



Swansea and Carmarthen Bay Engineering Group

Lavernock Point to St. Ann's Head Shoreline Management Plan SMP2

Main Document

January 2012

Halcrow



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Preface

Shoreline Management Plans – A route map for managing our changing coastline towards the future

The shape and position of the coastline has always changed and will continue to do so. At the end of the last ice age, around 10,000 years ago, coastal land extended much further into what is now covered by the sea. As the ice melted sea levels in the Bristol Channel are estimated to have risen by over 100 metres changing the coastline dramatically as vast areas of land were submerged.

The global climate is still changing and sea levels continue to rise, albeit at a much reduced rate. There is much uncertainty about the amount of climate change and sea level rise that will occur in future. Predictions of sea level rise along the south coast of Wales over the next century range between 0.2 metre and 1 metre, with extreme forecasts of up to 2 metres.

As sea levels rise the natural coastal response is for the shoreline to move inland. On undefended sections of coast this process can evolve naturally. On sections of coast where communities have developed and defences have been constructed, how we manage the future coastal change is more complex.

It is important for those who live on the coast, or who have an interest in the coast, to understand how the coastal environment might change in the future.

The impacts of climate change, including sea level rise and increased storminess, will result in an increased threat of flooding and erosion to those living near the coast and possible drainage, surface and ground water flooding problems. In addition it is likely that the coastal environment will change. We are used to having beaches in front of our seawalls and promenades. In future we can expect to see more towns and villages where beach levels are much lower or are even totally covered by the sea. This is another effect of sea level rise which could have serious consequences on our recreational beaches and tourist industry.

The Welsh Assembly Government has continued to increase investment in building flood and coastal defences, however it must be recognised that it is not feasible to continue to build bigger and bigger defences to keep pace with climate change impacts at all locations. Funding is limited and will need to be focussed on communities which are at greatest risk.

The Welsh Assembly Government recognises the significant risks facing Wales and is committed to helping those at risk. The Welsh Assembly Government is changing the way flood and coastal risks are managed and while continuing to invest in defences is also funding work to improve flood forecasting, flood warning, emergency response and planning. We are also engaged with work in England to investigate how communities can adapt to coastal change.

The Welsh Assembly Government has called on local authorities, the Environment Agency Wales and other bodies involved in managing the coast to work together to produce Shoreline Management Plans for the whole of the Welsh coastline. The Shoreline Management Plans address the wide range of factors which can influence the management of coastline. The location of coastal communities, existing defences, power stations and public utilities, transport links, ports and harbours, industrial facilities, tourist and amenity areas, conservation and heritage sites and the wider natural environment, will affect how coastal erosion and flood risks are managed. The consideration of these factors as well as cost and affordability will inform the development of sustainable and deliverable flood and coastal erosion risk management policies. Shoreline Management Plans set out the long term vision for the coast and provide a route map for decision makers to move from the present situation towards the future.

The Welsh Assembly Government is committed to engaging with the public during this process and your views will be taken in account and considered in the development of the Shoreline Management Plans.

The following members of the Client Steering Group have led the development of the Lavernock Point to St Ann's Head SMP2

Carmarthenshire County Council
Vale of Glamorgan Council
Bridgend County Borough Council
Neath Port Talbot County Borough Council
City and County of Swansea
Pembrokeshire County Council
Environment Agency Wales
Countryside Council for Wales
Ministry of Defence/ QinetiQ
Welsh Assembly Government

Phil Williams (Coastal Group Chairman)
Christopher Perkins
Stephen Edwards
Steve Jones
Mike Sweeney
Emyr Williams
Natalie Newton
Nicola Rimington
Clayton Lewis
Kerry Keirle



1 Introduction

1.1 Lavernock Point to St Ann's Head Shoreline Management Plan 2

1.1.1 What is this document?

A Shoreline Management Plan (SMP) provides a large-scale assessment of the risks associated with coastal erosion and flooding at the coast. It also presents policies to help manage these risks to people and to the developed, historic and natural environment in a sustainable manner. SMPs form an important part of the Welsh Assembly Government (WAG) strategy for managing risks due to flooding and coastal erosion (Defra, 2006¹).

First generation SMPs were completed along the South Wales coast in 2000 and 2001. This review has been undertaken to ensure that this second generation SMP (SMP2) takes account of latest available information, including climate change guidance, changes in environmental legislation and an improved understanding of flood and coastal erosion risk management to provide a long term sustainable plan for the next 100 years.

