

River Hamble to Portchester Coastal Flood and Erosion Risk Management Strategy

MAIN STRATEGY DOCUMENT
2014



GOSPORT
Borough Council

FAREHAM
BOROUGH COUNCIL



Environment
Agency



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Glossary and Acronyms

ATL (Advance the Line)

New defences are built on the seaward side.

Baseline

Defines an existing condition/situation (usually Do Nothing) against which options or scenarios are compared.

Benefits

The savings (damages avoided) delivered by implementing strategy options.

Costs

The amount of money required to implement the strategy options.

HTL (Hold the Line)

A policy with an overarching intent to build or maintain coastal defences so that the position of the shoreline remains where it currently is.

Leachate

A liquid that absorbs from the soil when it passes through. Leachate is relevant to contaminated land studies and can transport contaminated materials (i.e. heavy metals) to the shoreline.

MR (Managed Realignment)

Allowing the shoreline to move naturally, but managing the process to direct it in certain areas. This is usually done in low-lying areas, but may occasionally apply to cliffs.

NAI (No Active Intervention)

No planned investment in defending against flooding or erosion, whether or not a coastal defence has existed previously.

ODU (Option Development Unit)

A section of the coastline in which local scale options to manage flood and erosion risk are developed.

Partnership Funding

This relates to the way coastal defences are often paid for where various "partners" have input into the project. Typically this refers to joint funding between government and private sources.

Potentially contaminated land

Land potentially containing substances in or under the land which could pollute controlled waters or cause significant harm to other receptors such as humans, animals or the environment.

Present Value

An economics term which refers to the current worth of a future sum of money.

Priority Schemes

The initial works required following the Strategy to address flood and erosion risk in key areas.

Property Level Protection (PLP)

Flood mitigation measures applied to individual properties that reduce the risk of flooding on a property level (i.e. door flood defenders etc).

Residual life

The time left (typically in years) that a defence structure is expected to be able to provide flood and erosion protection before it comes to the end of its service life. The residual life is estimated from a defence condition survey and assumes that no maintenance works will be carried out in the future.

Scheme

A measure, or combination of measures undertaken to increase the level of protection against flooding and erosion to a local area (i.e. a new floodwall structure).

SMP (Shoreline Management Plan)

A high-level non-statutory planning document which provides a broad scale assessment of the risk associated with coastal processes and presents the a long-term policy framework to reduce these risks to people and the developed, historic and natural environment in a sustainable manner.

SMZ (Strategy Management Zone)

A group of ODUs with similar characteristics in which overarching, wider scale options to manage the flood and erosion risk are developed.

Standard of Protection (SoP)

The level of flood risk that a coastal defence structure is designed to protect against. For example, a defence structure with a 1:100 year SoP indicates that the structure will protect against flooding from a flood event which typically occurs once every 100 years.

Sustain (e.g. SoP)

This is a flood risk management term which refers to options that keep pace with change (e.g. sea level rise). This is achieved by raising or upgrading defences in the future.

Abbreviations

STRATEGY LANDOWNERS

MOD	Ministry of Defence
FBC	Fareham Borough Council
GBC	Gosport Borough Council
HCC	Hampshire County Council
HA	Highways Authority
PO	Private Ownership

ENVIRONMENTAL DESIGNATIONS

SPA	Special Protection Areas
SSSI	Sites of Special Scientific Interest
SAC	Special Areas of Conservation
SAM	Scheduled Ancient Monuments
NNR	National Nature Reserve
LNR	Local Nature Reserve

ENVIRONMENTAL ASSESSMENTS

WFD	Water Framework Directive
QRA	Qualitative Risk Assessment
HRA	Habitats Regulations Assessment
SEA	Strategic Environmental Assessment

OTHER

ESCP	Eastern Solent Coastal Partnership
URS	URS (Environmental and Engineering Consultants)



Photography by Roger D Smith ABIPP Gosport

Sailing at Stokes Bay



Introduction

Setting the scene



Introduction

The Eastern Solent Coastal Partnership (ESCP) and Engineering and Environmental Consultancy URS have developed a Coastal Flood and Erosion Risk Management Strategy on behalf of Gosport Borough Council and Fareham Borough Council.

The Strategy covers a 58km (36 mile) stretch of coastline between Portchester Castle (in Portsmouth Harbour) to Burridge on the east bank of the River Hamble. This coastal frontage is highly varied and ranges from very sheltered estuarine and creek environments to much more exposed open coast beach environments.

The Strategy area contains a mix of highly developed residential and commercial areas including the major settlements of Fareham, Gosport and Lee-on-the-Solent. There are large areas of open space and sites of significant environmental importance around much of the frontage. In addition there are areas owned by the Ministry of Defence (MOD) as well as many historical land marks, areas of potentially contaminated land and also high grade agricultural land. This diverse and interesting coastal environment provides many access and recreation opportunities and is widely used for leisure by a significant number of visitors each year.

Many parts of the Strategy frontage are already defended however, the condition, standard of protection against flooding and expected life of these defences is highly variable. This means that there are significant areas of lower lying land across Gosport and Fareham that are at risk of flooding from large storm events. Parts of the open coast are potentially at threat from coastal erosion.

In the future, with the increased storminess and rising sea levels that are predicted as a consequence of climate change, the risk of coastal flooding and erosion is set to increase significantly if sea levels rise as currently predicted.

WITHOUT ACTIVELY IMPLEMENTING MEASURES TO MANAGE COASTAL FLOOD AND EROSION RISKS, OVER 2,600 PROPERTIES AND 10,000 PEOPLE ARE LIKELY TO BE AT AN INCREASED RISK BY 2115.

With all of the interacting and competing pressures on the coastline the primary objective of the Strategy is to reduce the risk of coastal flooding and erosion to people, the developed and natural environment.

It achieves this by identifying the preferred options to manage and reduce these risks in a cost effective, holistic and sustainable manner.

The Strategy is now in a three month period of consultation (1st September 2014 to 1st December 2014). During this time key stakeholders and the public are invited to attend a series of exhibitions to review and provide feedback on the Strategy proposals.

Please visit www.escp.org.uk for further details.

Strategy Frontage



The Strategy frontage and the Boroughs of Gosport and Fareham

Strategy Objectives

A number of primary and secondary objectives were developed at the outset of the project and these agreed by the Project Steering Group:

Primary objectives:

- To build on the work of the North Solent Shoreline Management Plan;
- To define the coastal flooding and erosion risks to people and the developed, historic and natural environments;
- To identify the preferred technically, economically and environmentally sound and sustainable strategic options for managing those risks over a 100 year appraisal period, and define an implementation plan (taking into account climate change and predicted sea level rise);
- To identify the consequences of implementing the preferred policies from the North Solent Shoreline Management Plan;
- To balance the needs of people and the environment;
- To comply with environmental legislation and identify opportunities for environmental enhancement, allowing where possible the natural evolution of the shoreline;
- Where schemes are required and are appropriate to develop; to identify their costs, benefits and associated outcomes measures;
- To identify opportunities for broader outcomes. Broader outcomes will be linked to partner initiatives such as regeneration and economic growth, tourism, recreation and amenity; and
- To identify opportunities for potential financial contributions through partnerships with the Solent Flood Risk 2026 project, the Solent Local Enterprise Partnership (LEP), Partnership for Urban South Hampshire (PUSH) and Local Planning Authorities.

Secondary Objectives:

- To provide a co-ordinated approach across a range of authorities and organisations managing the coastline;
- To link with neighbouring strategies, projects and initiatives including those which are outside of the realm of coastal management and to utilise existing information for the area where possible;
- To encourage awareness and provide support and information to communities to promote adaptation;
- To identify Coastal Change Management Areas and residual risks to inform the Local Planning Authority;
- To inform others so future land use and coastal zone development & management can take account of the risks, time frame of risks and the Strategy options;
- To consider opportunities to enhance coastal access; and
- To inform and feed into the Lead Authority (HCC) local Flood Risk Management Strategy for the area.

These objectives were enshrined in the Strategy development process and were key considerations in the appraisal of potential management options.



Photography by Roger D Smith ABIPP Gosport

View over Hill Head and Lee-on-the Solent

The shoreline management planning hierarchy

Shoreline Management Plans (SMPs) sit at the top of the hierarchy of plans for managing coastal flooding and erosion. A Shoreline Management Plan (SMP) is a high-level non-statutory planning document which provides a broad assessment of the risks associated with coastal processes and presents a long-term policy framework to reduce these risks to people and the developed, historic and natural environment in a sustainable manner. An SMP aims to manage risk by employing a range of methods which reflect both national and local priorities, to:

- Reduce the threat of coastal flooding and erosion to people and their property; and
- Benefit the environment, society and the economy as far as possible, in line with the Government's 'sustainable development principles'.

The Strategy area falls within the boundaries of the North Solent Shoreline Management Plan (2010). This SMP presents the high level policies for future management of the coastline. These policies were finalised following a period of public consultation and were formally approved by the Environment Agency and adopted by Gosport and Fareham Borough Councils in 2011. An overview of the North Solent SMP policies is provided in the opposite map.

Given the significant urban areas within the Strategy area, and the potential threat of erosion and coastal flooding, the SMP policy for the majority of the coastline is to **Hold the Line** for the coming century. This policy means that there is an overarching intent to build or maintain coastal defences so that the position of the shoreline remains where it currently is.

In order to maintain key habitats and natural environment there are also areas towards the western end of the frontage where the SMP policy is to allow natural process to continue (**No Active**

Intervention). This policy means that the shoreline will continue to evolve naturally in the future and that no defences will be built.

At Hook Lake (mouth of the river Hamble), a **Managed Realignment** policy has been locally recommended in the future. This policy is required in order to help balance habitat losses created by continuing to defend much of the coastline elsewhere. This policy means that existing defences may be removed or breached and the position of the shoreline will move landwards in a managed way.

With these high level policies set, it is the role of this Strategy to recommend the preferred strategic management options to deliver the policies.



The Coastal Management Hierarchy

The high level coastal management policies (North Solent SMP, 2010)



The need for a strategic approach

Coastal strategies sit at the second tier in the hierarchy and it is the role of strategies to identify the appropriate scheme or flood risk mitigation option for implementing the SMP policies. The Strategy reviews the SMP policies in more detail to ensure these high level policies remain appropriate at the local scale.

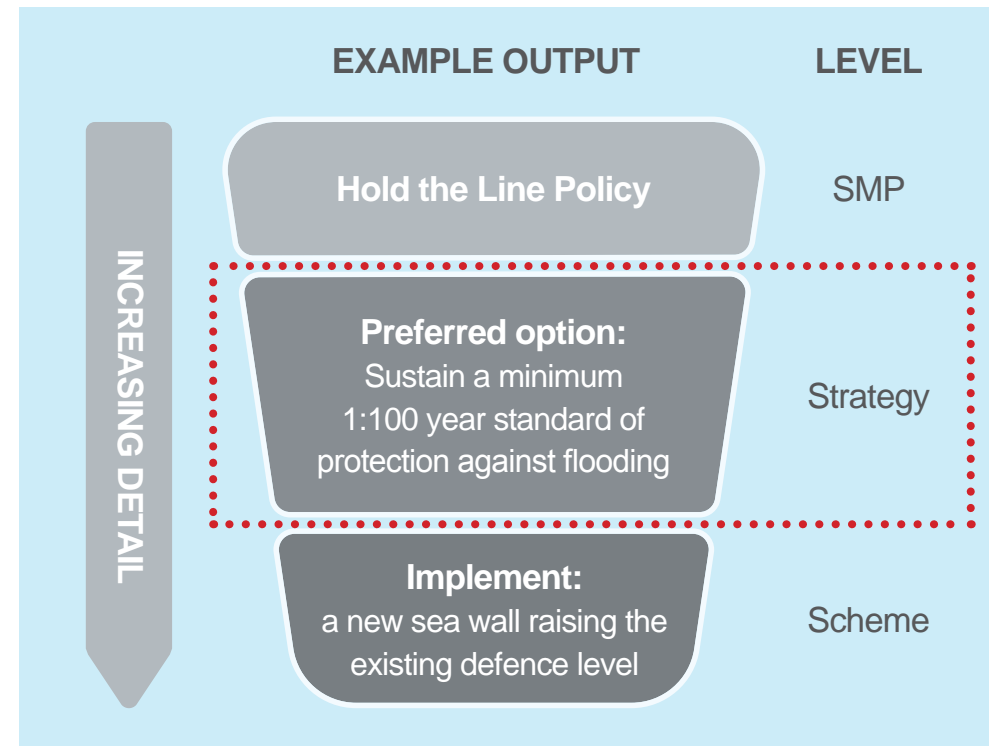
The Strategy considers how flood and erosion risk is likely to change in the future in response to changes in climate change and develops sustainable and robust options to manage the risks associated with coastal flooding and erosion. This approach ensures that technically feasible, environmentally acceptable and economically viable options are recommended to reduce the risks from coastal flooding and erosion to people, their properties and the environment. This also ensures that the options are compatible with the preferred management strategies of adjacent areas.

The Strategy is required in order to gain approval for future schemes, and helps secure public grant aid monies to contribute to the cost of defences.

Without such an approach, it is likely that future coastal defence works would be managed on an 'ad-hoc' or reactive basis which would lead to poor cost efficiency and a general increase in the flood and erosion risk over time. A Strategy is also important to deliver an integrated approach to the management of our coastline. Holistic wider-level thinking behind Strategy decisions ensures that the management options implemented in one area do not increase the flood and erosion risk in adjacent areas, and that opportunities to deliver wider benefits are not missed.

The outputs

Following a Strategy a variety of outputs can result, depending on the level of risk and the preferred options put forward. To deliver



How the Strategy fits in the management of coastal flood and erosion risk

a strategic management option it may be necessary to implement a scheme (e.g. build new defences) to address coastal flood and erosion risks. Before works happen on the ground, a further element of work is carried out to design the scheme and deliver the business case for funding.

In other areas, where there is limited risk, the future action may include maintenance, or even to 'Do Nothing' if appropriate. There may also be action such as monitoring, planning and further studies in order to gain evidence to help make robust management decisions in the future.

Purpose and structure of this document

This document presents the draft Strategy for public consultation and sets out the recommendations and preferred options for managing coastal flood and erosion risk along the study frontage for the next 100 years. In developing The Strategy, an understanding of the present day risk has been developed along with how it might change in the future and the ways in which we can manage and adapt to these changes. Specifically, this document includes the following chapters:

Chapter 2 – Understanding what is at risk

- **A summary of what is at risk now and in the future (defining the baseline).** Including an assessment of what would happen if we ‘do nothing’ and how the risks change over time as a result of predicted climate change and sea level rise. This sets the context for why we need the Strategy.

Chapter 3 – Developing the Strategy

- **Overview of the study area - Key Features, Issues and Opportunities.** This identifies the key aspects and characteristics of the study area which the Strategy has considered. This includes: coastal processes, potentially contaminated land, the environment, stakeholder engagement and aspirations, and a summary of the existing defences.
- **A description of the option development and appraisal process.** Including a summary of how the strategic options were developed and appraised considering their economic and environmental sustainability.

Chapter 4 – Strategy overview

- **A summary of the Strategy** – the rationale behind decisions and discussion of the key principles.
- **An overview of the key economic, environmental and broader outcomes of the Strategy.**
- **How is coastal flood and erosion risk management funded** – This includes details of how partnership funding works for Flood defence schemes in the UK and the likelihood of funding for the priority schemes identified in the Strategy.
- **The priority schemes** – discussion relating to the priority works required following the Strategy.
- **Delivering more.** How we have been working to other organisations to try and deliver more for your coastline.

Chapters 5 to 9 – Management Zones 1 – 5

- **The draft preferred options by Management Zone.** An area by area summary of the draft Strategy options being put forward to reduce future coastal flood and erosion risk. Urgent priority works are also identified within this section.

Chapter 10 – What next?

- **A summary of future programme to finalise the Strategy.** Including a timeline of the future project activities and milestones.
- **What do we want from you?** Engagement and feedback from Key stakeholders and the public forms a vital part of shaping the final Strategy. We want to hear your views.

Supporting Information

This document provides a concise summary of the Strategy findings and proposals. For more detailed information please refer to the following Appendices.

These are available on line at www.escp.org.uk

Appendix A

Coastal Processes Report

Appendix B

Defence Condition Assessment

Appendix C

Desktop Contaminated Land Report

Appendix D

Wave Modelling Report

Appendix E

Joint Probability and Wave Overtopping Report

Appendix F

Flood Modelling Report

Appendix G

Stakeholder Engagement Report

Appendix H

Option Development and Appraisal

Appendix I

Economics

Appendix J

Strategic Environmental Assessment

Appendix K

Habitats Regulations Assessment

Appendix L

Water Framework Directive Assessment

Appendix M

Broader Outcomes and Contributions



Stormy seas near Hill Head



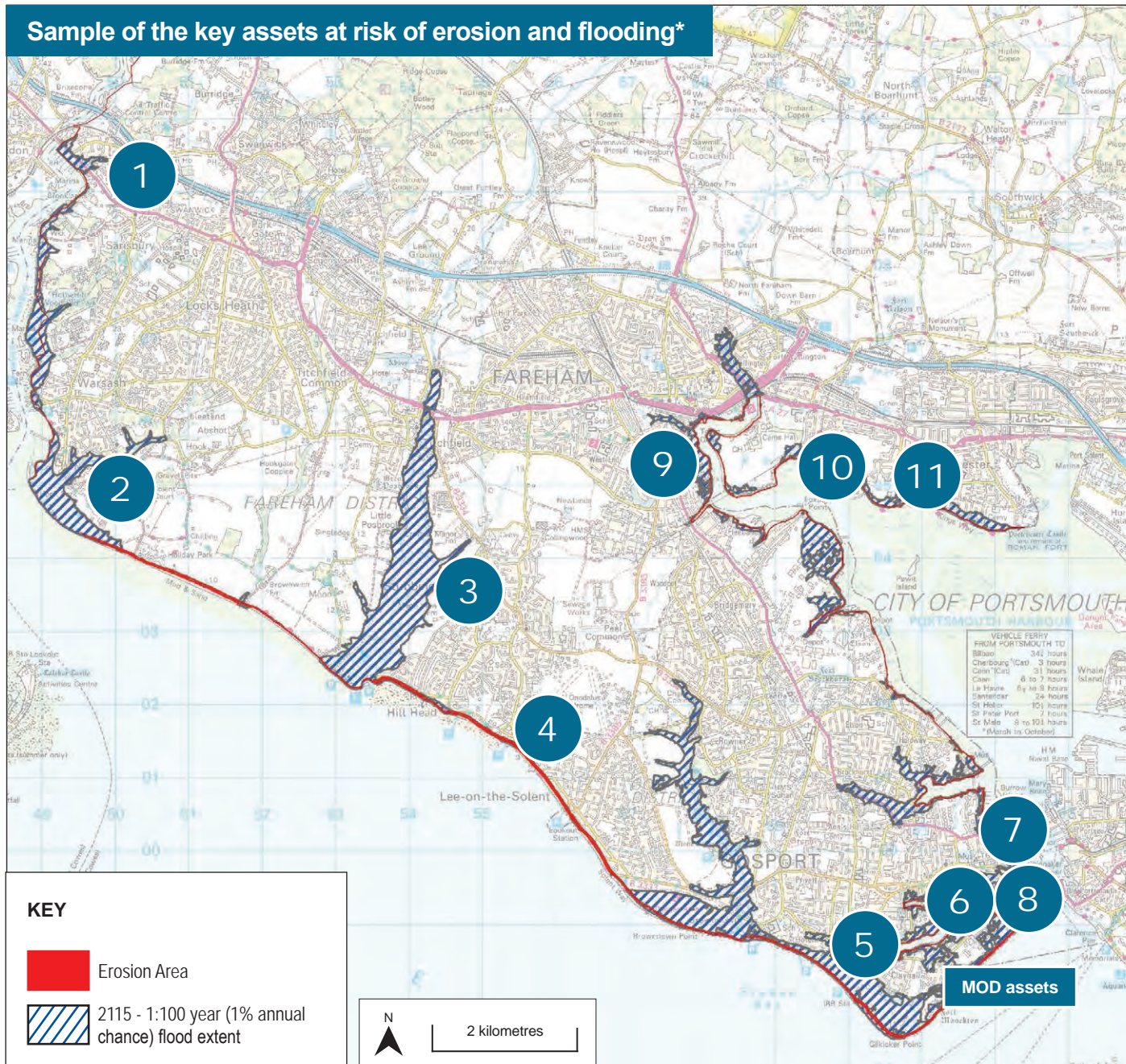
Tidal flooding at Fareham Quay



What is at risk if we do nothing?

Why do we need the Strategy?

Sample of the key assets at risk of erosion and flooding*



1. Properties and Heritage assets (Lower Swanwick) at risk of flooding



2. Hook Lake environmental designations at risk of flooding/damage



3. Environmental designations (Titchfield Haven) at risk of flooding/damage



4. Beaches and promenades (Lee-on-the-Solent) at risk of erosion



5. Carparks and slipways (Stokes Bay) at risk of erosion



6. Residential properties at risk of flooding (Gosport Creeks)



7. Marinas and leisure facilities (Gosport)



8. Gosport Town Centre



9. Residential and Commercial properties (Fareham) at risk of flooding



10. Eroding former landfill sites (North Portsmouth Harbour)



11. Residential properties and coastal access (North Portsmouth Harbour)



*Flooding extent from an event with a 1% chance of occurring at 2115 assuming current defences are in place

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Summary of people and assets potentially at risk of coastal flooding and erosion over the coming century

Over 10,000 residents (plus tourists, visitors and commuters)
Over 2,350 homes
Over 250 commercial properties (warehouse, shops, offices etc.)
6 churches/chapels
46 electricity sub stations
13 engineering works
5 petrol stations
4 schools/colleges
1 sewage pumping station
6 public houses
13 restaurants/cafes
1 supermarket
Numerous coastal footpaths including the Solent Way
Major roads including A27 and A32
33 hectares of former landfill sites
Heritage assets and numerous listed buildings
180 hectares of environmentally designated habitats (SSSIs, SPAs, SACs)
Several different coastal waterbodies
Local and national nature reserves
Several country parks
Tens of kilometres of coastal promenades, slipways, and cycleways
Over 15km of shingle beaches
Nationally important military assets

Why we need the Strategy - what is at risk if we 'Do Nothing'?

Gaining an understanding of the flood and erosion risk along the shoreline is imperative in order to define a baseline for developing the coastal Strategy. It allows comparisons to be made between the potential management options and is an essential step in the Strategy development process. The baseline was established by considering a 'Do Nothing' scenario.

The 'Do Nothing' scenario is defined as: *"Where there is no further intervention of any kind, including no emergency response or warning system. Where there are assets at present or where maintenance activities or other interventions are carried out, the option will be to withdraw all activities, allowing nature to take its course"*.

In essence, the 'Do Nothing' scenario represents a hypothetical situation whereby all existing defences are abandoned in terms of maintenance or repair, and no remedial or additional protection works are carried out. In addition, adaptation to sea level rise or other climate change responses are not addressed.

	Time Horizons			
	2015	2030	2060	2115
Residential properties (flood risk)	427	670	1188	2361
Commercial properties (flood risk)	70	90	151	271
Total properties at risk of flooding	497	760	1339	2632
Total properties at risk of erosion (Residential and Commercial)	0	105	219	464
Total Value of Assets at Risk (£M cash)	£92M	£164M	£294M	£569M

Properties at risk of flooding and erosion over the coming century if we 'Do Nothing'.
Based on 1:200 year (0.5% annual chance) flood event.

What is meant by flood risk?

Flood risk refers to the potential for experiencing flooding. This risk is often described by the likelihood or chance that a certain level of flooding will occur at any given location. This risk can be expressed in terms of an average return period in years. For example a large event occurring on average once per century may be referred to as a 1 in 100 year event. It follows that an event of this scale has a 1% chance of occurring in any one year). A more extreme event which typically only occurs once in any 200 year period is termed a 1 in 200 year event (this means there is a 0.5% annual chance of an event of this scale occurring), and so on.

Chance is also related to the scale of the flooding. In any one year a large (1 in 200 year) flood event has statically less chance of happening than a smaller 1 in 100 or 1 in 50 flood event. It is important to understand that a 1 in 100 chance of flooding does not mean that a flood will only happen once every 100 years. The chance remains the same every year. Throughout this document the scale of flood risk is described in terms of the average return period in years.

The Standard of Protection (SoP) offered by a defence is also described in terms of the event likelihood that it will prevent flooding from. For example, if a scheme provides a 1:100 year (1% annual chance) Standard of Protection it means it will prevent flooding from all events up to this magnitude.

What is meant by erosion risk?

For the purposes of the Strategy, properties or assets at risk of erosion are those which could potentially be lost to the sea through shoreline retreat. The risk has been estimated assuming no further works are done to repair or maintain defences which currently provide protection.

Understanding the potential erosion risk under a hypothetical 'Do Nothing' scenario' is important for comparing the relative merits of options to maintain or improve protection.

