (PU 2C.4 & 3A.1)

Isle of Wight Shoreline Management Plan 2

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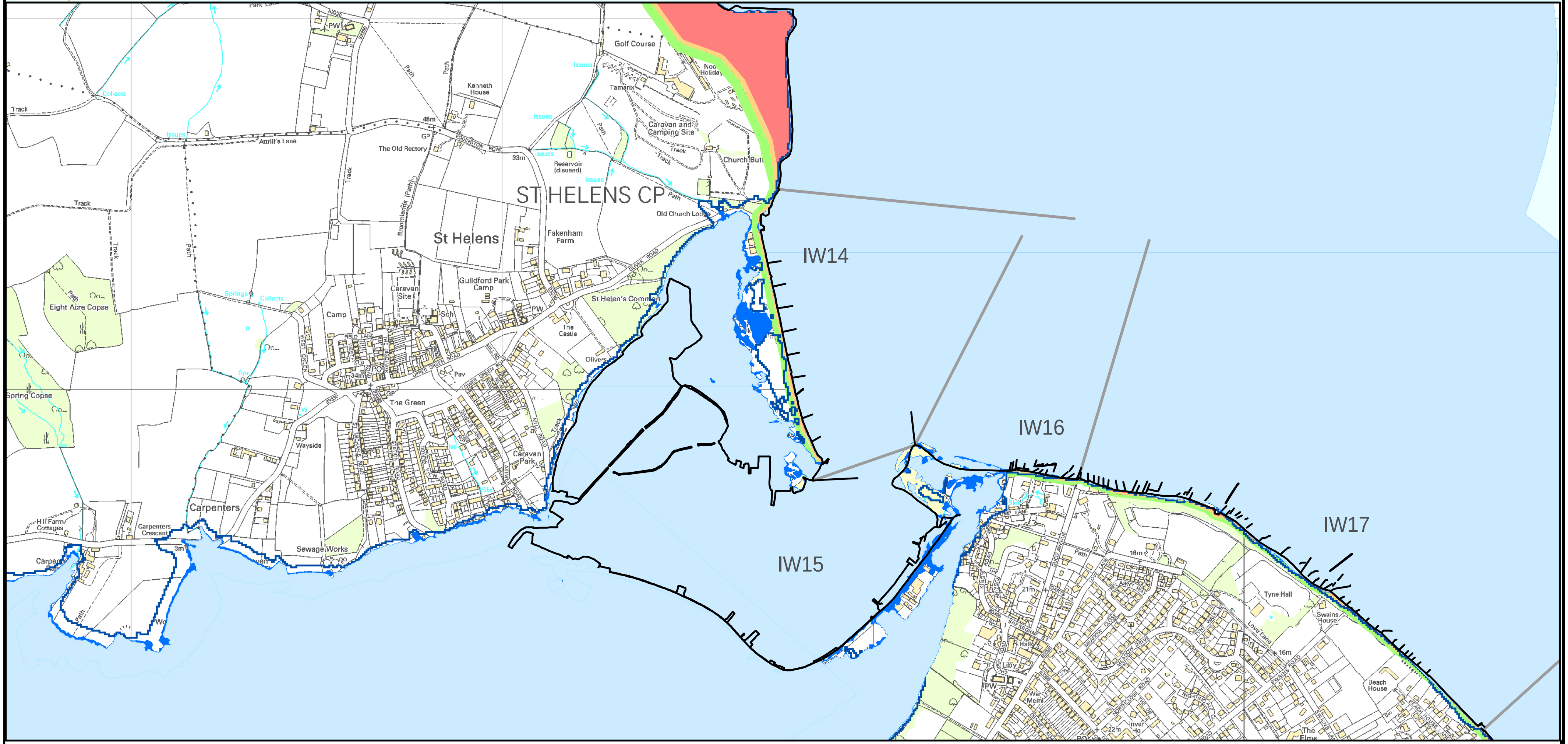

Key:

IW units (used in Appendix C) tables

Indicative erosion zone up to 2025 if 'No Active Intervention' occurs (i.e. if existing coastal defences are allowed to fail)

Indicative erosion zone up to 2055 if 'No Active Intervention' occurs

Indicative erosion zone up to 2105 if 'No Active Intervention' occurs

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2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Ordnance Survey

Erosion Mapping: No Active Intervention scenario

Bembridge Harbour (PU 3A.2 to 3B.1)

Isle of Wight Shoreline Management Plan 2

1:15,000

Meters
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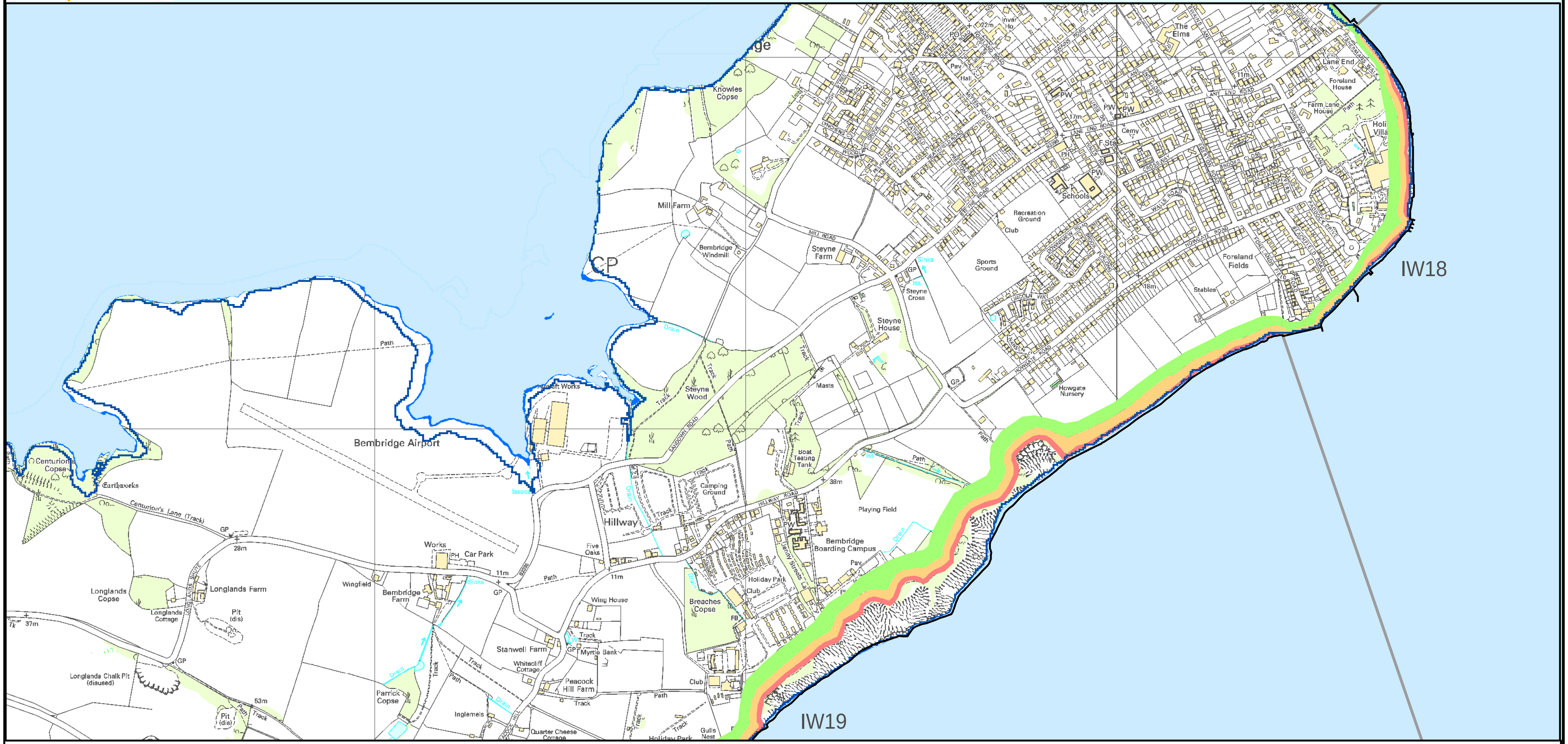

Key:

IW units (used in Appendix C) tables

Indicative erosion zone up to 2025 if 'No Active Intervention' occurs (i.e. if existing coastal defences are allowed to fail)

Indicative erosion zone up to 2055 if 'No Active Intervention' occurs

Indicative erosion zone up to 2105 if 'No Active Intervention' occurs

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2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

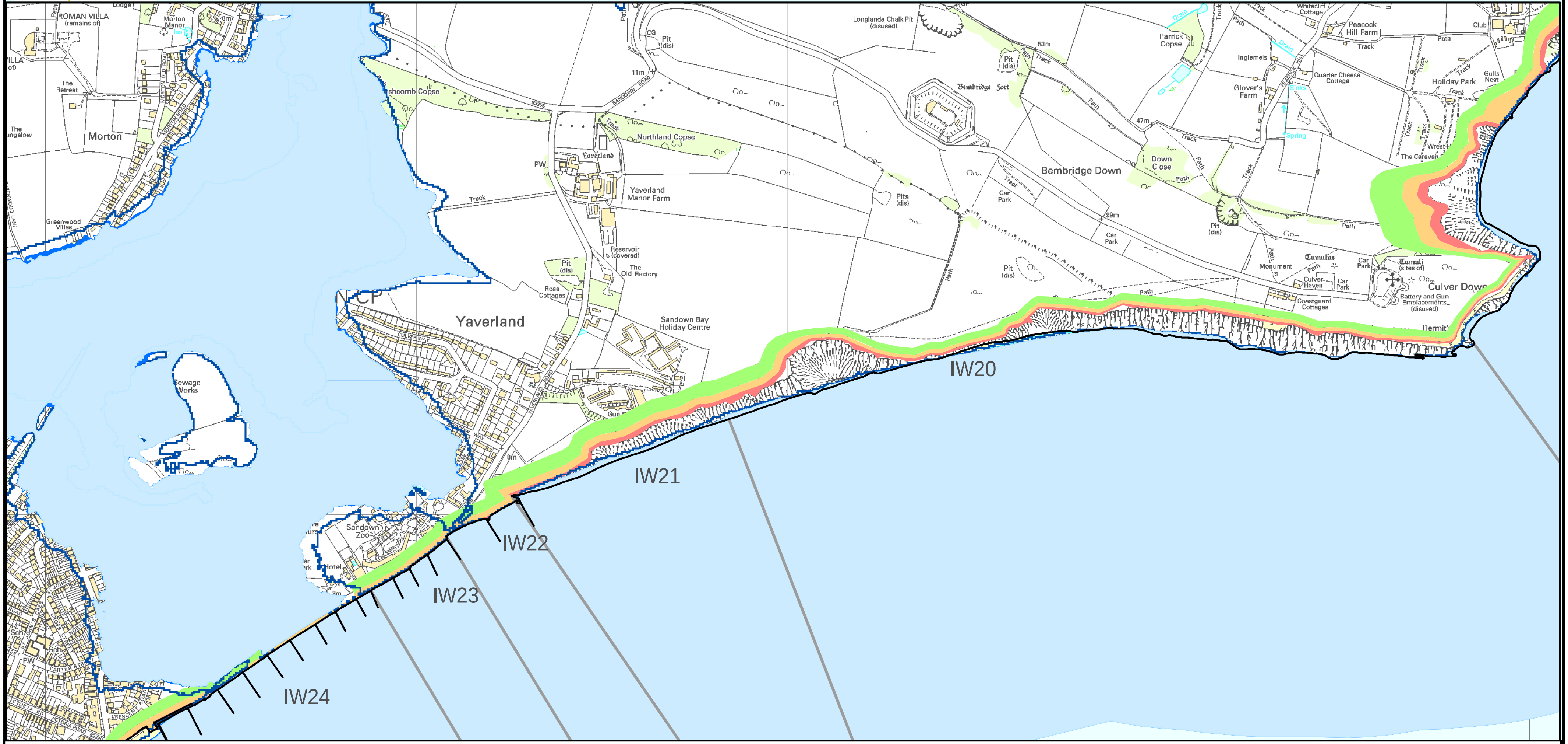
Erosion Mapping: No Active Intervention scenario

Foreland (PU 3B.2 to 3B.5)

Isle of Wight Shoreline Management Plan 2

1:15,000

0 50 100 200 300 400 500 Meters



Key:

!	IW units (used in Appendix C) tables
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	Indicative erosion zone up to 2055 if 'No Active Intervention' occurs
	Indicative erosion zone up to 2105 if 'No Active Intervention' occurs
	2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency
	2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency
	2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Erosion Mapping: No Active Intervention scenario

Yaverland to Whitecliff Bay (PU 3C.2 to 3B.5)

Isle of Wight Shoreline Management Plan 2

1:15,000

Meters
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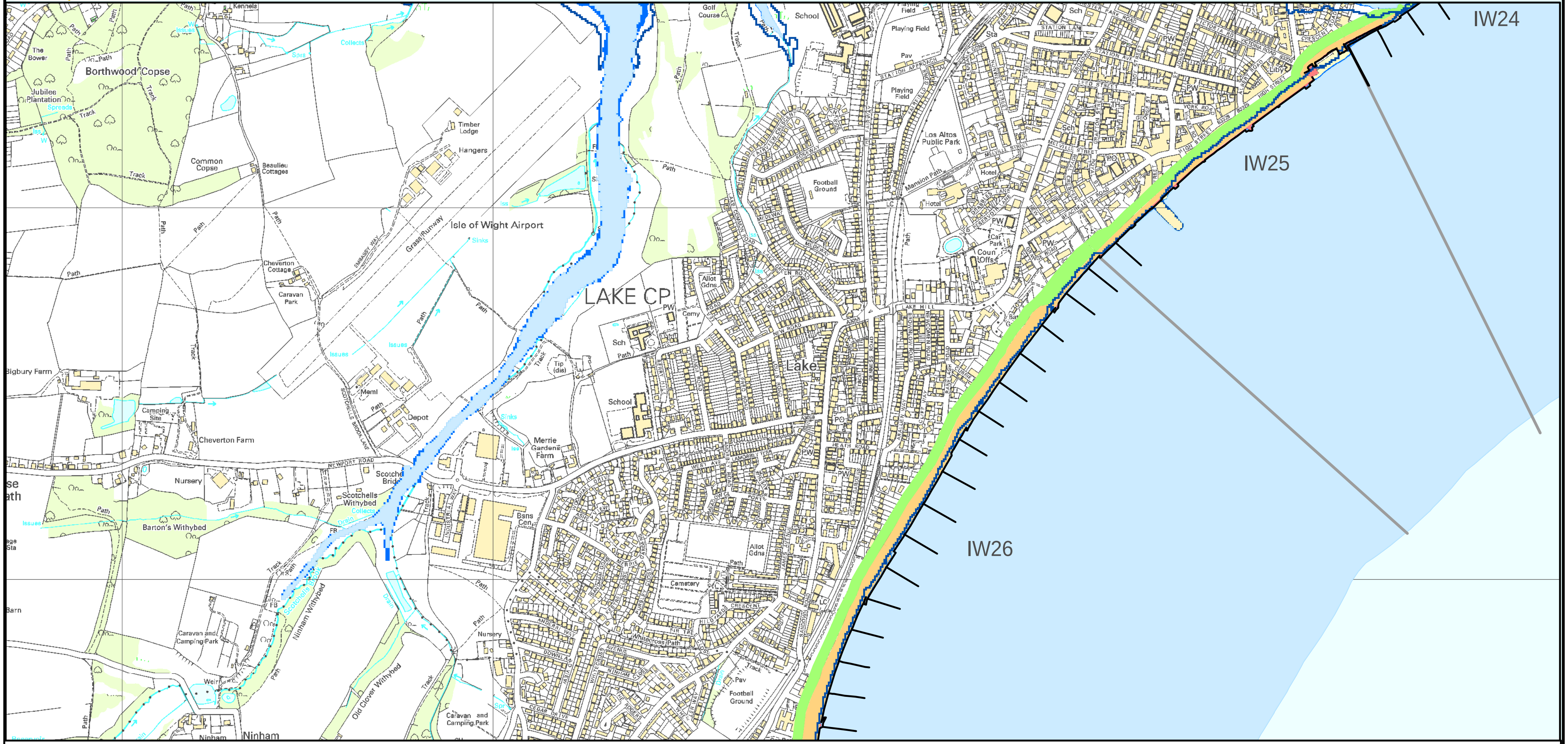

Key:

IW units (used in Appendix C) tables

Indicative erosion zone up to 2025 if 'No Active Intervention' occurs (i.e. if existing coastal defences are allowed to fail)

Indicative erosion zone up to 2055 if 'No Active Intervention' occurs

Indicative erosion zone up to 2105 if 'No Active Intervention' occurs

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Erosion Mapping: No Active Intervention scenario

Sandown and Lake (PU 3C.3)

Isle of Wight Shoreline Management Plan 2

1:15,000

Meters
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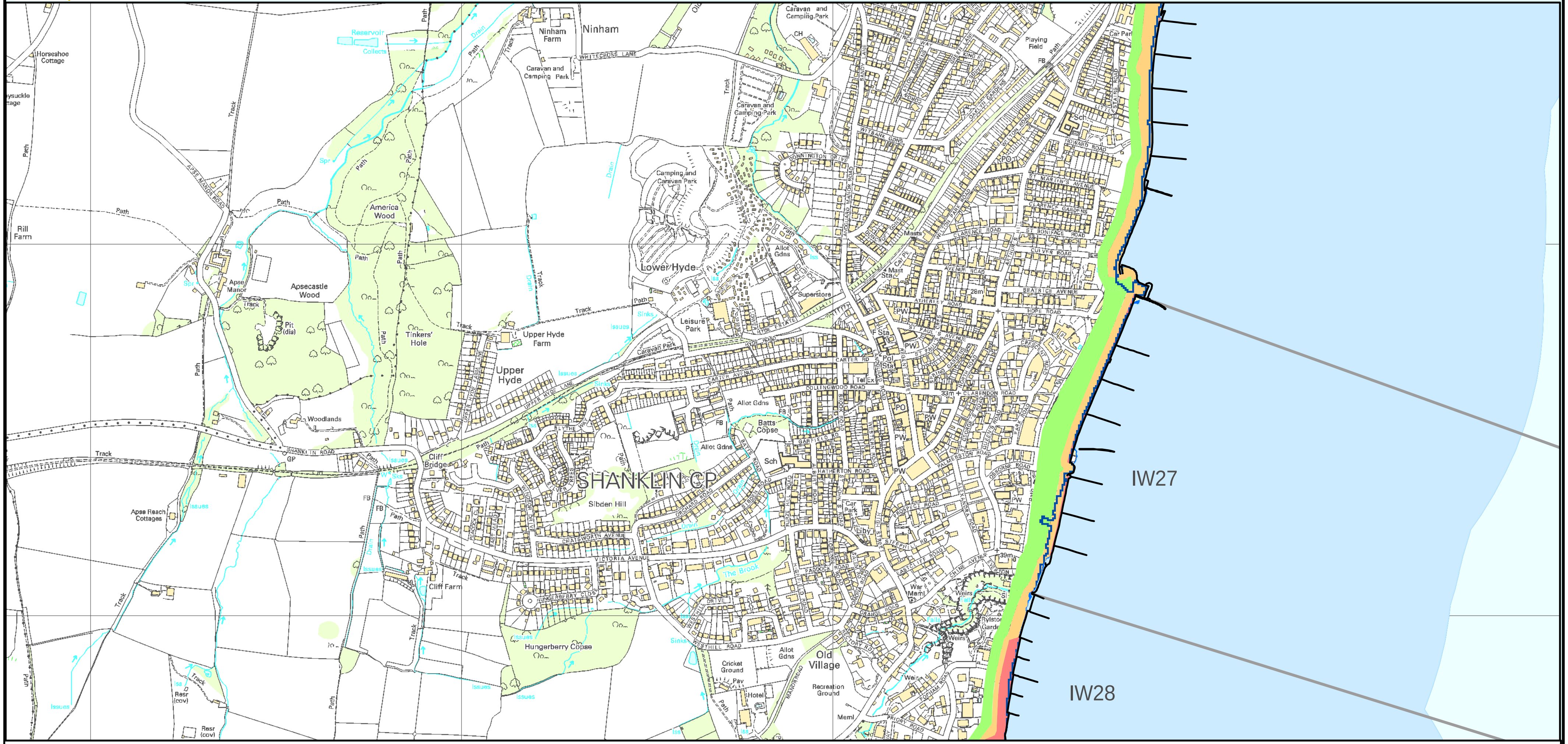

Key:

IW units (used in Appendix C) tables

Indicative erosion zone up to 2025 if 'No Active Intervention' occurs (i.e. if existing coastal defences are allowed to fail)

Indicative erosion zone up to 2055 if 'No Active Intervention' occurs

Indicative erosion zone up to 2105 if 'No Active Intervention' occurs

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Erosion Mapping: No Active Intervention scenario

Shanklin (PU 3C.3)

Isle of Wight Shoreline Management Plan 2

1:15,000

Meters
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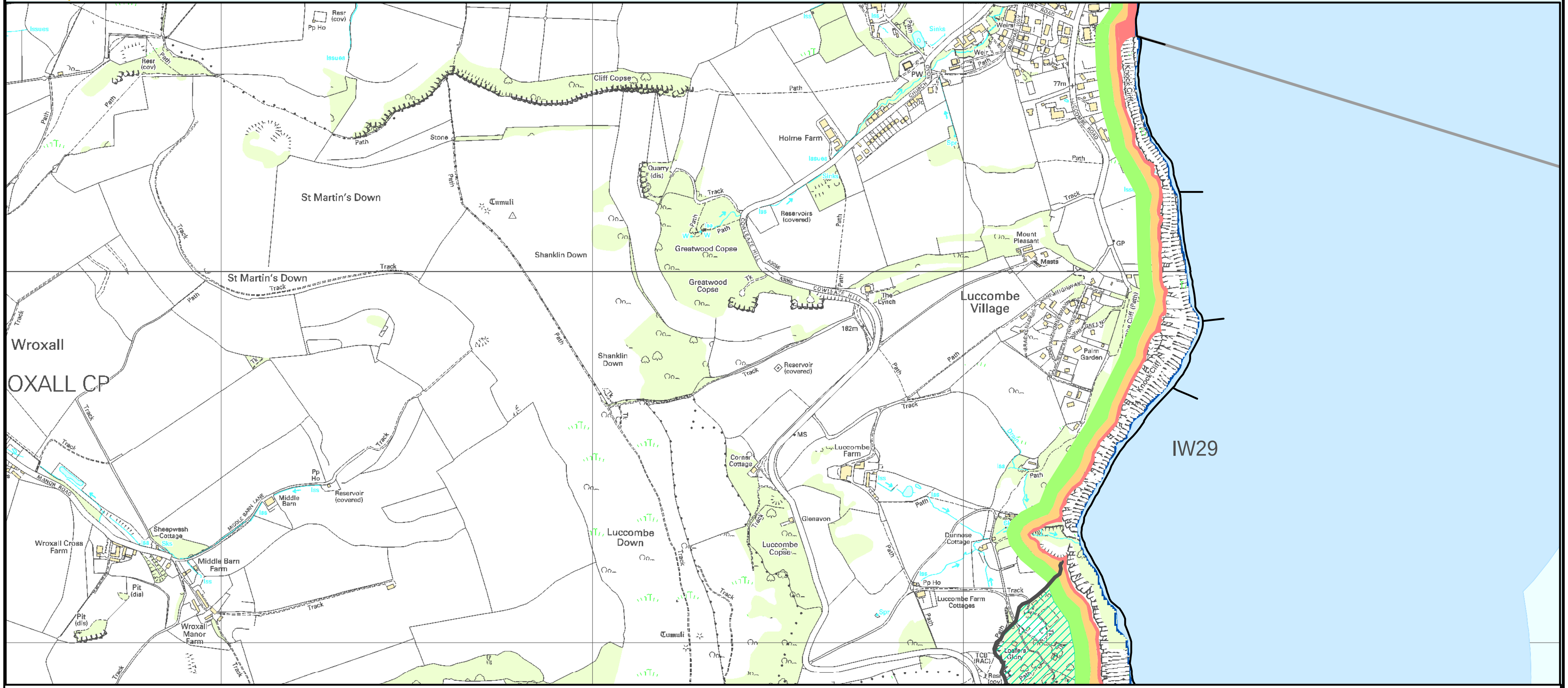


Key:

IW units (used in Appendix C) tables

Indicative erosion zone up to 2025 if 'No Active Intervention' occurs (i.e. if existing coastal defences are allowed to fail)

Indicative erosion zone up to 2055 if 'No Active Intervention' occurs

Indicative erosion zone up to 2105 if 'No Active Intervention' occurs

Increased potential for landslide reactivation within Ventnor and the steeper eastern Undercliff if 'No Active Intervention' occurs (if existing defences are allowed to fail and erosion commences or continues)

Landward limit of the Ventnor Undercliff Landslide Complex

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

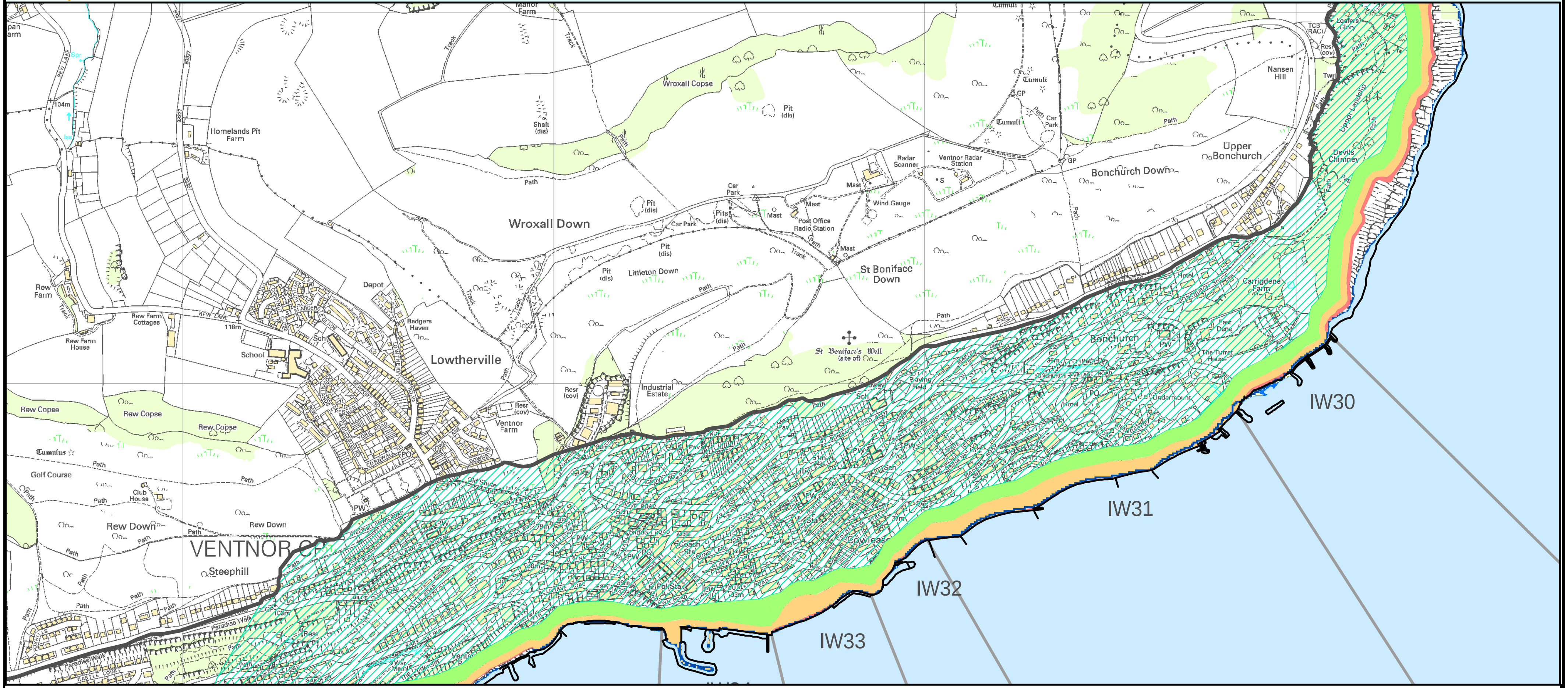
Erosion Mapping: No Active Intervention scenario