1.1.2 What area does the SMP2 cover?

This document is the second generation Shoreline Management Plan (SMP2) for the shoreline between Lavernock Point (Vale of Glamorgan) in the east and St Ann's Head (Pembrokeshire) in the west, including the counties of Vale of Glamorgan, Bridgend, Neath Port Talbot, Swansea, Carmarthenshire and Pembrokeshire, see Figure 1.1. The study area includes the Neath Estuary, the Tawe Estuary, the Loughor Estuary (Burry Inlet), the Three Rivers Estuarine Complex (Gwendraeth, Towy and Taf) and Milford Haven, as well as a number of smaller estuaries.

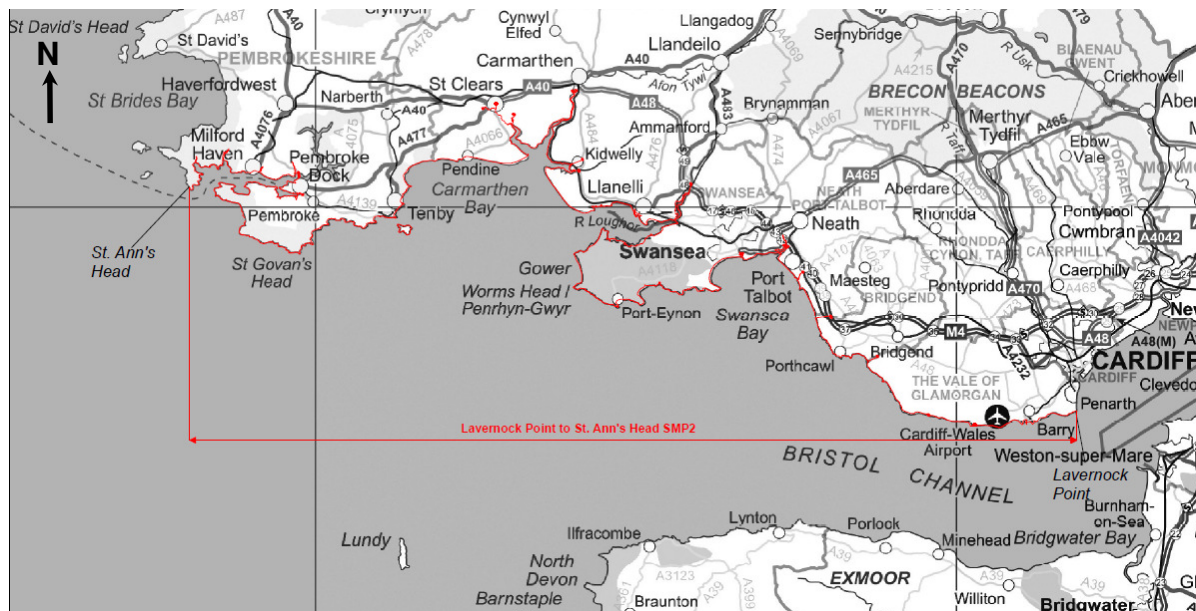


Figure 1.1: Lavernock Point to St Ann's Head SMP2 Study Area

¹ Defra (2006). Shoreline Management Plan Guidance. March 2006.

The recommended estuary boundaries for the Lavernock Point to St Ann's Head SMP2 are as follows:

Table 1.1: SMP2 Recommended Estuary Boundaries

Estuary	Agreed Boundary
Cadoxton	Estuary should not be included in the SMP – Boundary set at mouth
Thaw	Estuary should not be included in the SMP - Boundary set at outfall
Col-huw, Llantwit Major	Estuary should not be included in the SMP - Boundary set at outfall
Ogmore (Ogwr)	Normal Tidal Limit (NTL) - Sewage works bridge
Kenfig (Cynffig)	Catchment Flood Management Plan (CFMP) boundary - M4 bridge
Avan (Afan), Port Talbot	Catchment Flood Management Plan (CFMP) boundary - Green Park Weir
Neath (Nedd)	Catchment Flood Management Plan (CFMP) boundary - M4 bridge
Tawe	Catchment Flood Management Plan (CFMP) boundary - Tawe Barrage
Loughor (Llwchwr)	Normal Tidal Limit (NTL) - southern extent of Pontarddulais
Gwendraeth	Normal Tidal Limit (NTL) - Commissioner's Bridge, Gwendraeth Fawr and A484 bridge, Gwendraeth Fach
Towy (Tywi)	Limit of potential flooding stated by CFMP (Aalton river bend)
Taf	Normal Tidal Limit (NTL) - South of St Clears
Milford Haven (Daugleddau)	Catchment Flood Management Plan (CFMP) boundary - Cleddau Bridge

Further details are provided in Appendix C - Baseline Processes Understanding, Annex B Assessment of SMP Boundaries.