For the purpose of the Strategy, the risks posed by coastal flooding and erosion over the next 100 years have been established using Environment Agency approved numerical flood modelling and Shoreline Management Plan erosion predictions. It should be noted that even with the existing defences in place; future flood risk will increase significantly due to climate change and rising sea levels.

Through determining the present and future flood and erosion risks under a 'Do Nothing' scenario, the properties, features, assets and key infrastructure that are in need of protection over the next 100 years have been identified and valued; the preferred options to manage the risks strategically have then been developed.

Sea level rise and increasing risk

As a consequence of climate change and continued warming of the global oceans, sea levels are expected to increase in the future. This will increase flood and erosion risk across the Strategy frontage over the next 100 years.

To consider sea level rise, the Strategy has incorporated the latest sea level rise projections (UK Climate Projections 2009) into the flood modelling to produce 'Do Nothing' flood scenarios for 2030, 2060 and 2115. Following the latest guidelines, under the 'medium emissions' sea level rise scenario, mean sea levels across the Strategy frontage are expected to increase by approximately 0.76m over the coming century.

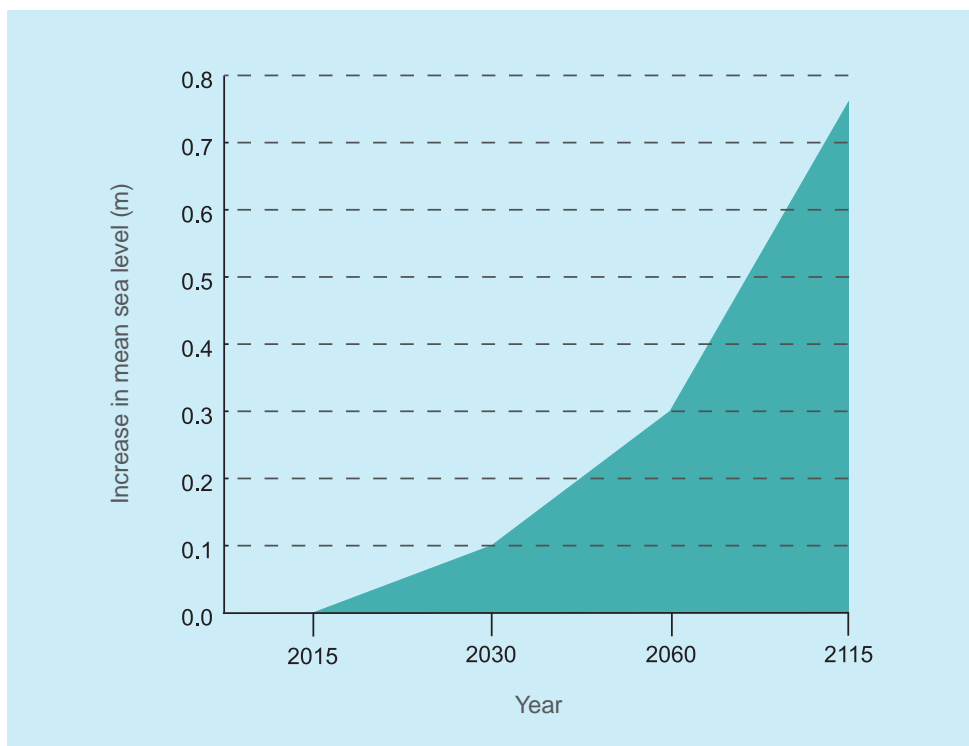
The figure (opposite) shows the cumulative relative sea level rise projections (m) at Gosport over the next 100 years that have been adopted by the Strategy.

Coastal flood and erosion risk would increase significantly in the future across the Strategy frontage under a 'Do Nothing' scenario due to sea level rise.

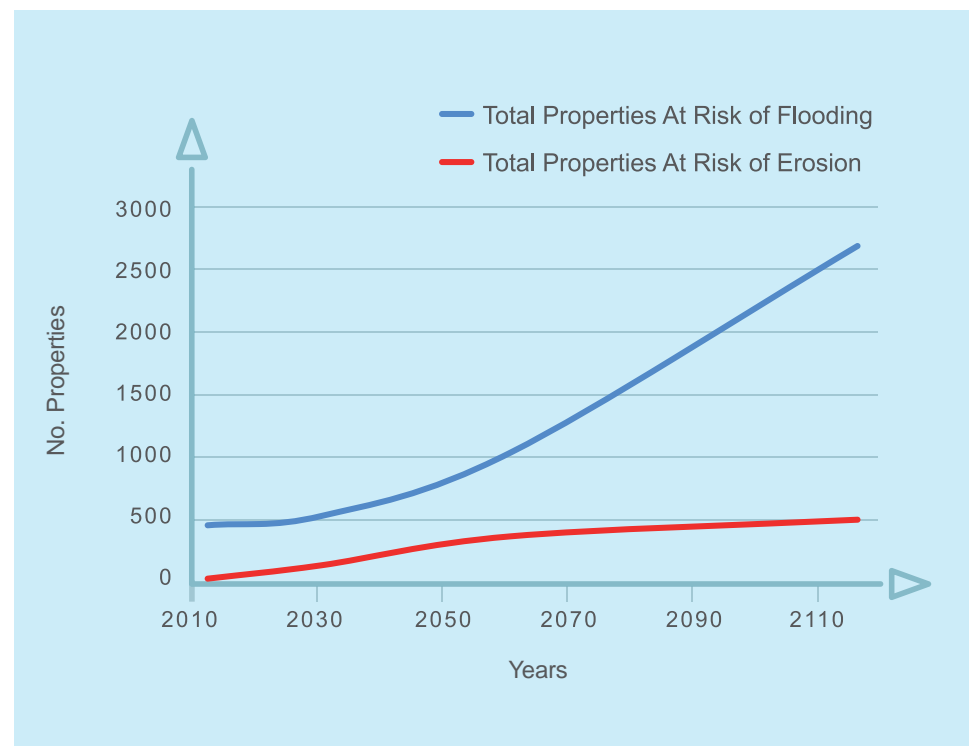
As well as properties, there are many other important features and valuable assets at risk. This includes schools, churches, public houses, nationally important environmentally designated sites, heritage assets, military assets, key services infrastructure, major roads, coastal footpaths and cycleways and shingle beaches. There is also a risk of erosion to former landfill sites which could pose a further threat to human health and to the quality of the coastal water bodies.

i For more detailed information on the design water levels used in the Strategy please refer to Appendix A: Coastal Processes

i For more detailed flood mapping see Appendix F: Flood Modelling Report



Increase in sea levels expected (compared to present) as a result of climate change



Increasing number of properties at risk of flooding and erosion over time



Hook Spit, mouth of the River Hamble



How the Strategy has been developed

Approach to option development

Overview of the study area - key features, issues and opportunities

Before strategic approaches to managing flood and erosion threats can be identified and evaluated, it is important to understand the key features, issues and opportunities that exist within the Strategy area. In order to achieve this, a number of studies and activities were undertaken during the early part of the Strategy Development.

These included:

- **A desktop review of coastal processes** – required to understand waves, tides, sediment movements and their interaction around the study area (see Appendix A);
- **Desktop assessment of potentially contaminated land** – to identify areas of contamination along the frontage which may require defending to prevent them polluting the environment (see Appendix C for more details);
- **Identification of important environmental and heritage features around the coast** – so that key environmental objectives and legal requirements to protect the environment can be accounted for in the Strategy (see Appendices J, K and L for details).
- **Engagement with key stakeholders** – meaningful engagement with numerous community groups, organisations and individuals to identify key issues and opportunities along the shoreline which can help to shape future coastal management (see Appendix G for more details)
- **Identifying potential broader outcomes and opportunities** – in order to capture ideas as to how the Strategy can be funded as well as deliver wider benefits to communities (see Appendix M); and
- **Site walkovers and visual inspections** – to determine the location, type and condition of coastal defences and assets (See Appendix B for detailed findings);

A summary of the findings of these activities required to understand the baseline for the Strategy is provided in the sections below:

Coastal Processes Overview – Wave, Tides, Sediment Transport

The Strategy frontage is highly diverse and varies in not only in character but also with regard to the forcing conditions it experiences, driven by the weather and tides.

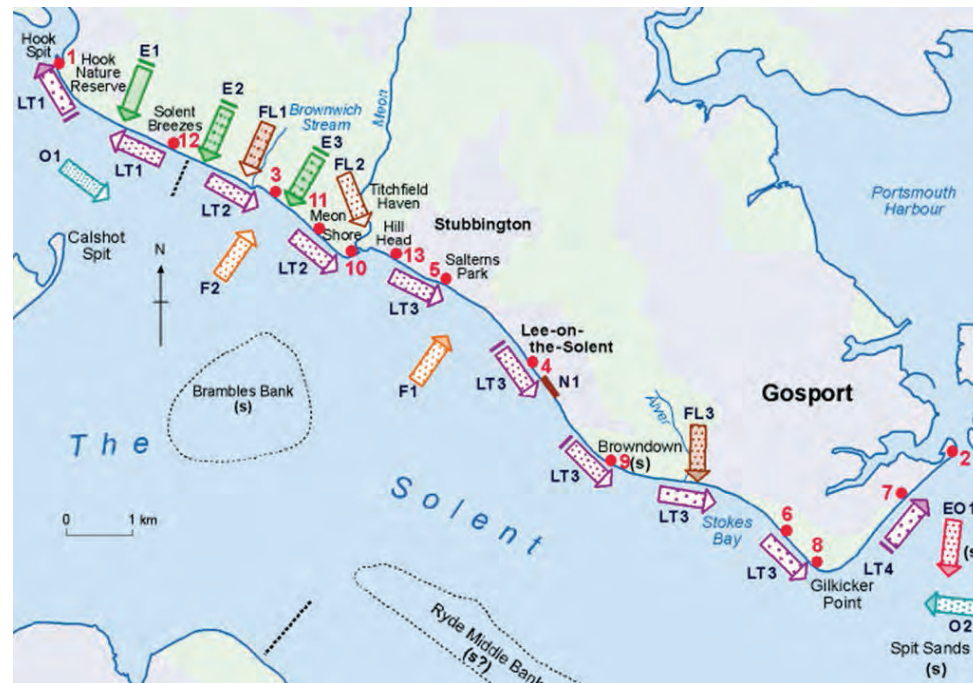
Wave heights vary significantly in size along the Strategy frontage. In the estuarine areas of the River Hamble and Portsmouth Harbour the waves are typically small (0.1 – 0.3m) as these areas are relatively sheltered by the narrow harbour entrances and shallower waters. The open coast between Portsmouth Harbour and Hill Head is much more exposed and subject to larger waves (1m to 2.5m). Immediately east of Gilkicker Point is the area that experiences the most extreme wave climate because it is directly exposed to large storm waves originating from the south and south east where the Isle of Wight affords little shelter.

The tidal regime along the Strategy frontage is rather unusual and includes some distinct and important features. The tidal curve is asymmetrical and includes a ‘double high water’ and ‘young flood stand’ during which pauses or periods of little change in water levels occur. These tidal features are particularly relevant to flood risk as they can increase the duration of flood events if storm conditions occur at the same time.

Much of the Strategy frontage comprises of beach or estuarine sediments which can be highly mobile and move along the coastline. The pathways of sediment movement have been well established in previous studies, such as the Shoreline Management Plan. As part of the Strategy work hundreds of tracer pebbles were placed at various locations along the shoreline and tracked to improve our understanding of how and when sediment is moving.

For the majority of the open coast the dominant movement of sediment is from west to east. However, the direction reverses west of Solent Breezes, where the sediment moves in the opposite direction; from east to west. The area around Solent Breezes can therefore be described as a sediment ‘drift divide’.

i For more information see Appendix A: Coastal Processes Report



Sediment Types involved in Transport	Sediment Types Mechanism	Reliability of Information
Sand	LT Littoral (beach) drift	Low Medium
Shingle and Sand	O Offshore sediment transport	Littoral drift divergence boundary
Shingle	E Cliff or coastal slope erosion input	Photographs of key sites and processes
Silt/Clay	EO Estuarine sediment transport	Volume of Sediment Flow
Sand, Silt/Clay	F Wave driven nearshore and offshore zone transport	No quantitative data
Gravel, Sand and Clay	FL Fluvial input	3 000 - 10 000 m³ a⁻¹
	N Beach nourishment	(s) Sediment sink

Sediment transport patterns around the eastern Solent

Source: SCOPAC Sediment transport study - <http://www.scopac.org.uk/sediment-transport.html>



Sheltered Estuarine Environments
High Tide in Portsmouth Harbour



More Exposed Open Coast
Waves crashing onto the seawall at Stokes Bay during a storm

Potentially Contaminated Land

Contaminated land is defined as any land which appears to the Local Authority to be in such a condition, by reason of the substances in, on or under the land, that:

- a) Significant harm is being caused or there is a significant possibility of such harm being caused; or
- b) Pollution of controlled waters is being, or is likely to be caused.

For land to be formally designated as being 'contaminated' it must be clearly demonstrated that there is:

- a contaminative source present (above a threshold level)
- a receptor which can be affected by the source; and
- a pathway linking a source to a receptor

Contaminated land often arises from present or historic land uses such as landfilling, industrial processes, military operations, as well as accidents or spills of contaminants, waste disposal or leaking underground storage tanks. In the coastal zone the presence of contaminated land is a risk because erosion of the shoreline, or flooding, can release the contaminants into the environment through exposure and leaching. If not dealt with adequately, contaminated material can pose a threat to human health, the environment and sustainable economic development.

In order to determine the risk of contaminated material being released into the environment, the likelihood of contaminated land being present along the frontage was first established. To do this a desktop study used former land use data to identify whether land is likely to be contaminated or not. If an area was thought to have contaminating substances, the area was designated as 'potentially contaminated land'. Then potential receptors, such as humans, animals, fish, birds and habitats, which could potentially be affected, were identified.

Next, with use of the Shoreline Management Plan erosion predictions, and the flood mapping, the likelihood of the 'potentially contaminated land' areas being at risk of eroding or flooding was established.

Following this approach, the desktop study identified areas where there is a high risk of contaminants being released in the future.

These sites include:

- Cams and Wicor Recreation Ground, Portchester
- Harbour View Road Recreation Ground, Portchester
- Other former landfill sites and MOD land which are currently undefended (no coastal defences)

In order to understand the risks posed by these sites in more detail, a controlled waters Qualitative Risk Assessment (QRA), and Water Framework Directive (WFD) assessment was undertaken for three of the key sites (historic landfill sites) at Salterns recreation ground, Cams Bay / Wicor recreation ground and the Harbour View recreation ground. The objective of the study was to determine whether soil and groundwater contamination was present at the three sites, and undertake a preliminary risk assessment of how this may impact controlled waters and the Water Framework Directive status and Ecological status of Portsmouth Harbour.

The investigation identified that the landfill leachate is contaminated with various heavy metals and hydrocarbons; this is to be expected given the former land uses.

However, after taking dilution of the leachate in Portsmouth Harbour into account there is likely to be no exceedances in the water body. Therefore it is concluded that that the former landfill sites are unlikely to pose a significant risk to controlled waters

and the WFD chemical status of Portsmouth Harbour. However, it should be noted that this conclusion has been based on the data from monitoring wells concentrated along the foreshore boundary.

Given the remit of this study, the risks of these sites in terms of wider receptors such as humans or terrestrial animals such as domestic pets who are using the beach was not assessed. Given the evidence of contaminants exceeding threshold levels at all three sites, and the physical presence of leachate apparent along parts of the eroding shoreline, it is likely that these receptors could be at risk and further detailed studies to confirm this are required. This further work is necessary to determine if these sites need to be formally classified as 'contaminated land'.

The evidence from the desktop contaminated land study and intrusive survey work was considered during the development of the Strategic Options. Options to mitigate the risks posed by the potentially contaminated land were then identified and considered in the appraisals.

 For more information see Appendix C:
Desktop Contaminated Land Report

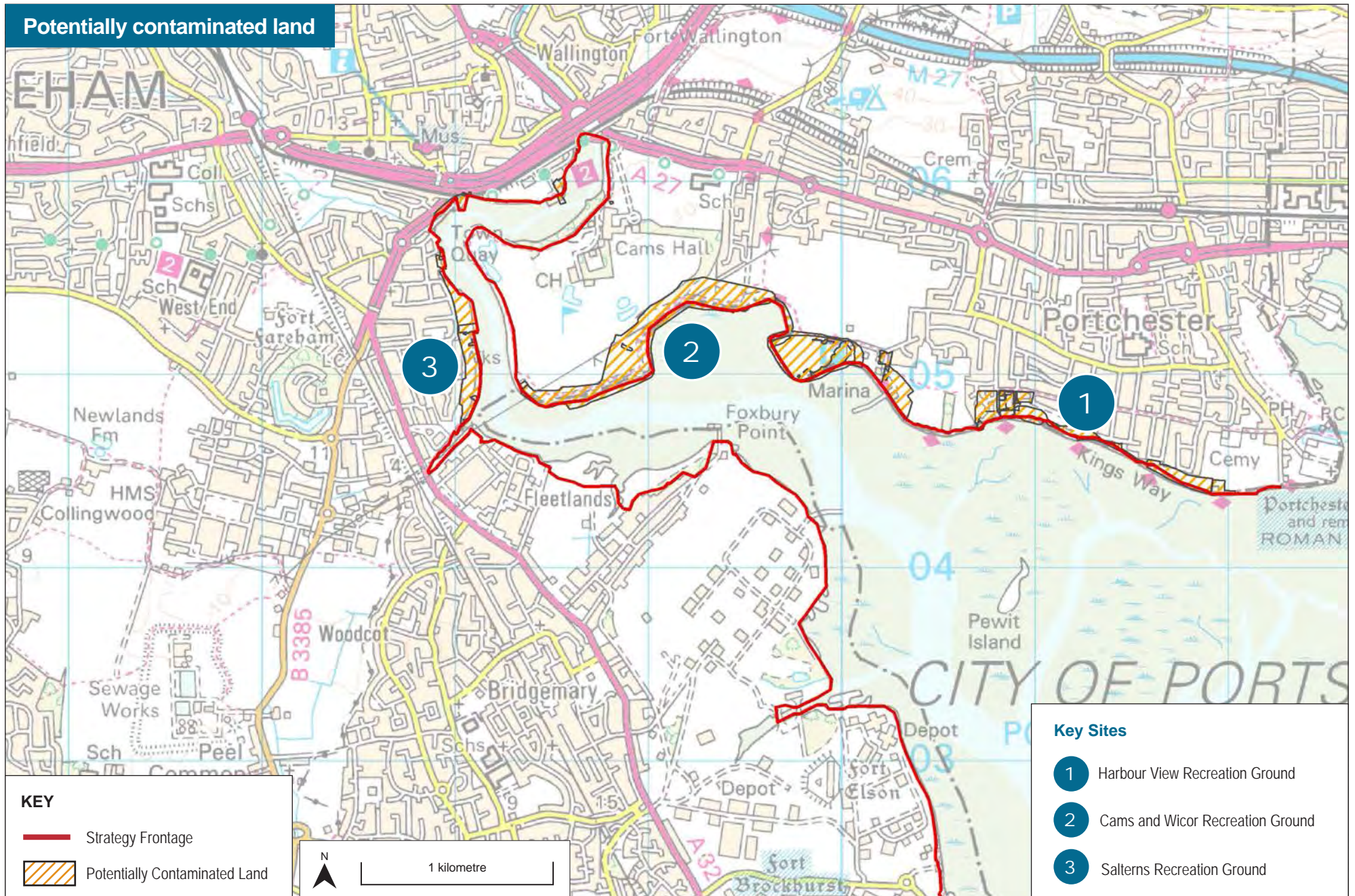


Leachate on the foreshore near Wicor



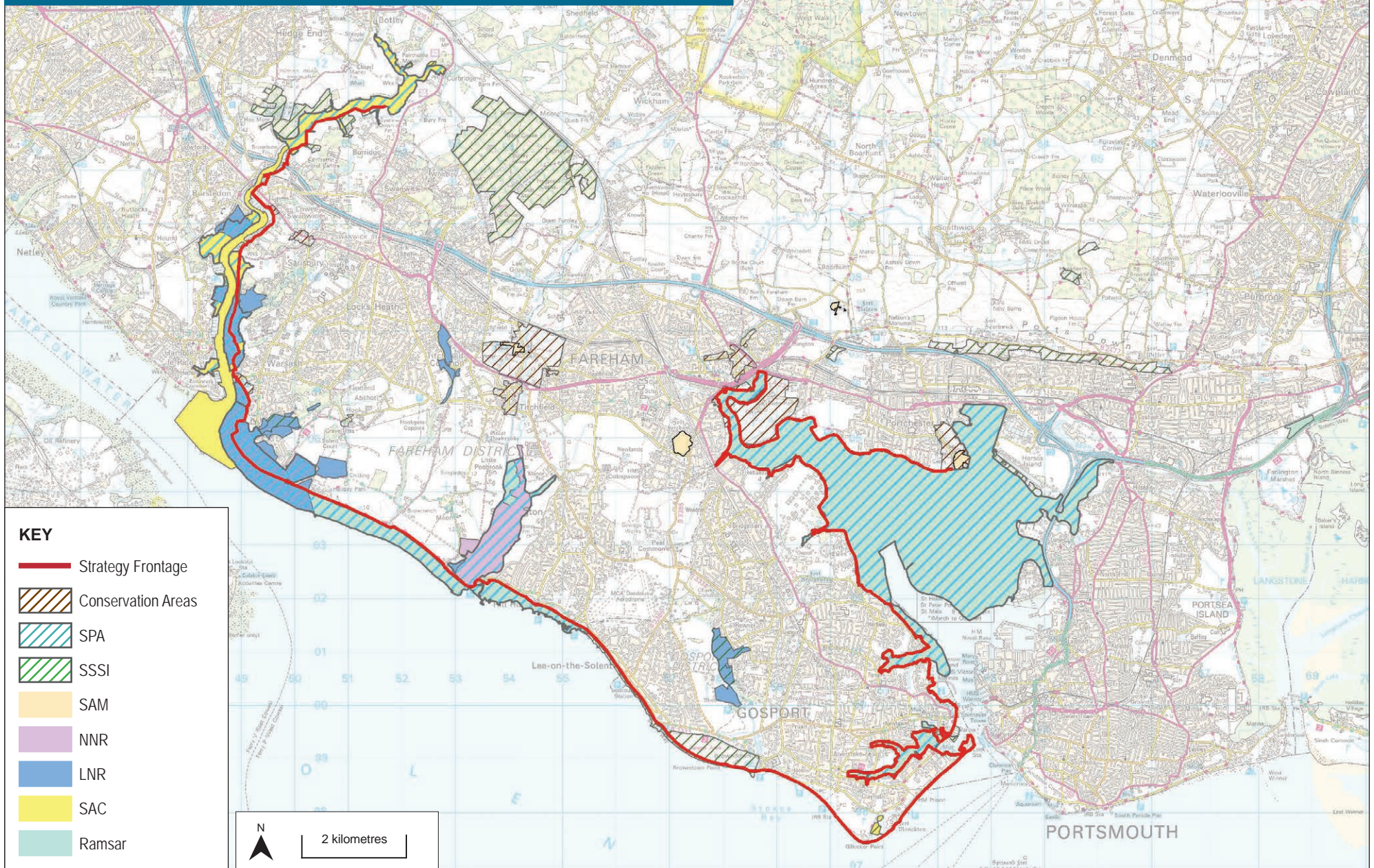
Former landfill eroding along the northern shore of Portsmouth Harbour

Potentially contaminated land



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Important environmental designations around the Strategy frontage



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Environmental designations

Despite being highly populated areas, the Fareham and Gosport Boroughs are well served with natural features and open spaces. A number of internationally important sites (see map on page 33) are found within the area, including Ramsar sites, Special Protection Areas (SPA) and Special Areas of Conservation (SAC). Areas of national importance, such as Sites of Special Scientific Interest (SSSI) and National Nature Reserves (NNR) are also present. Many of these important sites are situated along the Strategy coastline and as such it was essential to consider these areas when developing the Strategy.

Within many of these important sites there are a number of different habitats such as marshes, reed-beds, lagoons and vegetated embankments which support a wide diversity of wildlife. The intertidal mudflats provide a particularly important feeding habitat for birds, whilst other areas such as the River Hamble provide an important habitat for fish such as bass, flounders and mullet.

Unfortunately, with predicted sea level rise, it is thought that many of the important intertidal habitats will get 'squeezed' against coastal defence structures such as seawalls. This can decrease the size and health of the intertidal habitats and place additional stresses on the species that rely upon them.

To help offset these anticipated losses in the future, it is essential for the Strategy to consider environmental enhancement options. Particular areas signposted for potential environmental enhancement along the frontage include Titchfield Haven (at Hill Head) and Hook Lake (at the mouth of the River Hamble). Both of these areas are currently designated as SSSIs whilst Titchfield Haven is also designated as a National Nature Reserve.

Stakeholder engagement – understanding what people want from the coast

Many individuals and organisations have a key interest or stake in the Strategy shoreline for many different reasons. Each stakeholder is therefore likely to have a unique view on its use, development and future protection. As such stakeholder engagement is fundamental and can be a source of indispensable information which can be used to define coastal issues and objectives, steer Strategy development and achieve consensus on the future management of the shoreline.