Luccombe and Dunnose (PU 3C.4 & 4A.1)

Isle of Wight Shoreline Management Plan 2

1:15,000

0 50 100 200 300 400 500 Meters



Key:

- IW units (used in Appendix C) tables
- Indicative erosion zone up to 2025 if 'No Active Intervention' occurs (i.e. if existing coastal defences are allowed to fail)
- Indicative erosion zone up to 2055 if 'No Active Intervention' occurs
- Indicative erosion zone up to 2105 if 'No Active Intervention' occurs
- Increased potential for landslide reactivation within Ventnor and the steeper eastern Undercliff if 'No Active Intervention' occurs (if existing defences are allowed to fail and erosion commences or continues)
- Landward limit of the Ventnor Undercliff Landslide Complex
- 2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency
- 2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency
- 2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

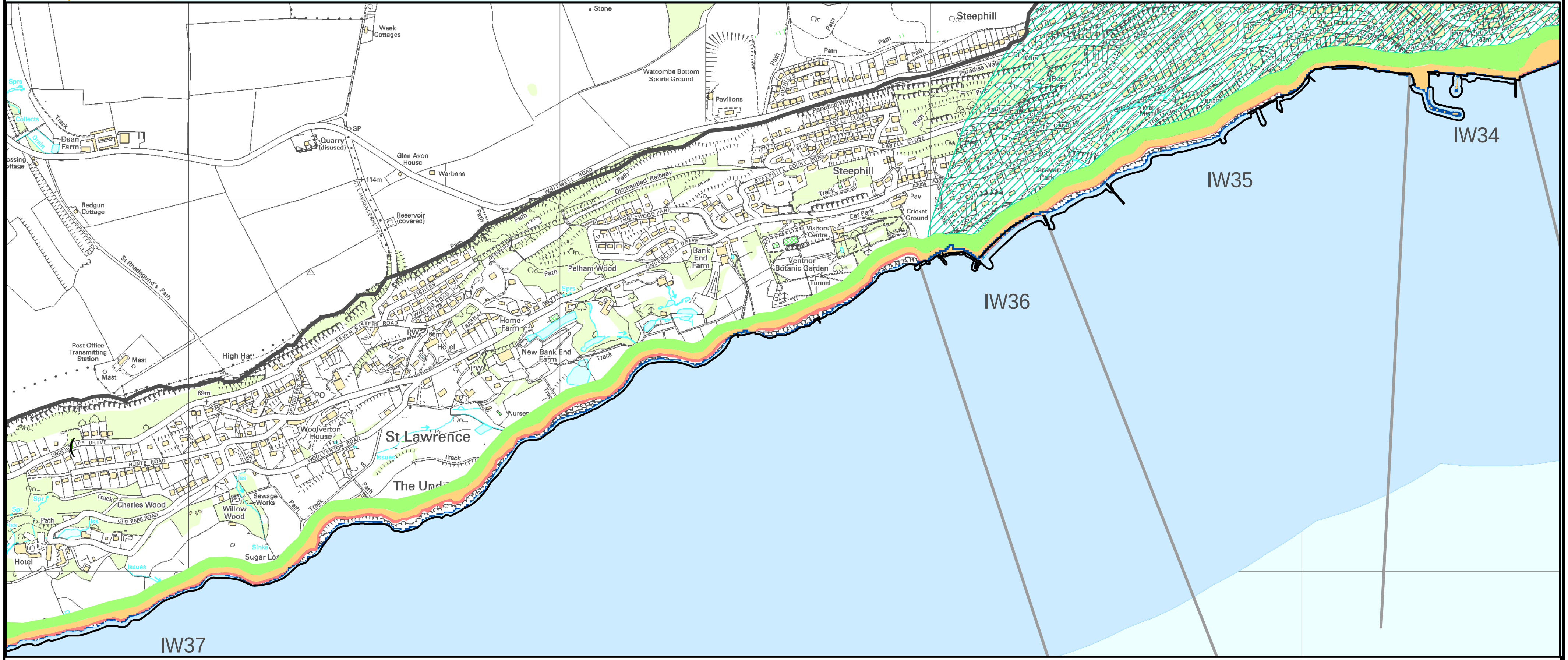
Erosion Mapping: No Active Intervention scenario

Ventnor, Bonchurch and Dunnose (PU 4A.1 & 4A.2)

Isle of Wight Shoreline Management Plan 2

1:15,000

0 50 100 200 300 400 500 Meters



Key:

!	IW units (used in Appendix C) tables
(red)	Indicative erosion zone up to 2025 if 'No Active Intervention' occurs (i.e. if existing coastal defences are allowed to fail)
(orange)	Indicative erosion zone up to 2055 if 'No Active Intervention' occurs
(green)	Indicative erosion zone up to 2105 if 'No Active Intervention' occurs
(hatched)	Increased potential for landslide reactivation within Ventnor and the steeper eastern Undercliff if 'No Active Intervention' occurs (if existing defences are allowed to fail and erosion commences or continues)
(dark line)	Landward limit of the Ventnor Undercliff Landslide Complex
(light blue)	2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency
(blue)	2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency
(outlined box)	2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII
(	Road breaches likely to occur if 'present management' continues in this area (due to landslide reactivation)

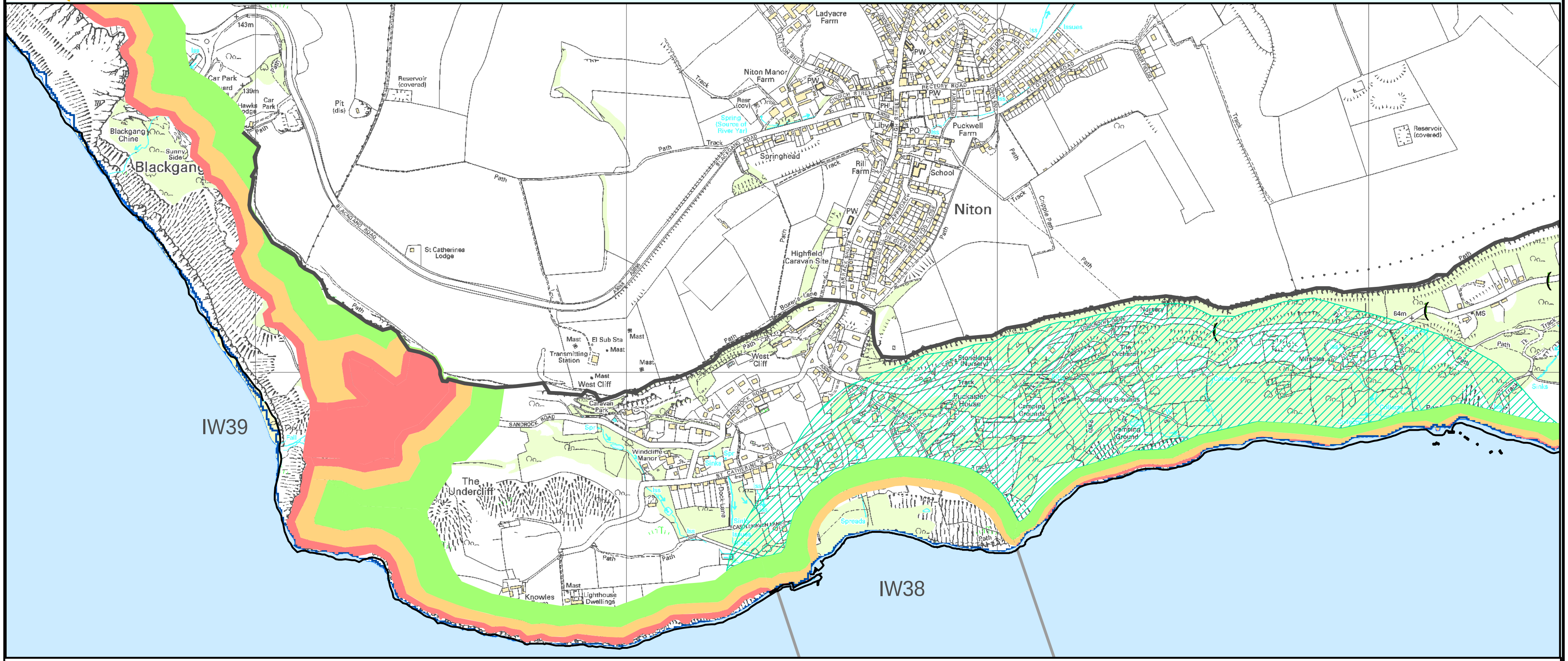
Erosion Mapping: No Active Intervention scenario

Ventnor and the St Lawrence Undercliff (PU 4A.2 & 4B.1)

Isle of Wight Shoreline Management Plan 2

1:15,000

0 50 100 200 300 400 500 Meters



Key:

- IW units (used in Appendix C) tables
- Indicative erosion zone up to 2025 if 'No Active Intervention' occurs (i.e. if existing coastal defences are allowed to fail)
- Indicative erosion zone up to 2055 if 'No Active Intervention' occurs
- Indicative erosion zone up to 2105 if 'No Active Intervention' occurs
- Increased potential for landslide reactivation near Castlehaven if 'No Active Intervention' occurs (if existing defences are allowed to fail and erosion commences or continues)
- Landward limit of the Ventnor Undercliff Landslide Complex
- 2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency
- 2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency
- 2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII
- Road breaches likely to occur if 'present management' continues in this area (due to landslide reactivation)

Erosion Mapping: No Active Intervention scenario

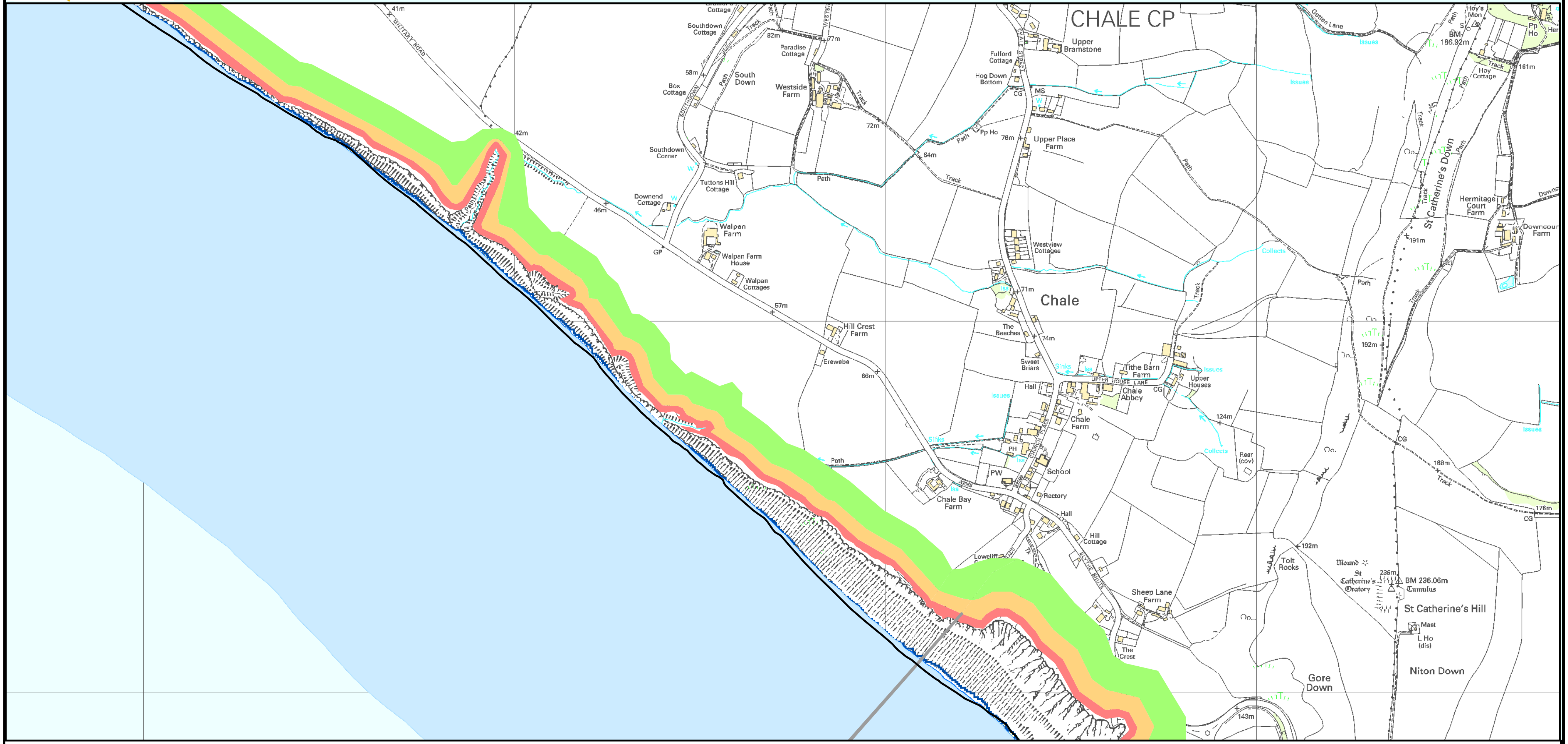
Castlehaven and Blackgang (PU 4B.2 & 4B.3)

Isle of Wight Shoreline Management Plan 2

1:15,000

Meters

0 50 100 200 300 400 500



Key:

! IW units (used in Appendix C) tables

Indicative erosion zone up to 2025 if 'No Active Intervention' occurs (i.e. if existing coastal defences are allowed to fail)

Indicative erosion zone up to 2055 if 'No Active Intervention' occurs

Indicative erosion zone up to 2105 if 'No Active Intervention' occurs

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

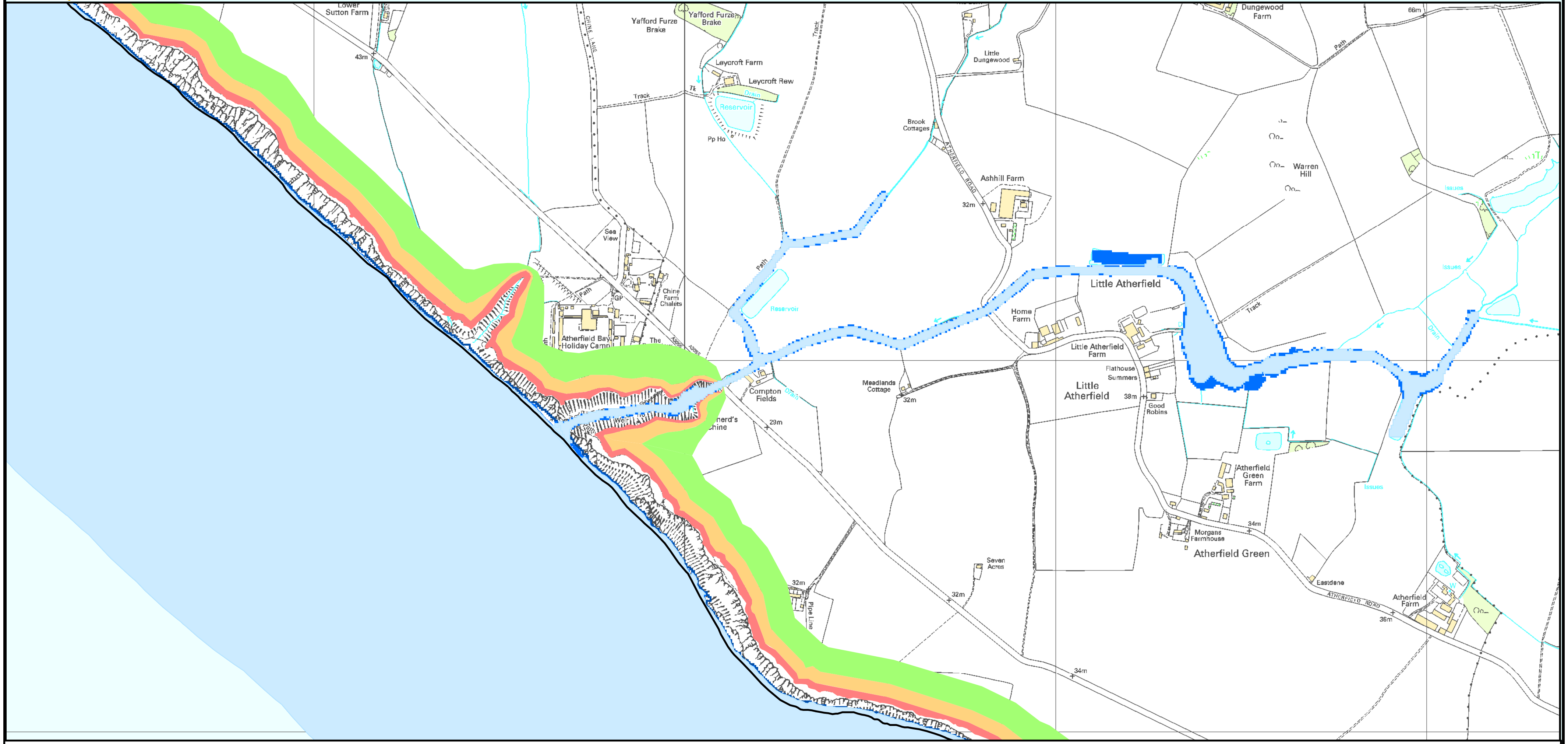
2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Erosion Mapping: No Active Intervention scenario **Chale (PU 5)**

Isle of Wight Shoreline Management Plan 2

1:15,000



Key:

- IW units (used in Appendix C) tables
- Indicative erosion zone up to 2025 if 'No Active Intervention' occurs (i.e. if existing coastal defences are allowed to fail)
- Indicative erosion zone up to 2055 if 'No Active Intervention' occurs
- Indicative erosion zone up to 2105 if 'No Active Intervention' occurs
- 2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency
- 2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency
- 2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Erosion Mapping: No Active Intervention scenario

Atherfield (PU 5)

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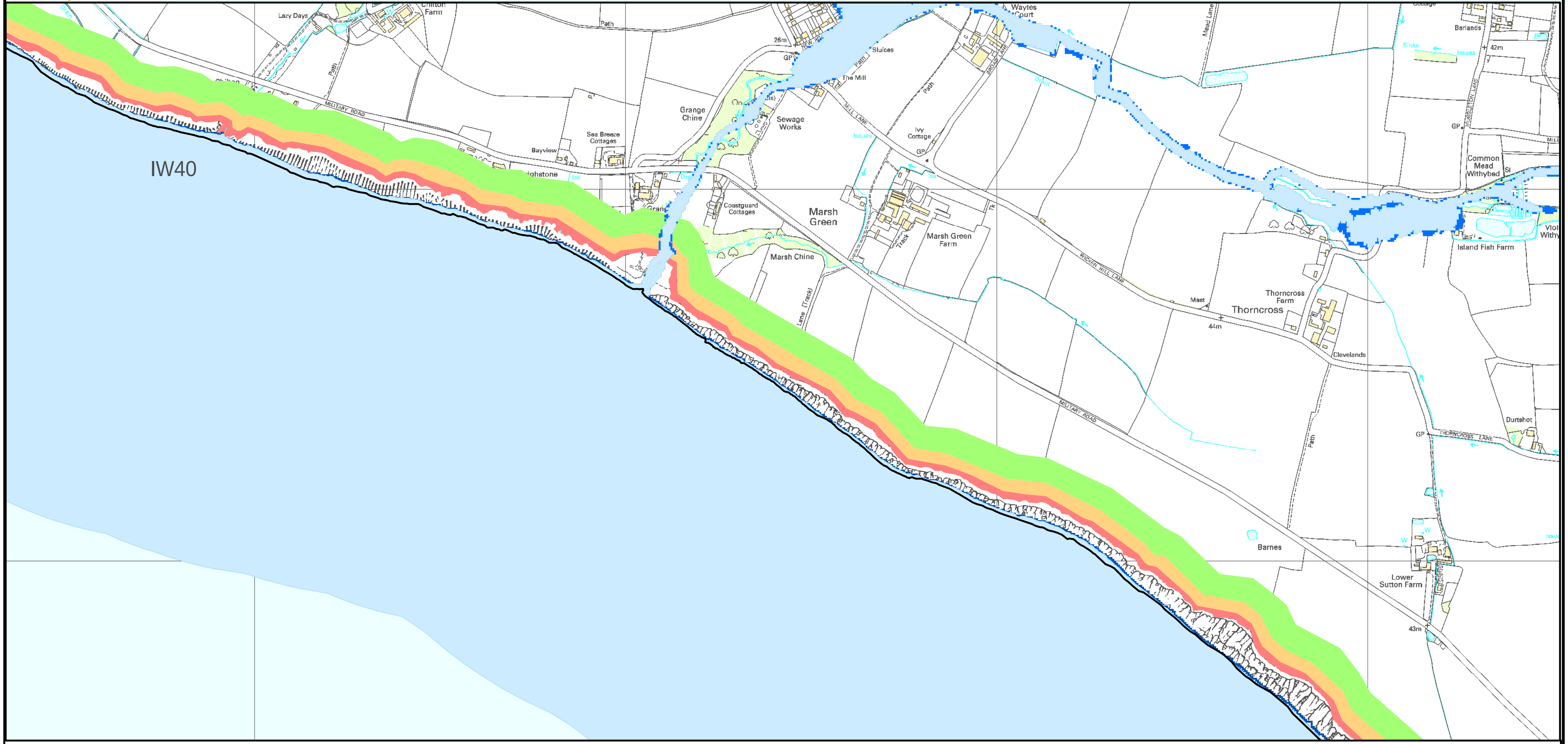
Isle of Wight Shoreline Management Plan 2

1:15,000

Meters
0 50 100 200 300 400 500



Key:

! IW units (used in Appendix C) tables

Indicative erosion zone up to 2025 if 'No Active Intervention' occurs (i.e. if existing coastal defences are allowed to fail)

Indicative erosion zone up to 2055 if 'No Active Intervention' occurs

Indicative erosion zone up to 2105 if 'No Active Intervention' occurs

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

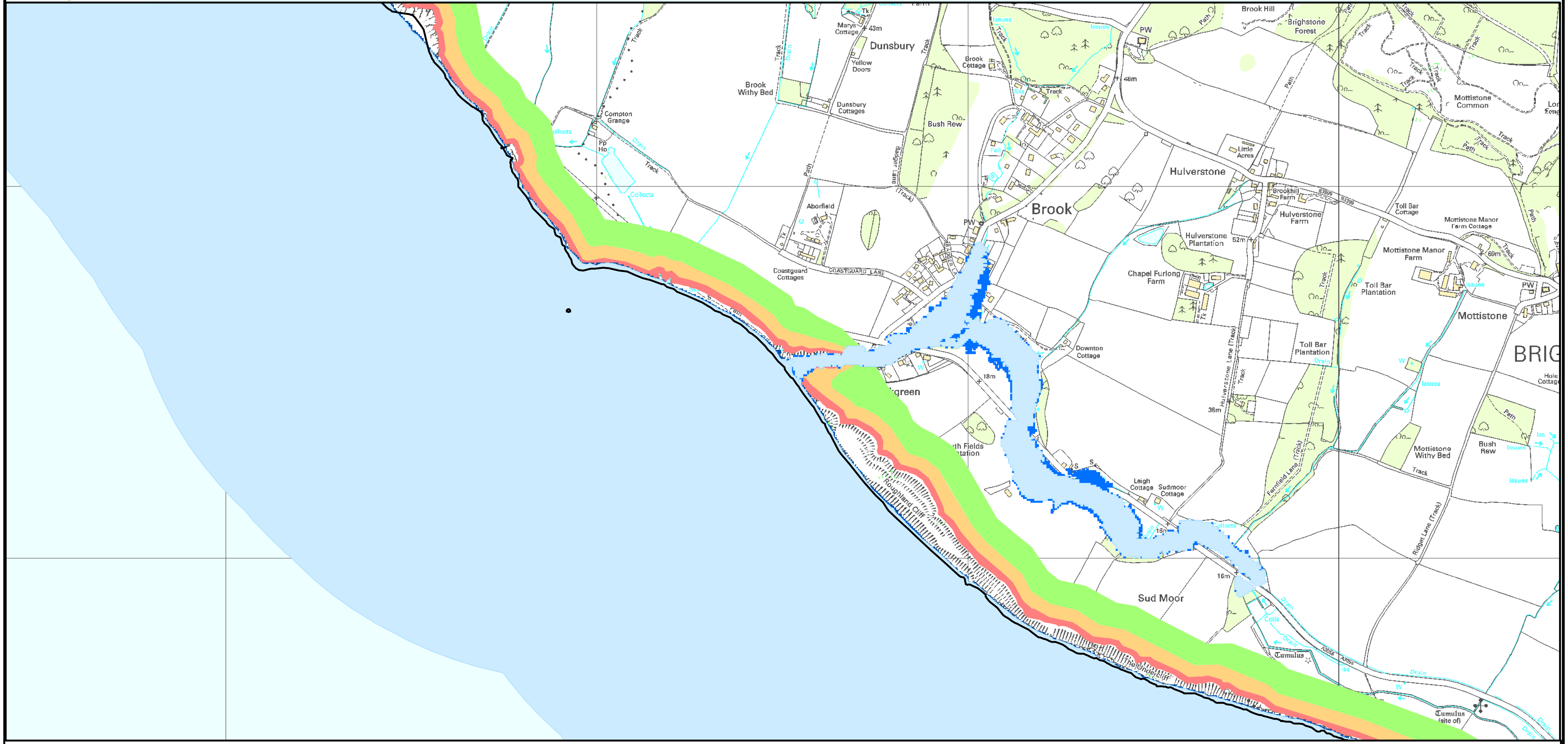
Erosion Mapping: No Active Intervention scenario

Brightstone (PU 5)

Isle of Wight Shoreline Management Plan 2

1:15,000

Meters
0 50 100 200 300 400 500



Key:

IW units (used in Appendix C) tables

Indicative erosion zone up to 2025 if 'No Active Intervention' occurs (i.e. if existing coastal defences are allowed to fail)