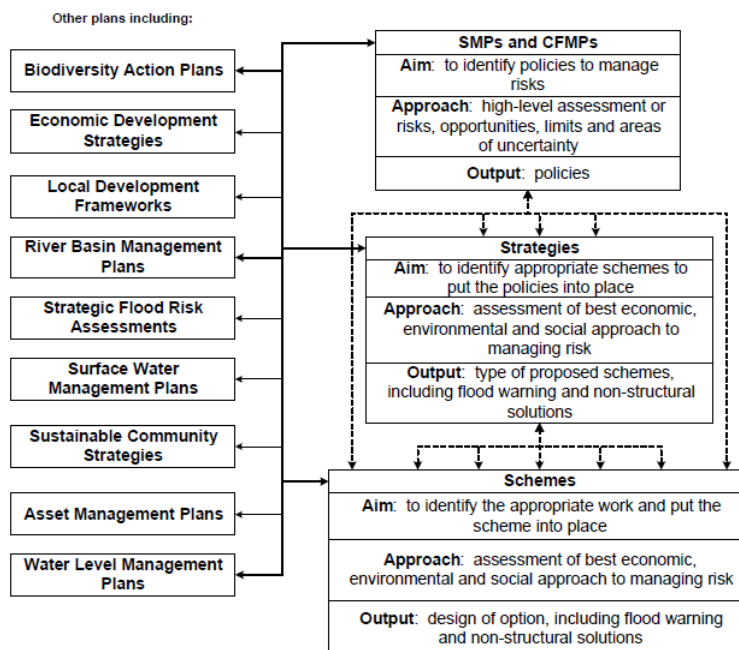
1.2 The Role of the Lavernock Point to St Ann's Head SMP2

1.2.1 Overview

This Shoreline Management Plan 2 is a non-statutory, high level policy document for coastal flood and erosion risk management planning. It takes into account existing planning initiatives and legislative requirements, and is intended to inform wider strategic planning. The SMP2 will sit at the top of a hierarchy of Strategy and Scheme plans that maritime Local Authorities and the Environment Agency Wales will use to manage coastal erosion and flood risks, as shown in Table 1.2 and Figure 1.2 below.

Table 1.2: Stages in assessing coastal flood and erosion risk management (Defra, 2006)

Stage	SMP (or CFMP ²)	Strategy	Schemes
Aim	To identify policies to manage risks	To identify appropriate schemes to put the policies into practice	To identify the type of work ³ that is needed to put the preferred scheme into practice
Delivers	A wide-ranging assessment of risks, opportunities, limits and areas of uncertainty	Preferred approach, including economic and environmental decisions	Compares the different options for putting the preferred scheme into practice
Output	Policies	Type of scheme (such as a seawall)	Design of work
Outcome	Improved long-term, strategic management for the coast	Management measures that will provide the best approach to managing floods and the coast for a specified area	Reduced risks from floods and coastal erosion to people and assets



² A CFMP (Catchment Flood Management Plan) is a high level policy plan, dealing with flood risk from rivers, equivalent to an SMP

³ Schemes could include a variety of activities such as building a seawall or developing a flood warning service

Figure 1.2: Hierarchy of decision-making with links to other processes, plans and policies (Flood and Coastal Erosion Risk Management Appraisal Guidance, EA, March 2010). This figure shows how SMPs, strategies and schemes are linked. Each SMP can lead to a number of strategies and, potentially, directly to schemes. Similarly a number of schemes may be derived from any one strategy.

1.2.2 What will the SMP2 do?

The Government guidance for developing SMP2s (Defra, 2006) requires them to:

- identify sustainable and deliverable policies for managing coastal risks while working with natural processes wherever possible;
- promote management policies for the coastline over the next 100 years, to achieve long-term objectives that are technically sustainable, environmentally acceptable and economically viable;
- be realistic and consider known legislation and constraints, both human and natural, and not promise what cannot be delivered.

A further review of the SMP2 is likely to be carried out in 5 to 10 years, which may include changes to policies, as a result of more detailed studies along particular sections of coast or the issue of new coastal erosion and flood risk management guidance, for example with respect to future climate change.