Strategy development set out and implemented a clear methodology for engaging with the local communities, businesses and public bodies with a vested interest in the Gosport and Fareham coastline. This approach ensures that those who may affect, or be influenced by the decisions of the Strategy are actively involved and informed at the right time.

The aims of the Strategy engagement process were;

- to raise an awareness and understanding of coastal flood and erosion risk,
- to identify the challenges and constraints, and
- to involve others in the decision making process for managing the coastline.

Early in the development phase of the Strategy a specific Key Stakeholder Workshop was held in Ferneham Hall (Fareham) to explore views on Coastal Defence, Recreation and Access, and Opportunities and Issues. The event was attended by 26 stakeholder groups including local Councillors, sailing clubs, fishermen, beach hut owners, and numerous other associations with an affiliation to the coast. At this workshop, extensive feedback and input was provided, helping to map key features, issues and opportunities for the Strategy to consider. The workshop was well

received by the stakeholders who showed robust support for the Strategy and what it was trying to achieve.

In addition to the stakeholder workshop, the Strategy team have met with a large number of individuals, organisations and community groups to discuss the project and to learn more about any concerns and aspirations they might have with regards to the Gosport and Fareham Coastline. Through presentations, question and answer sessions and on site meetings the Strategy team has learnt a huge amount about how people wish to see the shoreline evolve. All of the relevant feedback received to date has been used to inform the development of the Strategy to ensure that it accounts for, and captures key stakeholder input and ideas.

 For more information see [Appendix G: Stakeholder Engagement Report](#)

Summary of the existing defences

To help establish the baseline flood and erosion risks along the Strategy frontage it was necessary to identify the condition of the existing defences and how long they are likely to last without maintenance. This was done by undertaking a walkover of the entire Strategy shoreline and visually assessing defence condition in line with the Environment Agency's assessment manual.

Given the large number of dwellings and important coastal features, much of the Strategy shoreline is currently defended. There is a wide range of different defence types, from low sea walls and quays which protect the sheltered estuarine and creek areas from tidal flooding, to large sea walls and revetments along the more exposed open coast which protect against erosion and wave overtopping. In addition, the open coast is afforded protection by the beaches which act as a barrier to the waves. There are also a number of undefended areas or sections with no formal defences. In these areas, erosion is often a key risk.

Typically, many of the defences are in a fair condition. There are also some sections of new defence in very good condition. However, there are also some localised areas where the defences are in a poor state or provide a low standard of protection against flooding. These areas were identified by the defence condition assessment as critical areas for attention.

 For more information see [Appendix B: Defence Condition Assessment](#)



Project coastal engineers undertaking a site visit to inform Strategy development. (Haslar Wall, Gosport)

Option Development

Overview

On defining the baseline, and having gained a detailed understanding the processes, features and issues operating along the coast, the development and appraisal of strategic management options was undertaken.

The option development process refers to the tasks involved to select the preferred management options along the Strategy frontage. The process followed the Environment Agency's National Flood and Coastal Erosion Risk Management guidelines.

Option Development Units and identifying potential local measures

Flood and erosion risks, coastal defence types, land uses, land ownership and issues and opportunities vary significantly along the Strategy frontage. For effective flood and erosion risk management options to be developed it important to consider and recognise this local variability. With this in mind, the first stage of the option development process was to divide the frontage into small, local sections. These sections are known as Option Development Units (ODUs). Potential local measures for managing the risks were then identified through witting down a long list of options to a shortlist. This generated a toolbox of measures available to implement wider strategic management approaches.

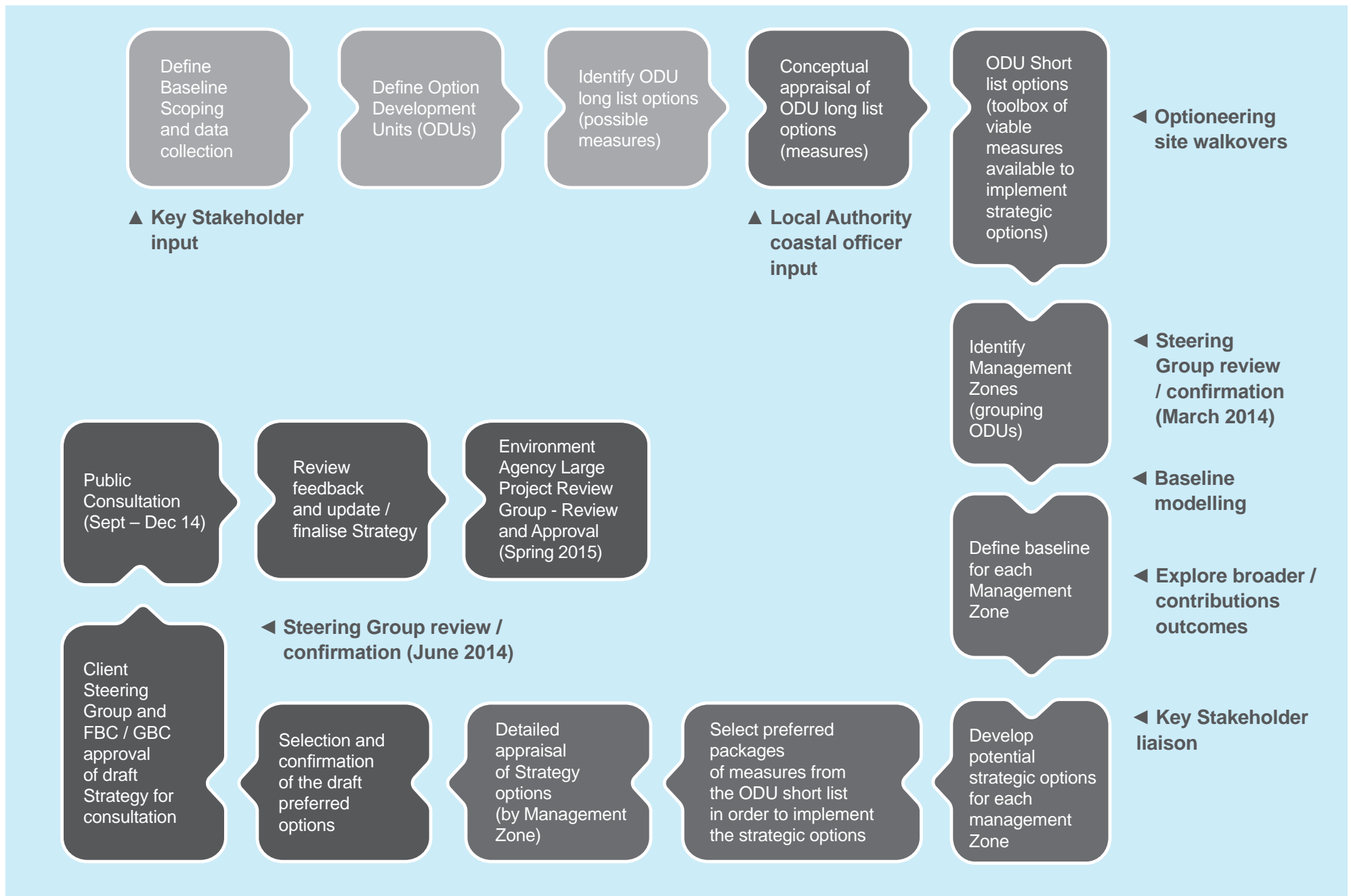
A total of 29 ODUs were created; and the locations and key characteristics of each unit are provided in a table on pages 38 – 41. The boundaries of each ODU are shown in the maps for each Management Zone in Chapters 5 – 9.

Thinking strategically - Management Zones

As well as recognising local variability, it is important to ensure that the management of flood and erosion risk is strategic and consistent across wider areas, and therefore joined up thinking is required across multiple ODUs that have similar characteristics; these are termed 'Strategy Management Zones (SMZs)'. Strategic level options were then identified for each Management Zone through combining packages of local measures from each ODU. These strategic options were then appraised against technical, economic, social and environmental criteria, and the preferred options for consultation were chosen on the basis of this evaluation.

A workflow summary of the option development process is presented on the opposite page. The following sections provide an overview of each of the steps.

 For more detail see Appendix H:
Option Development and Appraisal



Overview of Strategy development activities

ODU No.	Name	SMP PU	SMP Policy	Defence Residual Life – without maintenance (years)	Ownership	Indicative Erosion Risk (years from now)			Indicative Flood Risk (years from now)			Coastal Processes	Land Use
						0 – 15	15 - 45	45 - 100	0 – 15	15 - 45	45 - 100		
1	Hospital Lane to Beachway	5a21	HTL	10 – 15	FBC,HCC	Low	Low	Low	Low	Moderate	High	Estuarine, wind driven waves	Open space and residential
2	Beachway to Alton Grove	5a21	HTL	10 – 20	FBC	Low	Low	Moderate	Moderate	Moderate	High	Estuarine, some overtopping risk	Residential
3	Alton Grove to Cador Drive	5a21	HTL	<10	FBC and PO	Low	Moderate	Moderate	Low	Moderate	High	Estuarine, some overtopping risk	Residential, commercial, potentially contaminated land
4	Cador Drive to Cams Pumping Station	5a21	HTL	No Formal Defence	FBC	Low	Moderate	Moderate	Low	Moderate	Low	Estuarine, Sheltered	Boat yard, recreation and potentially contaminated land
5	Cams Pumping Station to A27 Cams Hill	5a22	HTL	No Formal Defence	PO	Low	Low	Low	Moderate	Low	Low	Estuarine, Sheltered	Potentially contaminated land, golf course, recreation grounds
6	A27 Cams Hill to Upper Quay	5a22	HTL	<10 – 20	FBC, HA, HCC	Low	Low	Moderate	Low	Low	Moderate	Estuarine, Sheltered	Residential and open space
7	Upper Quay to Hoeford Lake	5a23 and 24	HTL	<10 – 15	FBC and PO	Moderate	High	High	Moderate	High	High	Estuarine, Sheltered	Residential, commercial, potentially contaminated land
8	Hoeford Lake to Crabtree Lake	5a24 and 25	HTL	No Formal Defence	PO	Low	Low	Moderate	Low	Low	Moderate	Estuarine, Sheltered	Commercial, Industrial, potentially contaminated land

Indicative risk to people or assets under a 'Do Nothing' Scenario

■ Low
 ■ Moderate
 ■ High

ODU No.	Name	SMP PU	SMP Policy	Defence Residual Life – without maintenance (years)	Ownership	Indicative Erosion Risk (years from now)			Indicative Flood Risk (years from now)			Coastal Processes	Land Use
						0 – 15	15 - 45	45 - 100	0 – 15	15 - 45	45 - 100		
9	Crabtree Lake to Monks Walk	5a25	HTL	No Formal Defence (mainly)	MOD							Estuarine, Sheltered	MOD, Potentially contaminated land
10	Monks Walk to Lichfield Drive	5a25	HTL	15 – 20	GBC, PO, unknown							Estuarine, Sheltered	Residential, industrial, open space
11	Lichfield Drive to Parnham Road	5a25	HTL	<10 – 15	Mainly PO							Estuarine, low energy creek.	Residential, rec ground, Forton College
12	Parnham Road to Rolling Bridge	5a25	HTL	10 – 15	MOD							Estuarine, low energy creek.	MOD Refinery
13	Rolling Bridge to Jamaica Drive	5a25	HTL	20+	Mainly PO							Estuarine, low energy	Residential / commercial
14	Jamaica Drive to Rope Quays	5a25	HTL	<10 – 20	MOD							Estuarine, low energy	Oil pipeline and refuelling (MOD)
15	Rope Quays to Haslar Bridge	5a25	HTL	10 – 15	GBC and PO							Estuarine, low energy	Industrial, commercial, residential, infrastructure
16	Haslar Bridge to Willis Road	5a25	HTL	<10 – 15	GBC and PO							Estuarine, Sheltered	Environmental designation, boat yard, open space, residential
17	Willis Road to Dolphin Crescent	5a25	HTL	<10 – 15	GBC, PO, unknown, SW							Estuarine, low energy creek.	Mainly residential. Southern Water asset

ODU No.	Name	SMP PU	SMP Policy	Defence Residual Life – without maintenance (years)	Ownership	Indicative Erosion Risk (years from now)			Indicative Flood Risk (years from now)			Coastal Processes	Land Use
						0 – 15	15 - 45	45 - 100	0 – 15	15 - 45	45 - 100		
18	Dolphin Crescent to Park Road	5a25	HTL	No Formal Defence	GBC	Low	Low	Low	Low	Low	Low	Estuarine, low energy creek.	Open space / park
19	Park Road to Haslar Royal Naval Cemetery	5a25	HTL	No Formal Defence <10	GBC and PO	Low	Low	Moderate	High	High	High	Estuarine, low energy creek.	Residential
20	Haslar Royal Naval Cemetery to Fort Monckton	5a21 and 5b01	HTL	<10 – 20+	MOD + GBC Car park	Low	Moderate	Moderate	Moderate	High	High	Estuarine (rear), High wave energy – open coast	Residential, MOD, Commercial
21	Fort Monckton to Elmore Angling Club	5b02	HTL	<10 – 20+	GBC, MOD	Low	Moderate	High	Low	Moderate	High	Wave dominated, net eastward littoral drift	MOD, residential, roads, recreation, potentially contaminated land
22	Elmore Angling Club to Hill Head Sailing Club	5b02	HTL	<10 – 20+	GBC, FBC, HCC	Low	Moderate	High	Low	Moderate	High	Wave dominated, net eastward littoral drift	Residential, commercial, infrastructure
23	Hill Head Sailing Club to Meon Shore Chalets	5b02	HTL	10 – 15	FBC, HBC, PO	Moderate	High	High	Moderate	High	High	Wave dominated, net eastward littoral drift	Significant environmental asset, harbour, road, beaches
24	Meon Shore Chalets to Hook with Warsash Nature Reserve	5b03	NAI	Undefended <10 (Solent Breezes)	HCC and PO	Moderate	High	High	Low	Low	Low	Drift divide, int wind driven wave climate	Agricultural land, cliffs, holiday park, cross Solent infrastructure
25	Hook with Warsash Nature Reserve to Warsash Maritime College	5b03 and 5c01	NAI & NAI, MR, HTL	10 – 20+	HCC	Low	Low	Moderate	Moderate	Moderate	High	Complex, westward net littoral drift	Shingle spit, environmentally important habitat.

Indicative risk to people or assets under a 'Do Nothing' Scenario'

■ Low
 ■ Moderate
 ■ High

ODU No.	Name	SMP PU	SMP Policy	Defence Residual Life – without maintenance (years)	Ownership	Indicative Erosion Risk (years from now)			Indicative Flood Risk (years from now)			Coastal Processes	Land Use
						0 – 15	15 - 45	45 - 100	0 – 15	15 - 45	45 - 100		
26	Warsash Maritime College to Crofton Way	5c01	NAI & NAI, MR, HTL	<10 – 15	PO and HHM							Estuarine, small wind driven waves	Residential and commercial assets
27	Crofton Way to Swanwick Shore Road	5c02	NAI	10 – 15	HCC							Estuarine, Sheltered	Solent Way footpath, Universal Marina
28	Swanwick Shore Road to Green Lane	5c03	HTL, HTL, NAI	10 – 20	PO							Estuarine, Sheltered	Marina, Industrial Units, Commercial
29	Green Lane to Eastlands Boat Yard	5c04	NAI	Undefended	–							Estuarine, Sheltered	Woodland, Open Space and footpath

ODU long list options (local measures)

Following the development of the ODUs, the next stage of the option development process was to develop a ‘long list’ of options or ‘local measures’ which could potentially be suitable for each ODU.

At this early stage of the process, as many options as possible were considered by ‘casting the net wide’. This wide-ranging approach was necessary to avoid overlooking potential management options.

The long list identification was undertaken in liaison with key stakeholders and consideration of the higher level Shoreline Management Plan policies of the area (i.e. Hold the Line, Advance the Line etc.). A variety of options were identified, including:

- options that change the source of risk;
- options that modify that pathway or change the probabilities of risk;
- options that manage or modify receptors to reduce the consequences;
- temporary options as well as permanent options;
- options that work with natural processes wherever possible;
- options that are adaptable to future changes in risk;
- options that require actions to be taken to deliver the predicted benefits (i.e. closing flood gates);
- options that can deliver opportunities and wider benefits, through partnership working where possible

Within each ODU the generic methods or types of coastal defence structure that could be used to manage coastal flood and erosion risks were considered. At this early stage of the option development process, consideration of detailed structure alignments or the timing of potential works was not required.

The methods or coastal defence structures that were typically considered are outlined in the table on the right.

Generic methods / coast defence structures considered in the long list option development	
Options to implement ‘Hold the Line’	Crest raising (e.g. concrete crest wall), Setback flood wall, Revetment, Seawall, Earth Embankment, Road raising, vegetated buffer zones, flood barrage, flood storage areas, offshore breakwater, offshore reef, beach recycling/management/nourishment, sand dune creation, concrete sand bags, toe protection, soil reinforcing, beach groynes, gabions, diversion channels/channel works, temporary/demountable defences, dredging.
Options for community action / local options	Property level protection, sandbags/stop logs, community flood groups, flood forecasting/warnings, awareness raising/education.
Options for ‘Managed Realignment’	Breach existing defences, setback defences, regulated tidal exchange.
Options associated with flood risk adaption	Roll back (e.g. caravan sites), relocation, emergency assistance, evacuation plans, sustainable urban drainage systems.

ODU short list options (local measures)

The next stage of the option development process involved a conceptual appraisal of the long list options at each ODU. This reduced the 'long list' of options to a viable 'short list'. The appraisal was based upon a screening process which removed from further consideration the long list options that were considered 'non-viable'.

'Non-viable' options were defined as those options found to be unfeasible or unsuitable solutions, either on technical, practical, environmental or socially acceptable grounds. The screening of these 'non-viable' options improved the practicality and efficiency of the option development process.

i For further details of the screening process, including the basis from which options were selected, refer to Appendix H: Option Appraisal Report.

Following the conceptual appraisal and screening of 'non-viable' options from the long list, the short list of options was formed. Typically the short list for each ODU comprised several different options (e.g. seawall, revetment, crest raising etc.) and provided a 'toolbox' of viable measures that could be used in each ODU to implement a particular strategic option (e.g. sustain standard of protection, improve standard of protection etc.). These measures were then costed and appraised against a range of criteria in order to select the preferred measures to implement the strategic options.



The project team assessing potential management options (Wicor)



Surveys undertaken to inform management decisions (Harbour View)



Seawall



Earth Embankment



Gabions



Setback Floodwall



Steel Sheet Piling



Armorloc Revetment



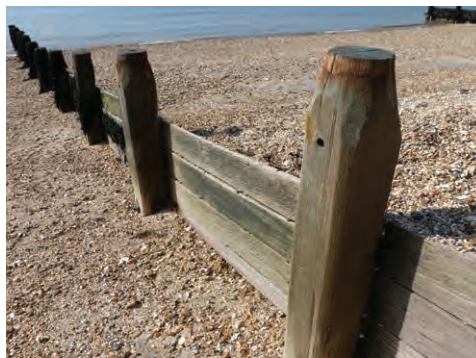
Property Level Protection



Timber Clad Sheet Pile Wall



Beach Nourishment/Recycling



Groynes



Land raising



Rock Revetment

Potential shortlist measures to implement the strategic management options

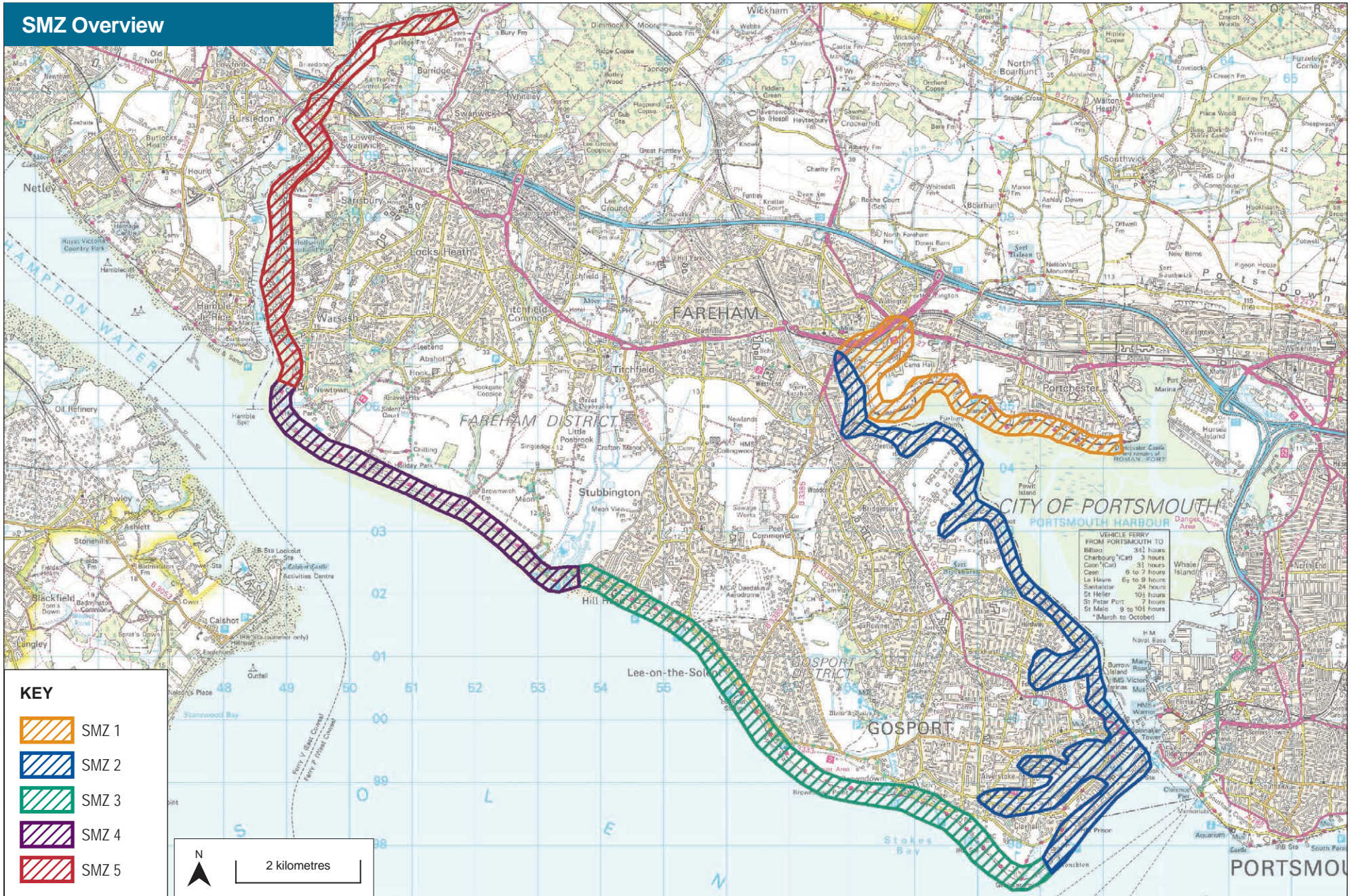
Strategy Management Zones

Following the identification of potential local measures available to manage flood and erosion risk, the ODUs were grouped into five larger areas, known as Strategy Management Zones (SMZs). This was undertaken in order to facilitate strategic management of the risks and to help deliver the Key Strategy Objectives on page 12.

Each SMZ is defined and characterised by consistent themes, such as a common land use, SMP policy or similar levels of flood and erosion risk etc. The SMZ areas are presented in the table below and shown on the map on page 46 (overleaf).