Indicative erosion zone up to 2055 if 'No Active Intervention' occurs

Indicative erosion zone up to 2105 if 'No Active Intervention' occurs

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

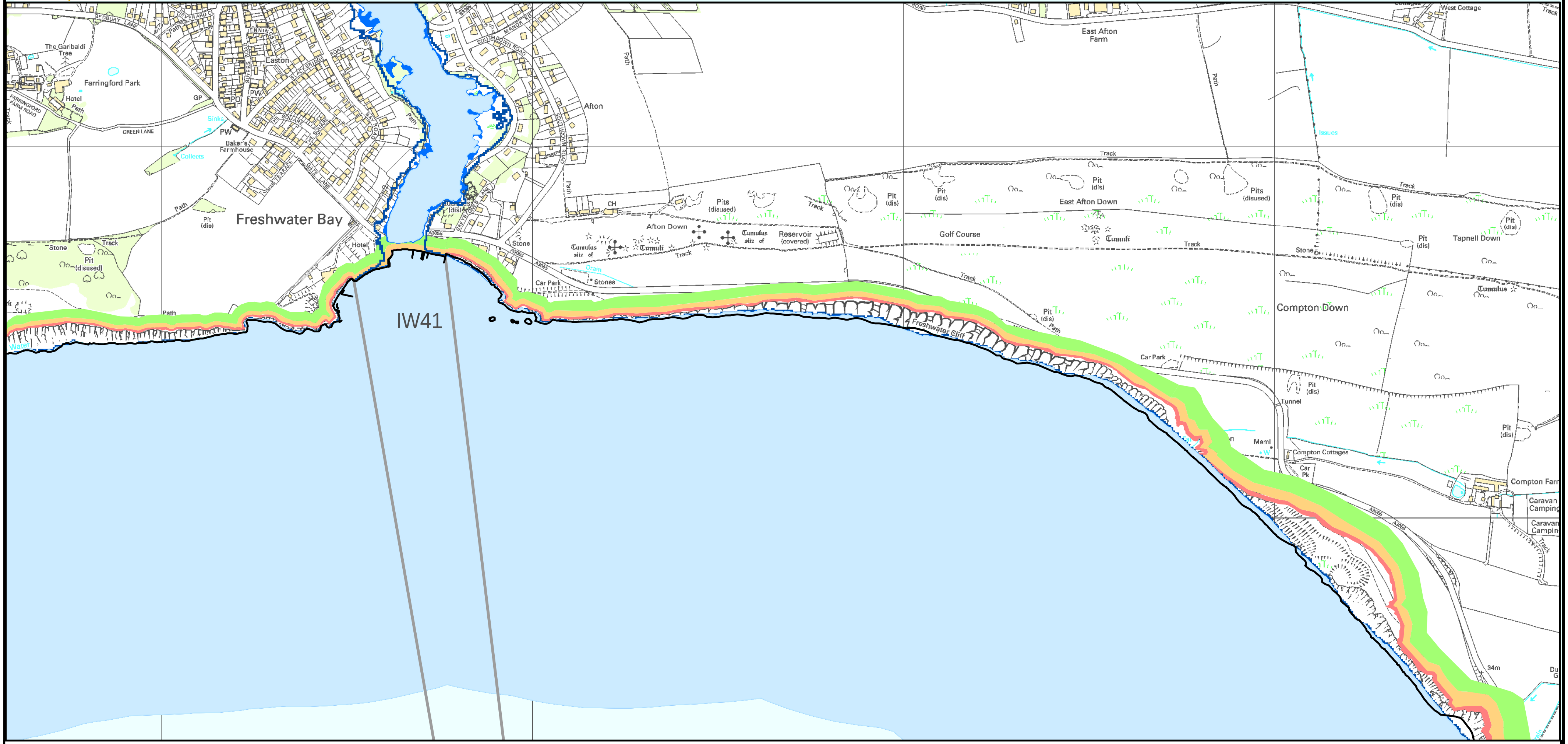
2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Erosion Mapping: No Active Intervention scenario

Brook (PU 5)

Isle of Wight Shoreline Management Plan 2

1:15,000



Key:

IW units (used in Appendix C) tables

Indicative erosion zone up to 2025 if 'No Active Intervention' occurs (i.e. if existing coastal defences are allowed to fail)

Indicative erosion zone up to 2055 if 'No Active Intervention' occurs

Indicative erosion zone up to 2105 if 'No Active Intervention' occurs

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

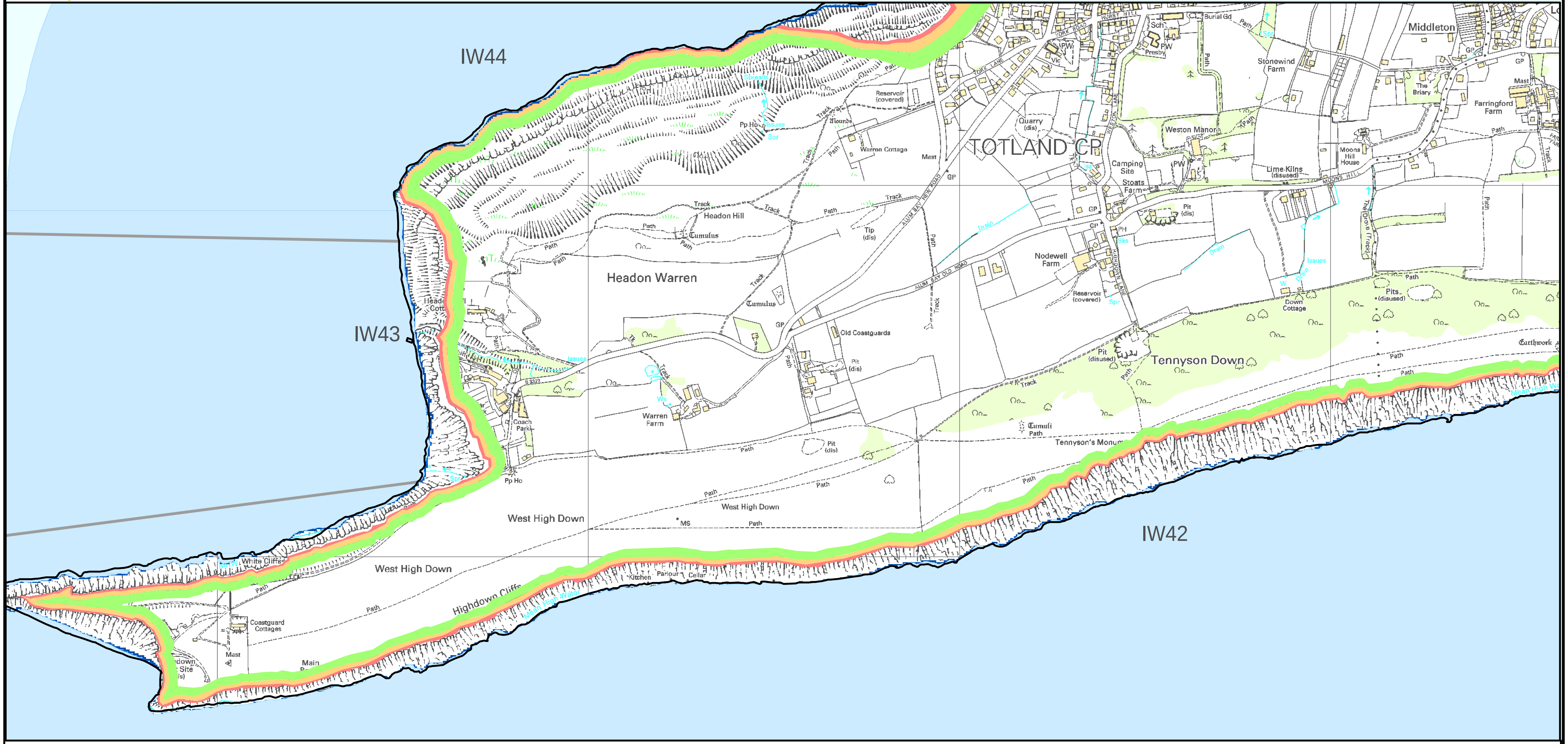
Erosion Mapping: No Active Intervention scenario

Freshwater Bay and Compton (PU 6A.1 & 5)

Isle of Wight Shoreline Management Plan 2

1:15,000

Meters
0 50 100 200 300 400 500



Key:

- IW units (used in Appendix C) tables
- Indicative erosion zone up to 2025 if 'No Active Intervention' occurs (i.e. if existing coastal defences are allowed to fail)
- Indicative erosion zone up to 2055 if 'No Active Intervention' occurs
- Indicative erosion zone up to 2105 if 'No Active Intervention' occurs
- 2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency
- 2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency
- 2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Erosion Mapping: No Active Intervention scenario

Tennyson Down and Alum Bay (PU 6A.2)

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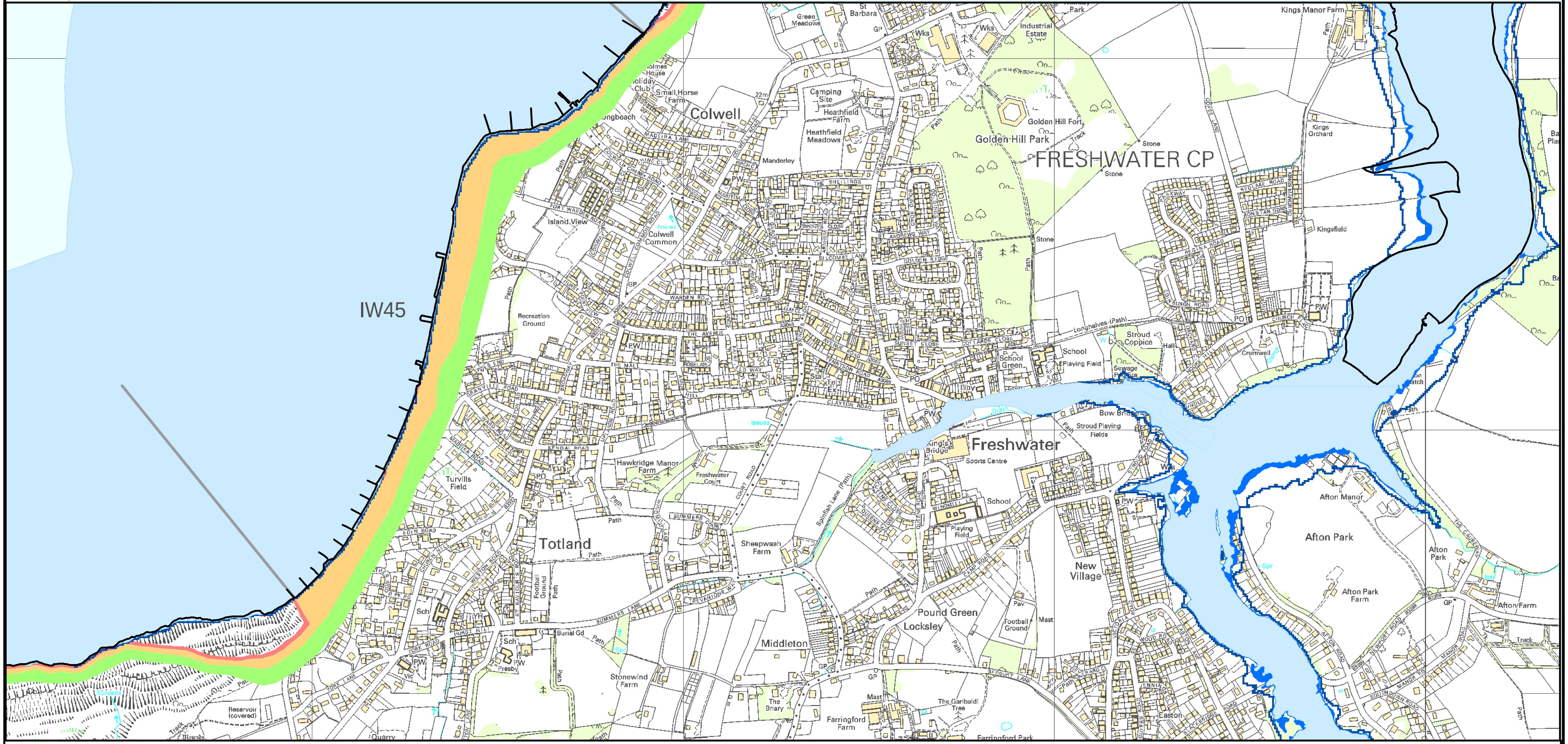
Isle of Wight Shoreline Management Plan 2

1:15,000

0 50 100 200 300 400 500 Meters



Key:

!	IW units (used in Appendix C) tables
(red)	Indicative erosion zone up to 2025 if 'No Active Intervention' occurs (i.e. if existing coastal defences are allowed to fail)
(orange)	Indicative erosion zone up to 2055 if 'No Active Intervention' occurs
(green)	Indicative erosion zone up to 2105 if 'No Active Intervention' occurs
(light blue)	2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency
(blue)	2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency
(outline)	2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

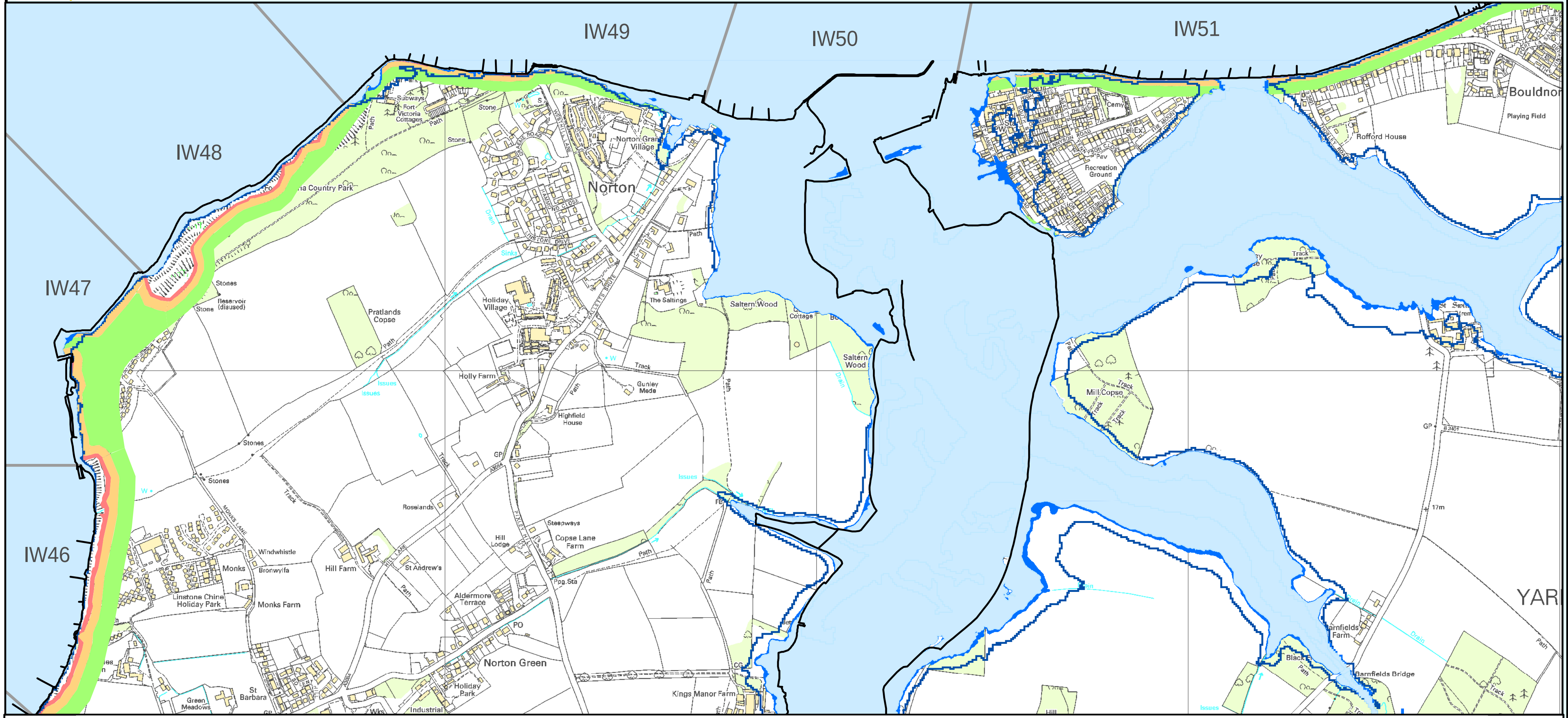
Erosion Mapping: No Active Intervention scenario

Totland (PU 6B.1)

Isle of Wight Shoreline Management Plan 2

1:15,000

Meters
0 50 100 200 300 400 500



Key:

IW units (used in Appendix C) tables

Current shoreline

Indicative erosion zone up to 2025 if 'No Active Intervention' occurs (i.e. if existing coastal defences are allowed to fail)

Indicative erosion zone up to 2055 if 'No Active Intervention' occurs

Indicative erosion zone up to 2105 if 'No Active Intervention' occurs

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

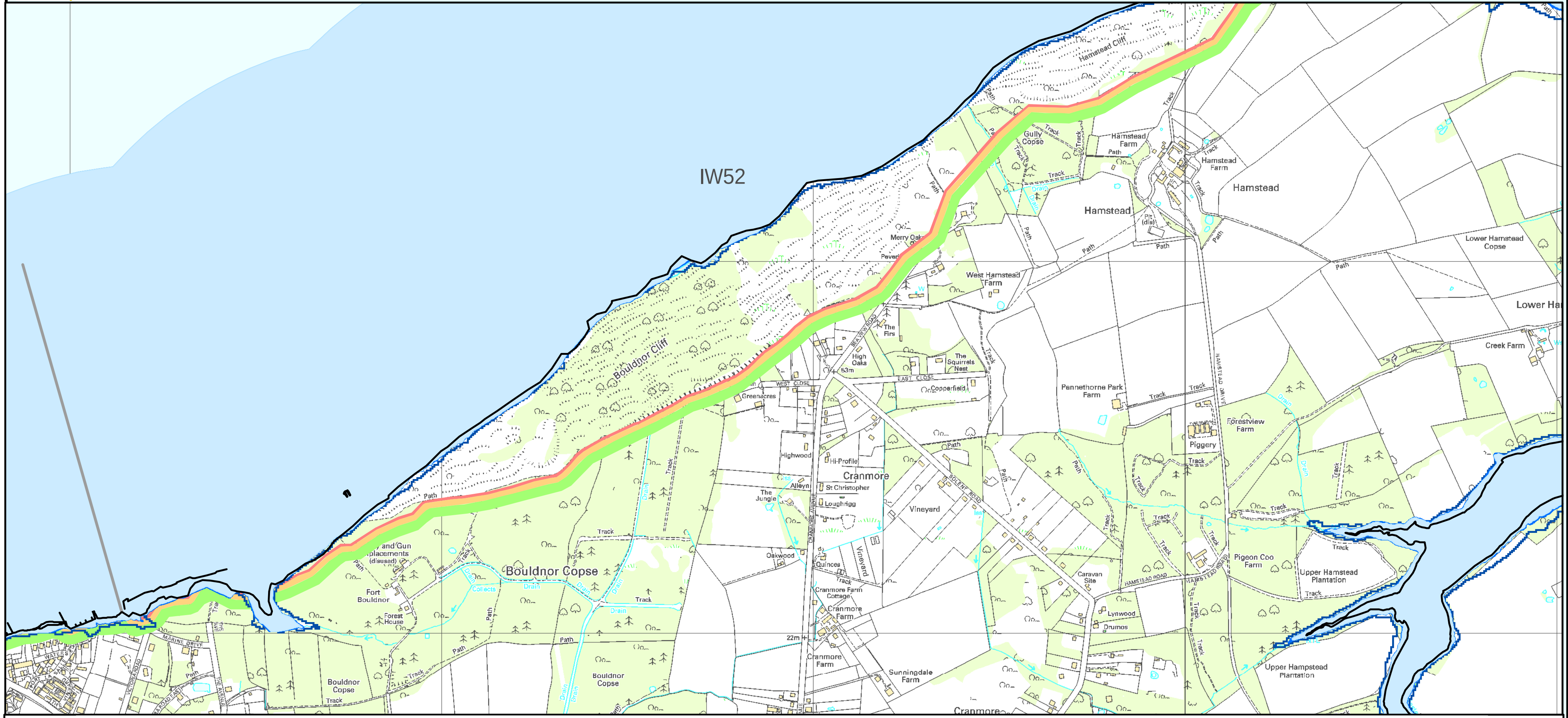
2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Erosion Mapping: No Active Intervention scenario

Colwell to Yarmouth, including the Western Yar (PU 6B.2 to 6C.6)

Isle of Wight Shoreline Management Plan 2

1:15,000



Key:

- IW units (used in Appendix C) tables
- Current shoreline
- Indicative erosion zone up to 2025 if 'No Active Intervention' occurs (i.e. if existing coastal defences are allowed to fail)
- Indicative erosion zone up to 2055 if 'No Active Intervention' occurs
- Indicative erosion zone up to 2105 if 'No Active Intervention' occurs
- 2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency
- 2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency
- 2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

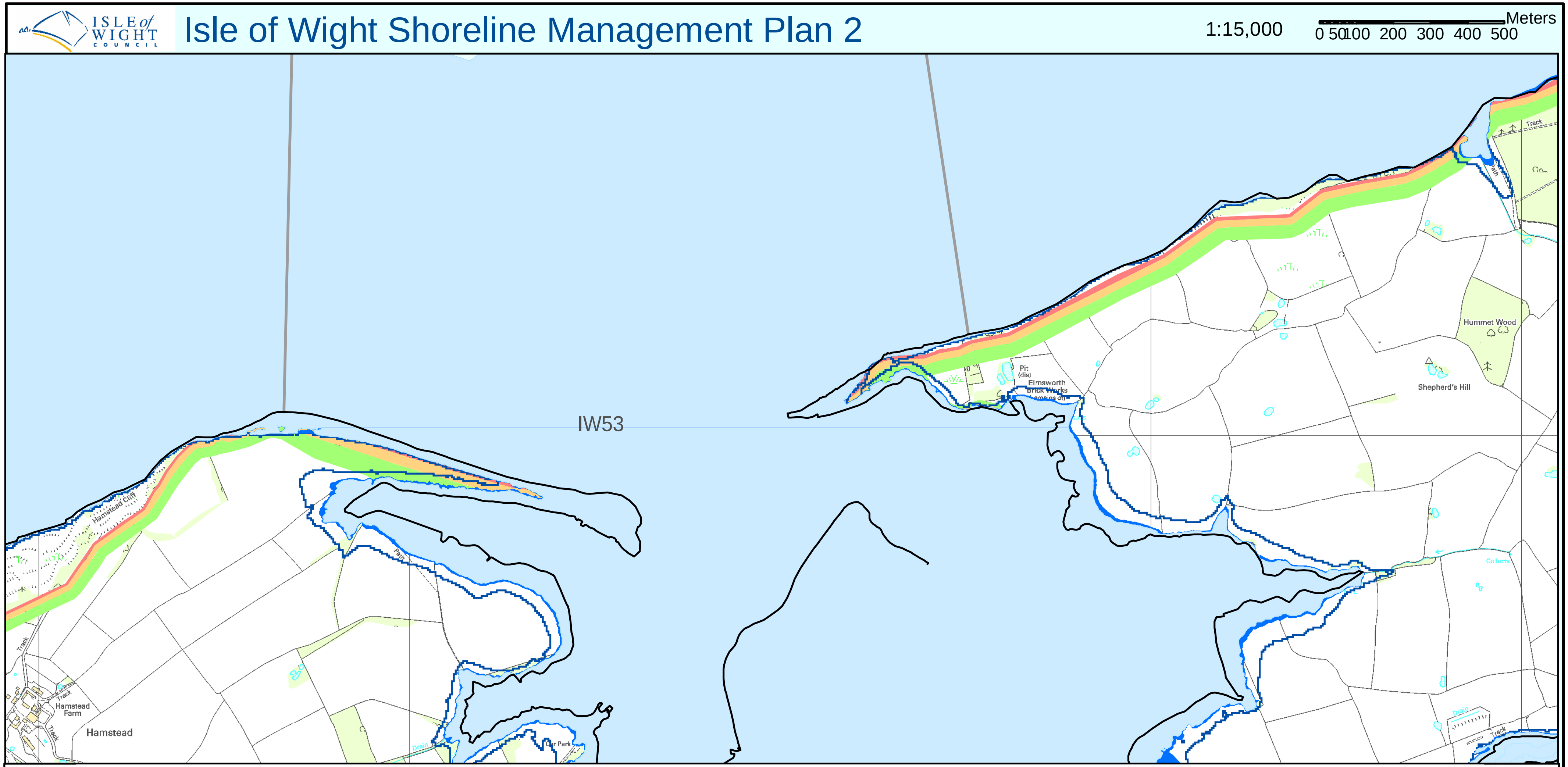
Erosion Mapping: No Active Intervention scenario

Bouldnor Cliff (PU 7.1)

Isle of Wight Council

Isle of Wight Shoreline Management Plan 2

1:15,000



Key:

- ! IW units (used in Appendix C) tables
- Current shoreline
- Indicative erosion zone up to 2025 if 'No Active Intervention' occurs (i.e. if existing coastal defences are allowed to fail)
- Indicative erosion zone up to 2055 if 'No Active Intervention' occurs
- Indicative erosion zone up to 2105 if 'No Active Intervention' occurs
- 2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency
- 2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency
- 2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

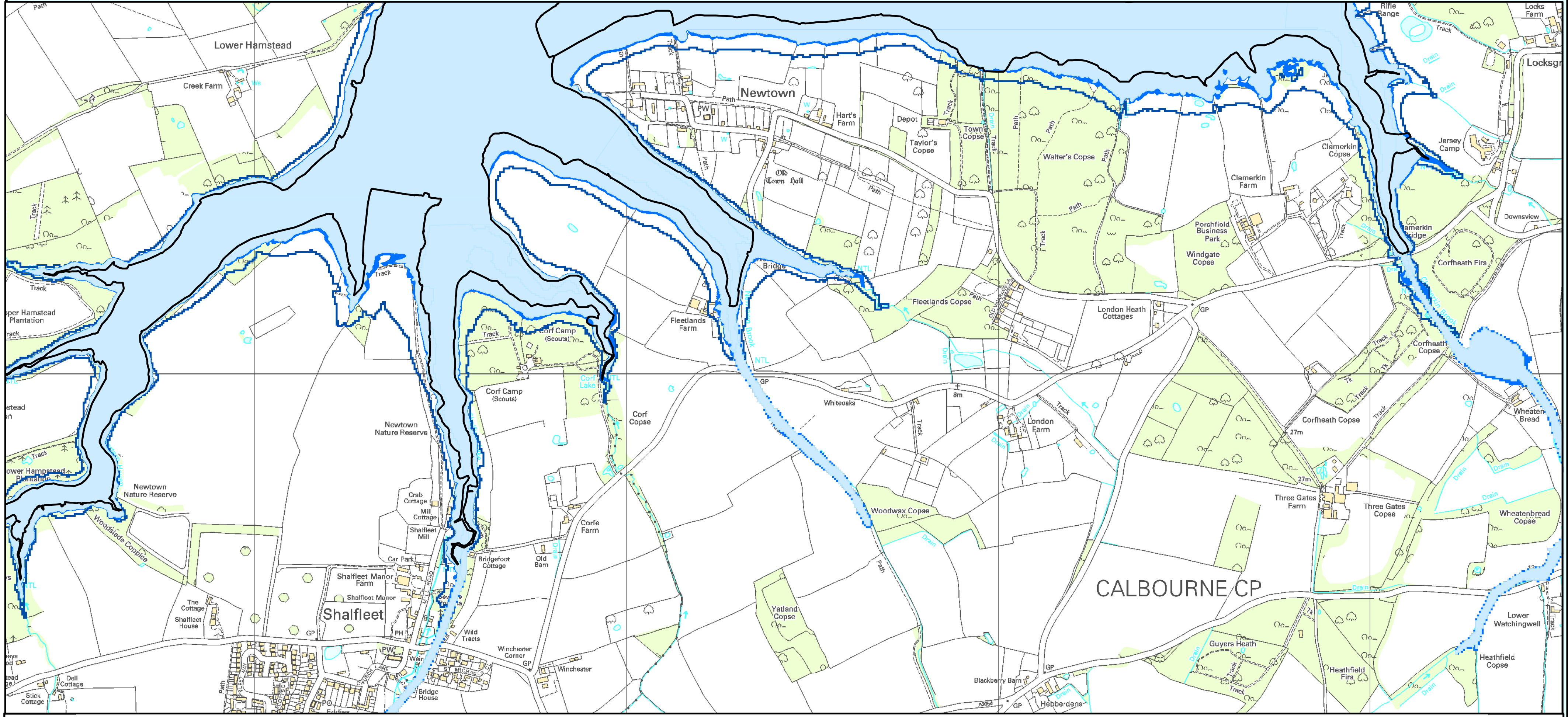
Erosion Mapping: No Active Intervention scenario