1.3 The Objectives of the Shoreline Management Plan 2

1.3.1 What are the objectives that WAG say the SMP2 should address?

- set out the risks from flooding and coastal erosion to people and the developed, historic and natural environment within the SMP2 area;
- identify opportunities to maintain and improve the environment by managing the risks from coastal erosion and flooding;
- identify the preferred policies for managing risks from coastal erosion and flooding over the next century;
- identify the consequences of putting the preferred policies into practice;
- set out procedures for monitoring how effective these policies are;
- inform others so that future land use, planning and development of the shoreline takes account of the risks and the preferred policies;
- discourage inappropriate development in areas where the flood and erosion risks are high; and
- meet international and national nature conservation legislation and aim to achieve the biodiversity objectives; and
- highlight areas where there are gaps in knowledge about the coast and produce an action plan to address these gaps.

The SMP2 must remain flexible to adapt to changes in legislation, politics and social attitudes. The SMP2 therefore considers objectives, policy setting and management requirements for three main epochs or timescales; the present day or short-term (the next 20 years), the medium-term (approximately 20 to 50 years) and the long-term (beyond 50 to 100 years). The SMP2 should show that we aim to achieve a long term sustainable vision when considering decisions about coastal defence now.

It is important to recognise that major changes to policies in the short term may not be possible. Setting policies over three timescales allows us to meet the objectives and put in place policies that provide opportunities for change in the future. Action Plans have been developed to help put the policies into practice.

1.3.2 What are the policies that are used in SMP2s?

The policies for managing the shoreline are defined in the SMP2 guidance as shown in Table 1.3.

Table 1.3: Descriptions of the four alternative policies considered in SMP2

Policy option	Description	Non-technical description
Hold the line (HTL)	This policy means that existing defences are maintained, or replaced, along their current alignment. Typically this will result in an increased risk of coastal flooding due to future sea level rise. If a significant number of assets are at risk it may be justifiable to upgrade existing defences (raise and strengthen) to reduce this risk.	Keeping the shoreline in the same place
Advance the line (ATL)	New defences are built seaward of the original defences, in order to create new land. This policy is restricted to places where significant land reclamation is considered.	Creating more land by moving coastal defences into the sea
Managed realignment (MR)	This policy allows the shoreline to move backwards with management to control or limit movement (such as reducing erosion or building new defences on the landward side of the original defences). Managed realignment has been assigned to all dune areas since it is not sustainable to artificially fix a line of dunes. Although dune areas will generally be allowed to evolve naturally, a policy of managed realignment means that management techniques could be used, if necessary.	Letting the shoreline move backwards in a controlled way
No active intervention (NAI)	<p>This policy means that there is no investment in coastal defences or operations. Where there are currently no defences, this policy means that the shoreline will continue to evolve naturally.</p> <p>However, where the shoreline is currently defended, any existing defences will not be maintained and will be allowed to fail. This means that areas inshore would be at increased risk of flooding and coastal erosion in the future.</p>	Letting nature take it's course on the shoreline once defences (if present) fail

1.4 Shoreline Management Plan 2 Report Structure

This SMP2 is the result of numerous studies and assessments performed over a period of time. To cater for a wide audience, the SMP2 is presented in two parts:

- **SMP2 Main Document** (this report); and
- **SMP2 Supporting Appendices** (documents which provide background information).

1.4.1 Main Document

What is included in the SMP2 Main Document?

The SMP2 Main Document sets out the policies for managing the risks of coastal erosion and tidal flooding over the next 100 years. It is intended for a general audience and is the main way that we will let people know what the SMP2 policies are. Whilst the justification for decisions is presented, it does not provide all of the information behind the recommendations; this is contained in the supporting Appendices.

The SMP2 Main Document is presented in five parts:

- **Chapter 1 – Introduction (this part)** gives details on the principles, structure and background to the SMP2s development.
- **Chapter 2 – Environmental Assessment** presents a summary of the environmental assessments undertaken to confirm that the SMP2 policies comply with the requirements of European and National Directives and Regulations.
- **Chapter 3 – The Preferred Plan** presents an overview of the preferred shoreline management policy options and the reasons for their selection.
- **Chapter 4 – Action Plan** provides an introduction to the action plan which is a programme for future activities that are needed to progress the plan between now and its next review.
- **Chapter 5 – Policy Statements** provides a series of policy statements that give details of how the policies might be implemented and the local implications of these policies in terms of: management activities; property, built assets and land use; landscape; nature conservation; historic environment; and amenity and recreational use.