Management Zone Summary					
Zone	1	2	3	4	5
Name	North Portsmouth Harbour	Fareham and Gosport (Portsmouth Harbour west)	Lee-on-the-Solent and Stokes Bay	Hook Lake to Titchfield Haven	River Hamble East Bank
Geographic Extent	Hospital Lane to Upper Quay	Upper Quay to Fort Monckton	Fort Monckton to Hill Head Sailing Club	Hill Head Sailing Club to Warsash Maritime College	Warsash Maritime College to Eversdown Copse
Option Development Units	ODU 1 to ODU 6	ODU 7 to ODU 20	ODU 21 & 22	ODU 23 to ODU 25	ODU 26 to ODU 29
SMP Policy	Hold the Line	Hold the Line	Hold the Line	Mixed (Hold the Line, No Active Intervention and Managed Realignment)	Mixed (Hold the Line and No Active Intervention)
Zones Characterised by (Common themes / issues)	<ul style="list-style-type: none"> Consistent coastal processes (estuarine, low wave energy) Coastal Access Mainly residential and recreational land use Flood and erosion risk – localised, increasing over time Potentially contaminated land Environmentally designated foreshore 	<ul style="list-style-type: none"> Consistent coastal processes (estuarine, very sheltered) Low erosion risk Significant flood risk pockets from present day Mixed mainly urban frontages (MOD interspersed) Regeneration opportunities Environmentally designated foreshore 	<ul style="list-style-type: none"> Open Coast / beaches Rural Few defences Low / Moderate wave energy Local flooding / erosion risk Coastal Access requirements Leisure / recreation use Environmentally designated habitats 	<ul style="list-style-type: none"> Environmentally designated habitats with Enhancement Opportunities Open Coast / beaches Rural Few defences Low / Moderate wave energy Few properties at risk of flooding or erosion Coastal Access requirements Leisure / recreation use 	<ul style="list-style-type: none"> Estuarine / Sheltered Low / Moderate wave energy Low wave energy Localised flood risk issues Low erosion risk Coastal access / recreation Environmentally designated habitats

SMZ Overview



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Strategic Options

In order to be able to assess the relative merits of different Strategy options, the baseline flood and erosion risks associated with a 'Do Nothing' approach were derived in each SMZ for the present day, 2030, 2060 and 2115. This allowed the risk areas within each SMZ to be identified, and the timing of risks to be defined. This understanding formed a basis from which to develop a number of potential 'strategic options' for the management of flood and erosion risk. The scope of strategic options considered across the SMZs included:

- **Do Nothing** (baseline – developed in each SMZ)
- **Do Minimum** – e.g. maintenance and repairs – least required to implement the SMP policy
- **Maintain** – e.g. continue to protect against erosion
- **Sustain** – maintain a minimum standard of protection (SoP) by raising defences over time to keep pace with sea level rise
- **Delay Sustain** – maximise existing defences then raise SoP of defences at a later date
- **Improve SoP** – improve SoP compared to present day
- Variations to the above options were also considered. One such example is in SMZ 4 whereby a range of environmental enhancement options to offset / mitigate potential environmental losses that may occur elsewhere were included. A table of the potential strategic options developed for each SMZ is presented in the table on the right and overleaf.

For each strategic option developed an appropriate 'package of measures' for each ODU within the SMZ was then established. Each 'package' was produced in conjunction with the short list of options and outlined the type of coastal defence structure and timing of works required over the next 100 years to implement the strategic option (i.e. crest raising in 2030).

Strategic options considered for each Strategy Management Zone (SMZ)
SMZ 1 Potential Strategic Options
Do nothing
Delay sustain - maximise the life of existing defences and then sustain minimum 1:100 year (1% annual chance) SoP from 2030 (phased)
Sustain - a 1:100 year (1% annual chance) SoP (phased)
Improve - to provide a minimum 1:200 year (0.5% annual chance) SoP
Delay sustain + defend where currently undefended
SMZ 2 Potential Strategic Options
Do nothing
Delay sustain - maximise life of existing defences and then sustain minimum 1:100 year (1% annual chance) SoP from 2060
Sustain - a minimum 1:100 year (1% annual chance) SoP (phased)
Improve - to provide a minimum 1:200 year (0.5% annual chance) SoP (phased)
Improve - to provide a minimum 1:200 year (0.5% annual chance) SoP (all now)
SMZ 3 Potential Strategic Options
Do nothing
Do minimum - reactive maintenance and repairs
Maintain protection - scheduled maintenance and beach recycling to maintain beaches, prevent erosion but accepting SoP will fall in the longer term
Improve - scheduled maintenance and beach recycling then future capital works to prevent erosion and sustain SoP despite SLR

SMZs 4 and 5 overleaf ►

Strategic options considered for each Strategy Management Zone (SMZ) continued

SMZ 4 Potential Strategic Options

Do nothing

Do minimum - adapt to natural processes but maintain existing structures

Allow natural processes to continue, but sustain protection to the environmentally important sites of Hook Lake and Titchfield Haven

Allow natural processes to continue, but sustain protection to the environmentally important sites of Hook Lake and Titchfield Haven and seek to create habitat through regulated tidal exchange at Hook Lake (phased) to offset habitat losses due to holding the line elsewhere.

Allow natural processes to continue, but sustain protection to the environmentally important sites off Hook Lake and Titchfield Haven and seek to create habitat through Managed Realignment at Hook Lake (phased) to offset habitat losses due to holding the line elsewhere.

SMZ 5 Potential Strategic Options

Do nothing

Do minimum - maintain existing defences and manage flood risk with local measures. SoP will fall over time

Sustain - a minimum 1:100 year (1% annual chance) SoP (phased) to key locations with footpath adaption

Do Minimum until 2060, but with Solent Way footpath adaption from 2030, then sustain a minimum 1:100 year (1% annual chance) SoP at key flood risk locations - Maximise life of existing defences managing flood risk with local measures and footpath adaption from 2030, then provide minimum 1:100 year SoP.

In addition to the strategic options appraised in each Management Zone, the benefits and drawbacks of a harbour wide tidal barrage scheme were evaluated. Such a device, which might look something like the Thames barrier, could be potentially be implemented across the mouth of Portsmouth harbour to protect the dwellings within the harbour from tidal surges.

However, the appraisal of this option demonstrates that it is not economically viable given the very significant scheme costs. Such an option would also be very technically challenging to implement and there is potential for large negative impacts to the environment, navigation and shipping. Therefore this option was not taken forward for further consideration.

Strategic Option Appraisal

The following stage in the option development process was an appraisal of the strategic options in each SMZ. This appraisal process included economic appraisal (Benefit:Cost analysis), a number of environmental assessments and a technical appraisal of each strategic option. This multi-variate appraisal of options was undertaken to ensure that the preferred options put forward meet the Strategy objectives and are robust and sustainable in technical, social, environmental and economic terms.

Technical aspects

A primary consideration in the development of a Strategy is to know what options being recommended are technically viable. There is little point in undertaking detailed economic and environmental appraisals, or putting the option forward, if the option in question cannot reasonably be implemented on the ground. Technical considerations include aspects such as the defence type in question, timing of works, space and height requirements, all in the context of the location and present condition of the site in question. For example, for a currently undefended, open space location, there are few technical issues and a range of options are likely to be technically viable (e.g. revetments, seawalls, land raising, floodwalls earth bunds etc.). However, for a more constrained site, such as a dense urban environment where space may be very limited, significant technical challenges may be present for many options (e.g. land raising or earth bunds which requires space) and may limit technically feasible options to those such as a floodwall which require a smaller footprint to implement.

In order to be able to assess the technical feasibility of options a sound appreciation of the coastline is therefore required. This was achieved through the baseline assessments undertaken. In addition, a full site walkover was carried out to assess the practical and technical constraints offered along the coastline in respect to the various potential local measures identified. This understanding of the Strategy area, coupled with the project team's extensive engineering judgement, allowed the technical feasibility of options to be appraised, and this was used to help inform the selection of packages of local measures in order to deliver the strategic options.

Social aspects

Extensive stakeholder engagement was undertaken through the development of options. This included a key stakeholder workshop as well as ongoing liaison and individual meetings with key organisations along the frontage. The feedback received provided a clear understanding of stakeholder needs, desires and opportunities to deliver wider outcomes. A number of recurring and common themes and aspirations were raised by stakeholders for the Strategy to consider.

These include:

- Robust flood and erosion risk management – protecting key assets and people;
- Protecting, enhancing and creating environmentally important sites;
- Improving and opening up coastal access (e.g. walking, cycling, fishing and leisure pursuits);
- Improved recreational space areas;
- Maintaining slipways and launching access;
- Improve parking facilities; and
- Linking new defences with redevelopment opportunities.



The project team conducting a site walkover to identify potential options



Strategy Key stakeholder Workshop, Ferneham Hall, Fareham (October 2013)

The option appraisal process accounted for these aspirations and there is an intent that the preferred options being put forward should support and facilitate these where possible.

Environmental aspects

The key environmental considerations and objectives helped shape the Strategy preferred options. This was achieved through a Strategic Environmental Assessment (SEA) which was undertaken as an integral part of the option appraisal process. An SEA Scoping report was consulted on during the early part of the project, and the key environmental objectives for the project were confirmed and these were related to the following categories:

- Biodiversity (including flora and fauna)
- Climate
- Cultural heritage
- Human health
- Landscape
- Material assets
- Soil
- Water
- And the interrelationship between the above factors

The options were then appraised in relation to the objectives of these categories and the environmental impacts of the options were determined. This information was then included as part of the evidence for selecting the preferred option. Where possible it is intended that the preferred options should not significantly detriment the achievement of the environmental objectives, but if they do, suitable mitigation or compensation must be identified in order to ensure the options are environmentally acceptable.


 The Strategic Environmental Assessment is provided in Appendix J.

Economic Appraisal

The economic assessment formed an important part of the selection of the preferred options. Although the preferred option does not necessarily have to deliver the most cost effective option, because there are many other determining factors (e.g. social and environmental drivers), it is however important to make sure the preferred option makes economic sense (i.e. the benefits of doing something outweigh the costs).

The strategic options were subjected to economic testing during the appraisal. The assessment involved an estimation of the Benefit:Cost ratio of each strategic option. The costs of a strategic option were estimated according to the defence types (as indicated by the 'package of measures'), and the defence lengths and heights. The flood and erosion benefits of a strategic option were determined by calculating the damages avoided compared to the baseline 'Do Nothing' scenario.

$$\text{Benefit : Cost ratio} = \frac{\text{Total Benefit}}{\text{Total Cost}}$$

 For further details on the economic appraisal, refer to Appendix I: Economics

Generally speaking, the higher the Benefit:Cost ratio, the more economically viable the strategic option. The Benefit:Cost ratio was used as a tool to help inform the decision, and as long as an option had a Benefit:Cost ratio greater than 1 (i.e. the benefits outweigh the cost) it was deemed economically viable. Sometimes more costly options provide additional benefits, and if these represent better value over a less expensive option (i.e. the additional damages avoided outweigh the costs), then it may have been preferable to choose this more costly option.

It should be noted that although management options may be economically viable, it does not mean they will go ahead; the required funding to pay for the schemes must still be found (see page 57).



Photography by Roger D Smith ABIPP Gosport

Low tide shingle banks near Hill head



Photography by Roger D Smith ABIPP Gosport

Gosport Waterfront



Overview

Strategy summary and funding

Overview

Through a rigorous option appraisal process it ensures that the preferred options recommended are technically robust, economically sound and environmentally sustainable. For more detail on the preferred options by Management Zone (SMZ) see Chapter 5 – 9.

A phased approach to management based on risk

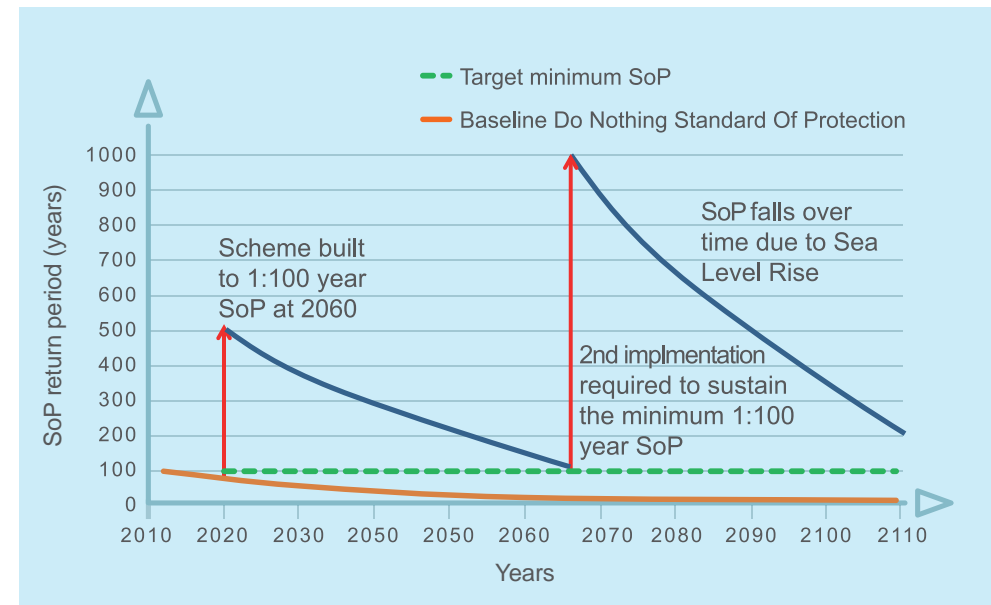
The Strategy options proportionately address flood and erosion risks with works phased over time depending on the risk based triggers. There are a number of priority areas where the current standard of protection offered by the existing defences is low and there is a significant risk of flooding from the present day. Then over time, due to sea level rise and ageing defences, further phased defence implementation is required to sustain protection to people and assets.

Many of the priority schemes are in Gosport, where the existing defences are relatively low and flood risk is apparent from the present day. There are also several local community level schemes, such as property level protection, which are required throughout the study area to address local flood risk issues. A programme of defence maintenance is also needed throughout the study area to maximise the life and function of existing defences in order to continue to provide flood and erosion protection. The priority schemes are presented in more detail on page 60.

As sea levels rise in the future, and existing defences reach the end of their service life, new coastal defences will be required. The Strategy has recommended a phased implementation programme for future works, based on when risks materialise.

For the large urban areas of Fareham and Gosport (SMZ 2), the Strategy recommends that future flood risk management options sustain a minimum 1:100 year (1% annual chance) standard of protection.

This standard was economically tested against alternatives and it was demonstrated that 1:100 year (1% annual chance) minimum SoP is appropriate and economically sound at the strategic level. It should be noted this minimum standard will be the design standard at the end of defences expected life. For much of the time defences will deliver a much higher standard of protection (e.g. 1:500 year SoP). This is because defences need to initially be built higher than required to allow for the fact that due to rising sea levels the SoP will fall over time. This concept is shown graphically below.



Schematic showing how Standard of Protection (SoP) is way in excess of the minimum SoP for much of the life of a scheme

It should also be noted that this strategic level minimum standard of protection will be reviewed and tested on a local scale in the development of specific schemes; this may result in higher standards of protection being delivered locally.

Another benefit of this phased approach to future works, is that it provides flexibility and scope for adaptive management. The Strategy is currently using best estimates for future sea level rise, however there is uncertainty over exactly how sea levels will change in the future. Should sea levels rise more slowly than currently anticipated, it may be prudent, and economically beneficial, to wait longer before implementing defences in some areas. Conversely, should sea levels rise more rapidly, it will be necessary to bring defence implementation forward, or build future schemes higher etc. This phased approach allows time to monitor sea level rise, secure funding for future schemes and ensure maximum benefits are generated by schemes. It also avoids implementing works now which we could potentially 'regret' because they are not needed.

On the open coast between Gilkicker Point and Hill Head, the preferred option is a 'softer' solution and one which works with natural process. Here the shingle beach is not only an important recreational and aesthetic feature, but it also forms an integral part of the coastal defence system. The beach forms a physical barrier to waves, helping to dissipate wave energy and prevent erosion and direct wave attack on the coastal defences and land which lies behind.

Currently the longshore drift takes beach sediment from west to east. Going forward, beach management, including local recycling (moving shingle from areas where it build up to areas where it is being eroded) will be the key to maintaining a healthy beach and therefore a robust defence. In the future sediment will slowly be lost from the system as it moves offshore or along shore out of the area. This loss of sediment, combined with rising sea levels, will mean that sometime in the future, when the beach reaches a critical level, further nourishment (addition of new shingle) and groyne improvements will be required to maintain its defence function.

The options put forward for the eastern bank of the River Hamble maintain and create important natural habitats with continuing to mitigate local flood risks and support coastal access desires. In order to compensate for habitat losses though holding the defence line in other areas, new coastal habitats need to be created and Hook Lake provides an opportunity to do this from 2030. However the existing freshwater habitats will need to then be recreated elsewhere within the region.

As well as providing significant benefits to people and their property, the Strategy also provides many positive impacts for the environment. A strategic Environment Appraisal was undertaken during the selection of the preferred options to help ensure that the Strategy is environmentally robust and sustainable. To make sure the Strategy complies with environmental legislation further assessments were undertaken, including a Habitats Regulations Assessment and a Water Framework Directive Assessment.



Environmentally important mudflats in Portsmouth Harbour

Environmental impacts summary

General

The Strategy will result in improved management and reduction of flood and erosion risk resulting in benefits for:

- Health
- Social
- Material Assets
- Heritage; and
- Soil.

However, there could be potential adverse short term impacts for Biodiversity associated with the construction of works and some mitigation such as sympathetic timing of works and methods will be required.

Environmental designations and habitats

There will also be longer term impacts in terms of habitat loss resulting from defending parts of the coastline. Rising sea levels will lead to coastal squeeze and the potential habitat losses have been estimated by the Shoreline Management Plan (SMP) and accounted for by Regional Habitat Creation Programme. **The Strategy will not add to this loss.** There is the potential for some minor reduction in intertidal losses compared to that estimated by the SMP, through the Strategy not requiring to Hold the Line in some Hold the Line policy areas (e.g. Portsmouth harbour – ODU 8 and 18).

From 2030 the Strategy also promotes the creation of new coastal habitats through regulating tidal exchange at Hook Lake which could potentially provide:

- Gains of 26ha of mudflat within the SPA/Ramsar site
- Gains of 20ha of saltmarsh within the SPA/Ramsar site

However, the creation of this new habitat will be at the expense of:

- Loss of 3ha of saline lagoon
- Loss of 39ha of grazing marsh
- Loss of 4ha of reedbed

These habitats will also require compensation within the region.

The Strategy also promotes local environmental enhancement opportunities through using softer options such as vegetation and planting in ODUs 8 and 18 to help build up the natural defences.

Water quality

Overall the Strategy is unlikely to have significant adverse effects on the coastal waterbodies present, as the works are generally within, or landwards of existing defence footprints. There is the potential for some adverse impacts in certain areas, however, these local impacts, when considered within the context of the wider waterbodies and heavily modified catchments, are unlikely to prevent the achievement of good ecological potential within the waterbodies as a whole.

It is noted that there may be localised and temporary water quality impacts as a result of maintenance/construction of defences, although this will be minimal and unlikely to cause a permanent changes in the ecological potential of the waterbodies.

The Strategy promotes a preferred option in the north of Portsmouth Harbour to improve waterbodies if funding can be found by remediating or prevent potentially contaminated land areas from eroding and leaching harmful substances into the harbour.

How will future management be paid for? Funding for coastal flood and erosion risk management in the UK

Until recently, gaining public funding for coastal defences was an all or nothing process. If a scheme was deemed worthy (in terms of the economic benefits it delivered) it would gain Environment Agency approval and would receive 100% public funding. Other schemes which were still viable, but were less economically beneficial, would fail to gain approval and would receive no funding. With a finite pot of money to pay for schemes it meant some key defences were not being built.

In recent years there has been a change to the way coastal defences get funded. The new system, referred to as a payment for outcomes approach, rewards partnership funding of schemes and provides many positive benefits with lots more schemes now being built as a result.

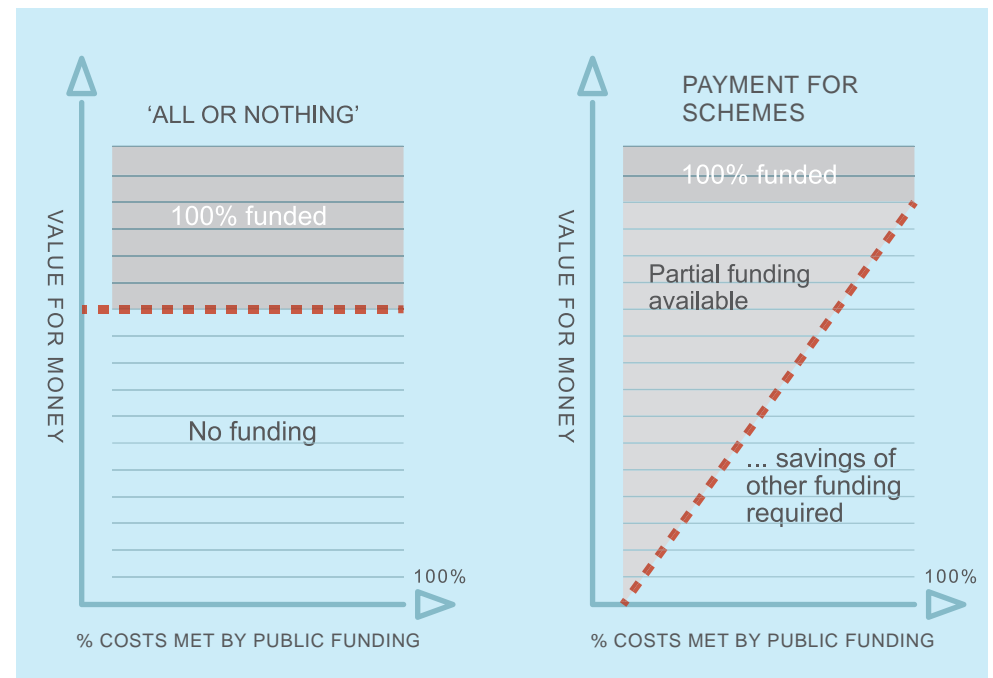
Although the worthy schemes can still gain approval for 100% public funding (Grant in Aid), schemes with an external contribution are looked on most favourably to also attract public monies. In addition, the merits of schemes are not judged purely financially, and the wider outcomes that a scheme delivers are also considered.

For example, if a scheme moves people in highly deprived areas out of significant flood risk, this propels the scheme up the ladder in the bid for public funding.

The Strategy recommends economically sound preferred strategic approaches to managing flood and erosion risk. Although many future schemes are likely to attract some public funding, contributions will often be required to make up the shortfall and ensure defences get built. By knowing the potential future costs of works, mechanisms to secure funding streams can be developed.

Such contributions come from:

- A Community Infrastructure Levy – where developers are effectively taxed and this money is spent on community projects
- Directly through developers (e.g. raising land through redevelopment)
- Potential Beneficiaries of Schemes – businesses and private individuals
- Local levies
- Local Enterprise Partnership
- Other sources



Payments for schemes

There are several priority schemes required under the Strategy (see table on page 60). Under the current funding regime these schemes are likely to attract decent levels of public grant aid funding, but they may not be prioritised over other schemes unless contributions can be secured. If contributions are gained then they would move up the list for receiving approval of public monies and ensure their construction is not unduly delayed.

There are also future schemes recommended for 2030 and 2060 in the Strategy. This phasing of works has been based largely on the timing of risk, but there is the potential to fast track and bring these forward future schemes if sufficient contributions can be obtained before these dates.

Priority schemes

When developing the Strategy the key areas with the most significant flood and erosion risk and the greatest need for coastal defence schemes were identified (see map opposite and table below). Within the Strategy, these areas are known as 'priority areas'. Included in each of the preferred strategic options are the schemes for each priority area that are necessary to alleviate the flood and erosion risk. If funding can be obtained, it is anticipated that these schemes will be implemented during the time periods recommended in the Strategy.

To assess the economic feasibility of the priority schemes the likelihood of partnership funding for each scheme has been determined. The priority schemes with the greatest chance of funding are at Forton Lake, Seafield and Alverstoke.

Elsewhere, the schemes at Fareham Quay and Alton Grove/ Cadour Drive/Harbour View have a reduced chance of funding, but remain aspirational schemes if contributions / funding

partners can be identified and further work will be undertaken try to facilitate these schemes.

i To find out more detailed information on the economic assessments and the partnership funding score of the priority schemes see Appendix I: Economics

Delivering more – broader outcomes and contributions

The Strategy primarily presents the preferred strategic approaches for managing the risks posed by coastal flooding and erosion. However, in doing this, there are also many other opportunities for the Strategy to protect, support and facilitate wider benefits. This is a key objective of the Strategy.

For example, a new coastal defence to protect an area from flooding can be as simple as a sea wall. Whilst such a defence will serve its purpose, with some joined up thinking there may be opportunities to build maintenance free passive defences such as raising land through redevelopment. Such a scheme could provide multiple benefits and not just a flood defence. This could include regeneration, reduce visual impact, improve access to the coast, reduce future maintenance costs and reduce risk of defences breaching. A partnership approach such as this could also help fund defences and ensure that they are approved and built more efficiently.