Entrance to Newtown Estuary (PU 7.2)

Isle of Wight Shoreline Management Plan 2

1:15,000

Meters
0 50 100 200 300 400 500



Key:

- IW units (used in Appendix C) tables
- Current shoreline
- Indicative erosion zone up to 2025 if 'No Active Intervention' occurs (i.e. if existing coastal defences are allowed to fail)
- Indicative erosion zone up to 2055 if 'No Active Intervention' occurs
- Indicative erosion zone up to 2105 if 'No Active Intervention' occurs
- 2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency
- 2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency
- 2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Erosion Mapping: No Active Intervention scenario

Southern Newtown Estuary (PU 7.2)

Isle of Wight Shoreline Management Plan 2

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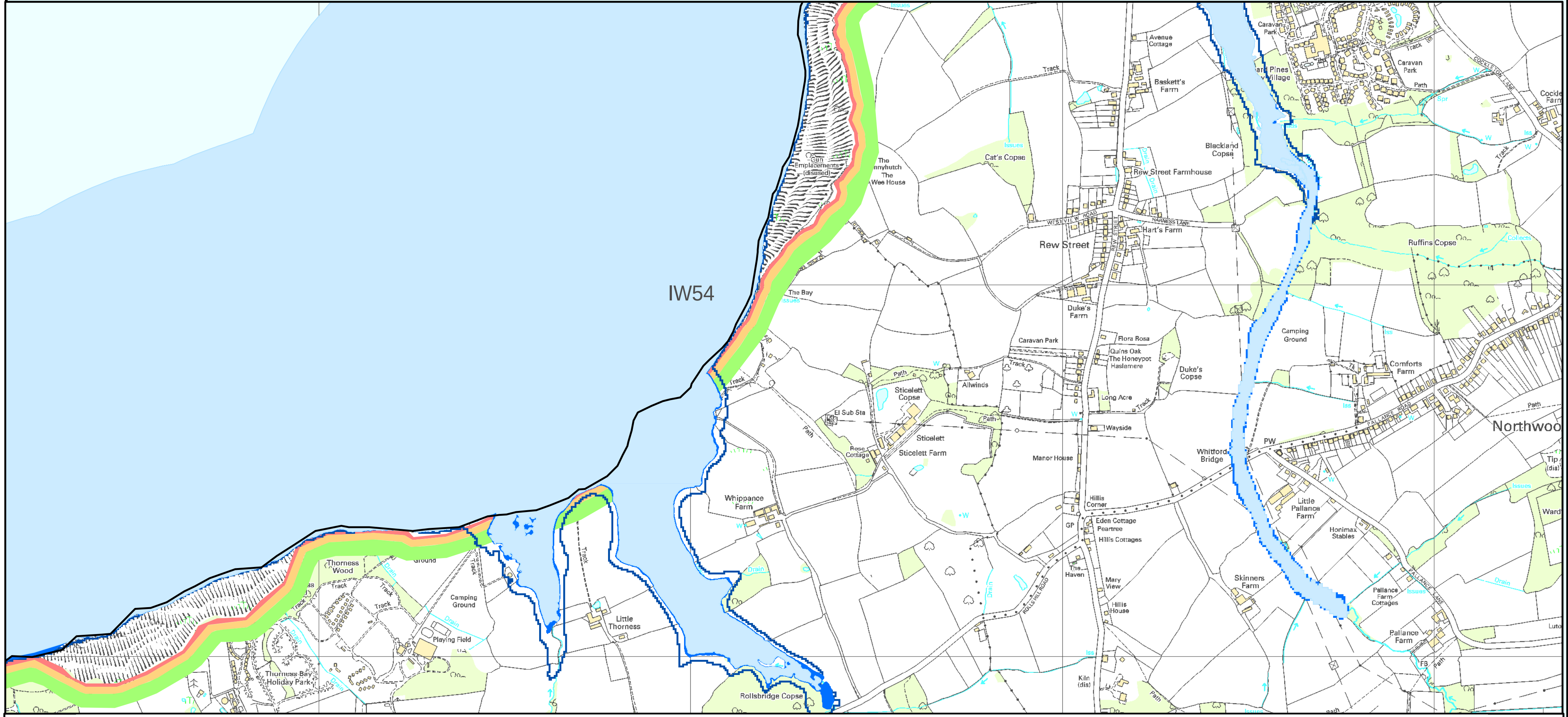
1:15,000

0 50 100 200 300 400 500 Meters



Key:

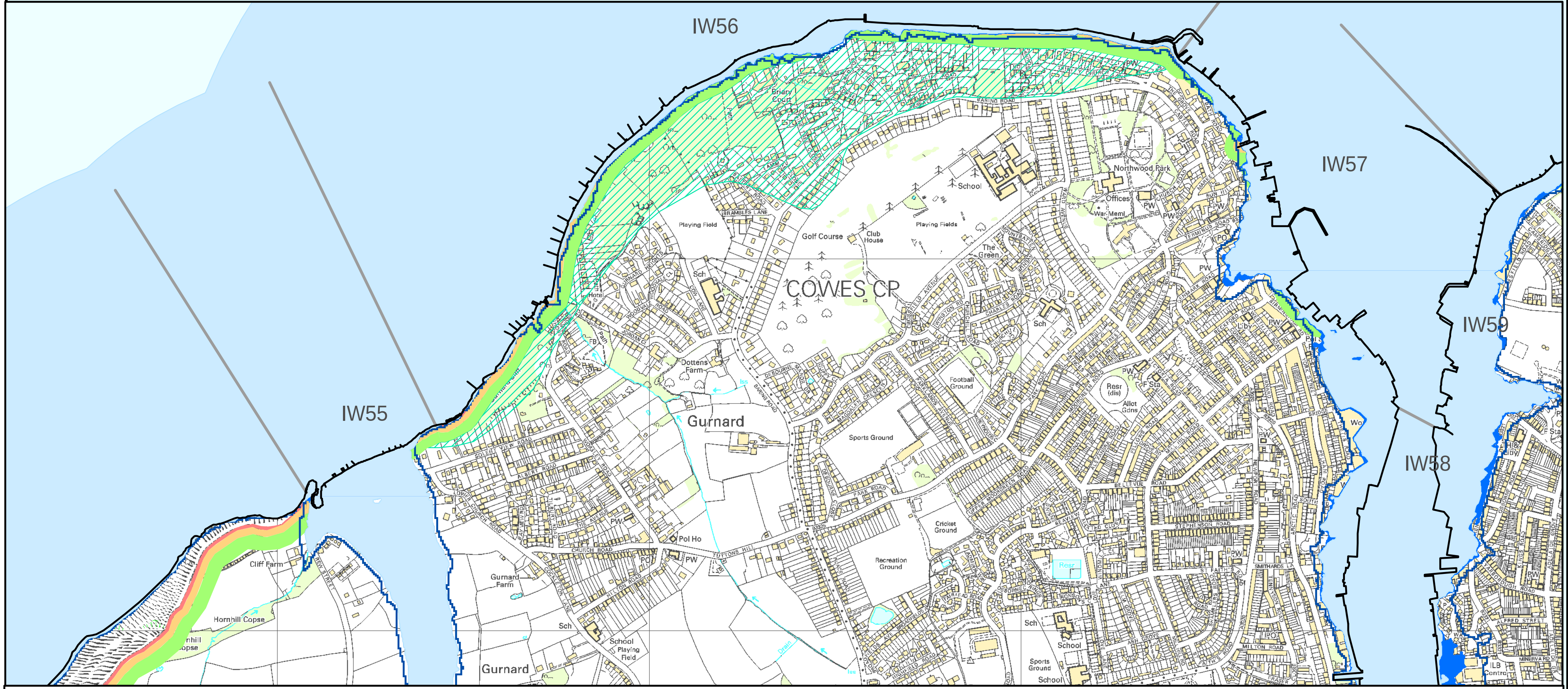
- IW units (used in Appendix C) tables
- Current shoreline
- Indicative erosion zone up to 2025 if 'No Active Intervention' occurs (i.e. if existing coastal defences are allowed to fail)
- Indicative erosion zone up to 2055 if 'No Active Intervention' occurs
- Indicative erosion zone up to 2105 if 'No Active Intervention' occurs
- 2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency
- 2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency
- 2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Erosion Mapping: No Active Intervention scenario

Thorness Bay (PU 7.3)

Isle of Wight Shoreline Management Plan 2

1:15,000



Key:

- IW units (used in Appendix C) tables
- Current shoreline
- Indicative erosion zone up to 2025 if 'No Active Intervention' occurs (i.e. if existing coastal defences are allowed to fail)
- Indicative erosion zone up to 2055 if 'No Active Intervention' occurs
- Indicative erosion zone up to 2105 if 'No Active Intervention' occurs
- Increased potential for landslide reactivation within Cowes and Gurnard if 'No Active Intervention' occurs (if existing defences are allowed to fail and erosion commences)
- 2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency
- 2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency
- 2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

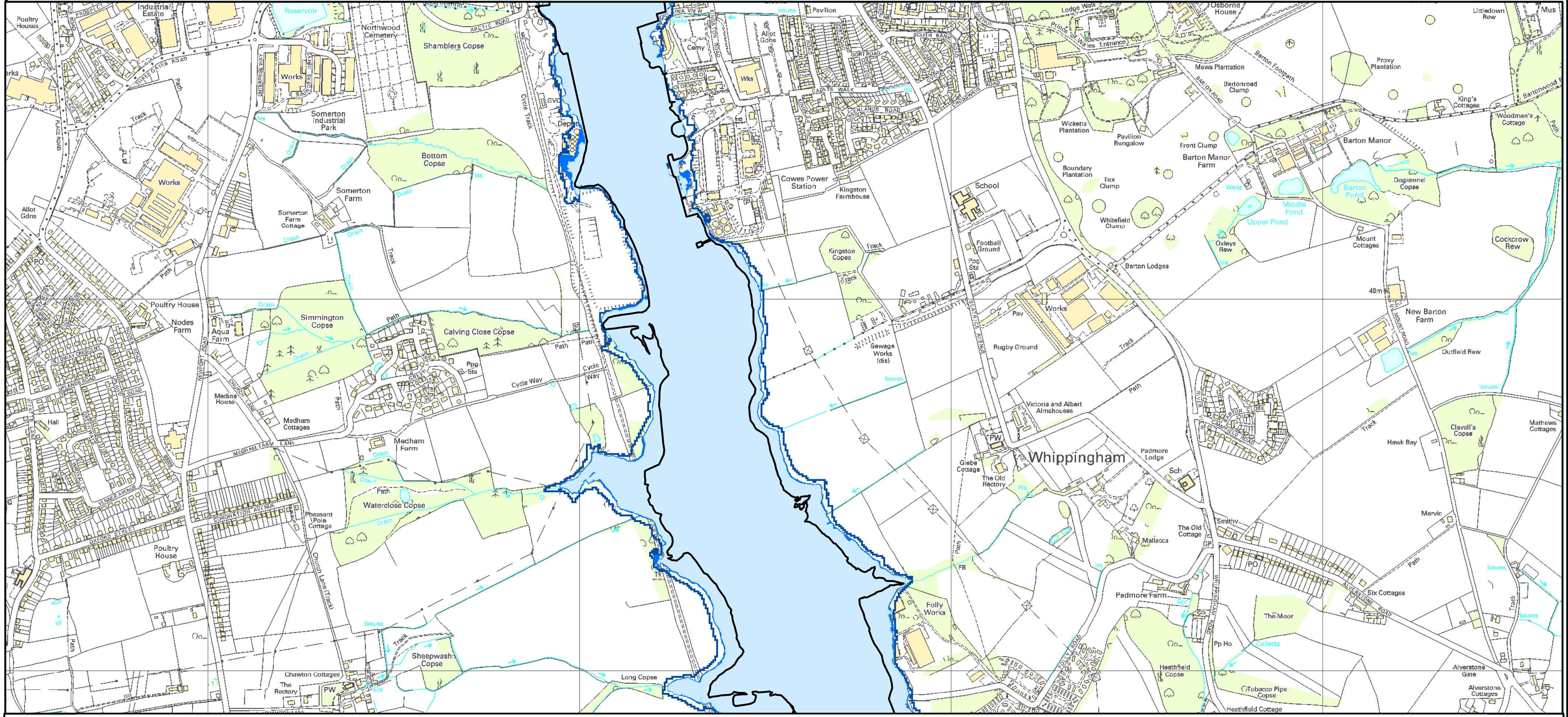
Erosion Mapping: No Active Intervention scenario

Gurnard, Cowes and East Cowes (PU 1A.1 to 1A.6)

Isle of Wight Shoreline Management Plan 2

1:15,000

0 50 100 200 300 400 500 Meters



Key:

IW units (used in Appendix C) tables

Current shoreline

Indicative erosion zone up to 2025 if 'No Active Intervention' occurs (i.e. if existing coastal defences are allowed to fail)

Indicative erosion zone up to 2055 if 'No Active Intervention' occurs

Indicative erosion zone up to 2105 if 'No Active Intervention' occurs

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

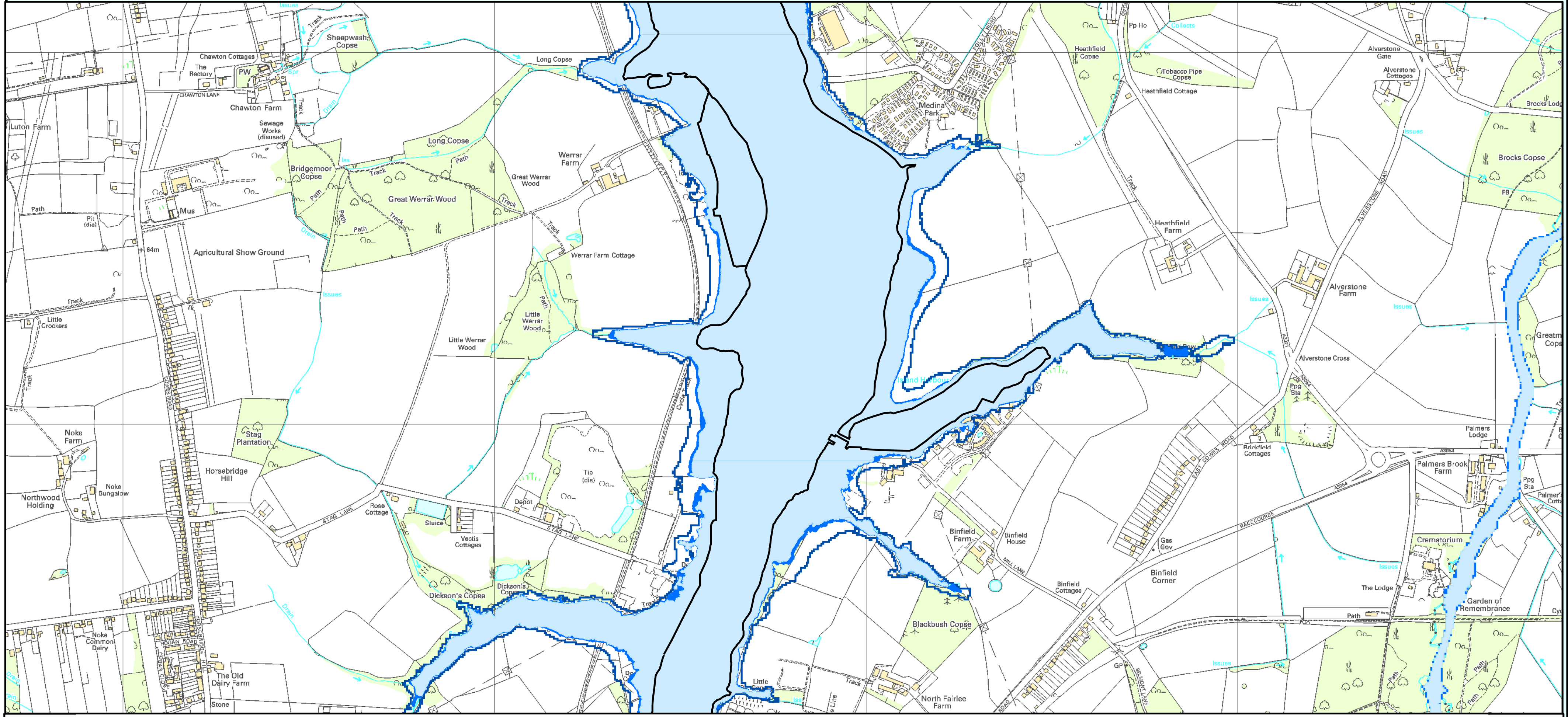
Erosion Mapping: No Active Intervention scenario

Medina Estuary (northern) (PU 1B.1 & 1B.5)

Isle of Wight Shoreline Management Plan 2

1:15,000

0 50 100 200 300 400 500 Meters



Key:

IW units (used in Appendix C) tables

Current shoreline

Indicative erosion zone up to 2025 if 'No Active Intervention' occurs (i.e. if existing coastal defences are allowed to fail)

Indicative erosion zone up to 2055 if 'No Active Intervention' occurs

Indicative erosion zone up to 2105 if 'No Active Intervention' occurs

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

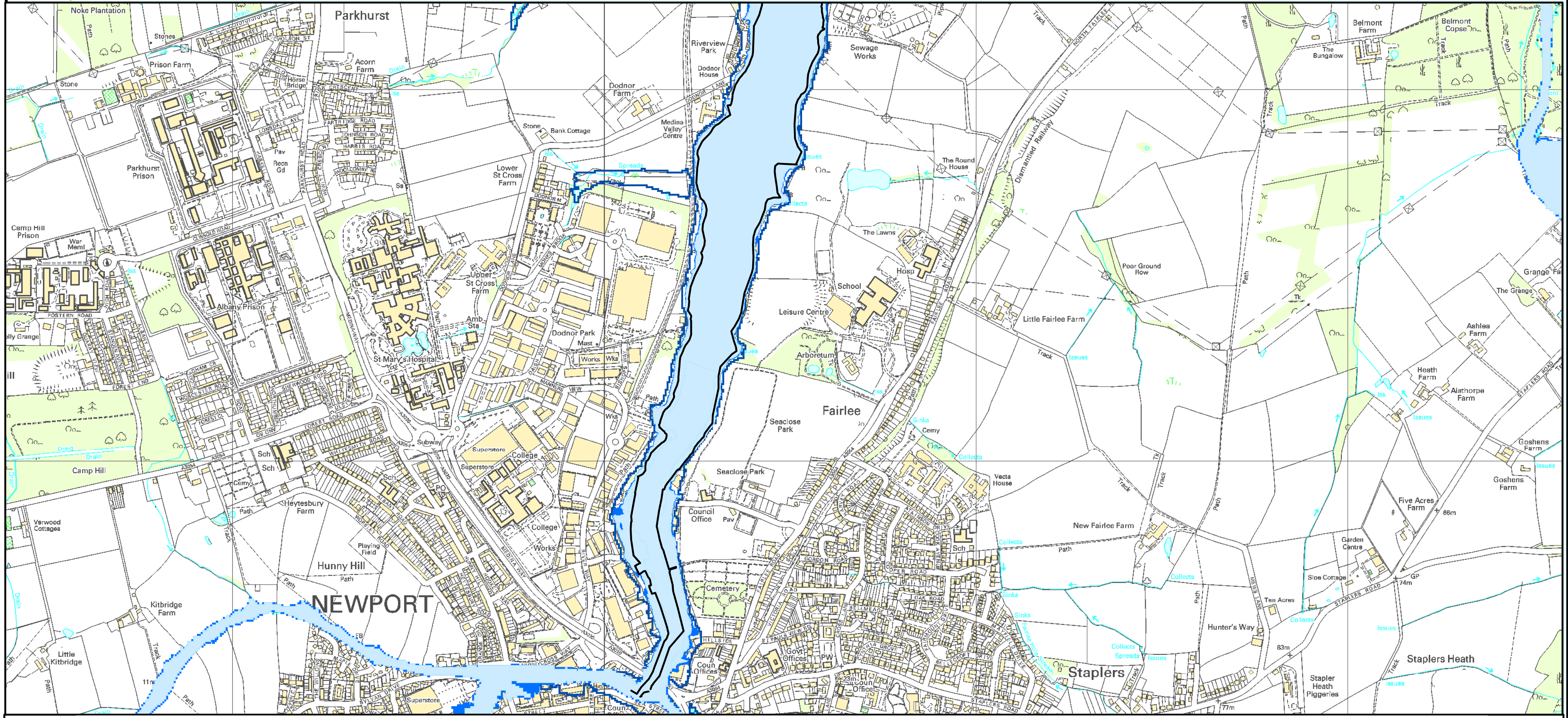
Erosion Mapping: No Active Intervention scenario

Medina Estuary (central) (PU 1B.1, 1B.2 & 1B.5)

Isle of Wight Shoreline Management Plan 2

1:15,000

Meters
0 50 100 200 300 400 500



Key:

IW units (used in Appendix C) tables

Current shoreline

Indicative erosion zone up to 2025 if 'No Active Intervention' occurs (i.e. if existing coastal defences are allowed to fail)

Indicative erosion zone up to 2055 if 'No Active Intervention' occurs

Indicative erosion zone up to 2105 if 'No Active Intervention' occurs

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

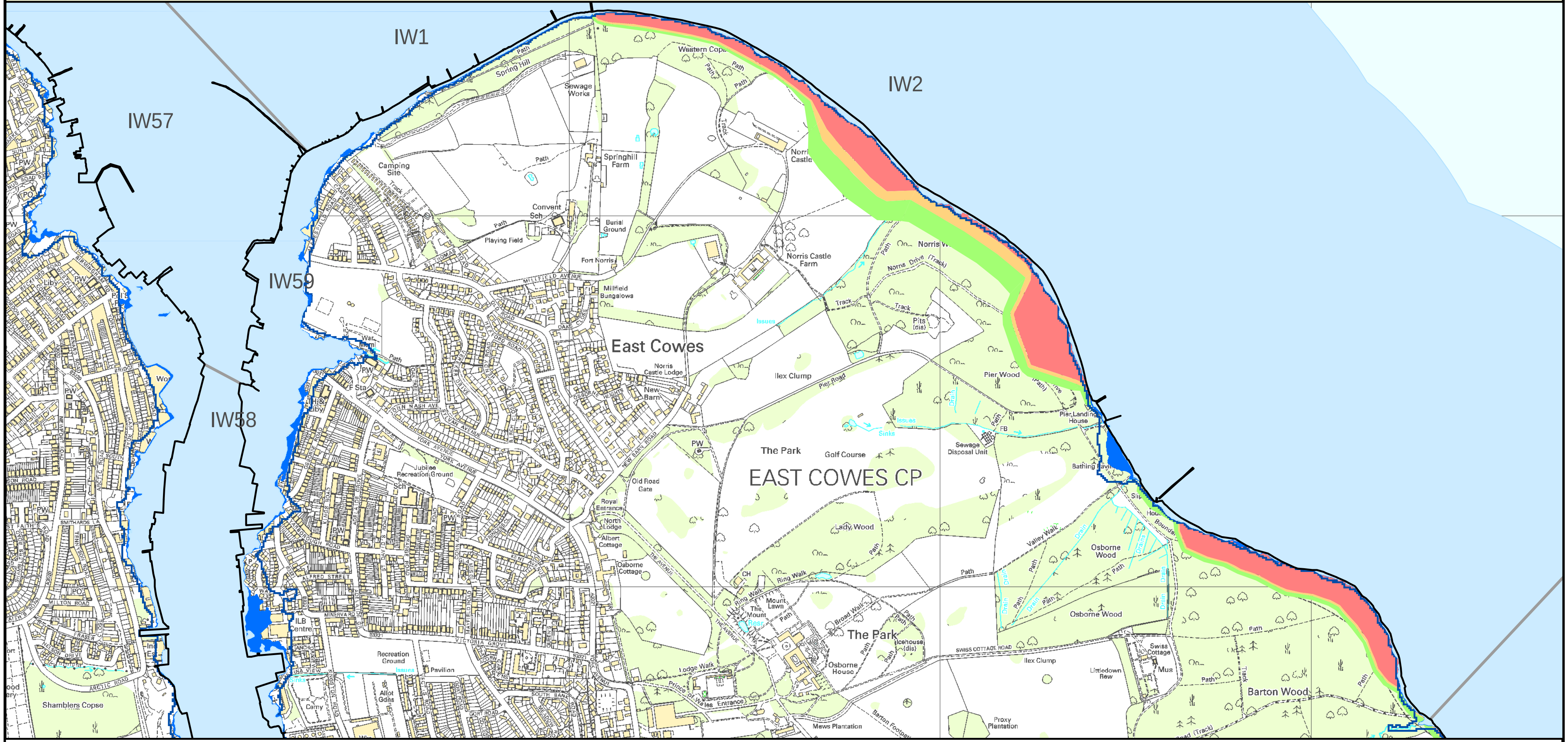
2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Erosion Mapping: No Active Intervention scenario

Medina Estuary and Newport Harbour (PU 1B.3, 1B.4, 1B.5)

Isle of Wight Shoreline Management Plan 2

1:15,000



Key:

IW units (used in Appendix C tables)

Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)

Indicative erosion zone up to 2055 if continuing 'With Present Management'

Indicative erosion zone up to 2105 if continuing 'With Present Management'