In order to seek the delivery of these multiple benefits of future defence schemes, the Strategy has identified, signposted and begun exploring the opportunities.

i For further details on the projects approach to seeking contributions and broader outcomes, refer to Appendix M: Broader Outcomes and Contributions



Flood and erosion defences at Lee-on-the Solent providing a wide range of benefits for walking, cycling and recreation

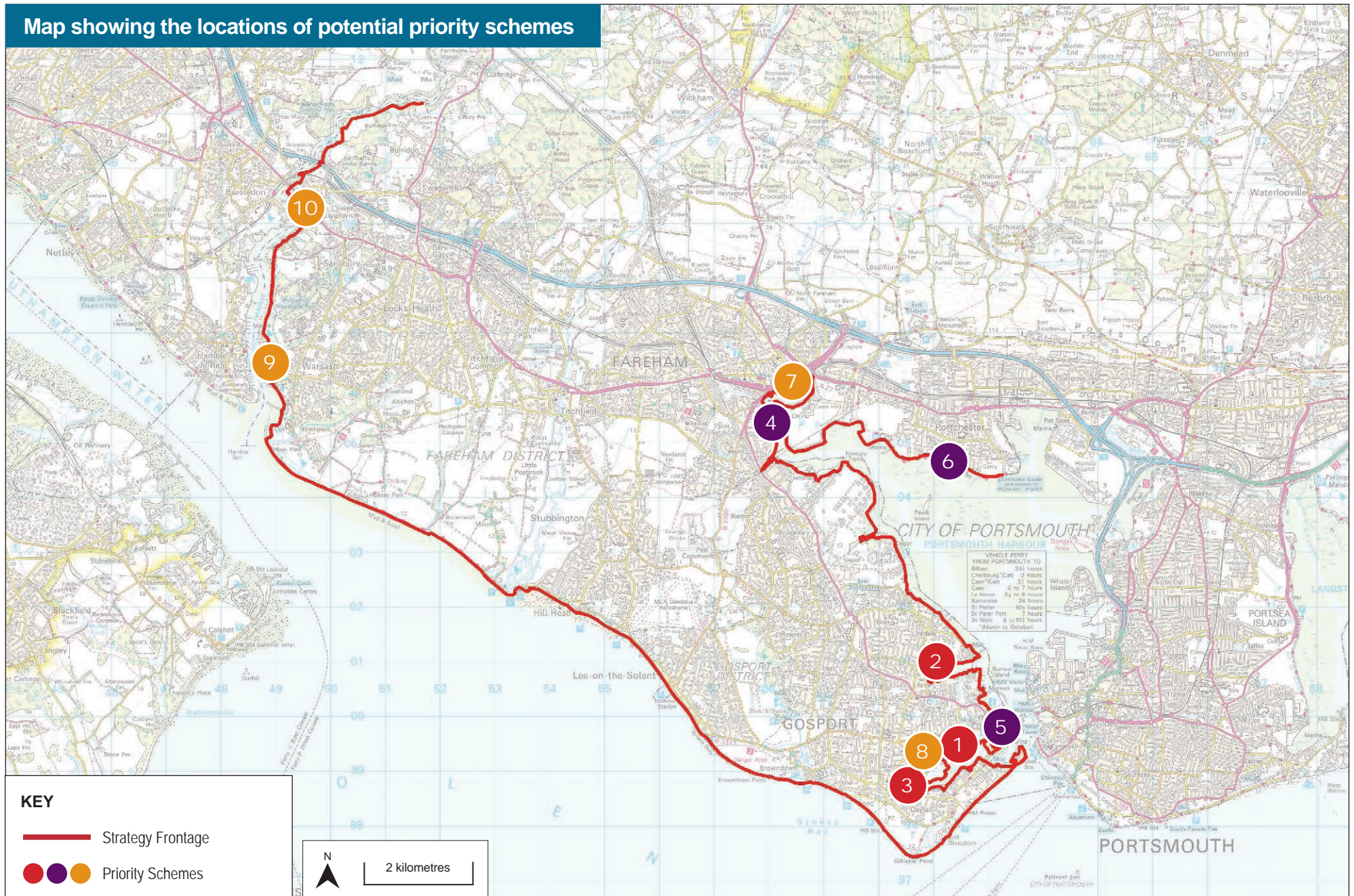
Summary of priority schemes

No.	Area	ODU	Potential Scheme	Cost (£)	B:C	No. properties benefiting
Nos 1-3						
1	Seafield	17	Seawall / crest raising	2,029,700	5:1	192
2	Forton Lake	11	Setback floodwall / crest raising	1,451,700	3:1	217
3	Stoke Lake (Alverstoke)	19	Setback floodwall / crest raising with floodgate or road ramp	869,300	12:1	132
Nos 2-6						
4	Fareham (Lower Quay)	7	Setback earth bund improvement and property level protection	852,000	3:1	35
5	Gosport Town Centre	15	Subject to redevelopment plans	-	-	-
6	Alton Grove to Cador Drive	2&3	New seawall / setback floodwall / crest raising	1,689,900	1:1	77
Nos 7-10						
7-10	Various		Local Property Level Protection	-	-	-

Key (for table above and map right)

- Capital schemes with higher chance of grant aid funding
- Aspirational schemes if contributions/funding partners can be aquired
- PLP/resilience schemes to reduce risk/impacts until business case for capital works improves

Map showing the locations of potential priority schemes



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View towards Cador Drive

SMZ 1

North Portsmouth Harbour

Hospital Lane (Portchester) to Upper Quay (Fareham)

Strategy Management Zone 1 (SMZ 1) is located immediately to the west of Portchester Castle and spans the northern coastline of the harbour from Hospital Lane to Upper Quay in Fareham.

Shoreline Management Plan Policy: The overarching policy for SMZ 1 is to 'Hold the Line'. This policy supports the maintenance of existing defences and implementation of new defences to manage flooding and erosion risks.

Land Use: Mainly residential and recreational. Dense housing areas lay immediately behind this frontage which is also valued for its open space, coastal footpath and natural habitats.

Coastal Processes: This shallow frontage is characterised by low energy wave conditions which are typical of an estuarine environment. However, when strong winds from the south combine with high tides, wave overtopping can result along parts of the frontage.

Environment: The nationally/internationally intertidal area and foreshore provides an important habitat for a number of species such as wading birds and overwintering dark bellied Brent Geese. Erosion of historic landfill and former industrial land, particularly around Wicor and Cams, presents a contamination risk to people and the environment in the future.

Coastal Defences: Revetments, seawalls and earth embankments in generally fair condition; however some are in poorer condition and require significant maintenance. There are also several undefended stretches i.e. Wicor recreation ground and Cams Hill golf course.

Flood and Erosion Risk: The risk of flooding is currently localised but will become much more significant over time as a result of sea level rise. Wave overtopping of the defences recently occurred close to Cadour Drive as a result of the 2013/14 winter storms. Given the relatively sheltered nature of this frontage, a slow but ongoing erosion risk exists to the coastal footpath, open space and the historic landfill sites.

Wider stakeholder aspirations: Improve coastal access, coastal flood and erosion risk protection, environmental enhancement.

Baseline – what would happen if we did nothing?

Under a 'No Active Intervention' scenario the risks of flooding and erosion would increase over the next 100 years. The number of properties that would be at risk from a 1:100 year flood event (which has a 1% chance of occurring in any year) are shown in the table overleaf.

Today there are 29 properties at risk of flooding from a 1:100 year (1% annual chance) event but by 2115 a total of 335 properties would be at risk from tidal flooding and 36 properties would be at risk of erosion.

Properties at risk from flooding▼	Time Horizons			
	2015	2030	2060	2115
Residential	25	30	118	319
Commercial	4	4	4	16
Total	29	34	122	335

Properties at risk of flooding from a 1:100 year (1% annual chance) event between 2015 and 2115.

Properties at risk from erosion▼	Time Horizons			
	2015	2030	2060	2115
Residential & Commercial	0	25	27	36

Properties at risk of erosion.



Wave overtopping during a winter storm at Cadour Drive

By 2115 the total damages in SMZ 1 would be expected to reach just over £11million.

The damages to residential, commercial and environmental assets that could be expected if nothing was done to reduce coastal flood and erosion risk are presented in the table below.

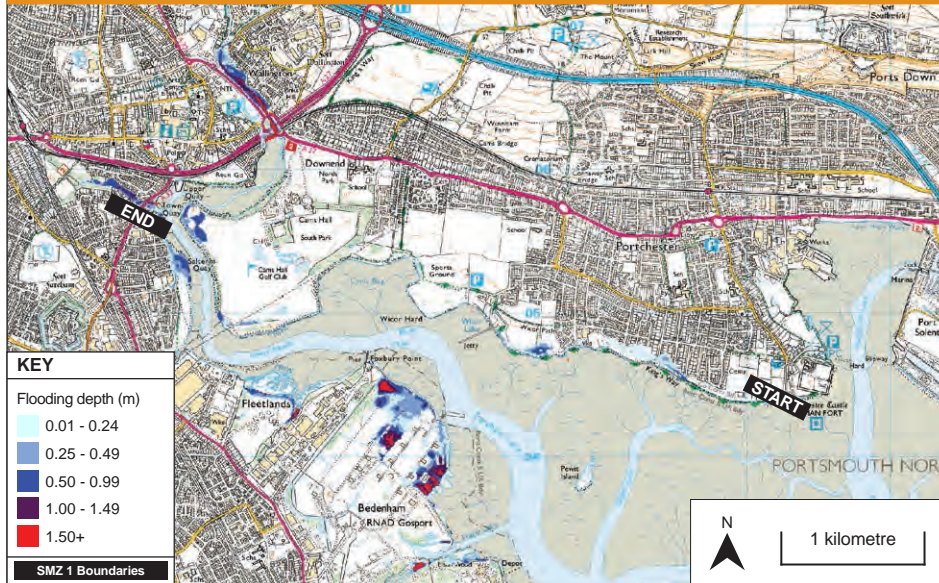
Type of damage	Cost of damage
Direct flood damages	£7.3M
Direct erosion damages	£2.6M
Indirect damages (e.g. health)	£1.0M
Environmental Damages (flooding / erosion)	£0.2M
Total	£11.1M

SMZ 1 whole life (100 year) do nothing damages (present value - £M)

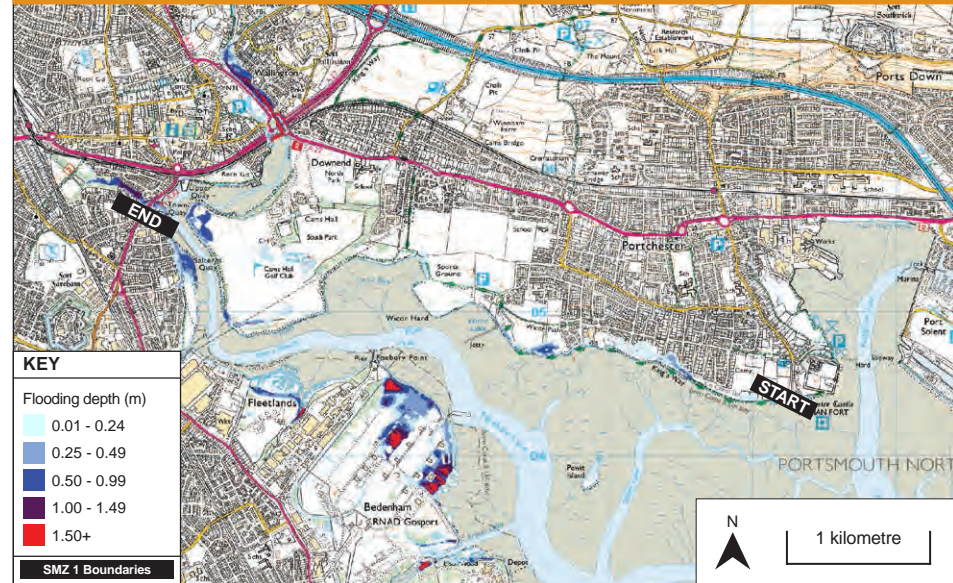


Erosion of potentially contaminated land at Wicor Recreation Ground

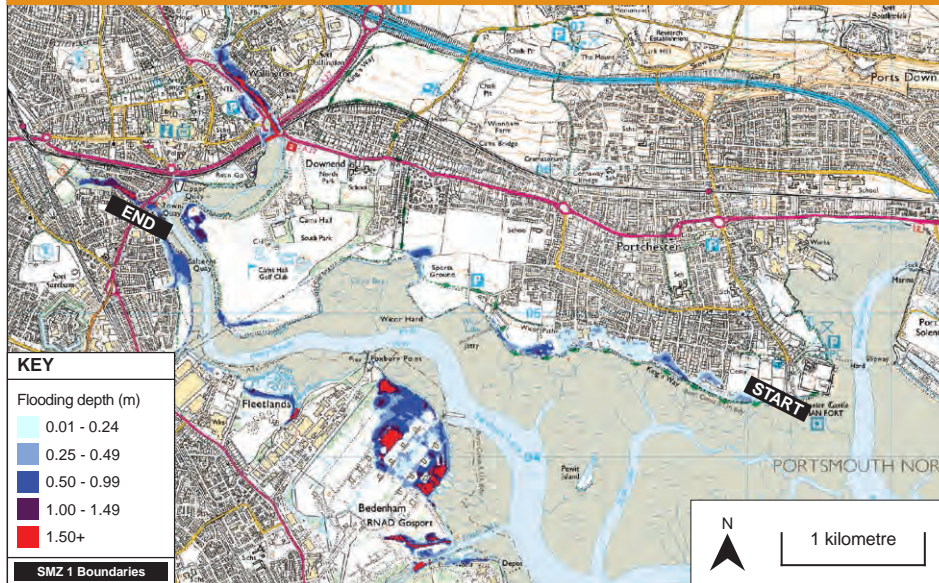
Baseline flood risk map 2015



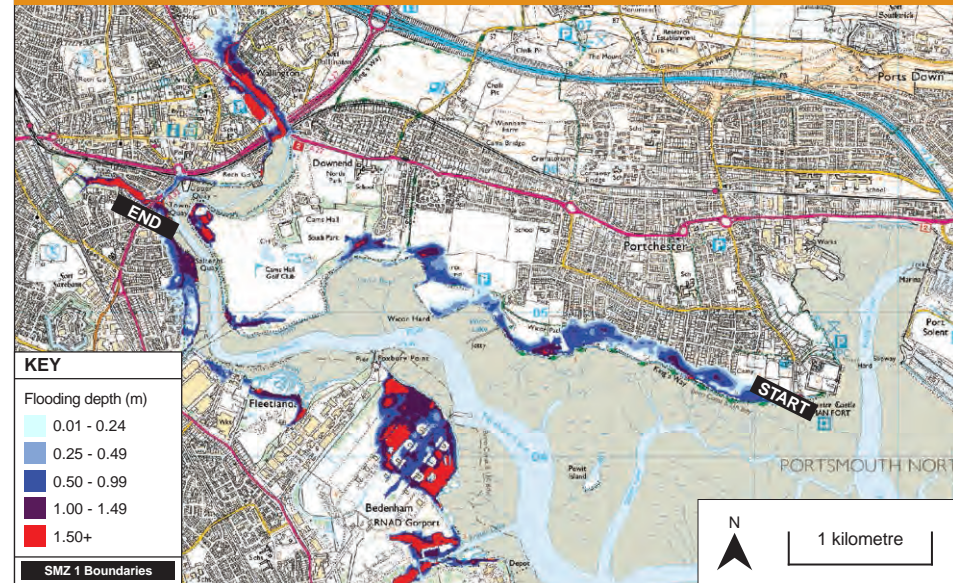
Baseline flood risk map 2030



Baseline flood risk map 2060



Baseline flood risk map 2115



Maximum potential flood depths from a 1:100 year (1% annual chance) event with existing defences in place

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Strategy preferred option - commentary

The existing defences in this zone currently provide flood and erosion risk management benefits to the community. **The preferred strategic approach involves maximising the life of these existing defences, and then sustaining a minimum 1:100 year (1% annual chance) SoP against flooding through phased implementation of new defences.**

Options to implement new defences sooner have also been appraised, but without a sizeable contribution, the economic case to gain grant in aid monies to build defences is not strong. However, as sea levels rise and the risk increases the case for public funding of schemes will strengthen considerably in the future.

As well as implementing defences to address flood risk in the future, there is also intent to mitigate potential risks to human health and the environment from the erosion of former landfill sites. Further studies into the hazards posed by these sites are recommended and appropriate measures to remediate or protect these areas from eroding should be sought. The cost of such options is considerable and therefore it is likely to take time to implement. However efforts to unlock the required funding streams should be prioritised in order to implement this intent.

Should the required funding be unlocked or secured through contributions, or through a legal obligation to remediate the risks posed by contaminated land, there is an opportunity to bring forward the implementation of new defences within this zone.

The preferred option will deliver sustainable flood and erosion risk management and will also facilitate wider environmental benefits. The preferred option also provides opportunities to improve coastal access, health and recreational aspects for the community,

factors which must be a consideration during the development of future schemes.

The preferred options are presented by ODU in the following tables.

 For further details, refer to Appendix H: Option Development and Appraisal

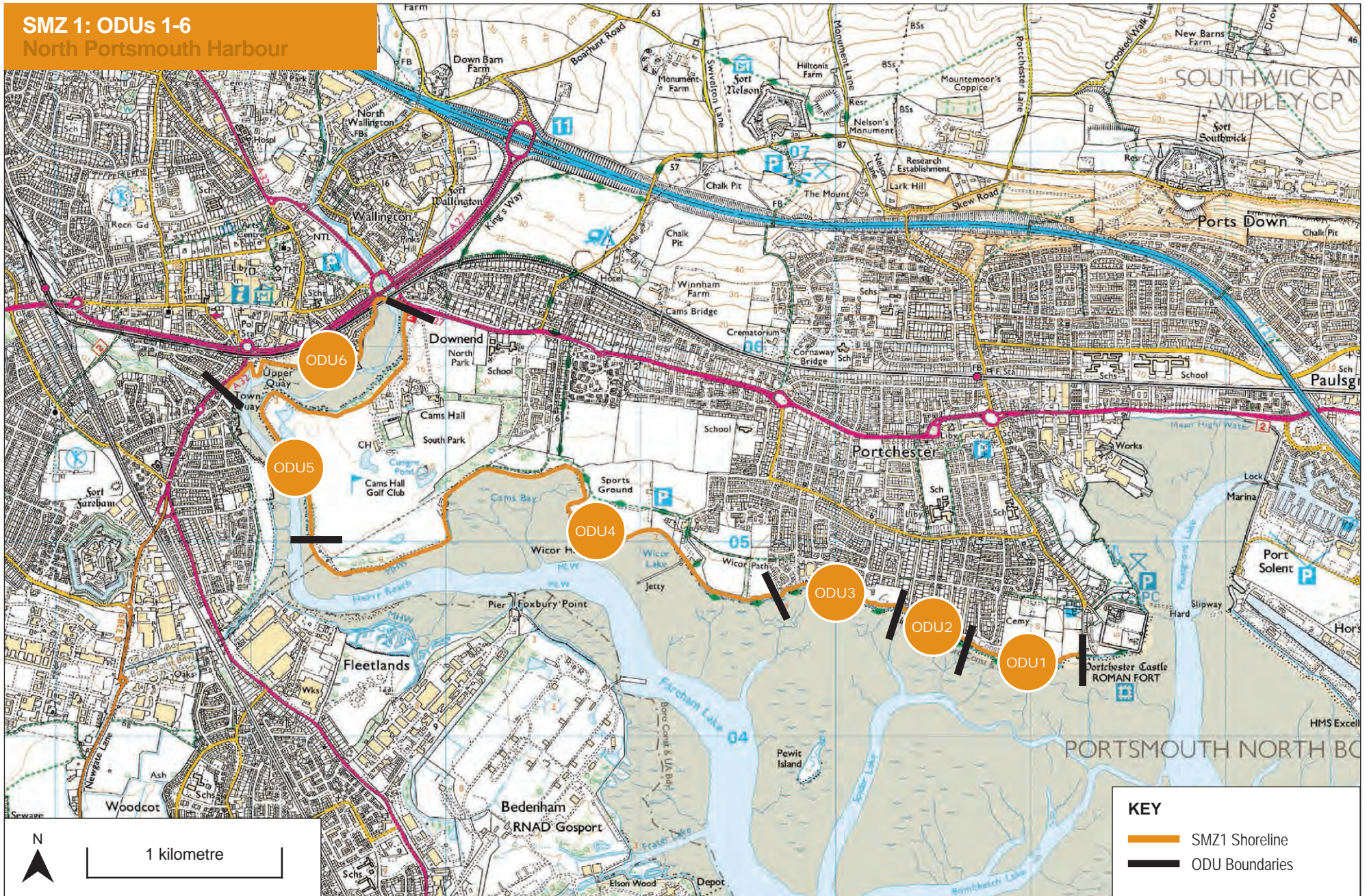


Cador Drive Sea Defences



Fareham Creek at low tide

SMZ 1: ODUs 1-6
North Portsmouth Harbour



Option Development Units (ODUs) boundaries in SMZ 1

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SMZ 1 Preferred Strategic Option: Maximise the life of existing defences then sustain a minimum 1:100 year (1% annual chance) Standard of Protection from 2030, with environmental improvements to currently eroding former landfill sites

Cost	Benefits - Damages avoided	Benefit:Cost ratio
£5,124,000	£10,010,000	2:1

KEY

 Do Nothing	 Property Level Protection	 Upgrade
 Maintenance	 Environmental Enhancement	 Planning/Monitoring
 Capital Works		

ODU 1 | Hospital Lane to Beachway

2015-2030	2030-2060	2060-2115	
			





Existing defences will require ongoing maintenance and repairs. From 2060 a new frontline defence (e.g. wall) will be required.

ODU 4 | Cador Drive to Cams Pumping Station

2015-2030	2030-2060	2060-2115	
			

Plan environmental improvement of currently undefended potentially contaminated land. Work to unlock funding to implement remediation or protection of these sites by 2030.

ODU 2 | Beachway to Alton Grove

2015-2030	2030-2060	2060-2115	
			



The life of the existing defence will be maximised through maintenance until 2030 when a new defence, such as a crest wall, will be required to sustain a minimum 1:100 year SoP.

ODU 5 | Cams Pumping Station to A27 Cams Hill

2015-2030	2030-2060	2060-2115	
			

Plan environmental improvement of currently undefended potentially contaminated land. Work to unlock funding to implement remediation or protection of these sites by 2030.

ODU 3 | Alton Grove to Cador Drive

2015-2030	2030-2060	2060-2115	
			

The life of the existing defences will be maximised through maintenance until 2030 when a new defence, such as a new seawall, will be required to sustain a minimum 1:100 year SoP.

ODU 6 | A27 Cams Hill to Upper Quay

2015-2030	2030-2060	2060-2115	
			

Existing defences will require ongoing maintenance and repairs. From 2060 a new defence (e.g. wall) will be required to sustain a minimum 1:100 year SoP against flooding.



Photography by Roger D Smith ABIPP Gosport

View of entrance to Portsmouth Harbour

SMZ 2

Fareham and Gosport

Upper Quay (Fareham) to Fort Monckton (Gosport)

Strategy Management Zone (SMZ 2) encompasses the west side of Portsmouth Harbour from Upper Quay, in Fareham, to Fort Monckton on the open coast at Haslar Wall. The major settlements of Fareham and Gosport fall within this zone.

Shoreline Management Plan Policy: The overarching policy for SMZ 2 is to 'Hold the Line'. This policy supports the maintenance of existing defences and implementation of new defences to manage flooding and erosion risks.

Land Use: Mainly urban with large areas of residential housing interspersed with commercial property and MOD land. There are also nationally significant naval heritage sites along this frontage including Royal Clarence Yard, Haslar Hospital and Priddy's Hard.

Coastal Processes: Much of this zone is comprised of sheltered, shallow, estuarine, creek and harbour frontages characterised by low energy wave conditions. However, the 3.5km stretch of deeper open coastline between the harbour entrance and Fort Monckton is subject to much larger waves as a result of its greatly increased exposure.

Environment: The significant intertidal area and foreshore provides a nationally/internationally important habitat for a number of species. In addition the two brackish lagoons within the zone,

Little Anglesey Lake and Cockle Pond, are designated SSSIs and support populations of the starlet sea anemone and the lagoon sand shrimp.

Coastal Defences: Much of the frontage is currently defended by a variety of structures including seawalls, earth embankments, revetments and informal private defences. The condition and residual life of the defences varies significantly, but there are a number of areas where the defence crests are quite low.

Flood and Erosion Risk: Excluding the open coast frontage, the erosion risk within the zone is generally low as a result of the shelter afforded by the harbour. There is however a significant flood risk in key areas and the extent and severity of this risk will increase over time as a result of sea level rise.

Wider stakeholder aspirations: Improve coastal access, coastal flood and erosion risk protection, environmental enhancement, redevelopment and regeneration in Fareham and Gosport.

Baseline – what would happen if we did nothing?

Under a 'No Active Intervention' approach SMZ 2 would be subject to significant levels of flood risk over the next 100 years. During the 2013/14 winter storms local tidal flooding was experienced in parts of Fareham and Gosport. The severity and frequency of such events is expected to increase in the future due to climate change. The ongoing threat of erosion is also present if defences are allowed to fail. The number of properties that would be at risk from a 1:100 year flood event (which has a 1% chance of occurring in any year) are shown in the table overleaf.

Today a total of 1924 properties would be at risk from tidal flooding and 285 properties would be at risk of erosion.

Properties at risk from flooding▼	Time Horizons			
	2015	2030	2060	2115
Residential	322	359	636	1748
Commercial	35	34	65	176
Total	357	393	701	1924

Properties at risk of flooding from a 1:100 year (1% annual chance) event between 2015 and 2115.

Properties at risk from erosion▼	Time Horizons			
	2015	2030	2060	2115
Residential & Commercial	0	51	144	285

Properties at risk of erosion.

By 2115 the total damages in SMZ 2 would be expected to reach just over £82million.

The damages to residential, commercial and environmental assets that could be expected, if nothing was done to reduce coastal flood and erosion risk, are presented in the table below.

Type of damage	Cost of damage
Direct flood damages	£59.7M
Direct erosion damages	£15.6M
Indirect damages (e.g. health)	£6.6M
Environmental Damages (flooding / erosion)	£0.2M
Total	£82.1M

SMZ 2 whole life (100 year) do nothing damages (present value - £M)

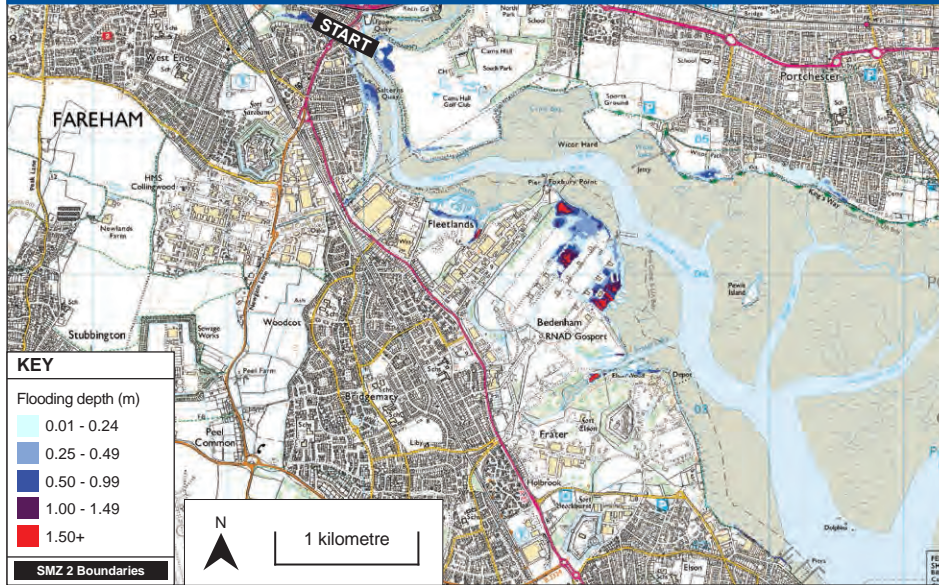


Fareham Town Quay flooding

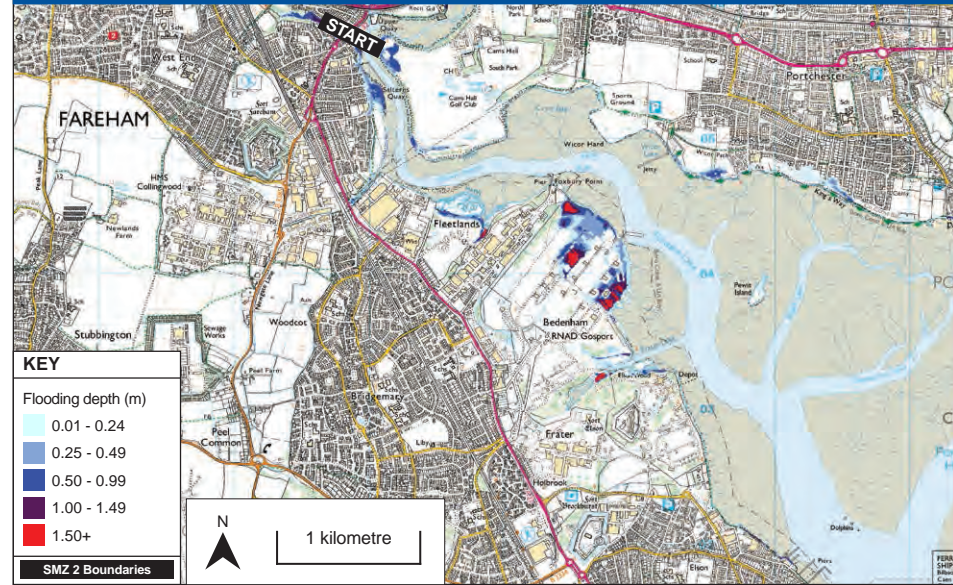


View of Stoke Lake at high tide

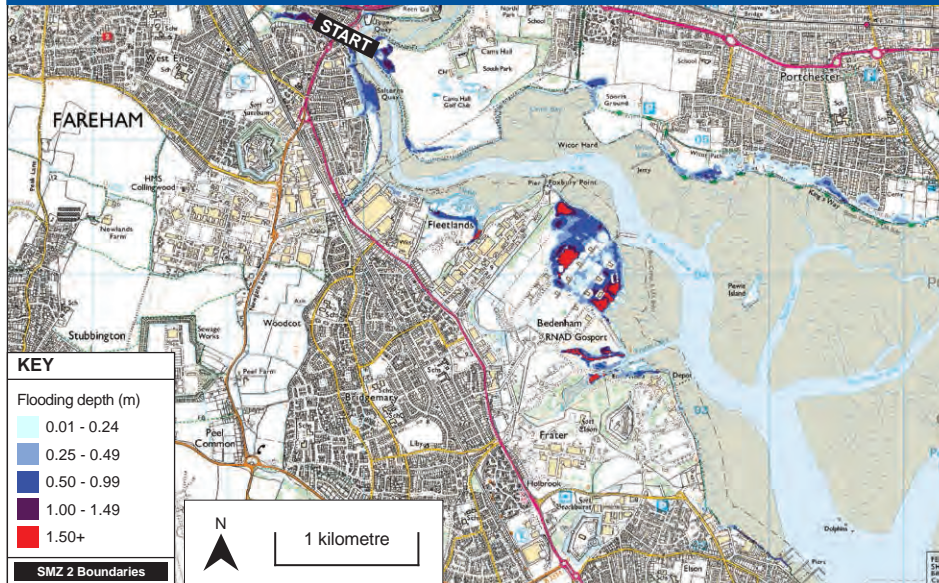
Baseline flood risk map 2015



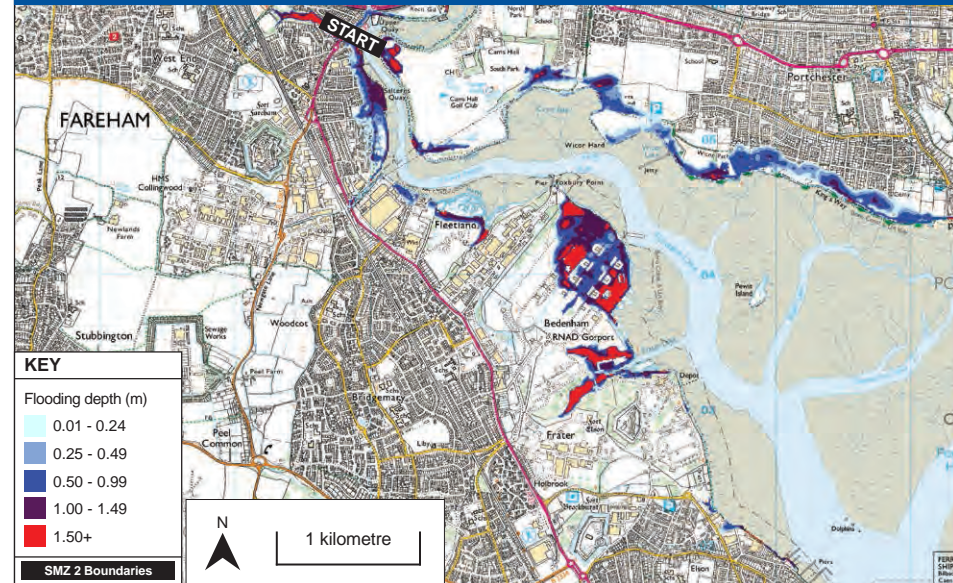
Baseline flood risk map 2030



Baseline flood risk map 2060



Baseline flood risk map 2115



SMZ 2 (Northern Section): Maximum potential flood depths from a 1:100 year (1% annual chance) event with existing defences in place

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Baseline flood risk map 2015



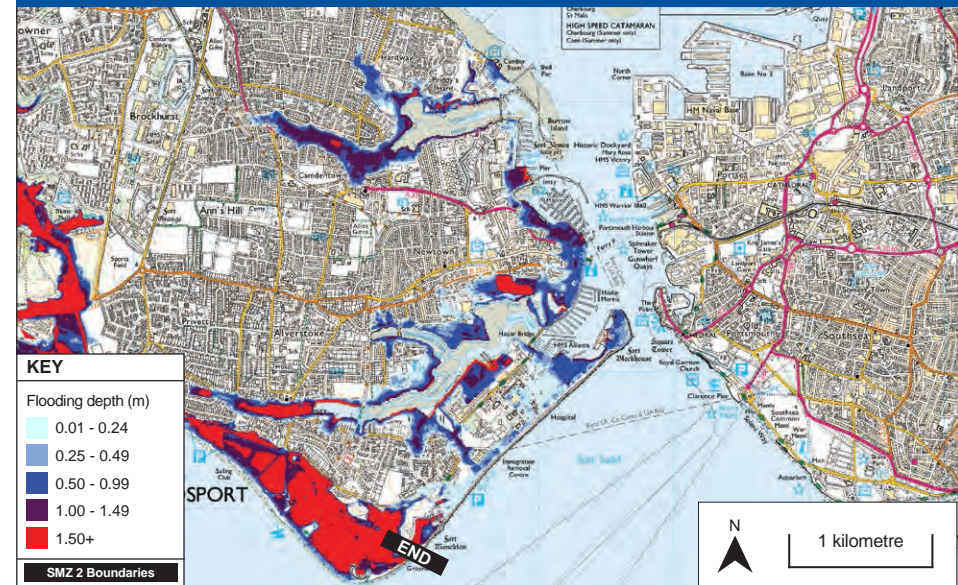
Baseline flood risk map 2030



Baseline flood risk map 2060



Baseline flood risk map 2115



SMZ 2 (Southern Section): Maximum potential flood depths from a 1:100 year (1% annual chance) event with existing defences in place

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Strategy preferred option - commentary

The existing defences in this zone currently provide flood and erosion risk management benefits to the community. However in some key areas, where defence heights are lowest, there is a significant risk of tidal flooding from the present day. These priority areas include parts of Fareham Quay, Forton Lake, Seafield, Little Anglesey Lake, and Workhouse Lake.

The preferred strategic approach involves sustaining a minimum 1:100 year (1% annual chance) SoP against flooding through phased implementation of new defences.

This preferred option means that new defences are required first in the priority areas, with a programme of future works in other areas to address the risks as they increase significantly over time. The preferred option also provides opportunities to improve coastal access, health and recreational aspects for the community, factors which must be a consideration during the development of future schemes.

Other strategic options such as ‘improve all now’, ‘provide a higher standard of protection’, or to ‘delay building new defences’ have also been appraised, but the preferred option currently represents best value for money and the defences required in the priority areas are likely to attract some grant in aid monies to help fund them. Public money for potential schemes is not guaranteed, but if contributions from non-Government sources can be secured the chances of getting defences built quickly will increase substantially.

There are also aspirations to redevelop and regenerate parts of the zone, and new coastal defences can potentially play an important role in supporting these wider initiatives.

Should such broader outcomes and contributions be achieved, there is an opportunity to bring forward the implementation of new defences within other parts of the Zone such as at Gosport Waterfront. The preferred option also provides opportunities to improve coastal access, health and recreational aspects for the community which must be considered during the development of future schemes.

Holding the line will lead to coastal squeeze impacts on important intertidal habitats, and these impacts will require compensation in other areas. In local areas of the zone, such as ODU 8 and 18, where erosion risk is low and flood risk is minimal, environmentally friendly, softer solutions to maintain the natural defence have been recommended (e.g. through encouraging vegetation accretion etc.).

The options put forward for MOD owned areas have not been included in the economic appraisal, as flood and erosion risk to their sites does not affect third parties. However, the MOD has been engaged and involved through the development of the Strategy and it is their intent to continue maintaining, and where appropriate (funds permitting) upgrading sea defences on their sites.

The preferred options are presented by ODU in the following tables.

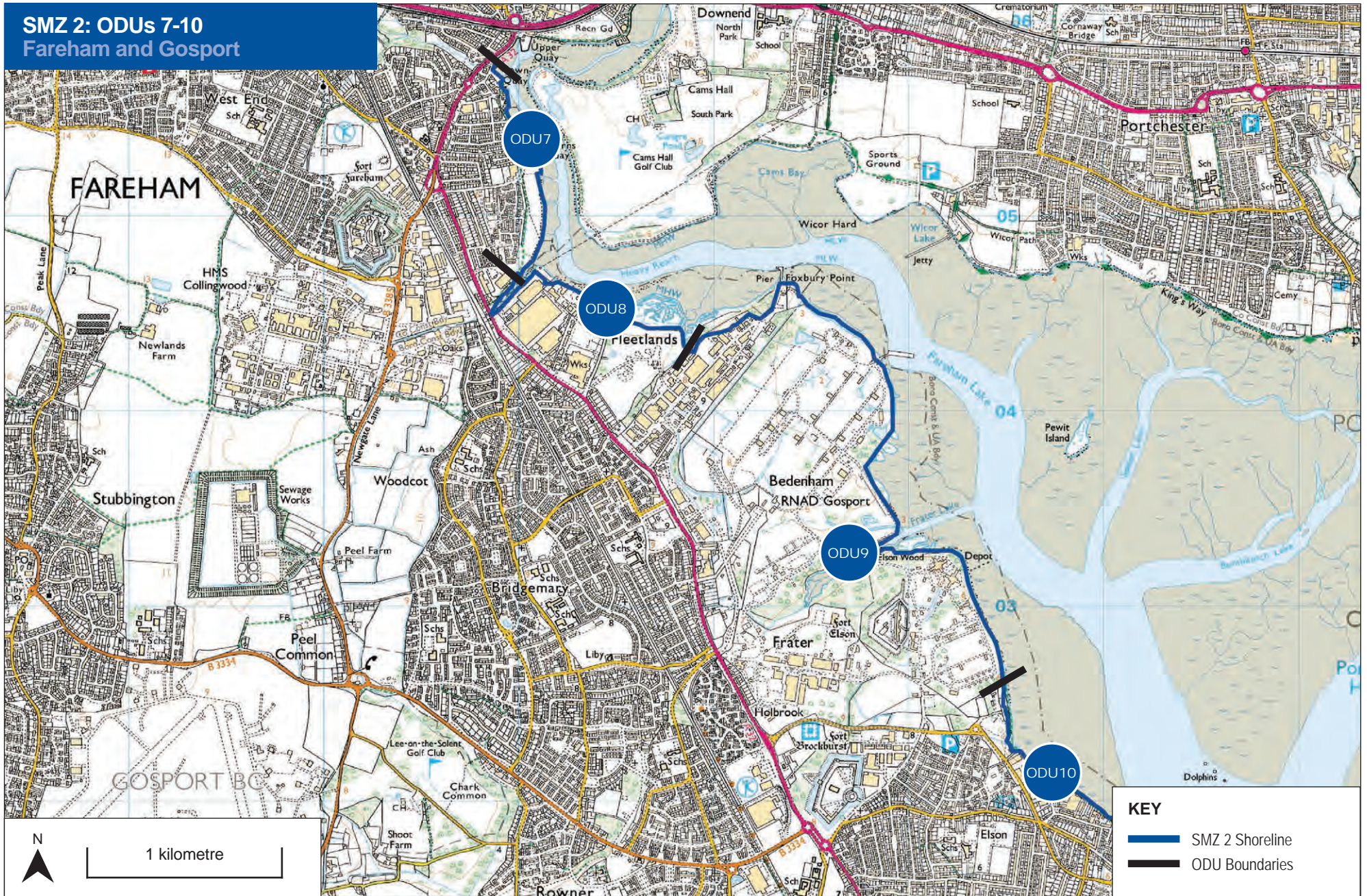


For further details, refer to Appendix H:
Option Development and Appraisal



View towards Cockle Pond (Gosport) at low tide

SMZ 2: ODUs 7-10
Fareham and Gosport



Option Development Units (ODUs) boundaries in SMZ 2 (Northern Section)

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SMZ 2 Preferred Strategic Option: Sustain a minimum 1:100 year (1% annual chance) Standard of Protection against flooding

KEY

-  Do Nothing
-  Property Level Protection
-  Upgrade
-  Maintenance
-  Environmental Enhancement
-  Planning/Monitoring
-  Capital Works

Cost	Benefits - Damages avoided	Benefit:Cost ratio
£17,094,000	£79,653,000	4.7:1

ODU 7 | Upper Quay to Hoeford Lake

2015-2030	2030-2060	2060-2115	
			

Maintenance, priority capital works (such as earth bund upgrades) and property level protection are required to address flood risk. Further upgrades will be required from 2060.

ODU 10 | Monks Walk to Lichfield Drive

2015-2030	2030-2060	2060-2115	
			





Scheduled maintenance is required to maintain the current defences which offer a good SoP. Capital works (e.g. seawall) will be required from 2060.

ODU 8 | Hoeford Lake to Crabtree Lake

2015-2030	2030-2060	2060-2115	
			

Flood and erosion risk is low, but softer options to encourage and build up the existing natural defence, such as vegetation management and planting, should be implemented.

ODU 9 | Crabtree Lake to Monks Walk

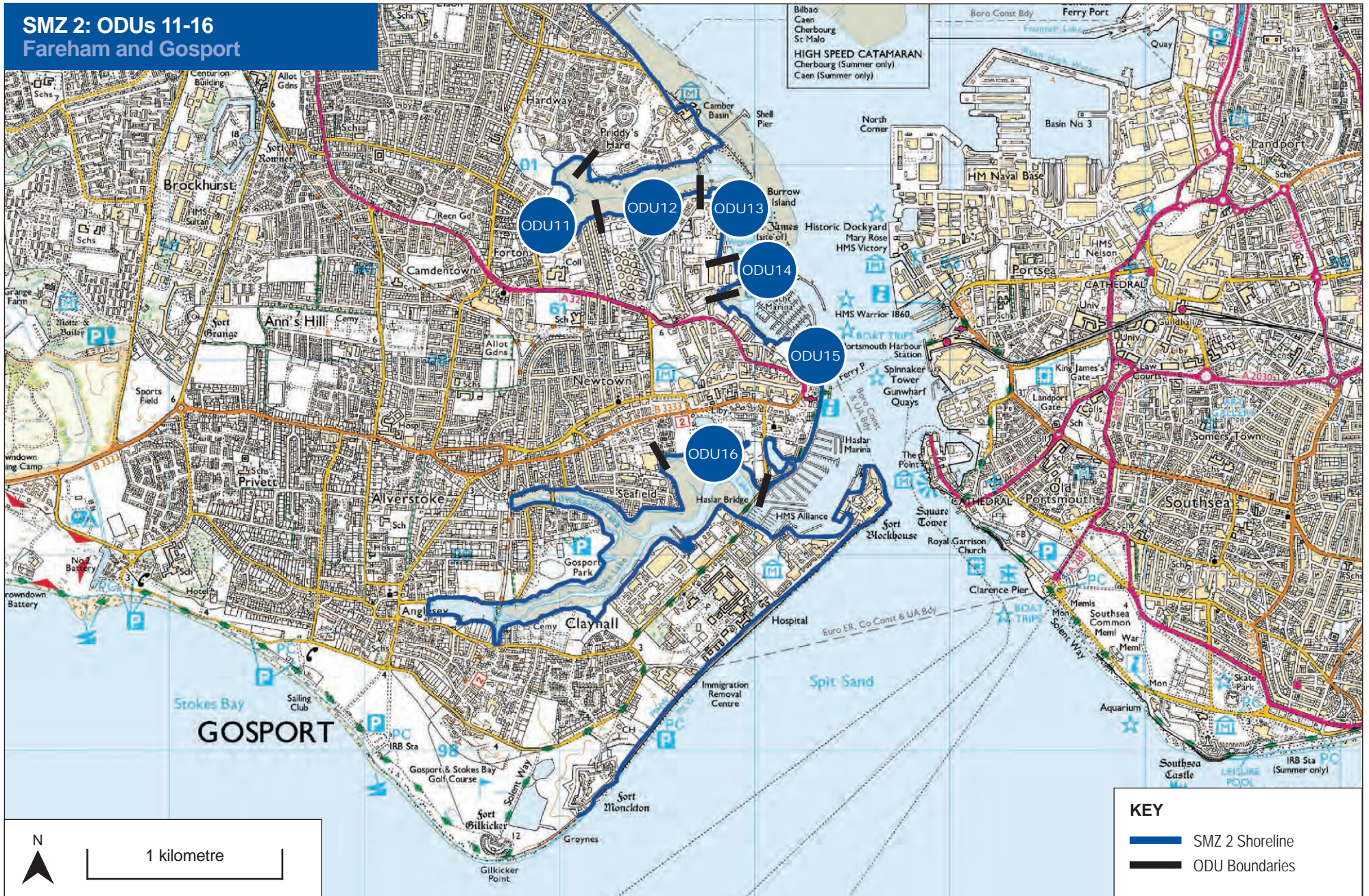
2015-2030	2030-2060	2060-2115	
			

It is recommended that the MOD implement capital works and then maintain their defences, to manage flood and erosion risk to their nationally important assets.



View across the harbour from SMZ 2 towards Portchester

SMZ 2: ODUs 11-16
Fareham and Gosport



Option Development Units (ODUs) boundaries in SMZ 2 (Central Section)

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SMZ 2 Preferred Strategic Option: Sustain a minimum 1:100 year (1% annual chance) Standard of Protection against flooding

KEY

 Do Nothing	 Property Level Protection	 Upgrade
 Maintenance	 Environmental Enhancement	 Planning/Monitoring
 Capital Works		



Cost	Benefits - Damages avoided	Benefit:Cost ratio
£17,094,000	£79,653,000	4.7:1

ODU 11 | Lichfield Drive to Parnham Road

2015-2030	2030-2060	2060-2115	
			





Priority capital works, such as a flood wall, are required near St Vincent's College to address flood risk. Ongoing defence maintenance with further defence upgrades will also be required from 2060.

ODU 14 | Jamaica Drive to Rope Quays

2015-2030	2030-2060	2060-2115	
			

The site is earmarked for redevelopment and capital works to mitigate present day flood risk are required. Opportunities to deliver passive defences (e.g land raising) should be explored.

ODU 12 | Parnham Road to Rolling Bridge

2015-2030	2030-2060	2060-2115	
			

It is recommended that the MOD maintain their existing defences, to manage flood and erosion risk to their nationally important assets.

ODU 15 | Rope Quays to Haslar Bridge

2015-2030	2030-2060	2060-2115	
			

Present day flood risk is localised and can be managed with maintenance and with property level protection until 2030. Explore opportunities to bring forward schemes through redevelopment.

ODU 13 | Rolling Bridge to Jamaica Drive

2015-2030	2030-2060	2060-2115	
			

Scheduled maintenance is required to maintain defences. Capital works (e.g. new floodwall) will be required from 2060 when existing defences reach the end of their service life and the SoP falls.

ODU 16 | Haslar Bridge to Willis Road

2015-2030	2030-2060	2060-2115	
			

Existing structures should be maintained to address the localised flood and erosion risks. Capital works (e.g. setback floodwall) from 2060 to mitigate increasing flood risk as sea levels rise.

SMZ 2: ODUs 17-20
Fareham and Gosport



Option Development Units (ODUs) boundaries in SMZ 2 (Southern Section)

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SMZ 2 Preferred Strategic Option: Sustain a minimum 1:100 year (1% annual chance) Standard of Protection against flooding

KEY

 Do Nothing	 Property Level Protection	 Upgrade
 Maintenance	 Environmental Enhancement	 Planning/Monitoring
 Capital Works		





Cost	Benefits - Damages avoided	Benefit:Cost ratio
£17,094,000	£79,653,000	4.7:1

ODU 17 Willis Road to Dolphin Crescent

2015-2030	2030-2060	2060-2115	
			

Priority capital works, such as a new sea wall, are required at Seafield to address flood risk. Property level protection also required. Ongoing maintenance with defence upgrades from 2060.

ODU 20 Haslar Royal Naval Cemetery to Fort Monckton

2015-2030	2030-2060	2060-2115	
			

It is recommended that the MOD maintain their existing defences, to manage flood and erosion risk to nationally important assets and the wider community. Other capital works required locally.

ODU 18 Dolphin Crescent to Park Road

2015-2030	2030-2060	2060-2115	
			

Flood and erosion risk is low, but softer options to enhance and build up the existing natural defence, such as vegetation management and planting, should be undertaken.

ODU 19 Park Road to Haslar Royal Naval Cemetery

2015-2030	2030-2060	2060-2115	
			

Priority capital works, such as a new flood wall and flood gates are required at Alverstoke to address present day flood risk. Ongoing maintenance with further defence upgrades from 2060.



Sunrise over Haslar Wall, Gosport



The promenade at Lee-on-the-Solent

SMZ 3

Lee-on-the-Solent and Stokes Bay

Fort Monckton (Gosport) to Hill Head Sailing Club

Strategy Management Zone 3 (SMZ 3) is located between Fort Monckton in Gosport and Hill Head Sailing Club in the Borough of Fareham.

Shoreline Management Plan Policy: The overarching policy for SMZ 3 is to 'Hold the Line'. This policy supports the maintenance of existing defences and implementation of new defences to manage flooding and erosion risks.

Land Use: The wide hinterland at Stokes Bay provides an important open space amenity whilst the shingle beach which dominates the entire frontage is valued highly for public recreation. Residential and commercial areas lay immediately behind the protected cliffs at Lee-on-the-Solent and Hill Head.