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

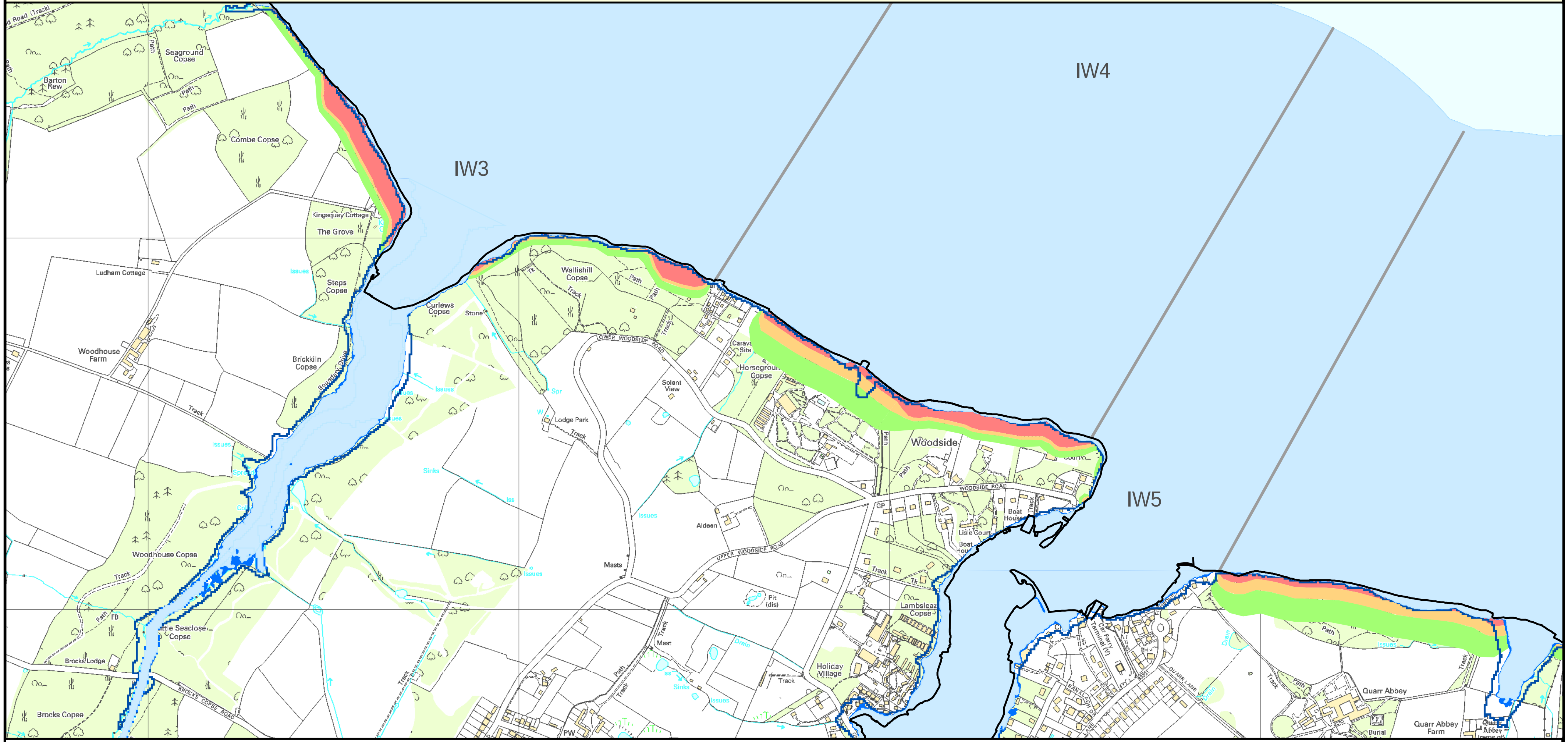
Erosion Mapping: With Present Management scenario

East Cowes and Osborne (PU 1A.4 to 2A.1)

Isle of Wight Shoreline Management Plan 2

1:15,000

0 50 100 200 300 400 500 Meters



Key:

IW units (used in Appendix C tables)

Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)

Indicative erosion zone up to 2055 if continuing 'With Present Management'

Indicative erosion zone up to 2105 if continuing 'With Present Management'

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

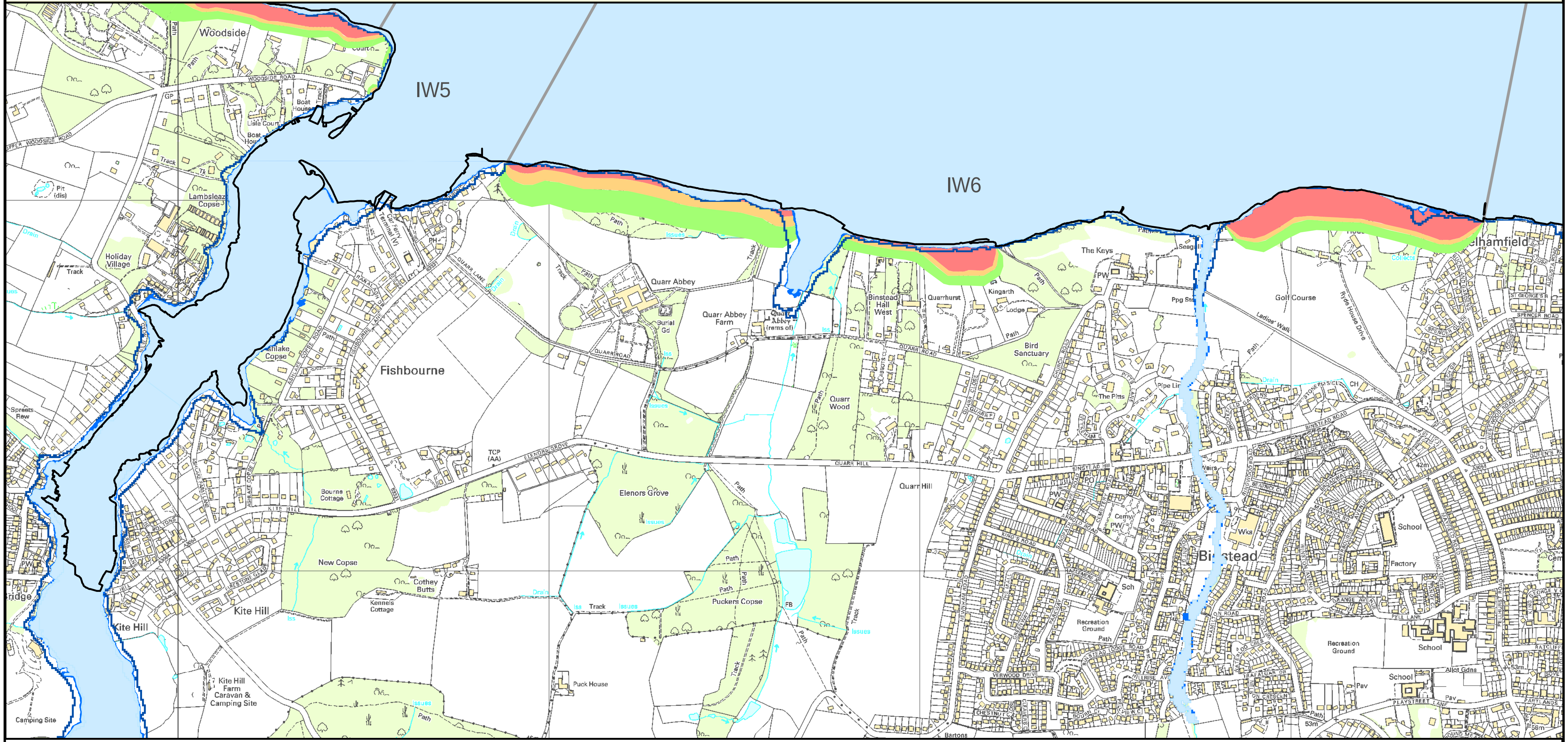
Erosion Mapping: With Present Management scenario

King's Quay and Woodside (PU 2A.1 & 2A.2)

Isle of Wight Shoreline Management Plan 2

1:15,000

Meters
0 50 100 200 300 400 500



Key:

IW units (used in Appendix C tables)

Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)

Indicative erosion zone up to 2055 if continuing 'With Present Management'

Indicative erosion zone up to 2105 if continuing 'With Present Management'

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

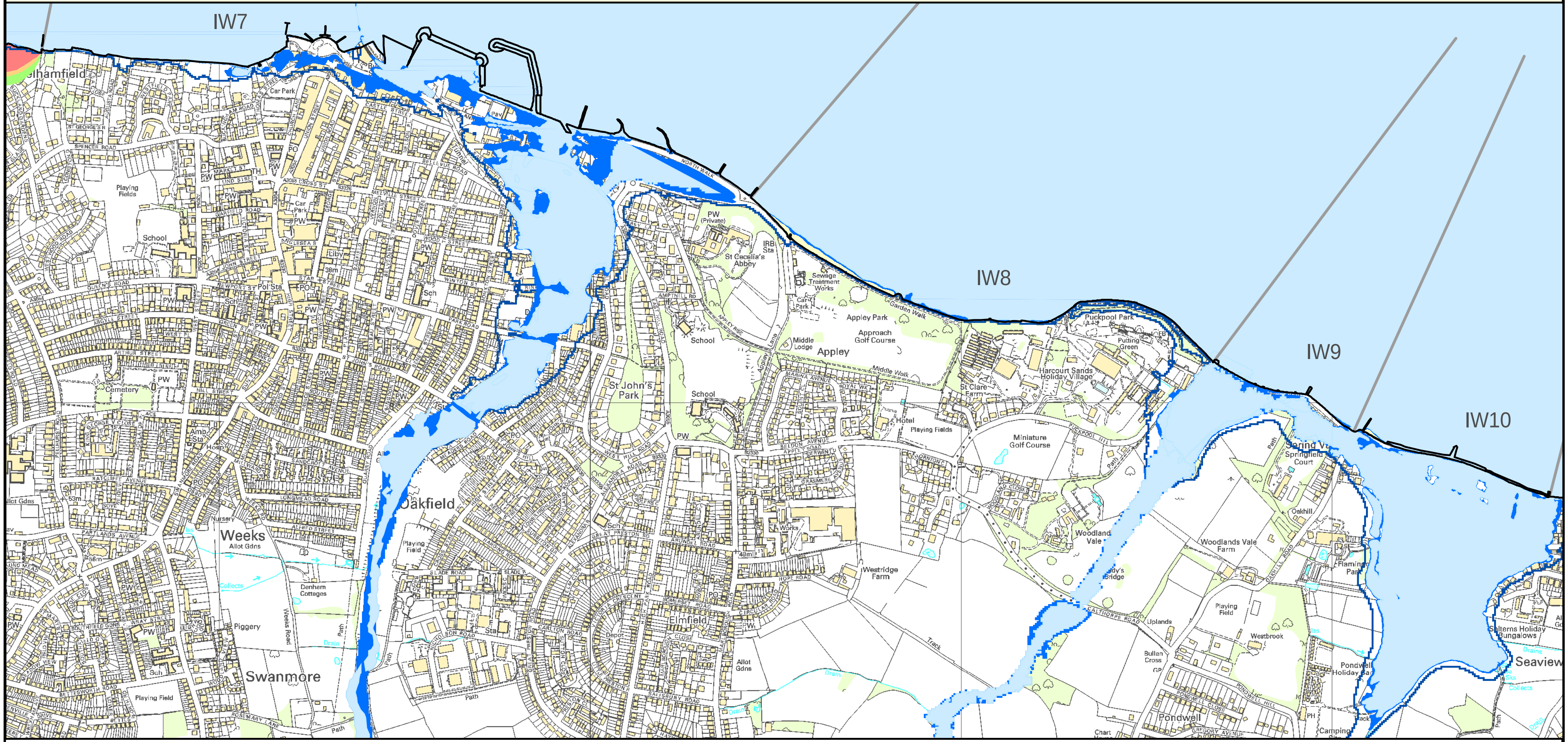
Erosion Mapping: With Present Management scenario

Wootton Creek and Quarr (PU 2B.1 to 2B.8)

Isle of Wight Shoreline Management Plan 2

1:15,000

Meters
0 50 100 200 300 400 500



Key:

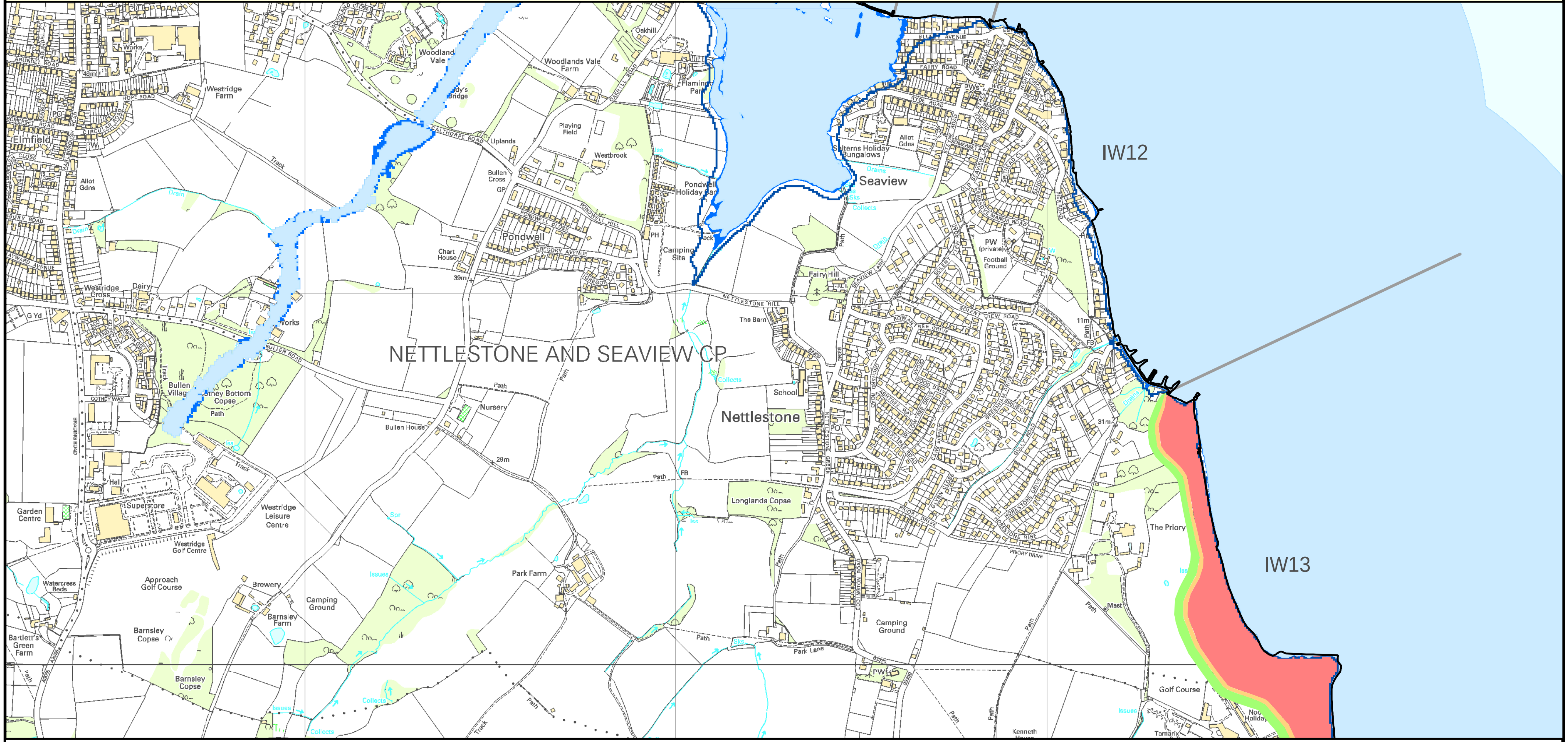
- IW units (used in Appendix C tables)
- Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)
- Indicative erosion zone up to 2055 if continuing 'With Present Management'
- Indicative erosion zone up to 2105 if continuing 'With Present Management'
- 2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency
- 2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency
- 2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Erosion Mapping: With Present Management scenario

Ryde to Seaview Duver (PU 2C.1 to 2C.3)

Isle of Wight Shoreline Management Plan 2

1:15,000



Key:

IW units (used in Appendix C tables)

Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)

Indicative erosion zone up to 2055 if continuing 'With Present Management'

Indicative erosion zone up to 2105 if continuing 'With Present Management'

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Erosion Mapping: With Present Management scenario

Seaview and Priory Bay (PU 2C.4 & 3A.1)

Isle of Wight Shoreline Management Plan 2

ISLE of WIGHT COUNCIL

1:15,000

Meters
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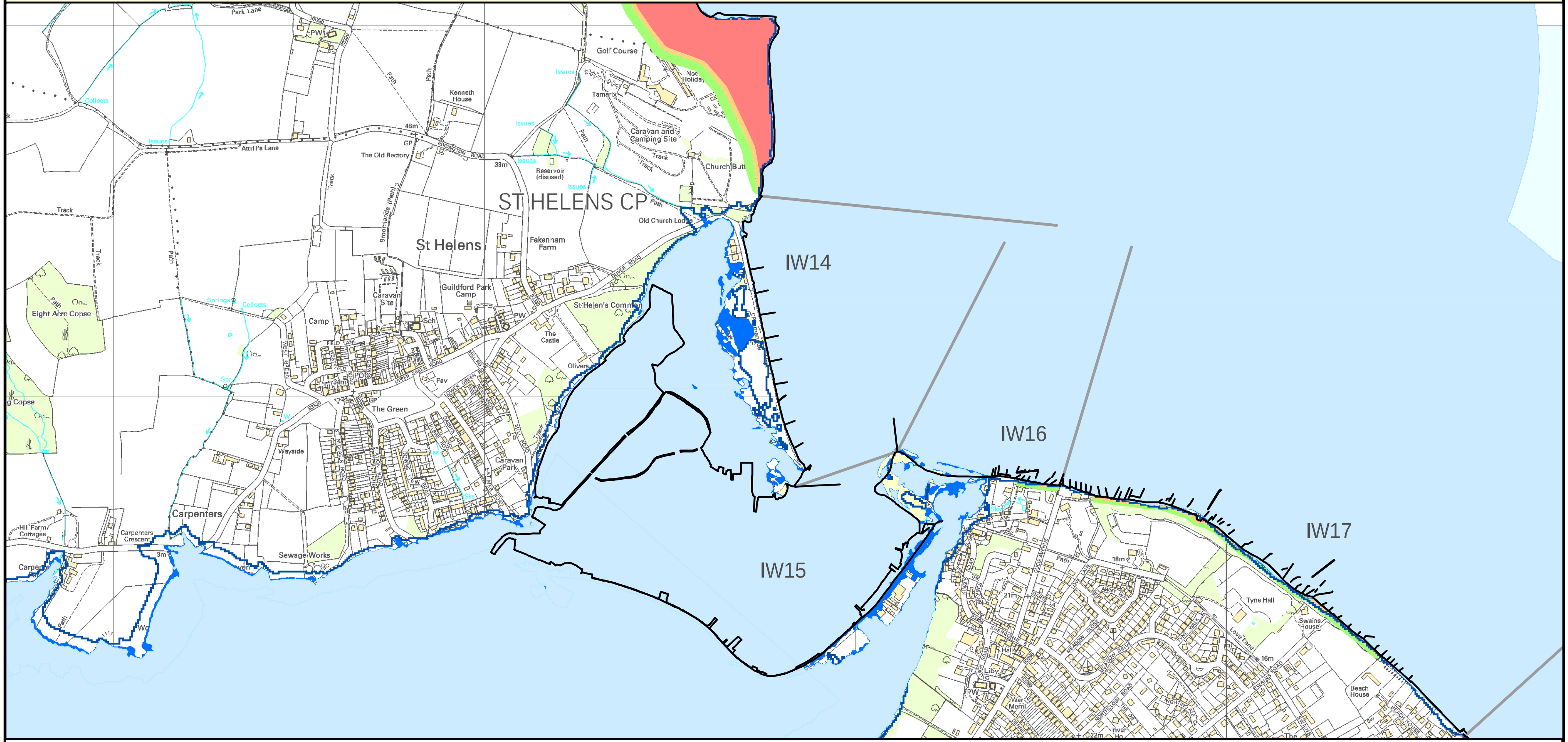

Key:

IW units (used in Appendix C tables)

- Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)
- Indicative erosion zone up to 2055 if continuing 'With Present Management'
- Indicative erosion zone up to 2105 if continuing 'With Present Management'
- 2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency
- 2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency
- 2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Erosion Mapping: With Present Management scenario

Bembridge Harbour (PU3A.2 to 3B.1)

Isle of Wight Shoreline Management Plan 2

1:15,000

Meters
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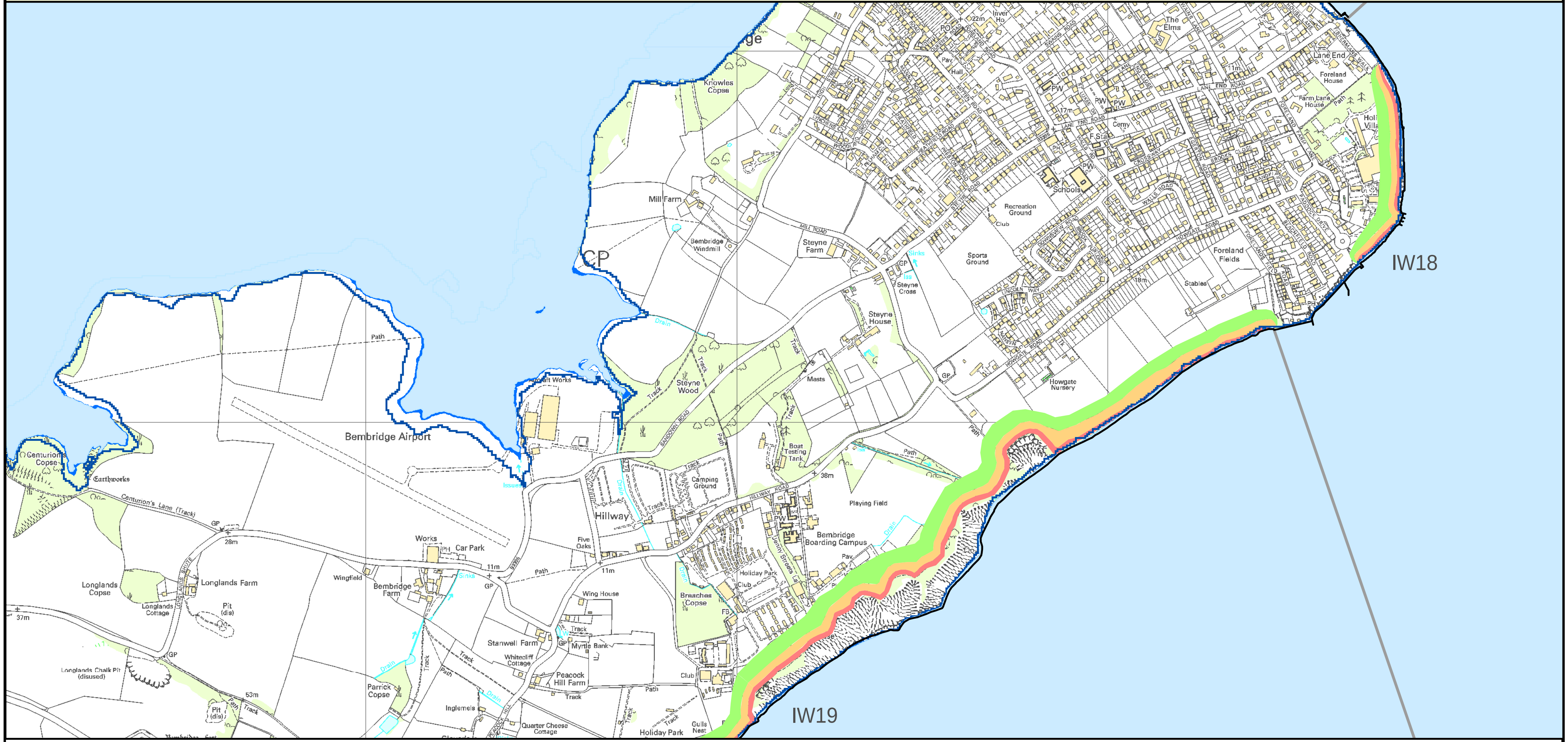


Key:

- IW units (used in Appendix C tables)
- Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)
- Indicative erosion zone up to 2055 if continuing 'With Present Management'
- Indicative erosion zone up to 2105 if continuing 'With Present Management'
- 2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency
- 2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency
- 2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

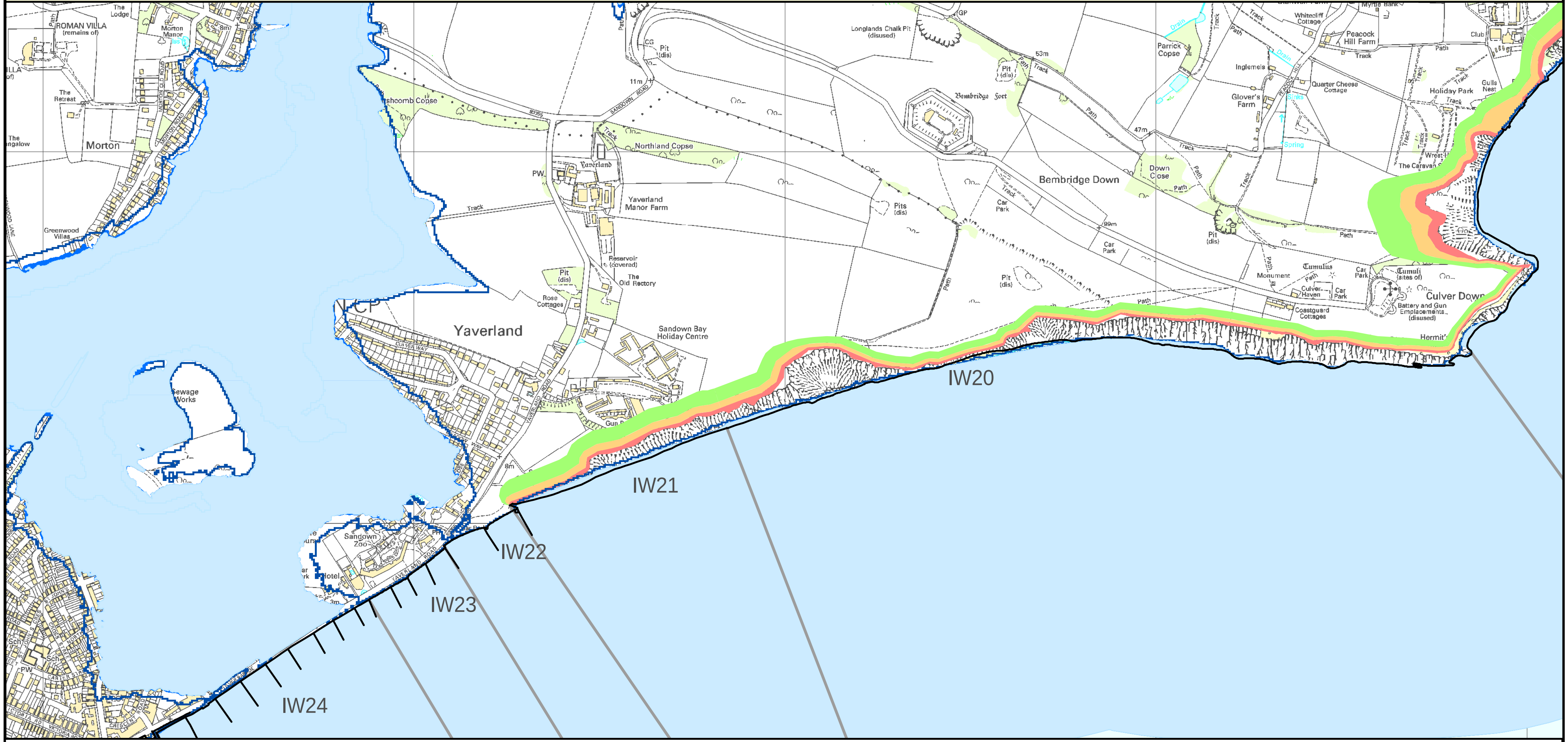
Erosion Mapping: With Present Management scenario

Foreland (PU3B.2 to 3B.5)

Isle of Wight Shoreline Management Plan 2

1:15,000

Meters 0 50 100 200 300 400 500



Key:

IW units (used in Appendix C tables)

Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)

Indicative erosion zone up to 2055 if continuing 'With Present Management'

Indicative erosion zone up to 2105 if continuing 'With Present Management'