Coastal Processes: This open coast, shingle beach frontage is exposed to larger waves than the other zones. There is an overall movement of sediment transport from west to east, driven by the prevailing south westerly winds. Tidal currents are shore parallel and strongest around Gilkicker Point and weakest in the bay.

Environment: This stretch of coastline is designated for its environmental value and the intertidal and shingle habitats support a wide diversity of birds and other species. The foreshore at Lee-on-the-Solent is designated as a Site of Special Scientific Interest as a result of the fossils such as sharks teeth which can be found here.

Coastal Defences: The wide shingle beach generally offers a good standard of protection. Groynes also help to stabilise the beach and trap material as it moves from west to east along the shoreline. The beach is also supplemented by seawalls and embankments in places which are typically in fair condition, although there are some localised areas where urgent maintenance is required, particularly in Stokes bay.

Flood and Erosion Risk: The risk posed by flooding in SMZ 3 is much less significant and more localised compared to other Strategy Management Zones. The erosion risk is more prominent than flood risk in this zone due to the proximity of development to the shoreline and the higher rates of erosion which can be experienced along the open coast.

Wider stakeholder aspirations: Improve coastal access for walking, fishing, cycling and parking, slipway maintenance and disabled access.

Baseline – what would happen if we did nothing?

Under a 'No Active Intervention' approach SMZ 3 would be subject to relatively low flood risk over the next 100 years. Erosion risk is more significant due to the wave exposure and proximity of the development to the shoreline. The number of properties that would be at risk from a 1:100 year flood event (which has a 1% chance of occurring in any year) are shown in the table below overleaf.

Today a total of 35 properties would be at risk from a 1:100 year (1% annual chance) event and 96 properties would be at risk of erosion.

Properties at risk from flooding▼	Time Horizons			
	2015	2030	2060	2115
Residential	5	8	10	34
Commercial	0	0	0	1
Total	5	8	10	35

Properties at risk of flooding from a 1:100 year (1% annual chance) event between 2015 and 2115.

Properties at risk from erosion▼	Time Horizons			
	2015	2030	2060	2115
Residential & Commercial	0	9	16	96

Properties at risk of erosion.



Beach erosion at Lee-on-the-Solent following a storm

By 2115 the total damages in SMZ 3 would be expected to reach nearly £4.8million.

The damages that could be expected to residential, commercial and environmental assets over the next 100 years, if nothing was done to reduce coastal flood and erosion risks are presented in the table below.

Type of damage	Cost of damage
Direct flood damages	£2.2M
Direct erosion damages	£2.4M
Indirect damages (e.g. health)	£0.2M
Environmental Damages (flooding / erosion)	-
Total	£4.8M

SMZ 3 whole life (100 year) do nothing damages (present value - £M)



Wave overtopping at Stokes Bay

Baseline flood risk map 2015



Baseline flood risk map 2030



Baseline flood risk map 2060



Baseline flood risk map 2115



Maximum potential flood depths from a 1:100 year (1% annual chance) event with existing defences in place

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Strategy preferred option - commentary

The wide shingle beaches and existing defences in this zone currently provide good protection against erosion and also provide significant benefits in reducing wave overtopping.

The presence of a healthy beach into the future is key to addressing the ongoing erosion risk and reducing the risk of flooding.

The wide beaches at Lee-on-the-Solent were created in 1996 through a significant nourishment scheme which placed large volumes of dredged material onto the foreshore. Originally the scheme was designed to last 50 years, however recent monitoring has shown that losses of shingle have been lower than expected; therefore it is likely that the beach will last significantly longer than first thought.


A cost effective way of extending the life and health of all of the beaches in this zone is through the implementation of a beach management plan. **The preferred option involves scheduled beach recycling, whereby shingle will be moved from local areas where it builds up to replace losses in other areas where it is eroding. The preferred option also requires that a programme of defence maintenance is implemented to ensure that existing structures continue to perform their flood and erosion risk protection functions. By 2060, capital works will be required to upgrade and refurbish the groynes to help maintain the beaches.**

Depending on the rate of sea level rise, and the future losses of sediment, that standard of protection may fall. Monitoring future beach levels will therefore be necessary to inform future options. Should sea levels rise faster than currently anticipated and the standard fall below acceptable levels, further nourishment or other capital works may need to be considered after 2060.

The preferred option not only mitigates the key erosion and flood risk but it also opens up opportunities to provide wider community benefits. For example, beach recycling could be used to remove sediment build-up from slipways to help maintain their function. In addition, considerable shingle build up has been experienced around the mouth of the River Alver, causing water quality issues upstream, and the regular removal of sediment from this area to recharge other eroding areas (such as in front of the main coastal car park at Lee-on-the-Solent, or the low beach in front of the Stokes Bay coastal road) could have significant water quality and environmental benefits.

Maintaining wide healthy beaches will deliver other broader outcomes including aesthetic, recreational and tourism benefits, and will also help protect important vegetated shingle habitats and lagoons behind Gilkicker point.

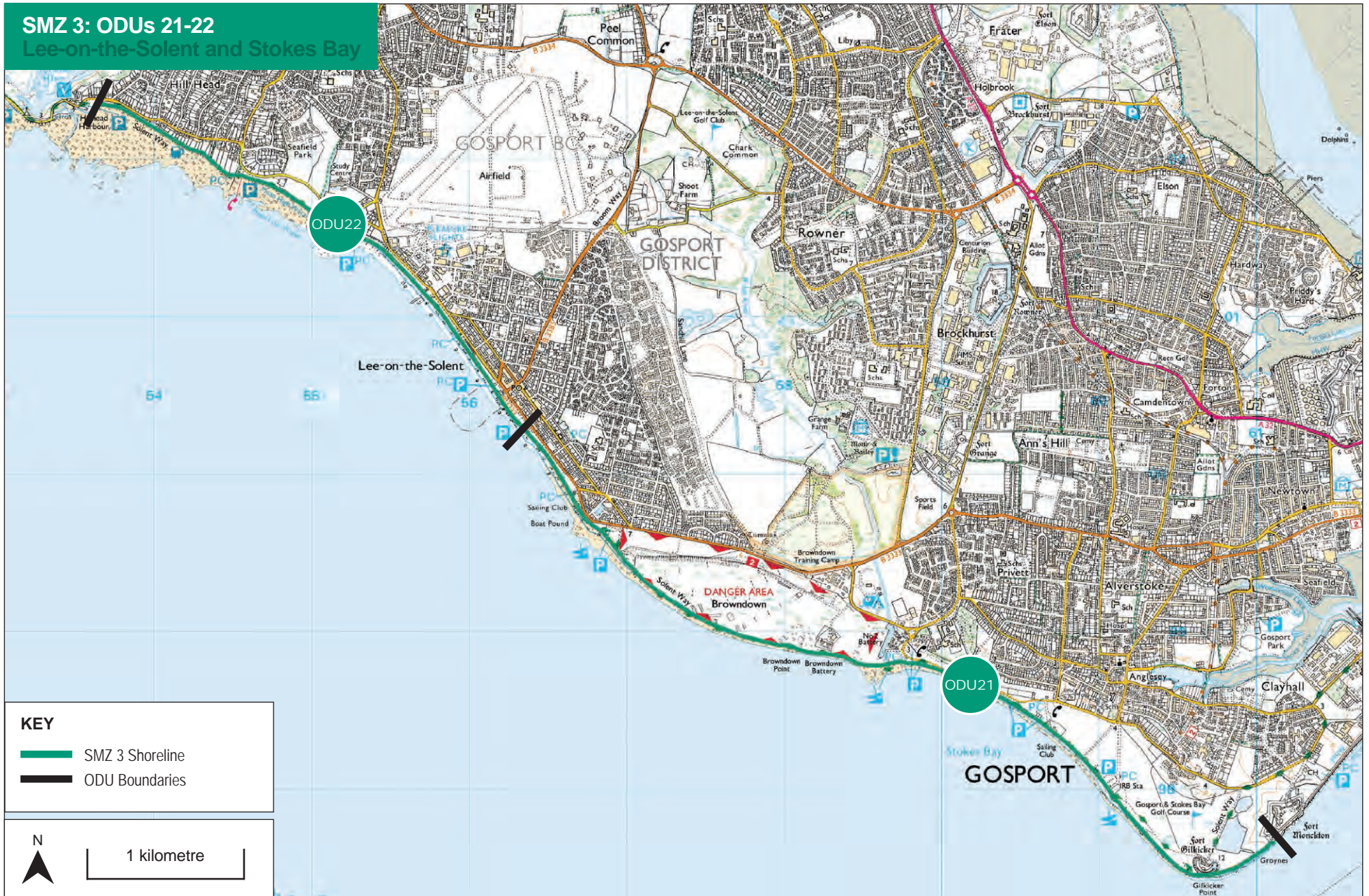
The preferred options are presented by ODU in the following tables.

 For further details, refer to Appendix H: Option Development and Appraisal



Vegetated shingle behind Gilkicker Point

SMZ 3: ODUs 21-22
Lee-on-the-Solent and Stokes Bay



Option Development Units (ODUs) boundaries in SMZ 3

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SMZ 3 Preferred Strategic Option: Maintain Protection – scheduled maintenance and beach recycling to prevent erosion through the development of a Beach Management Plan

Cost	Benefits - Damages avoided	Benefit:Cost ratio
£1,085,000	£10,281,000*	9.5:1

* includes significant tourism benefits generated by the preferred option.

KEY

 Do Nothing	 Property Level Protection	 Upgrade
 Maintenance	 Environmental Enhancement	 Planning/Monitoring
 Capital Works		

ODU 21 | Fort Monckton to Elmore Angling Club




2015-2030	2030-2060	2060-2115	
			

Develop and implement a beach management plan, including beach recycling and future monitoring. Maintenance of existing defences will also be required. Consider upgrades from 2060 if required.



View from Fort Gilkicker

ODU 22 | Elmore Angling Club to Hill Head Sailing Club

2015-2030	2030-2060	2060-2115	
			

Develop and implement a beach management plan, including beach recycling and future monitoring. Maintenance of existing defences will also be required. Consider Groyne upgrades from 2060 if required.



Beach huts at Hill Head



Nationally designated habitats at Titchfield Haven

SMZ 4

Hook Lake to Titchfield Haven

Hill Head Sailing Club to Warsash Maritime College

Strategy Management Zone 4 (SMZ 4) is located between Hill Head Sailing Club and Warsash Maritime College.

Shoreline Management Plan Policy: There are several different policies within this zone. The policy at Titchfield Haven is to 'Hold the Line'. The policy for the undefended Brownwich cliffs section is for 'No Active Intervention'. At Hook Lake the policy is for 'Managed Realignment' from 2030 through regulated tidal exchange in order to create habitat to offset losses caused by defending other parts of the frontage.

Land Use: Open space, agricultural land, recreation and significant environmentally important sites. The beaches along this frontage are highly valued for their amenity value and are popular for recreational activities. Chalets at Mean Shore and Solent Breezes are important to the local economy and attract tourism to the area.

Coastal Processes: This open coast shoreline is exposed to wind driven waves and is characterised by a narrow shingle beach fronted by wide intertidal mudflats. Sediment eroded from the steep undefended natural cliffs at Brownwich and Chilling is transported both eastward, along the coast towards Hill head and Lee-on-the-Solent, and westward, to feed and help maintain Hook Spit.

Environment: There are many environmentally important assets within this zone including the intertidal mudflats, the Hook with

Warsash Local Nature Reserve, which supports a wide range of wetland birds and coastal plants; Titchfield Haven, which hosts important freshwater wetland and grazing marshes and the Chilling Cliffs which provide a valuable habitat for one of the largest populations of mining bees in the UK.

Coastal Defences: Largely undefended, but with local defences including a low seawall at Hook Lake, a concrete revetment, sheet piling and groynes at Hill Head Harbour and private gabion defences at Solent Breezes. The condition of defences at Hook Lake and Solent breezes is poor. Hill head harbour defences are in fair to good condition.

Flood and Erosion Risk: Localised flood and erosion risk to people and property. The environmentally important sites are at significant risk, which could lead to detrimental effects on key habitats. The beach helps mitigate wave overtopping at Hook Lake and Meon Shore.

Wider stakeholder aspirations: Improve coastal access for walking, fishing, cycling, bird watching and sailing and seek environmental enhancement and nature conservation opportunities.

Baseline – what would happen if we did nothing?

Under a 'No Active Intervention' approach environmental assets in SMZ 4 would be subject to significant levels of flooding over the next 100 years. There are also properties at risk of flooding, and the risk increases overtime due to sea level rise The figures are shown in the table overleaf.

Today a total of 61 properties would be at risk from tidal flooding and 41 properties would be at risk of erosion.

Properties at risk from flooding▼	Time Horizons			
	2015	2030	2060	2115
Residential	5	6	22	48
Commercial	0	0	0	13
Total	5	6	22	61

Properties at risk of flooding from a 1:100 year (1% annual chance) event between 2015 and 2115.

Properties at risk from erosion▼	Time Horizons			
	2015	2030	2060	2115
Residential & Commercial	0	16	28	41

Properties at risk of erosion.



Sea wall at Hook Lake damaged by the winter 2013/2014 storms

By 2115 the total damages in SMZ 4 would be expected to reach £5.6million.

The damages that could be expected to environmental, residential, and commercial assets over the next 100 years, if nothing was done to reduce coastal flood and erosion risks, are presented in the table below.

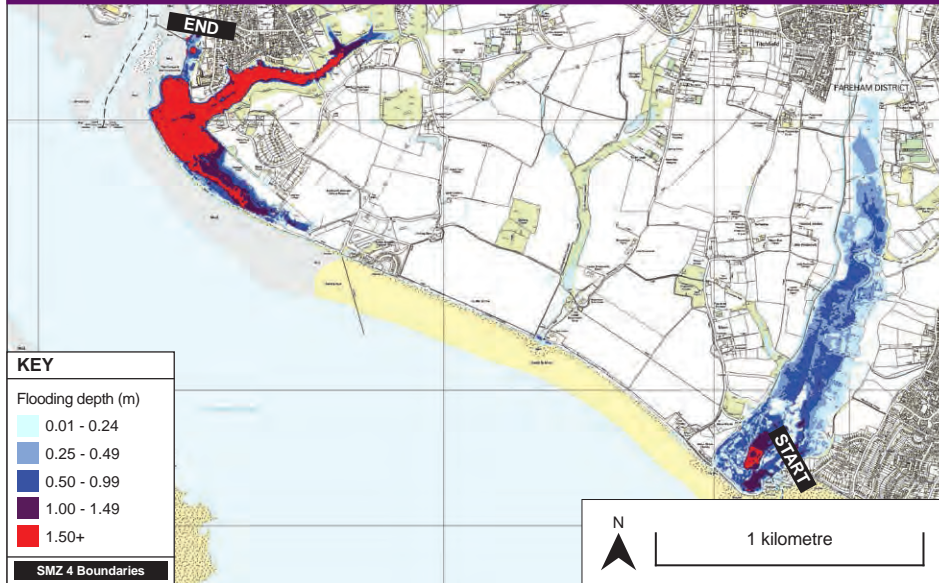
Type of damage	Cost of damage
Direct flood damages	£1.4M
Direct erosion damages	£3.3M
Indirect damages (e.g. health)	£0.2M
Environmental Damages (flooding / erosion)	£0.7M
Total	£5.6M

SMZ 4 whole life (100 year) do nothing damages (present value - £M)

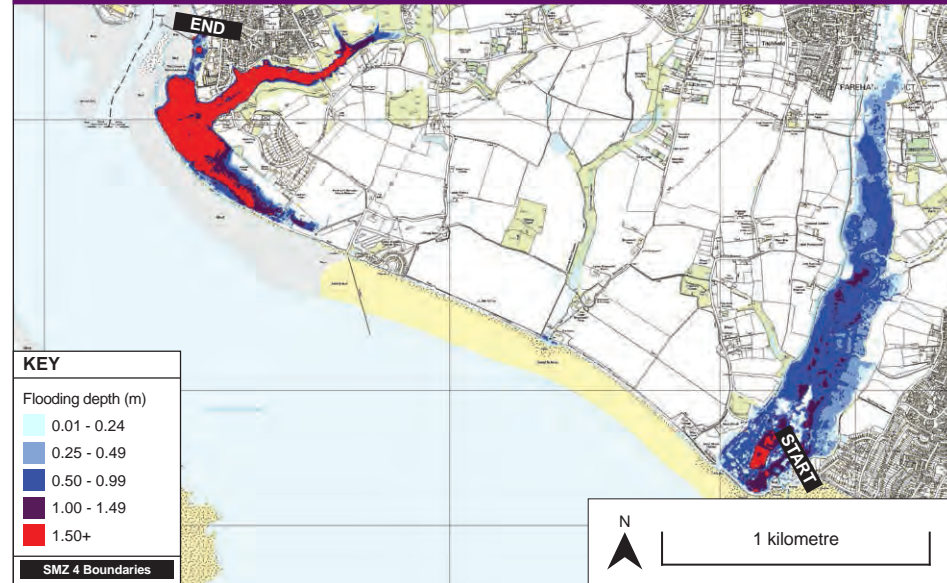


Wave overtopping near Hill Head Harbour during a storm

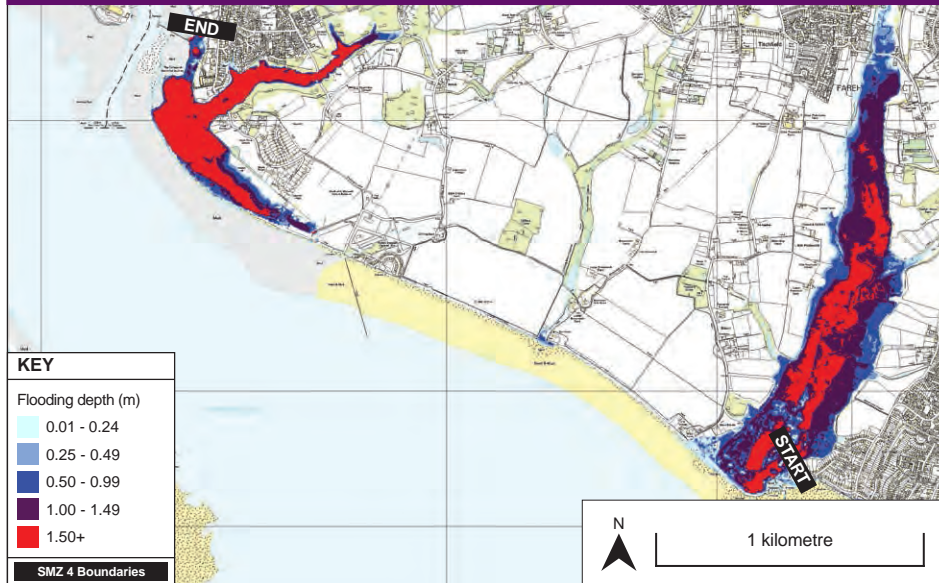
Baseline flood risk map 2015



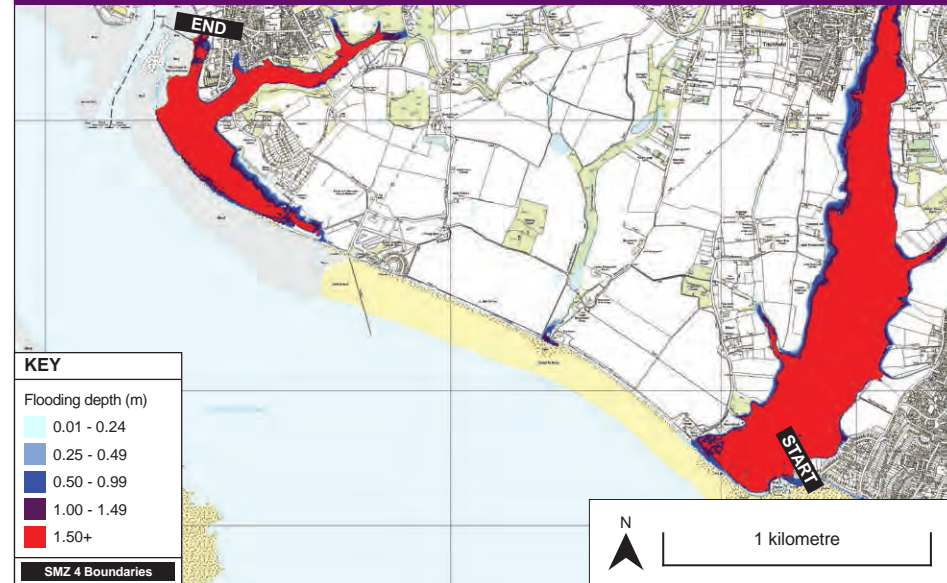
Baseline flood risk map 2030



Baseline flood risk map 2060



Baseline flood risk map 2115



Maximum potential flood depths from a 1:100 year (1% annual chance) event with existing defences in place

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Strategy preferred option - commentary

The preferred option for this zone balances the interests of competing Strategy needs. Given that the zone has relatively low flood and erosion risk to people and property, is largely undefended, and is valued for its natural beauty and environmental assets, the strategic approach is to work with nature as much as possible and enhance natural areas. However it is recognised that local risks to people and property need to be mitigated, and to provide time to adapt, private maintenance of existing defences is permitted (subject to gaining the necessary consents).

Under the Conservation of Habitats and Species Regulations (2010) there is a legal obligation to maintain the quantity and quality of internationally important natural habitats and species. By defending many other parts of the Strategy frontage outside SMZ 4 to protect people and their properties, key habitats will be lost in the future due to rising sea levels 'squeezing' habitats in front of defences.

Regional habitat creation schemes have identified compensatory sites to balance losses in the short term; however, by 2030 further creation of coastal habitats and intertidal mudflats will be required. This zone presents significant opportunities to enhance and create new habitats to allow future defences to be built in other areas.

Although careful planning and further detailed studies will need to be undertaken, Hook Lake presents particular opportunities to create intertidal and saltmarsh habitat in the future through regulated tidal exchange. This method of habitat creation allows change to be managed more gradually than breaching existing defences.


Although specific details are not currently available, this option has the potential to create up to 26ha of mudflat and 20ha of saltmarsh within the SPA/Ramsar site. However, this habitat creation will be at the expense of 3ha of saline lagoon, 39ha of grazing marsh and 4ha

of reedbeds. The loss of these habitats will also require compensation elsewhere and potential sites must be identified prior to 2030 to allow this option to be implemented. Following the 2013/14 winter storms the sea wall fronting Hook Lake is in a poor condition and urgent works are required to maintain this asset in the short term.

The preferred option requires that the defences at Hill Head harbour are maintained to protect the road and car parking, the sailing club, the harbour and Titchfield Haven which lies behind. When these defences reach the end of their service life, capital works will be required. Further environmental enhancement opportunities should also be explored for Titchfield Haven in the future.

The shingle beaches within this zone help to reduce wave overtopping and erosion risk. By allowing the cliffs to retreat naturally, sediment will be supplied to the beaches and adjacent frontages, thereby providing a benefit.

The preferred options are presented by ODU in the following tables.

 For further details, refer to Appendix H: Option Development and Appraisal



Intertidal mudflats near Hook Spit

SMZ 4: ODUs 23-25
Hook Lake to Titchfield Haven



Option Development Units (ODUs) boundaries in SMZ 4

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SMZ 4 Preferred Strategic Option: Allow natural processes to continue but sustain protection to environmentally important sites at Titchfield Haven and at Hook Lake (with regulated tidal exchange)

KEY

 Do Nothing	 Property Level Protection	 Upgrade
 Maintenance	 Environmental Enhancement	 Planning/Monitoring
 Capital Works		

Cost	Benefits - Damages avoided	Benefit:Cost ratio
£4,445,000	£6,291,000	1.4:1

ODU 23 Hill Head Sailing Club to Meon Shore

2015-2030	2030-2060	2060-2115	
			

Existing structures should be maintained to address the flood and erosion risks to key assets. Capital works (e.g. new revetment and wall) will be required from 2030 to continue to mitigate increasing flood.

ODU 25 Hook with Warsash Nature Reserve to the Maritime College

2015-2030	2030-2060	2060-2115	
			

Maintain the existing defences and undertake further studies and plan regulated tidal exchange which is to be implemented from 2030 to create new habitats.

ODU 24 Meon Shore to Hook with Warsash Nature Reserve

2015-2030	2030-2060	2060-2115	
			

Allow natural processes to continue but private maintenance of existing defences is permitted (subject to gaining the necessary consents).





View of the River Hamble (Bunny Meadows)

SMZ 5

River Hamble East Bank

Warsash Maritime College to
Eyersdown Copse (Burridge)

Strategy Management Zone 5 (SMZ 5) is located between Warsash Maritime College and Eyersdown Copse (Burridge).

Shoreline Management Plan Policy: The overarching policy for this varied SMZ 5 frontage is a mixture of 'Hold the Line' and 'No Active Intervention' depending on the location and time period in question.

Land Use: Mainly rural with lots of open space and natural environments, interspersed with pockets of commercial and residential properties south of the M27 road bridge. The region is valued for recreation and has a highly used coastal footpath which runs along the east bank of the river. Heritage assets including the wreck of the Grace Dieu are also present.

Coastal Processes: This sheltered estuarine frontage is characterised by a low energy wave climate. The river is also subject to strong tidal currents, particularly in the upper reaches and in the main channel.

Environment: There are a number of nationally and locally important habitats within this zone which are important areas supporting breeding and migratory birds. The area also offers some of the best examples of mature saltmarsh on the south coast.

Coastal Defences: Varied with embankments, sheet piled walls, and large undefended sections. The condition of defences is generally fair, although locally poor in places, notably around the Maritime College and at Lower Swanwick.

Flood and Erosion Risk: There is an ongoing erosion risk, particularly to the Solent Way footpath, but erosion rates are slow due to the sheltered nature of the estuary. A present day localised flood risk exists at Warsash and lower Swanwick which is expected to increase over time as a result of sea level rise.

Wider stakeholder aspirations: Maintain coastal access (specifically the Solent Way footpath) and maintain the natural environment.

Baseline – what would happen if we did nothing?

Under a 'No Active Intervention' approach there is a risk of erosion and flooding to environmental assets, the Solent Way and local properties. The risk will increase in the future due to sea level rise. The figures are shown in the tables overleaf.

Today a total of 67 properties would be at risk from a 1:100 year (1% annual chance) event and 6 properties would be at risk of erosion.

By 2115 the total damages in SMZ 5 would be expected to reach £11.4million.

The damages that could be expected to environmental, residential, and commercial assets over the next 100 years, if nothing was done to reduce coastal flood and erosion risks, are presented in the table overleaf.

Properties at risk from flooding▼	Time Horizons			
	2015	2030	2060	2115
Residential	10	12	23	36
Commercial	24	25	26	31
Total	34	37	49	67

Properties at risk of flooding from a 1:100 year (1% annual chance) event between 2015 and 2115.

Properties at risk from erosion▼	Time Horizons			
	2015	2030	2060	2115
Residential & Commercial	0	4	4	6

Properties at risk of erosion.

Type of damage	Cost of damage
Direct flood damages	£7.3M
Direct erosion damages	£1.0M
Indirect damages (e.g. health)	£0.3M
Environmental Damages (flooding / erosion)	£2.8M
Total	£11.4M

SMZ 5 whole life (100 year) do nothing damages (present value - £M)

Strategy preferred option - commentary

The preferred strategic option is to maintain and maximise the life of the existing defences to prevent erosion, with local property level protection to address local flood risk until 2060.

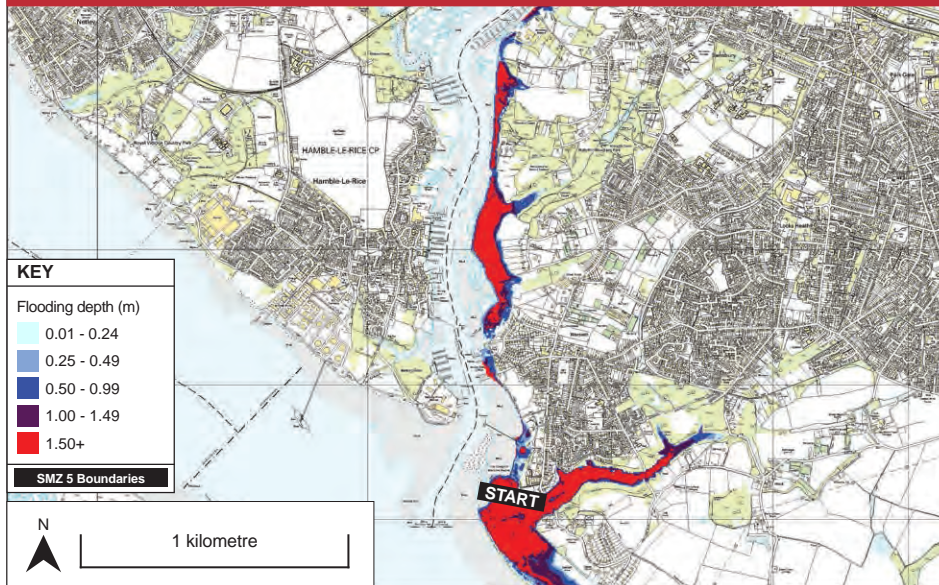
As the risk increases from 2060 due to sea level rise, capital works will be required in key areas, such as Warsash and Lower Swanwick, in order to sustain a minimum 1:100 year (1% annual chance) Standard of Protection.

The Solent Way footpath which runs through this zone provides a popular recreation and tourism asset. Although the economic case is marginal, there is a strong stakeholder and public aspiration to maintain this footpath which is at risk of flooding and erosion without future intervention. This will provide other intangible benefits. Therefore maintenance of the footpath is recommended and if sufficient funding can be secured, capital works should be carried out to adapt or protect the footpath.

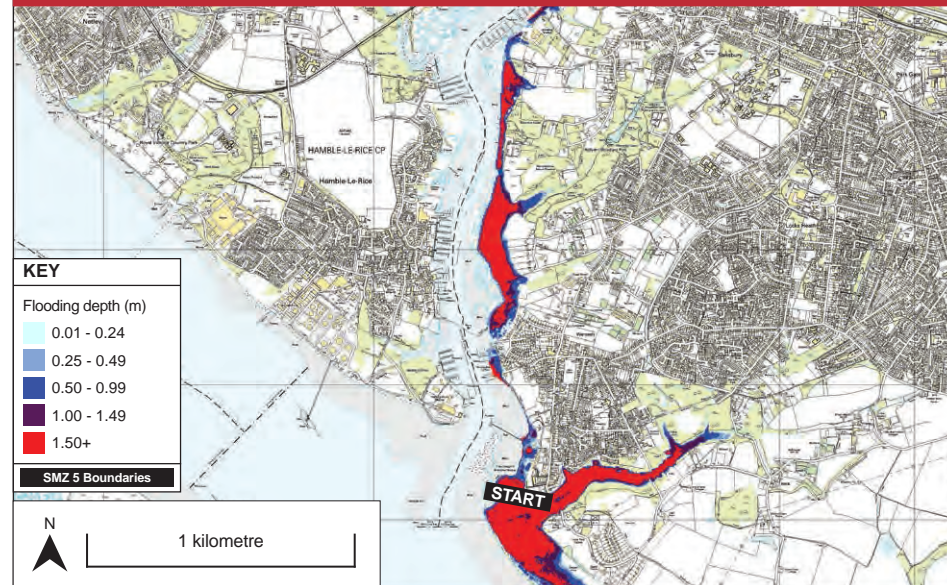
Above the M27 road bridge there are few assets at risk of flooding and erosion and consequently there are no formal defences here. Therefore no active intervention is the preferred option, allowing the shoreline to evolve naturally and preserve the natural and largely unspoilt character of the area.

 For further details, refer to Appendix H: Option Development and Appraisal

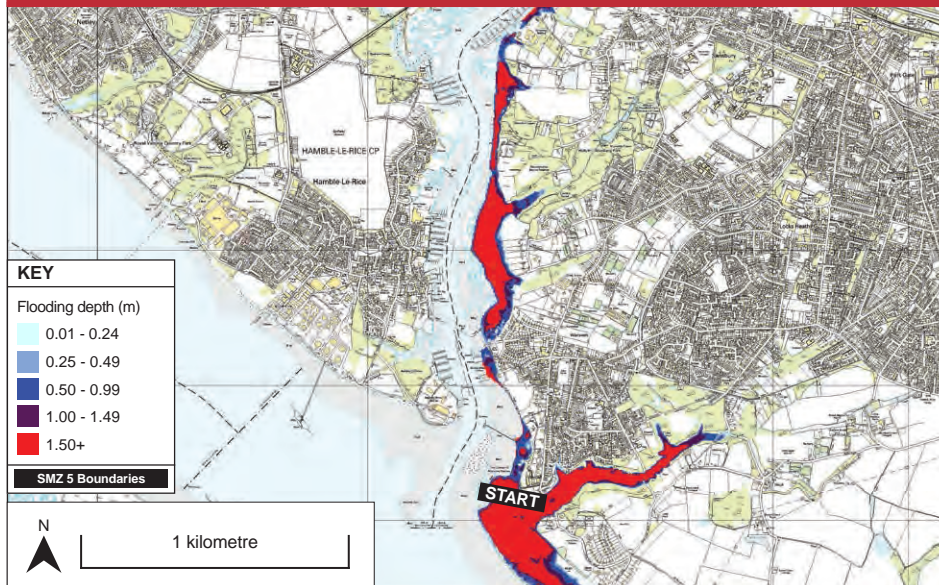
Baseline flood risk map 2015



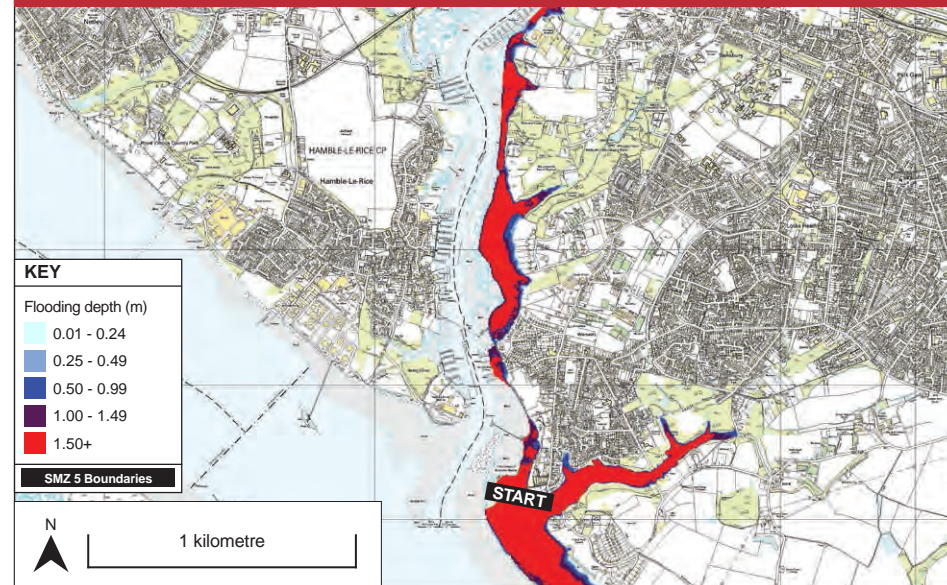
Baseline flood risk map 2030



Baseline flood risk map 2060



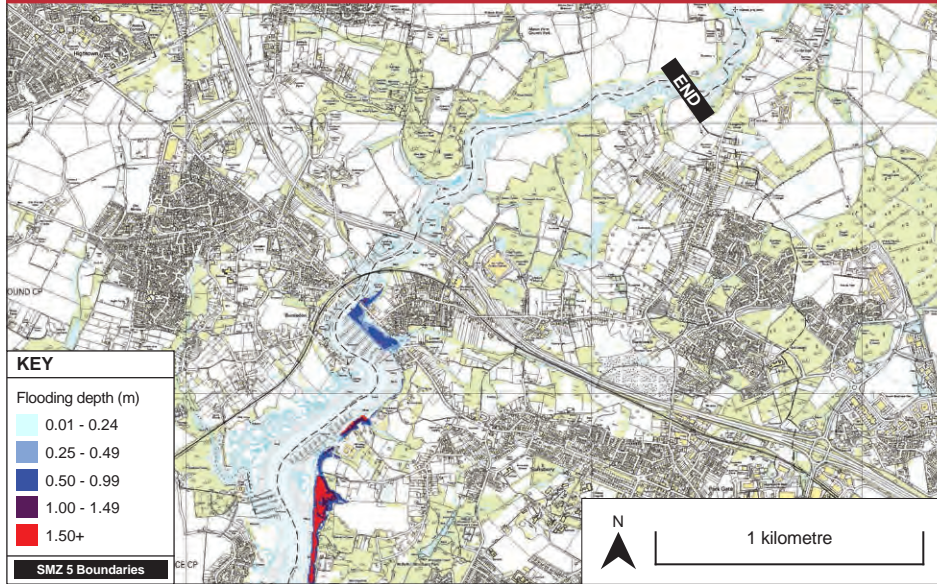
Baseline flood risk map 2115



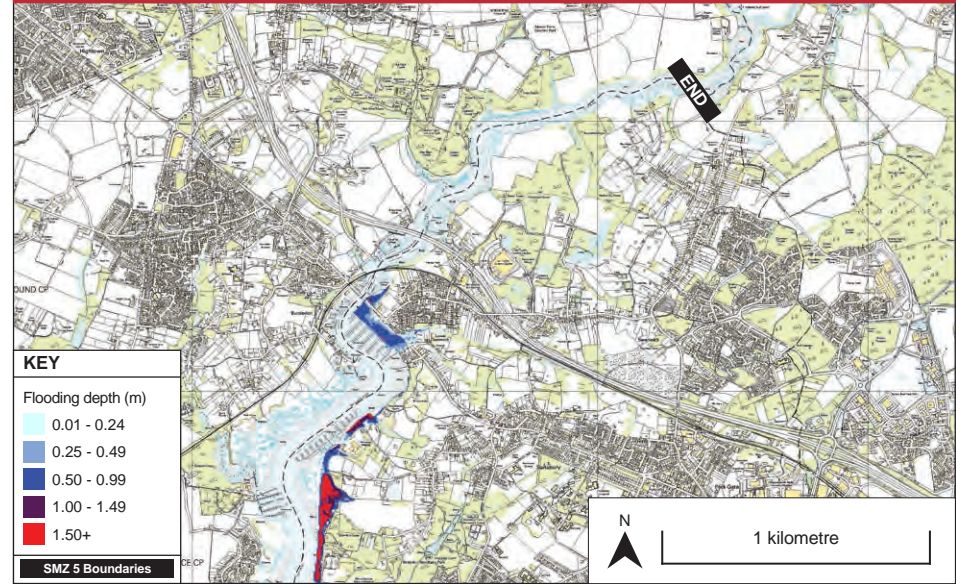
SMZ 5 (Southern Section): Maximum potential flood depths from a 1:100 year (1% annual chance) event with existing defences in place

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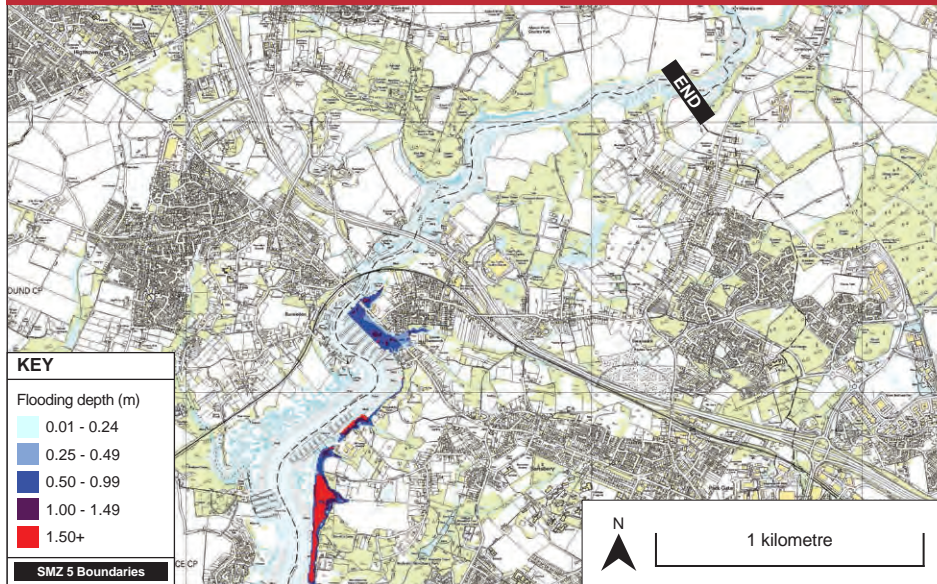
Baseline flood risk map 2015



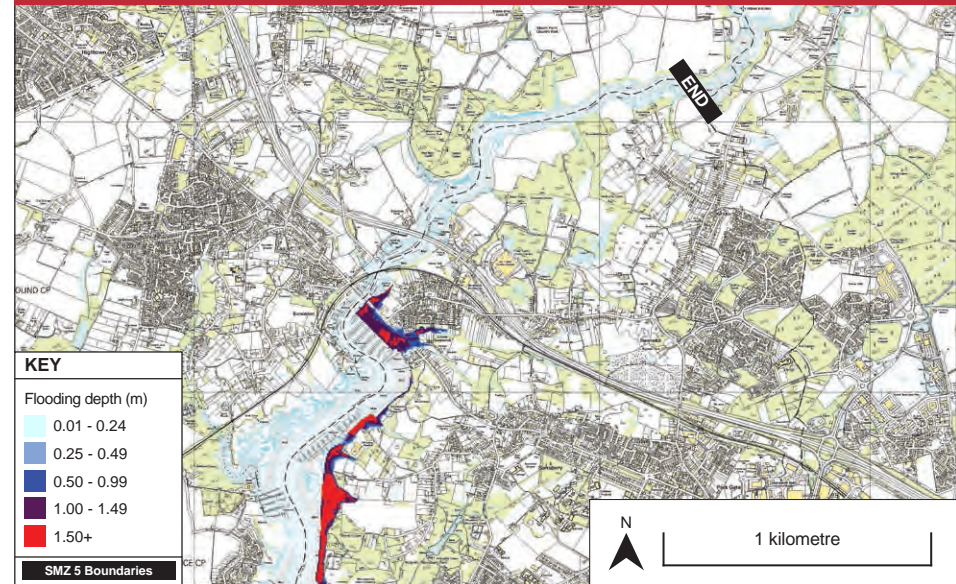
Baseline flood risk map 2030



Baseline flood risk map 2060



Baseline flood risk map 2115



SMZ 5 (Northern Section): Maximum potential flood depths from a 1:100 year (1% annual chance) event with existing defences in place

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SMZ 5: ODUs 26-27
River Hamble East Bank



Option Development Units (ODUs) boundaries in SMZ 5 (Southern Section)

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SMZ 5 Preferred Strategic Option: Do Minimum until 2060 – maximise the life of existing defences managing flood risk with local measures, then sustain minimum 1:100 year (1% annual chance) SoP from 2060 at key flood risk sites. Solent Way footpath adaption from 2030

KEY

	Do Nothing		Property Level Protection		Upgrade
	Maintenance		Environmental Enhancement		Planning/Monitoring
	Capital Works				

Cost	Benefits - Damages avoided	Benefit:Cost ratio
£4,284,000	£8,983,000*	2.1:1

* includes significant recreational benefits generated by the preferred option.

ODU 26 Warsash Maritime College to Crofton Way

2015-2030	2030-2060	2060-2115	
			

Defence maintenance is required between 2015 and 2060 and property level protection is required to mitigate local flood risk until 2060 when capital works (e.g. a new seawall) will be required to sustain flood protection.



Flooding of the car park at Warsash during the February 2014 storm

ODU 27 Crofton Way to Swanwick Shore Road

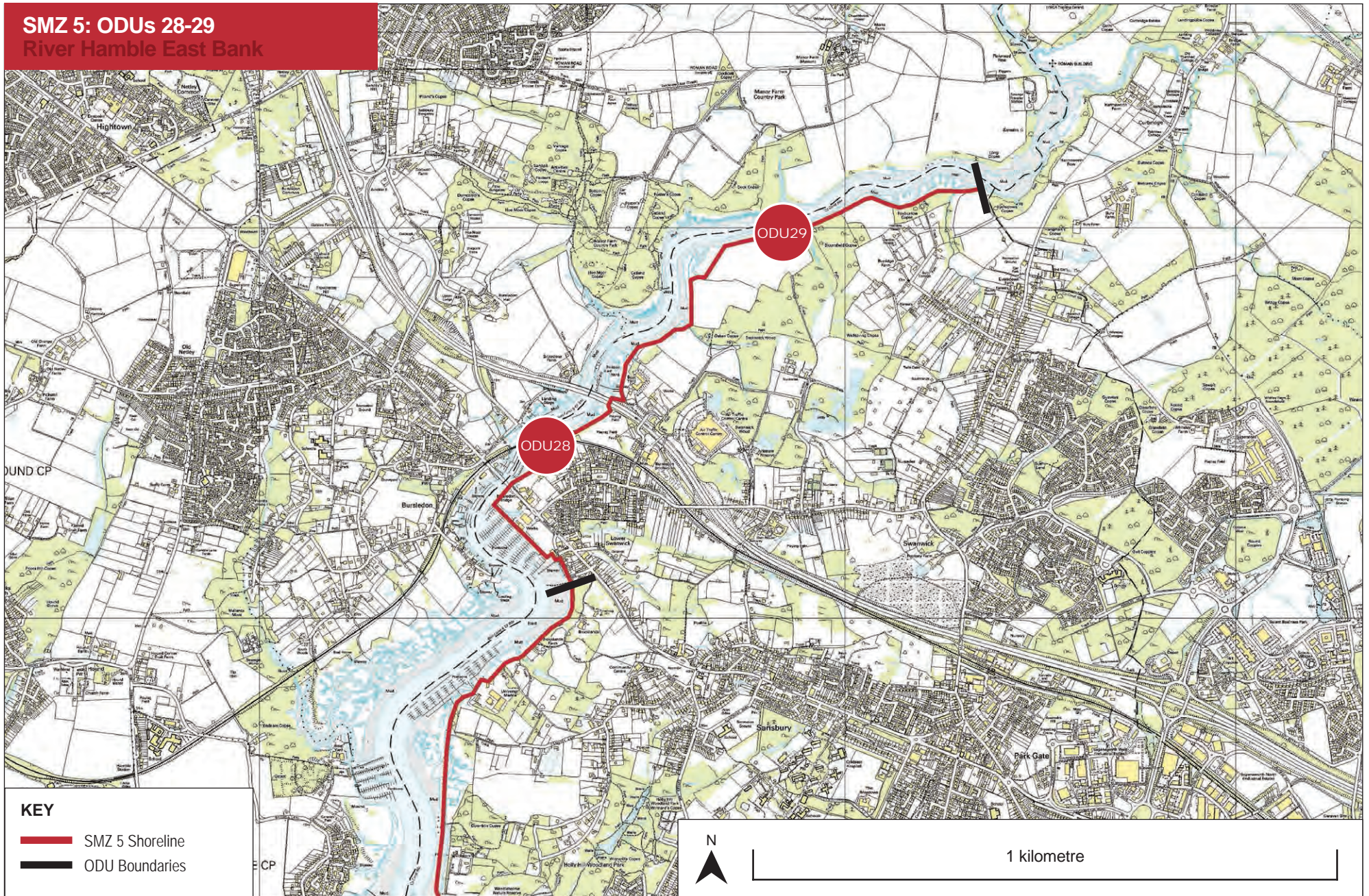
2015-2030	2030-2060	2060-2115	
			

Defence maintenance will be required with capital works from 2030 to maintain / adapt the Solent Way footpath (subject to funding availability).



A flooded Solent Way footpath during a storm

SMZ 5: ODUs 28-29
River Hamble East Bank



Option Development Units (ODUs) boundaries in SMZ 5 (Northern Section)

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SMZ 5 Preferred Strategic Option: Do Minimum until 2060 – maximise the life of existing defences managing flood risk with local measures, then sustain minimum 1:100 year (1% annual chance) SoP from 2060 at key flood risk sites. Solent Way footpath adaption from 2030

KEY

	Do Nothing		Property Level Protection		Upgrade
	Maintenance		Environmental Enhancement		Planning/Monitoring
	Capital Works				

Cost	Benefits - Damages avoided	Benefit:Cost ratio
£4,284,000	£8,983,000*	2.1:1

* includes significant recreational benefits generated by the preferred option.

ODU 28 Swanwick Shore Road to Eastlands Boat Yard

2015-2030	2030-2060	2060-2115	
			

Defence maintenance is required between 2015 and 2060 and property level protection is required to mitigate local flood risk until 2060 when capital works (e.g. flood wall) will be required to sustain flood protection.



ODU 29 Eastlands Boat Yard to Eversdown Copse

2015-2030	2030-2060	2060-2115	
			

Given the very limited flood and erosion risk and undeveloped nature of the unit the preferred option is to allow natural processes to continue.





Looking towards Portchester Castle at high tide

next?

What next?

What we need from you...



What we need from you...

Engagement and feedback from key stakeholders and the public forms a vital part of shaping the final Strategy. **We want to hear your views.**

The Strategy consultation period runs for three months from 1st September 2014 to 1st December 2014. During this time key stakeholders and the public are invited to attend a series of exhibitions to review and provide feedback on the Strategy proposals. Following this public consultation period, the feedback will be reviewed and the Strategy updated accordingly. Please visit www.escp.org.uk for further details of the public exhibitions and the ways in which you can provide feedback on the Strategy.

Following the evaluation and incorporation of stakeholder and public feedback the Strategy will be finalised during the winter of 2014/2015. The Strategy and business case for the preferred options will then be put forward for approval by the Environment Agency in late spring 2015. Following the Strategy's approval it will then be put forward for adoption by Fareham and Gosport Borough Councils and the Strategy action plan will be implemented along with starting work towards the priority schemes over the coming few years.

Next steps



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