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Erosion Mapping: With Present Management scenario

Yaverland to Whitecliff Bay (PU 3C.2 to 3B.5)

Isle of Wight Shoreline Management Plan 2

1:15,000

Meters
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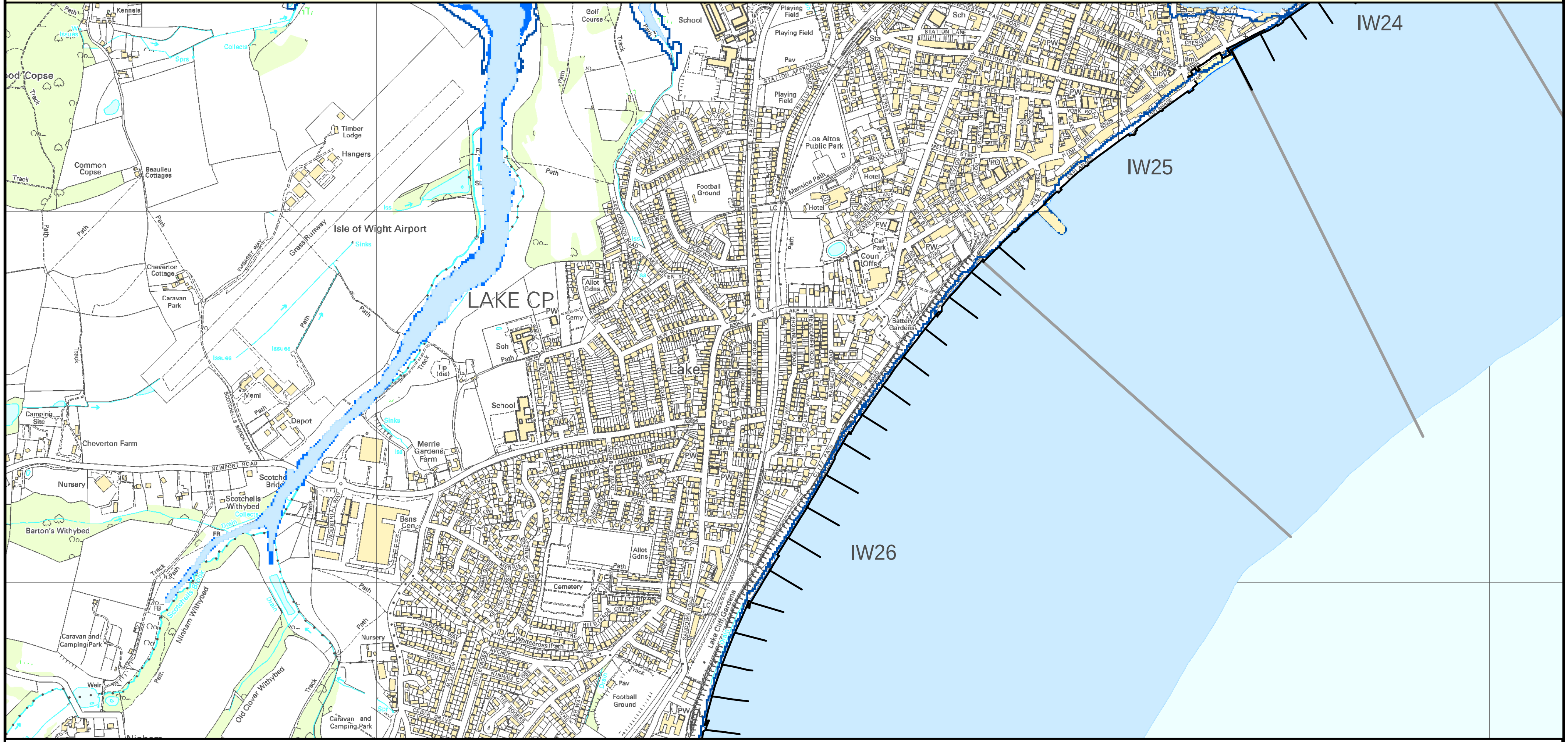


Key:

IW units (used in Appendix C tables)

Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)

Indicative erosion zone up to 2055 if continuing 'With Present Management'

Indicative erosion zone up to 2105 if continuing 'With Present Management'

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

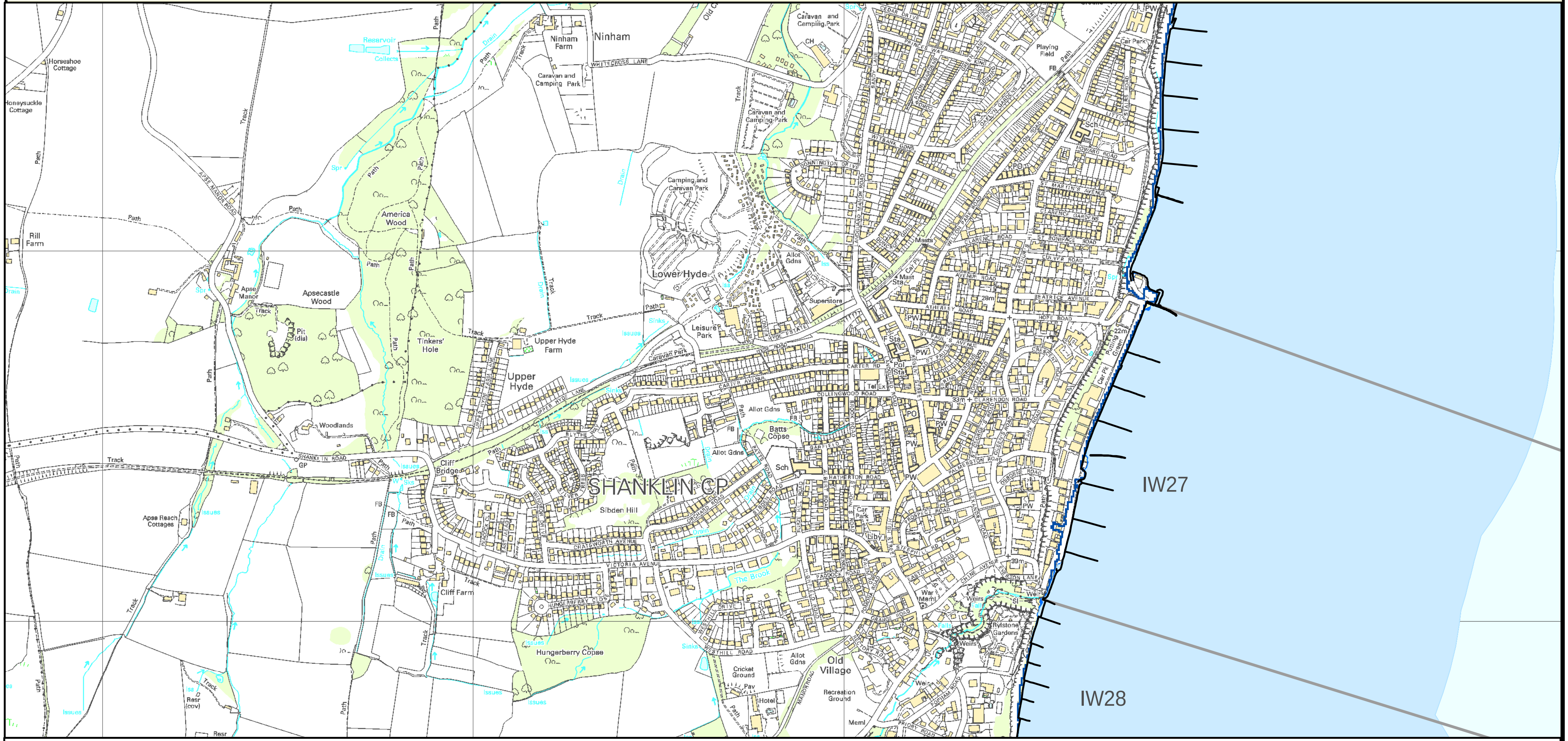
Erosion Mapping: With Present Management scenario

Sandown and Lake (PU 3C.3)

Isle of Wight Shoreline Management Plan 2

1:15,000

0 50 100 200 300 400 500 Meters



Key:

IW units (used in Appendix C tables)

Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)

Indicative erosion zone up to 2055 if continuing 'With Present Management'

Indicative erosion zone up to 2105 if continuing 'With Present Management'

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Erosion Mapping: With Present Management scenario

Shanklin (PU 3C.3)

Isle of Wight Shoreline Management Plan 2

ISLE of WIGHT COUNCIL

1:15,000

Meters
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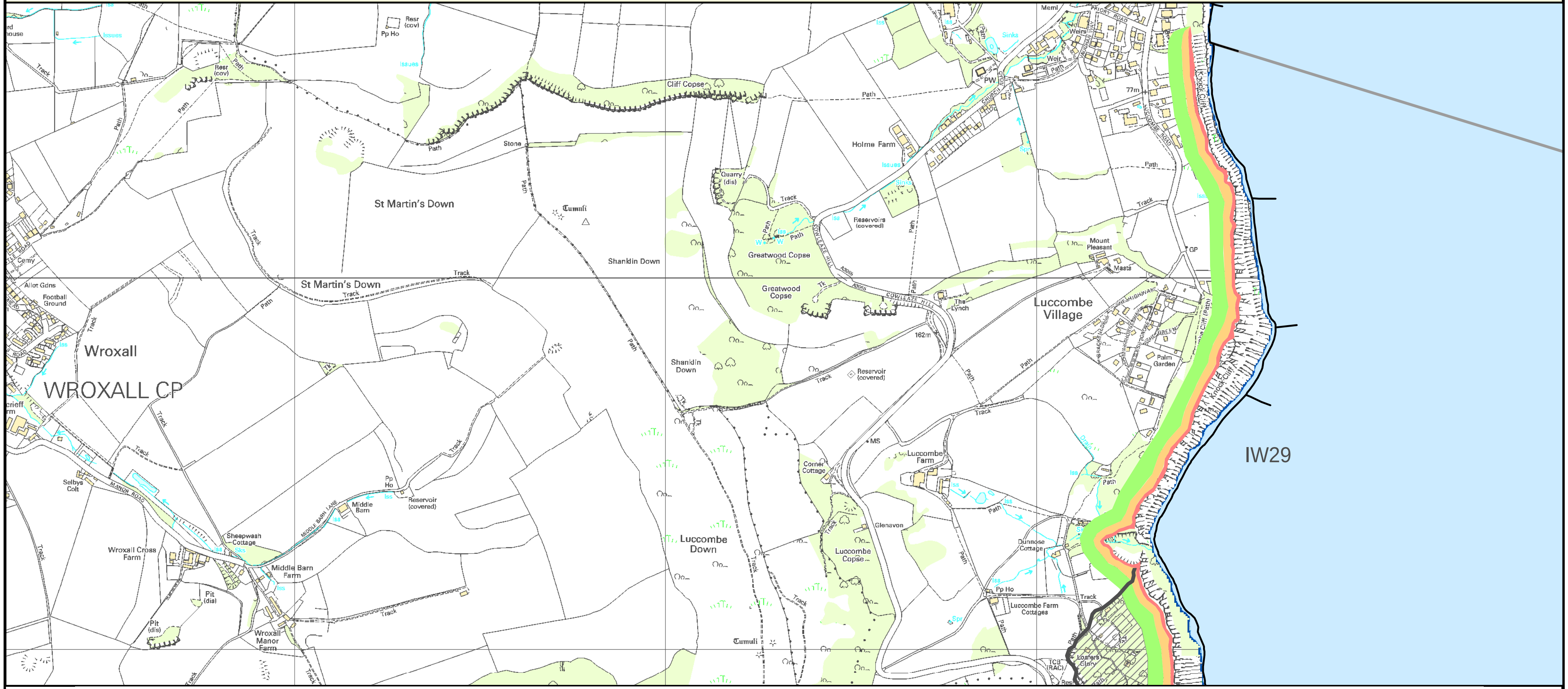


Key:

IW units (used in Appendix C tables)

Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)

Indicative erosion zone up to 2055 if continuing 'With Present Management'

Indicative erosion zone up to 2105 if continuing 'With Present Management'

Continuing 'With Present Management' will minimise the risk of landslide reactivation and slope failure (where existing coastal defences are maintained)

Landward limit of the Ventnor Undercliff Landslide Complex

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

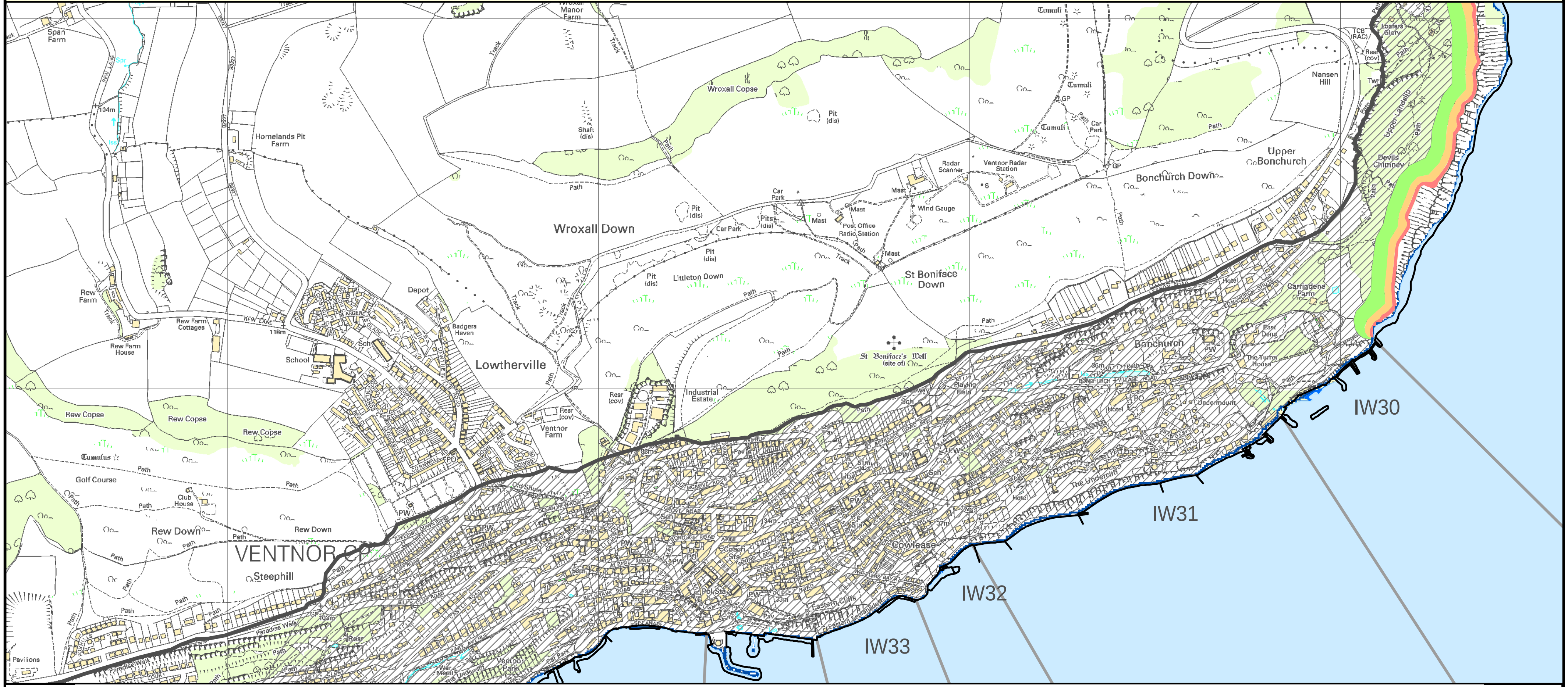
Erosion Mapping: With Present Management scenario

Luccombe and Dunnose (PU 3C.4 & 4A.1)

Isle of Wight Shoreline Management Plan 2

1:15,000

0 50 100 200 300 400 500 Meters



Key:

IW units (used in Appendix C tables)

Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)

Indicative erosion zone up to 2055 if continuing 'With Present Management'

Indicative erosion zone up to 2105 if continuing 'With Present Management'

Continuing 'With Present Management' will minimise the risk of landslide reactivation and slope failure (where existing coastal defences are maintained)

Landward limit of the Ventnor Undercliff Landslide Complex

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Erosion Mapping: With Present Management scenario

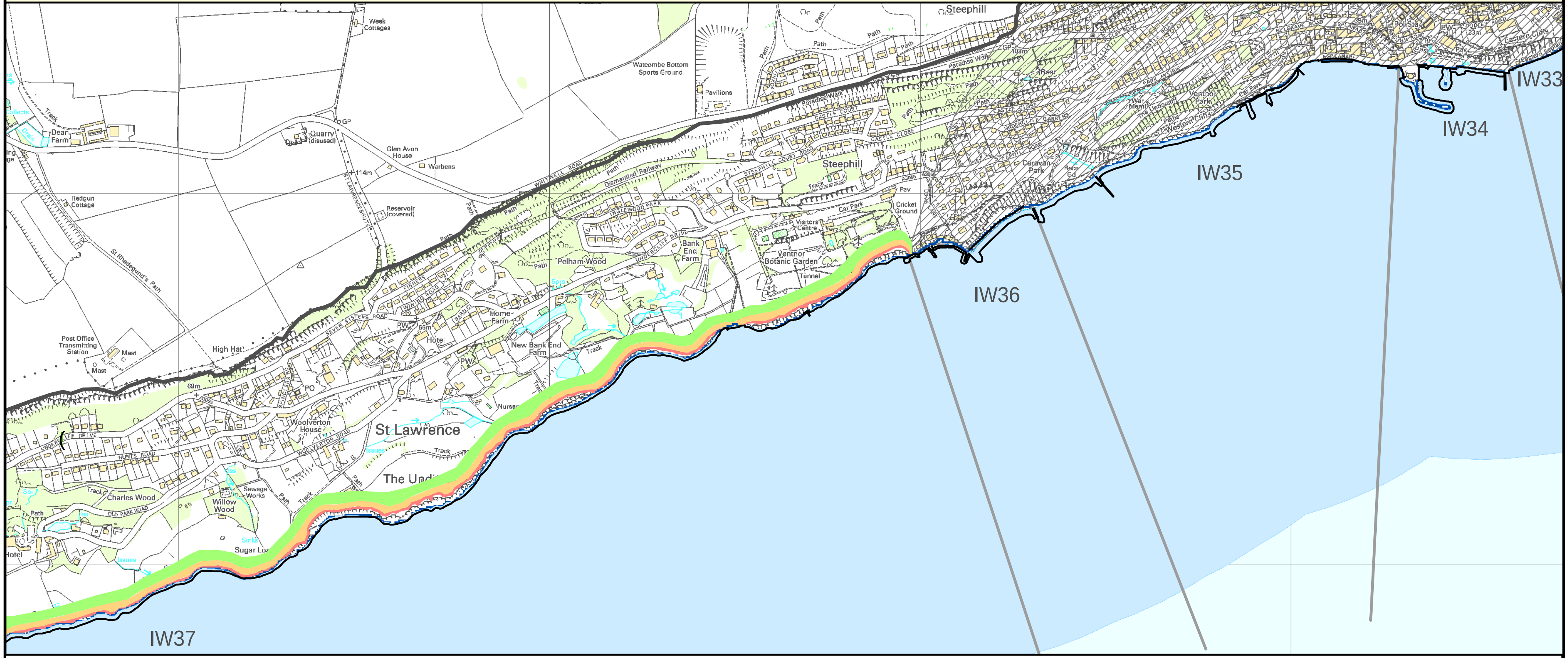
Ventnor, Bonchurch and Dunnose (PU 4A.1 & 4A.2)

ISLE of WIGHT COUNCIL

Isle of Wight Shoreline Management Plan 2

1:15,000

0 50 100 200 300 400 500 Meters



Key:

IW units (used in Appendix C tables)

Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)

Indicative erosion zone up to 2055 if continuing 'With Present Management'

Indicative erosion zone up to 2105 if continuing 'With Present Management'

Continuing 'With Present Management' will minimise the risk of landslide reactivation and slope failure (where existing coastal defences are maintained)

Road breaches likely to occur if 'No Active Intervention' continues in this area (due to landslide reactivation)

Landward limit of the Ventnor Undercliff Landslide Complex

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Erosion Mapping: With Present Management scenario

Ventnor and the St Lawrence Undercliff (PU 4A.2 & 4B.1)

Isle of Wight Shoreline Management Plan 2

1:15,000

Meters
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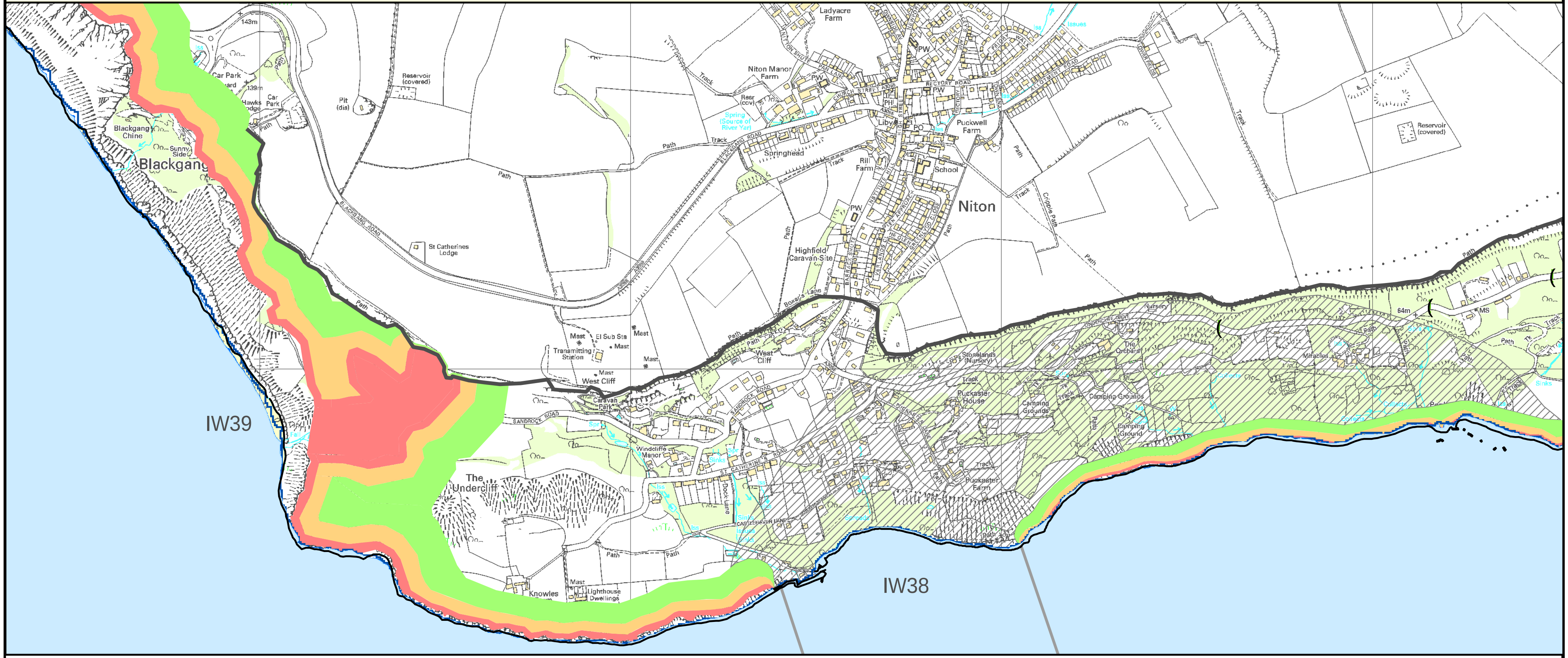

Key:

IW units (used in Appendix C tables)

Ordnance Survey

- Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)
- Indicative erosion zone up to 2055 if continuing 'With Present Management'
- Indicative erosion zone up to 2105 if continuing 'With Present Management'
- Continuing 'With Present Management' will minimise the risk of landslide reactivation and slope failure (where existing coastal defences are maintained)
- (Road breaches likely to occur if 'No Active Intervention' continues in this area (due to landslide reactivation)
- Landward limit of the Ventnor Undercliff Landslide Complex
- 2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency
- 2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency
- 2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Erosion Mapping: With Present Management scenario

Castlehaven and Blackgang (PU 4B.2 & 4B.3)

Isle of Wight Shoreline Management Plan 2

1:15,000

Meters
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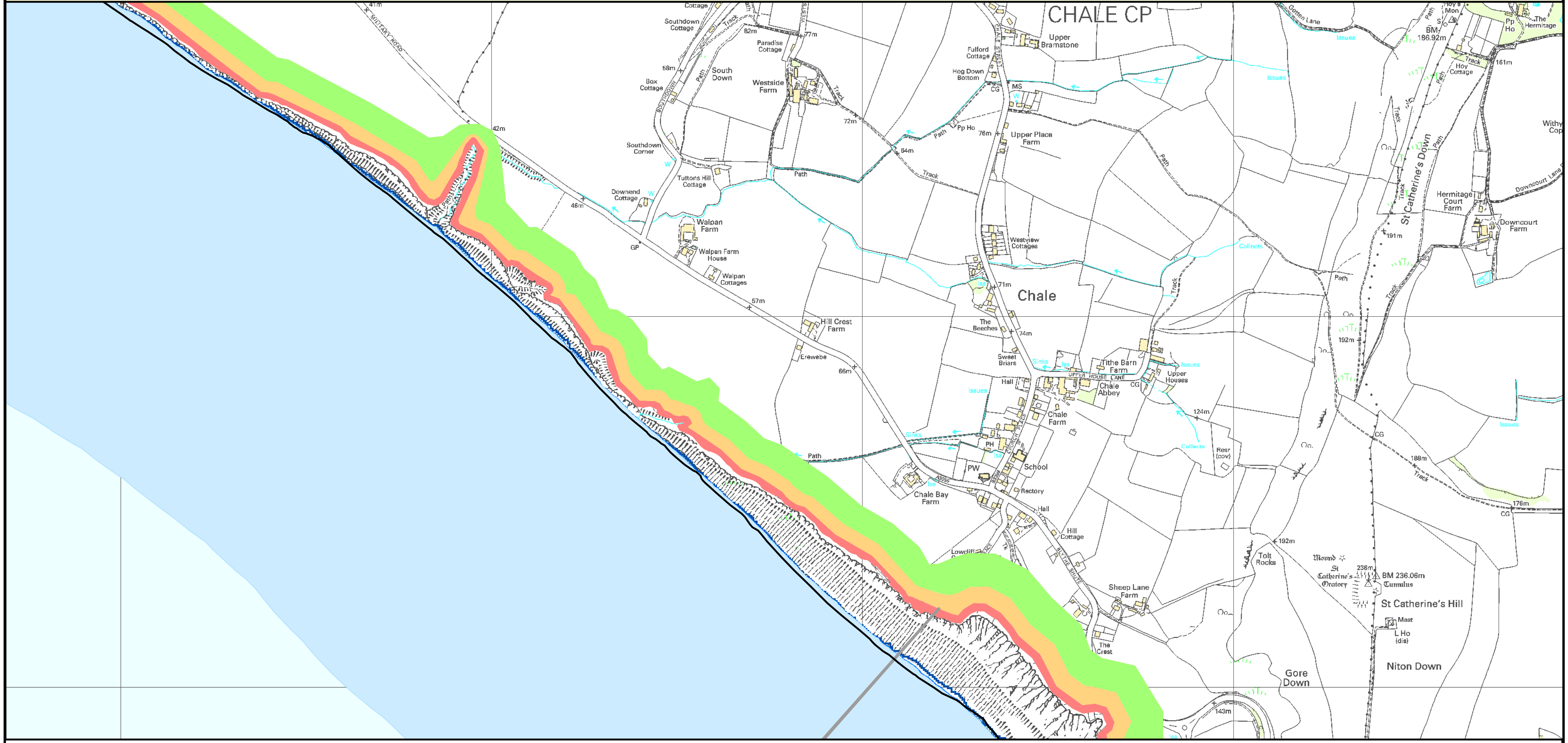


Key:

IW units (used in Appendix C tables)

Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)

Indicative erosion zone up to 2055 if continuing 'With Present Management'

Indicative erosion zone up to 2105 if continuing 'With Present Management'

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

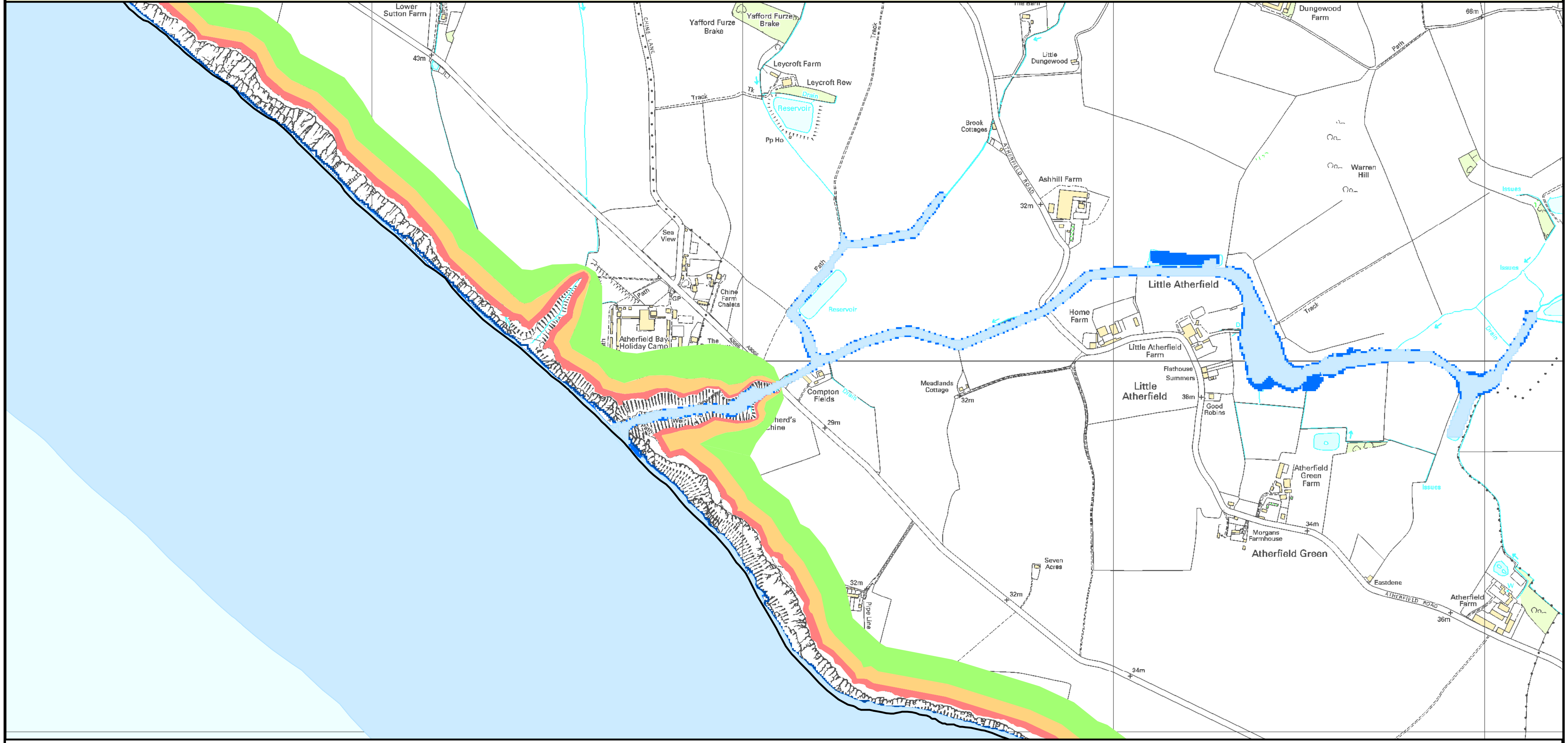
Erosion Mapping: With Present Management scenario

Chale (PU 5)

Isle of Wight Shoreline Management Plan 2

1:15,000

Meters
0 50 100 200 300 400 500



Key:

IW units (used in Appendix C tables)

- Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)
- Indicative erosion zone up to 2055 if continuing 'With Present Management'
- Indicative erosion zone up to 2105 if continuing 'With Present Management'
- 2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency
- 2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency
- 2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Ordnance Survey

Erosion Mapping: With Present Management scenario

Atherfield (PU 5)

Isle of Wight Shoreline Management Plan 2

1:15,000

Meters
0 50 100 200 300 400 500

Key:

IW units (used in Appendix C tables)

Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)

Indicative erosion zone up to 2055 if continuing 'With Present Management'

Indicative erosion zone up to 2105 if continuing 'With Present Management'

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Erosion Mapping: With Present Management scenario **Brighstone (PU 5)**

Isle of Wight Shoreline Management Plan 2

1:15,000

Meters
0 50 100 200 300 400 500

Key:

IW units (used in Appendix C tables)

Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)

Indicative erosion zone up to 2055 if continuing 'With Present Management'

Indicative erosion zone up to 2105 if continuing 'With Present Management'

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

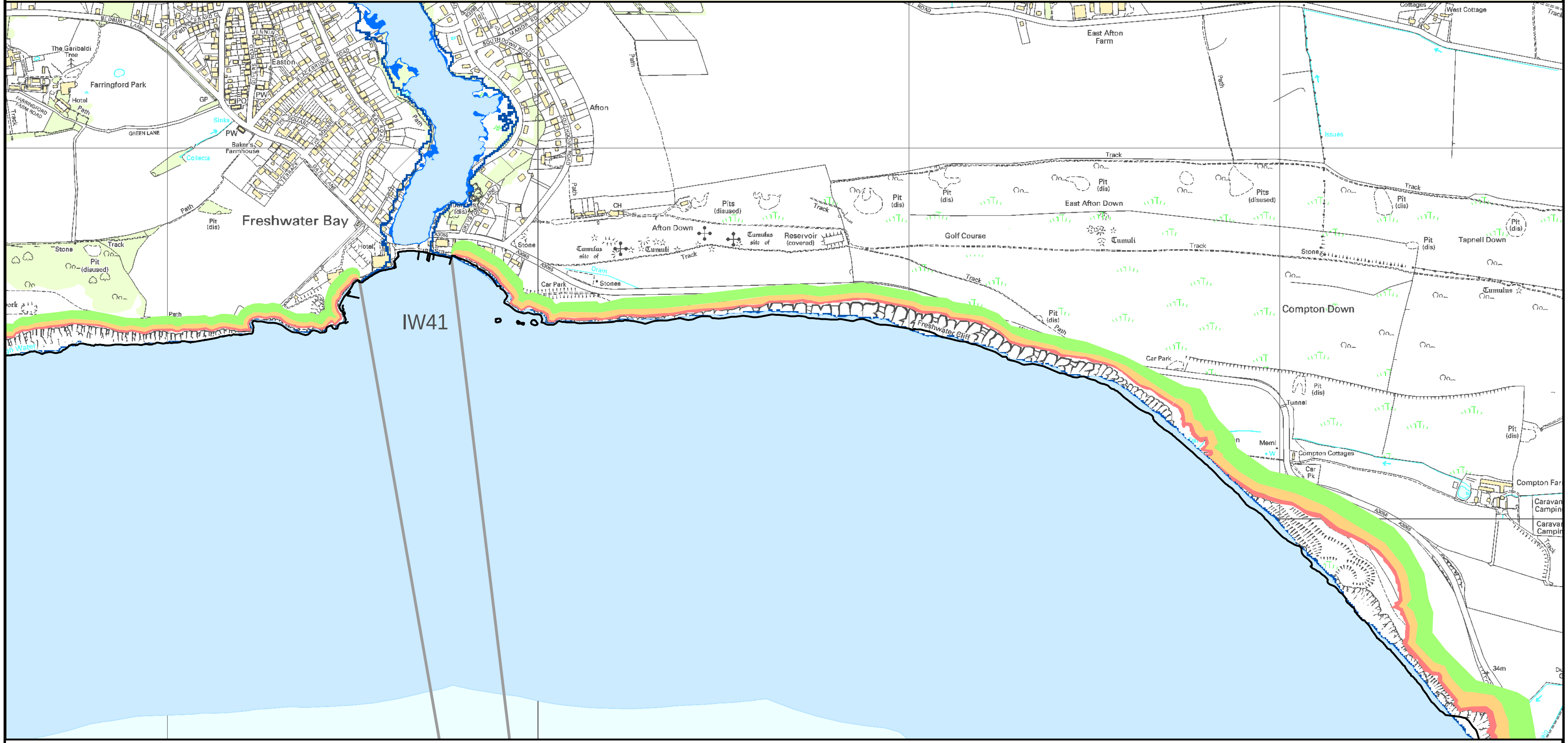
2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Erosion Mapping: With Present Management scenario

Brook (PU 5)

Isle of Wight Shoreline Management Plan 2

1:15,000 Meters 0 50 100 200 300 400 500



Key:

IW units (used in Appendix C tables)

Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)

Indicative erosion zone up to 2055 if continuing 'With Present Management'

Indicative erosion zone up to 2105 if continuing 'With Present Management'

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

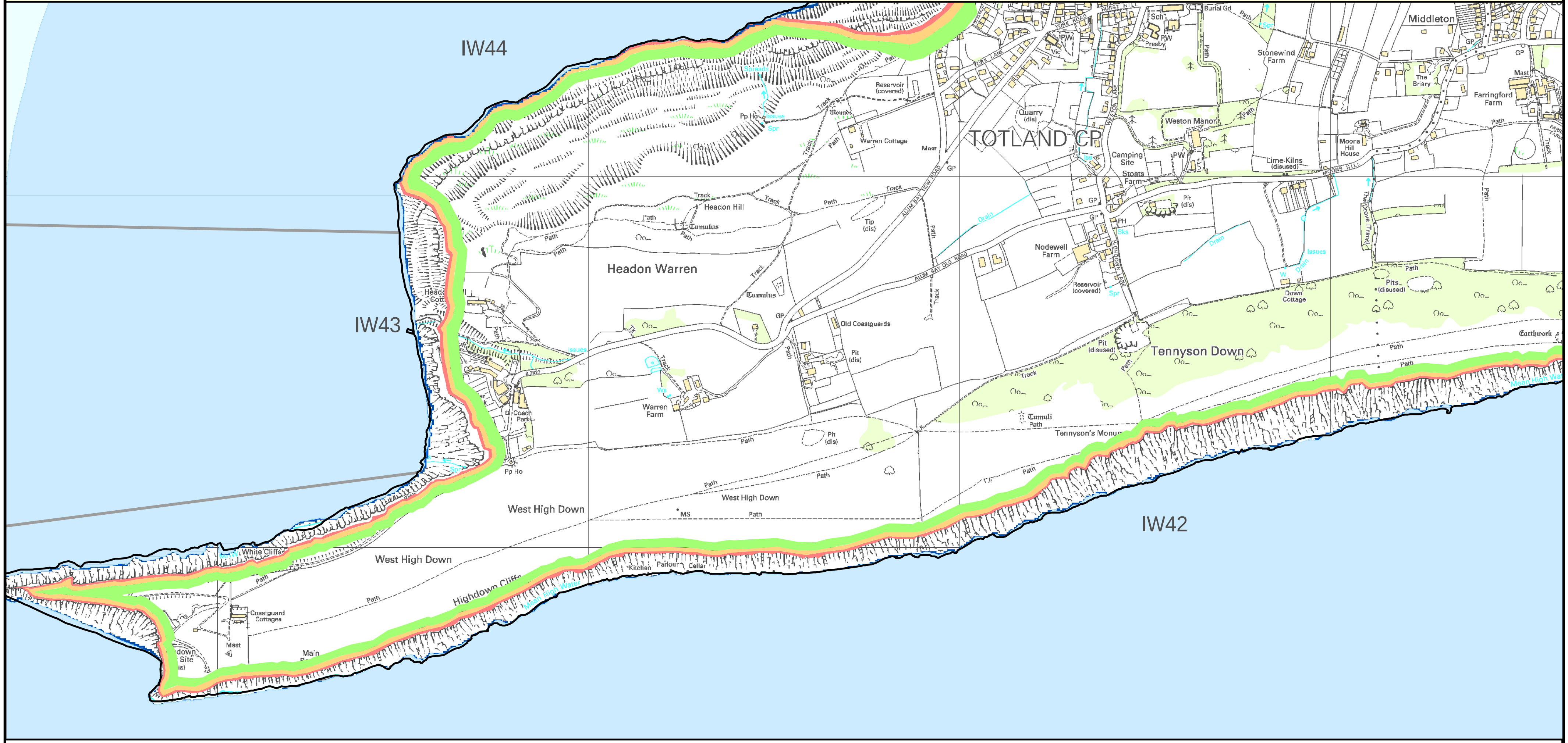
2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Erosion Mapping: With Present Management scenario

Freshwater Bay and Compton (PU 6A.1 & 5)

Isle of Wight Shoreline Management Plan 2

1:15,000



Key:

IW units (used in Appendix C tables)

Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)

Indicative erosion zone up to 2055 if continuing 'With Present Management'

Indicative erosion zone up to 2105 if continuing 'With Present Management'

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

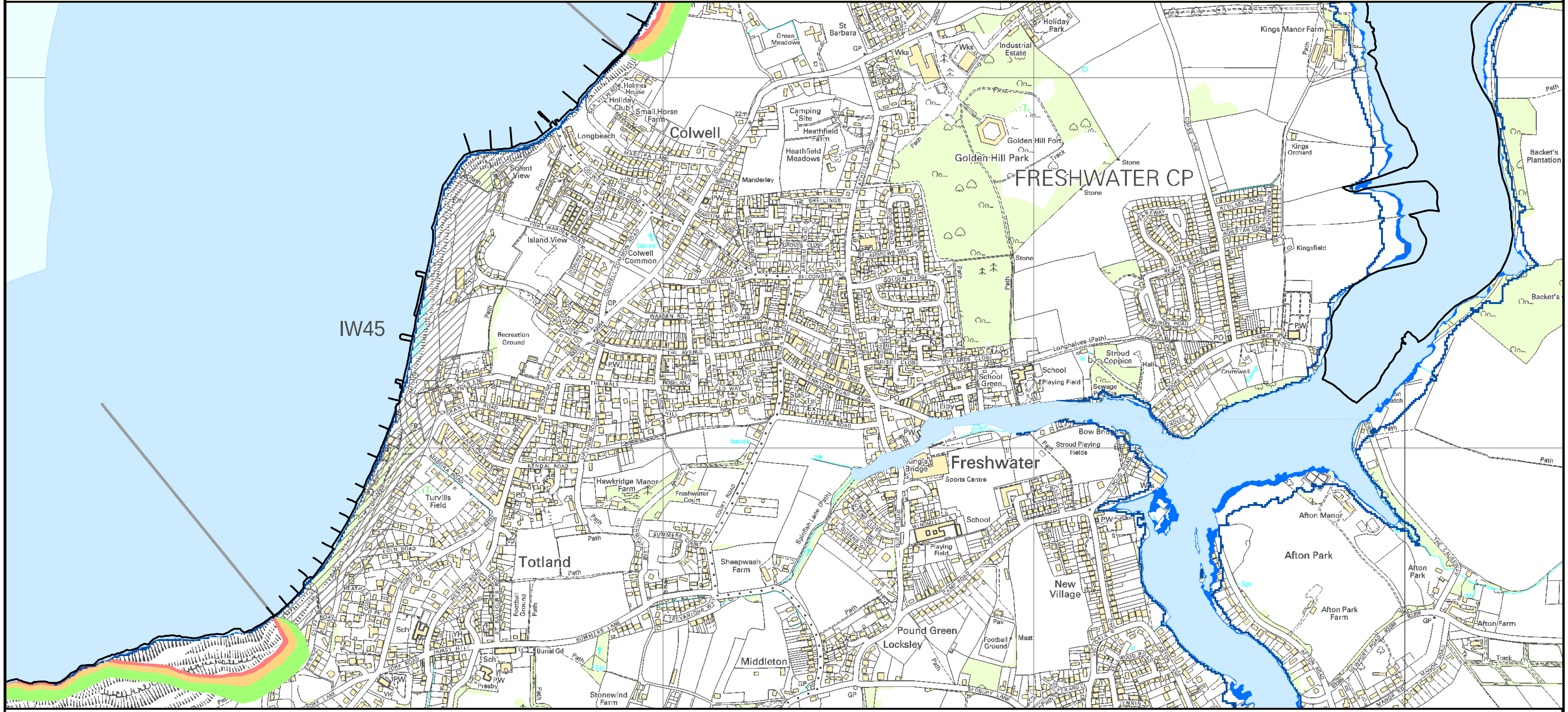
Erosion Mapping: With Present Management scenario

Tennyson Down and Alum Bay (PU 6A.2)

Isle of Wight Shoreline Management Plan 2

1:15,000

0 50 100 200 300 400 500 Meters



Key:

IW units (used in Appendix C tables)

Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)

Indicative erosion zone up to 2055 if continuing 'With Present Management'

Indicative erosion zone up to 2105 if continuing 'With Present Management'

Continuing 'With Present Management' will minimise the risk of slope failure (where existing coastal defences are maintained)

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

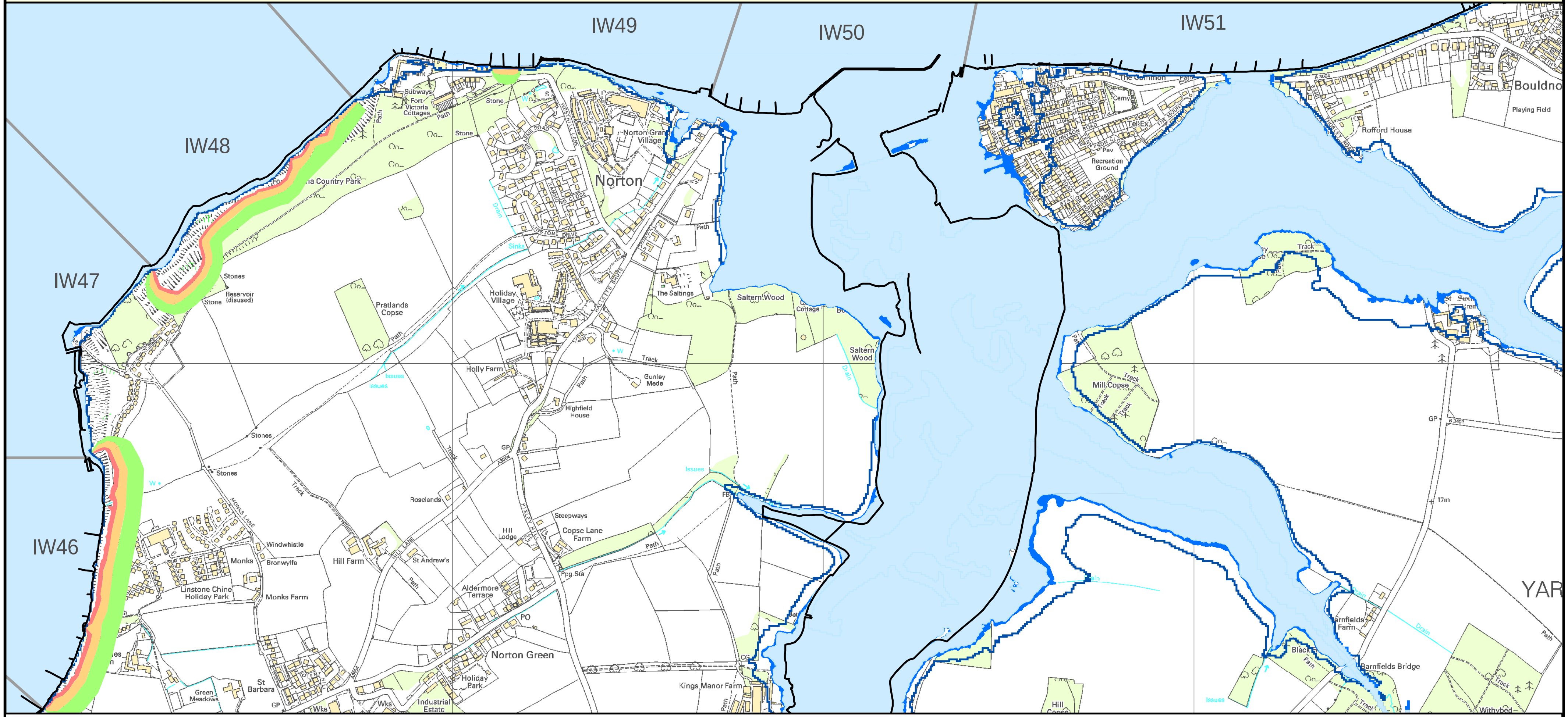
Erosion Mapping: With Present Management scenario

Totland (PU 6B.1)

Isle of Wight Shoreline Management Plan 2

1:15,000

Meters 0 50 100 200 300 400 500



Key:

IW units (used in Appendix C tables)

Current shoreline

Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)

Indicative erosion zone up to 2055 if continuing 'With Present Management'

Indicative erosion zone up to 2105 if continuing 'With Present Management'

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

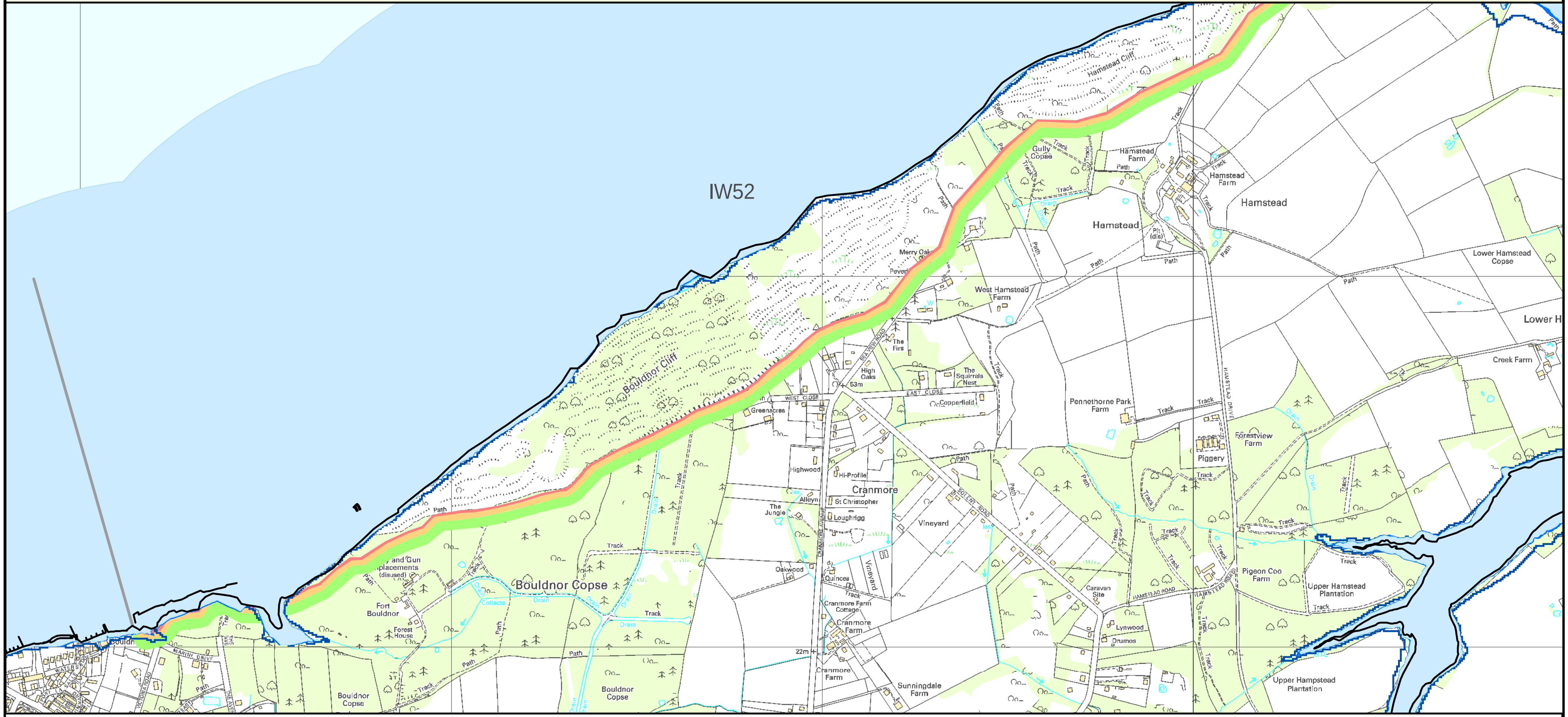
2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Erosion Mapping: With Present Management scenario **Colwell to Yarmouth, including the Western Yar (PU 6B.2 to 6C.6)**

Isle of Wight Shoreline Management Plan 2

1:15,000



Key:

IW units (used in Appendix C tables)

Current shoreline

Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)

Indicative erosion zone up to 2055 if continuing 'With Present Management'

Indicative erosion zone up to 2105 if continuing 'With Present Management'

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

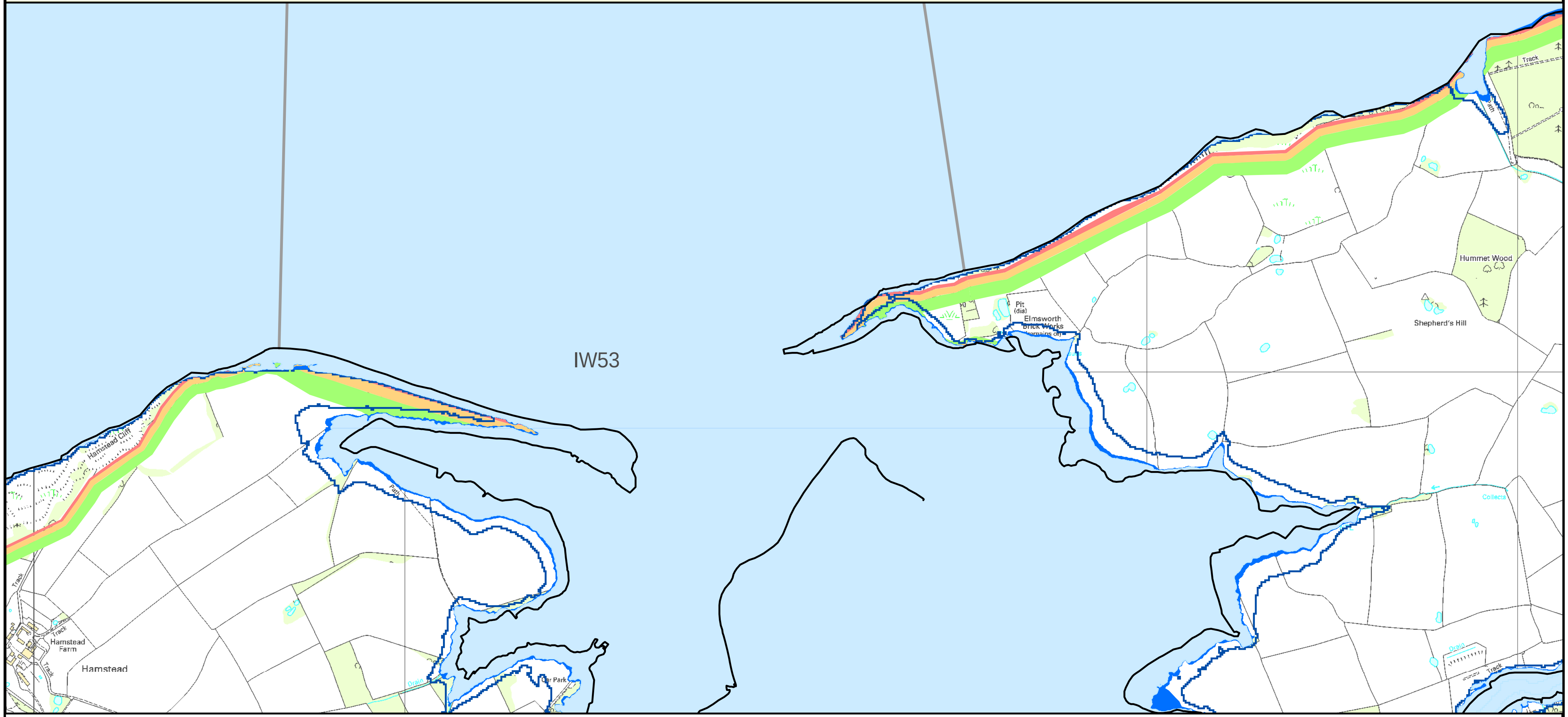
Erosion Mapping: With Present Management scenario

Bouldnor Cliff (PU 7.1)

Isle of Wight Shoreline Management Plan 2

1:15,000

0 50 100 200 300 400 500 Meters



Key:

- IW units (used in Appendix C tables)
- Current shoreline
- Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)
- Indicative erosion zone up to 2055 if continuing 'With Present Management'
- Indicative erosion zone up to 2105 if continuing 'With Present Management'
- 2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency
- 2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency
- 2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

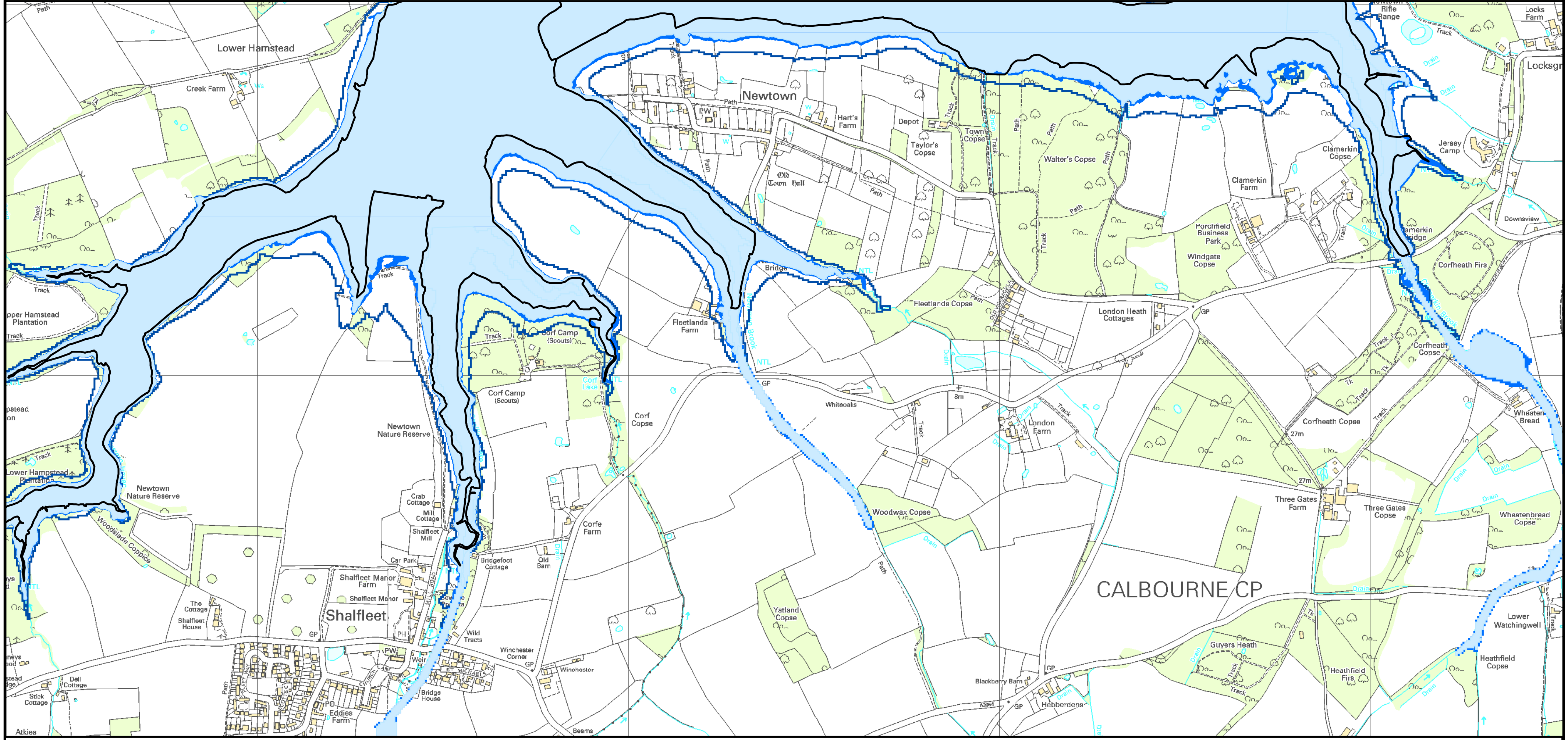
Erosion Mapping: With Present Management scenario

Entrance to Newtown Estuary (PU 7.2)

Isle of Wight Shoreline Management Plan 2

1:15,000

Meters
0 50 100 200 300 400 500



Key:

IW units (used in Appendix C tables)

Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)

Indicative erosion zone up to 2055 if continuing 'With Present Management'

Indicative erosion zone up to 2105 if continuing 'With Present Management'

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

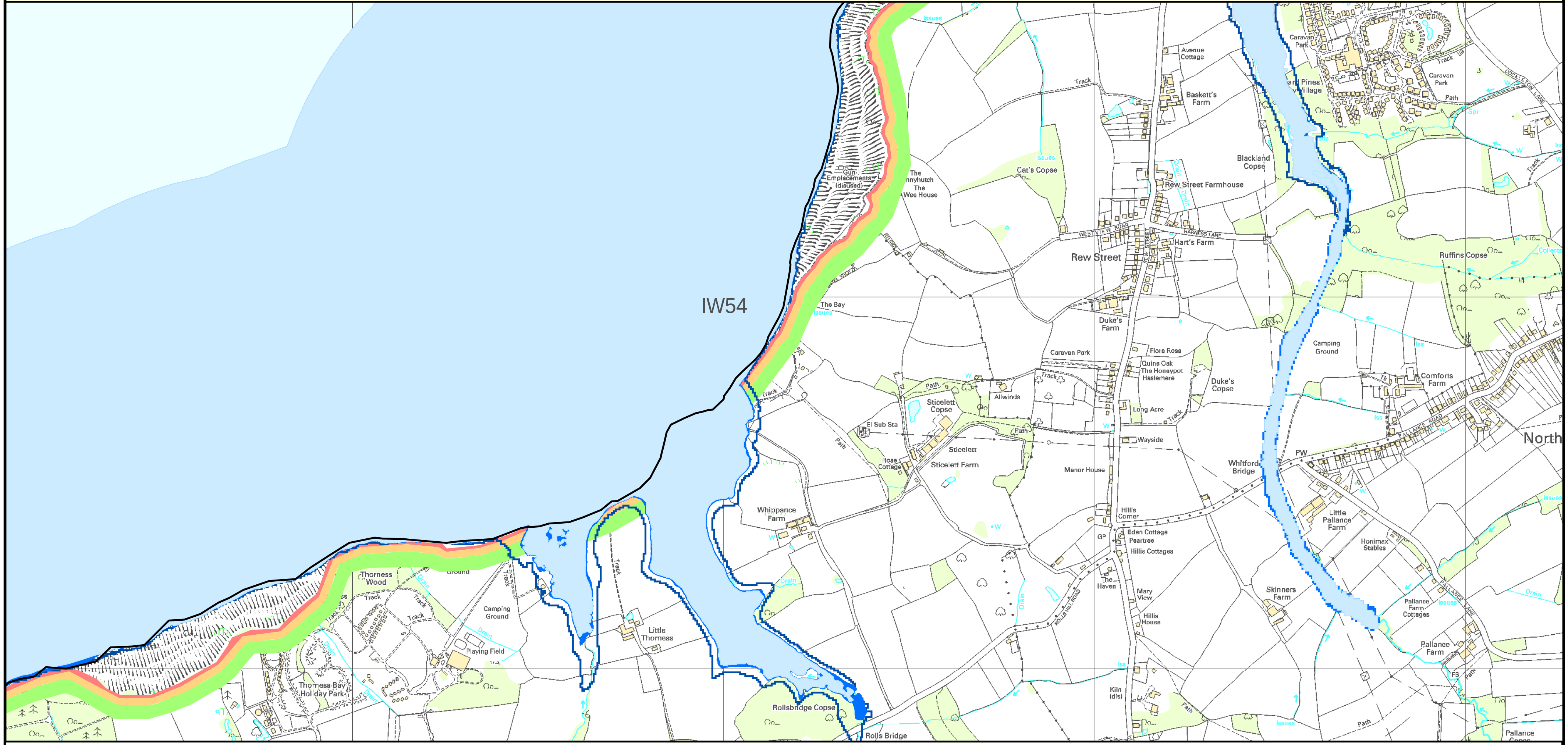
Erosion Mapping: With Present Management scenario

Southern Newtown Estuary (PU 7.2)

Isle of Wight Shoreline Management Plan 2

1:15,000

Meters
0 50 100 200 300 400 500



Key:

IW units (used in Appendix C tables)

Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)

Indicative erosion zone up to 2055 if continuing 'With Present Management'

Indicative erosion zone up to 2105 if continuing 'With Present Management'

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

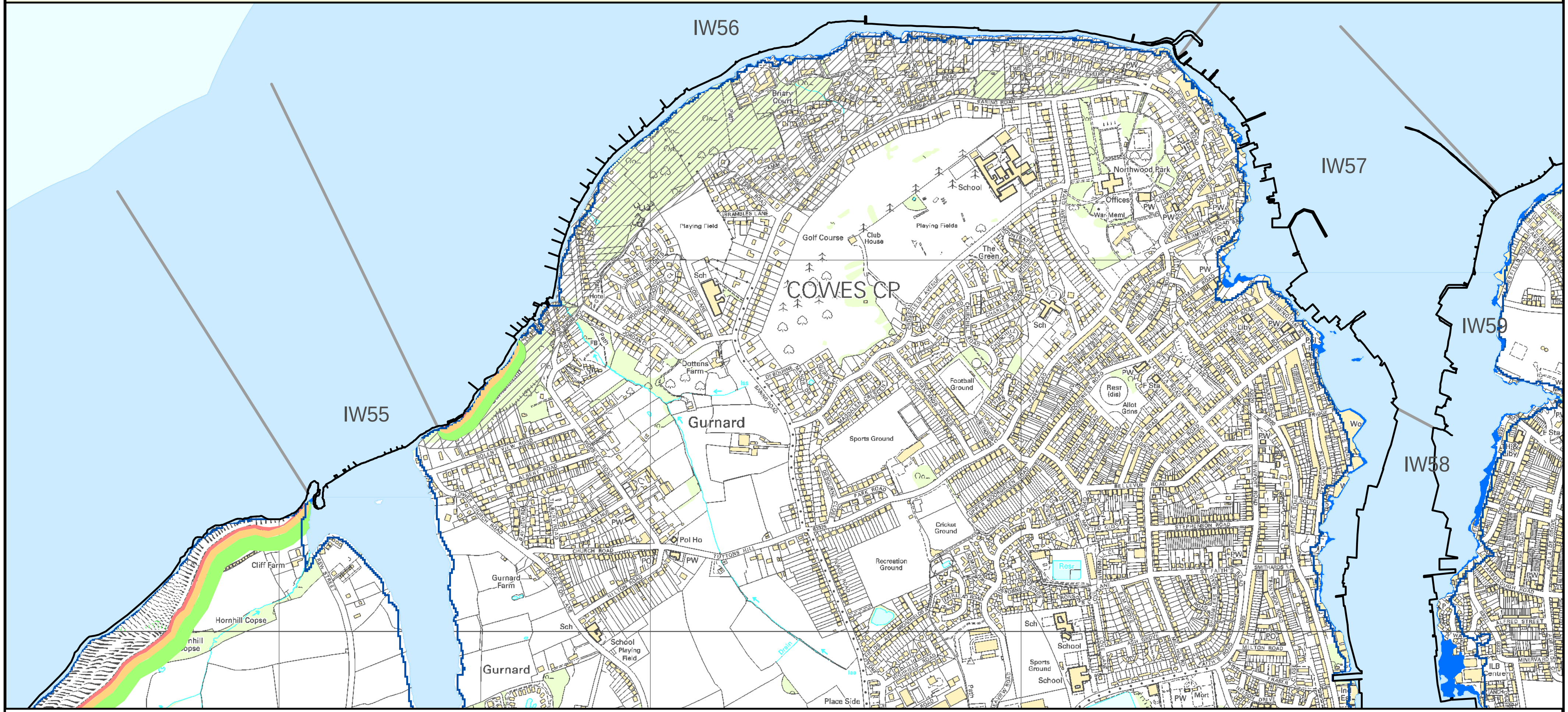
Erosion Mapping: With Present Management scenario

Thorness Bay (PU 7.3)

Isle of Wight Shoreline Management Plan 2

1:15,000

Meters
0 50 100 200 300 400 500



Key:

- IW units (used in Appendix C tables)
- Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)
- Indicative erosion zone up to 2055 if continuing 'With Present Management'
- Indicative erosion zone up to 2105 if continuing 'With Present Management'
- Continuing 'With Present Management' will minimise the risk of slope failure (where existing coastal defences are maintained)
- 2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency
- 2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency
- 2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Erosion Mapping: With Present Management scenario

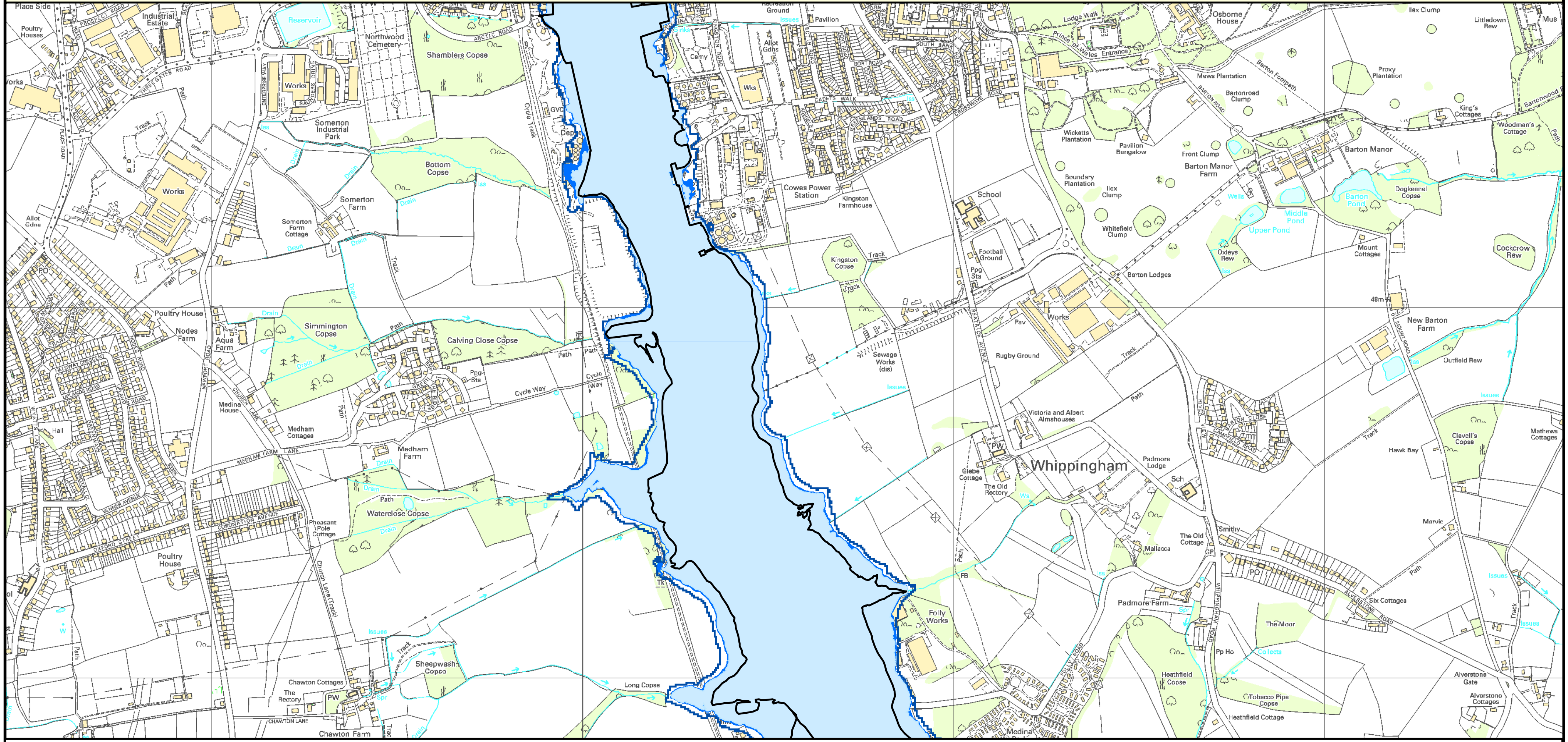
Gurnard, Cowes and East Cowes (PU 1A.1 to 1A.6)

Isle of Wight Shoreline Management Plan 2

ISLE of WIGHT COUNCIL

1:15,000

0 50 100 200 300 400 500 Meters



Key:

IW units (used in Appendix C tables)

Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)

Indicative erosion zone up to 2055 if continuing 'With Present Management'

Indicative erosion zone up to 2105 if continuing 'With Present Management'

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

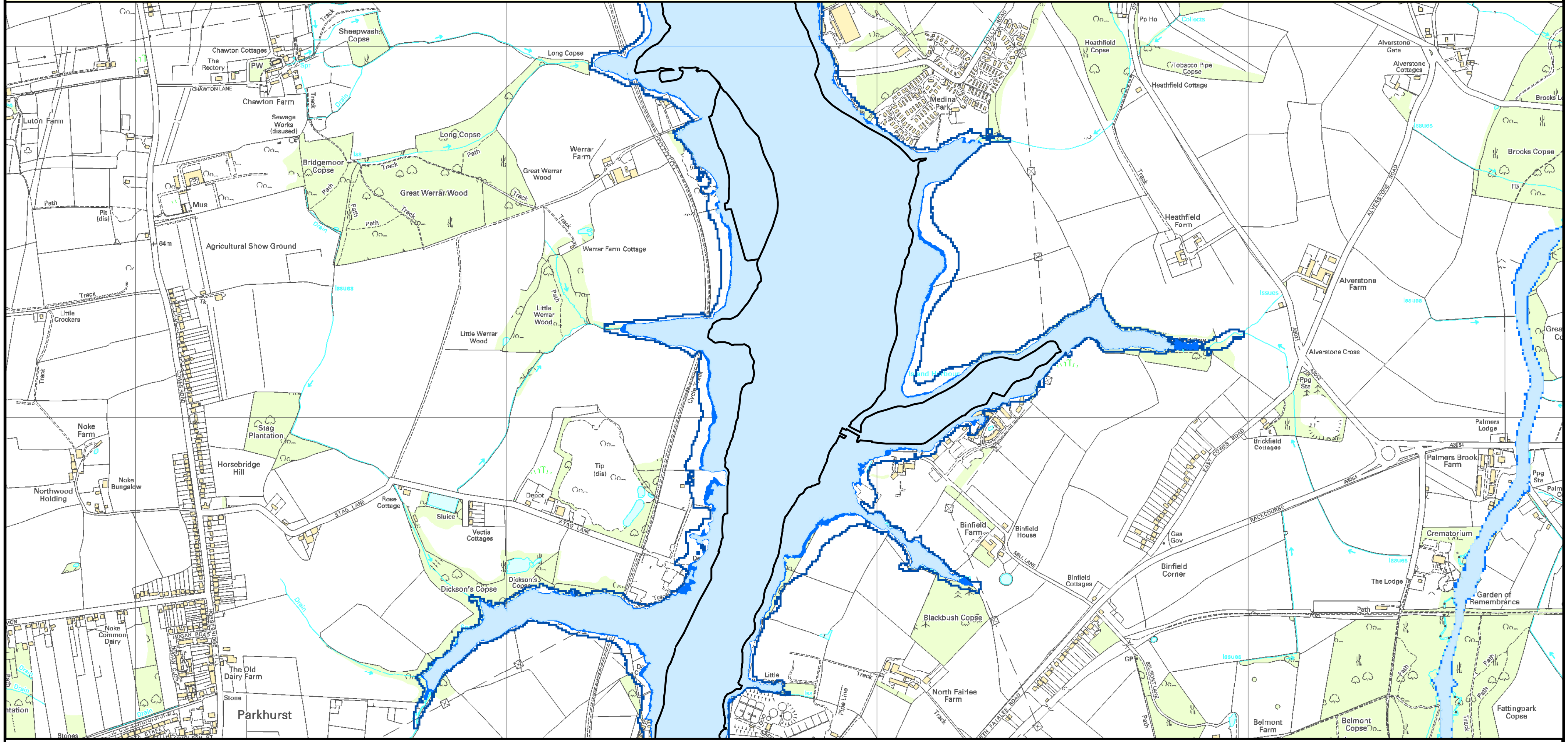
Erosion Mapping: With Present Management scenario

Medina Estuary (northern) (PU 1B.1 & 1B.5)

Isle of Wight Shoreline Management Plan 2

1:15,000

Meters
0 50 100 200 300 400 500



Key:

IW units (used in Appendix C tables)

Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)

Indicative erosion zone up to 2055 if continuing 'With Present Management'

Indicative erosion zone up to 2105 if continuing 'With Present Management'

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

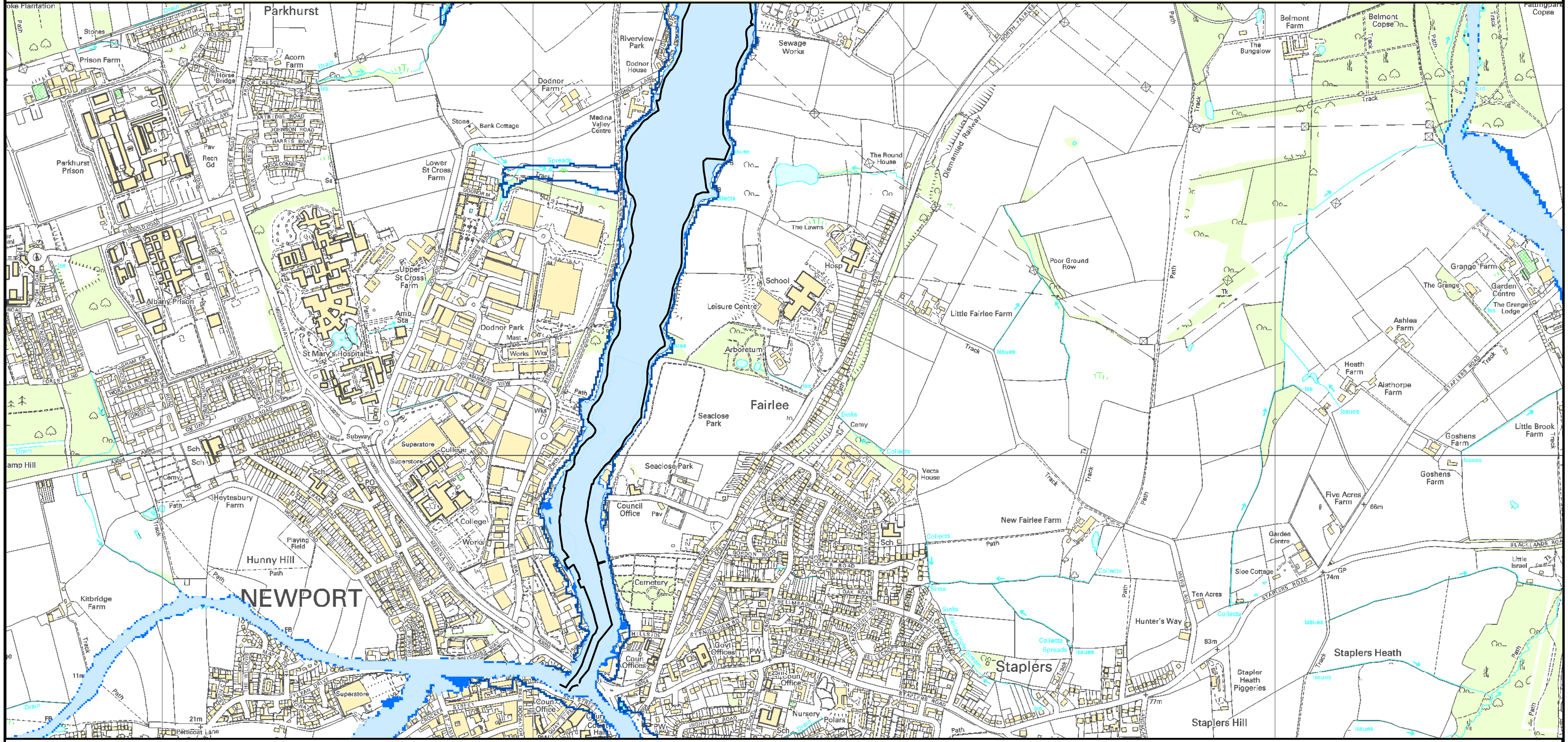
Erosion Mapping: With Present Management scenario

Medina Estuary (central) (PU 1B.1, 1B.2 & 1B.5)

Isle of Wight Shoreline Management Plan 2

1:15,000

Meters
0 50 100 200 300 400 500



Key:

IW units (used in Appendix C tables)

Indicative erosion zone up to 2025 if continuing 'With Present Management' (i.e. if existing coastal defences are maintained)

Indicative erosion zone up to 2055 if continuing 'With Present Management'

Indicative erosion zone up to 2105 if continuing 'With Present Management'

2010 Flood Zone 3 (area that could be affected by a flood from the sea that has a 0.5 per cent (1 in 200) or greater chance of happening each year, if there were no flood defences); Environment Agency

2010 Flood Zone 2 (additional extent of an extreme flood from the sea, with up to a 0.1 per cent (1 in 1000) chance of occurring each year, if there were no flood defences); Environment Agency

2105 Flood risk area 2 (with sea level rise; see description of Flood Zone 2 above) courtesy of IWSFRAMkII

Erosion Mapping: With Present Management scenario

Medina Estuary and Newport Harbour (PU 1B.3, 1B.4, 1B.5)