Although it is expected that many readers will focus upon the local details in Chapter 5, it is important to recognise that the SMP2 is produced for the Lavernock Point to St Ann's Head coastline as a whole, considering issues that extend beyond specific locations. Therefore, policy statements must be read in the context of the wider-scale issues and policy implications, as reported in Chapters 2 and 3 and the appendices to the SMP2.

1.4.2 SMP2 Supporting Appendices

What information is included in the SMP2 Supporting Appendices?

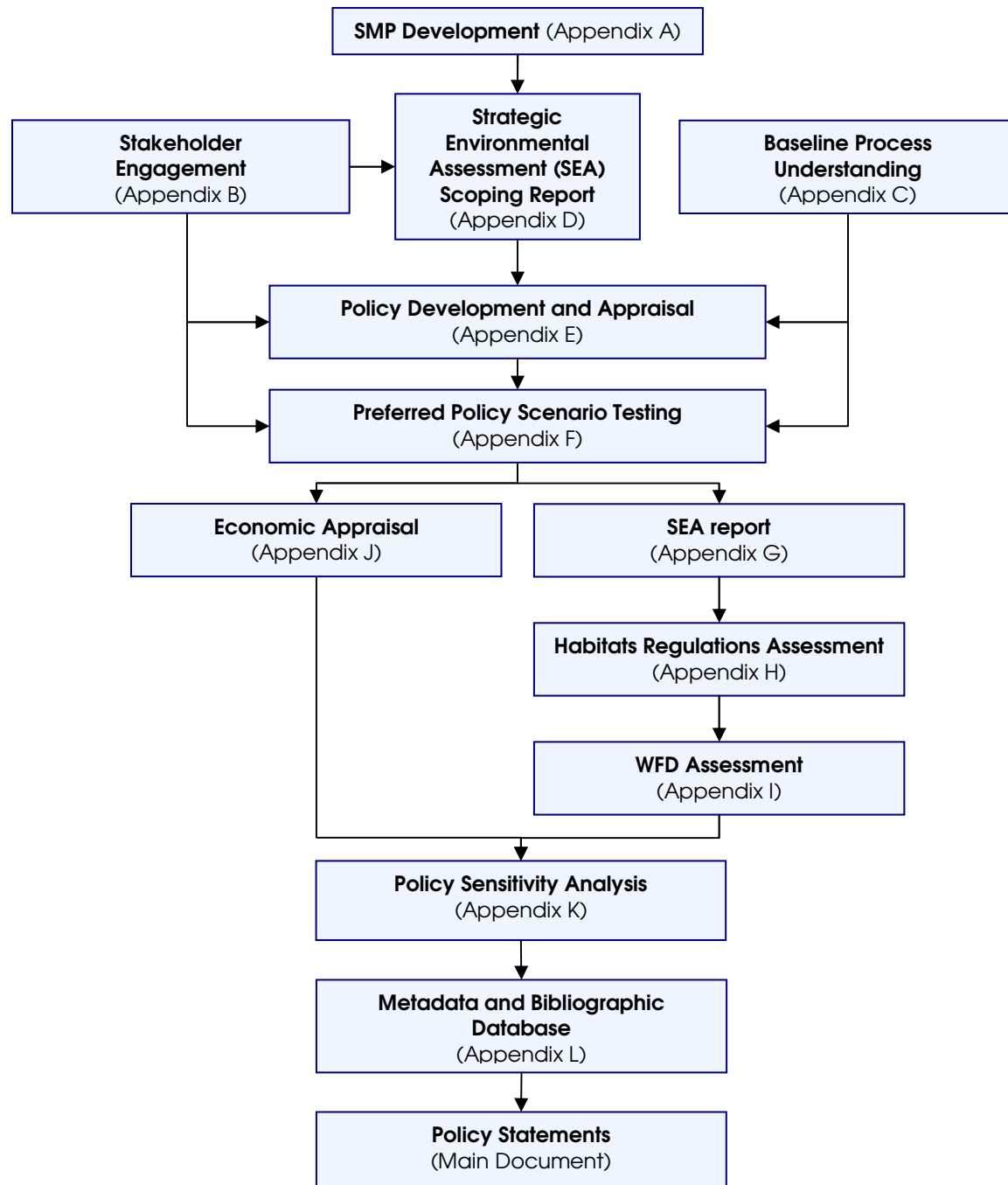
The SMP2 supporting appendices provide background information to ensure that there is clarity in the decision-making process and that the rationale behind the preferred SMP2 policies which are being promoted is both transparent and auditable.

This information is largely of a technical nature and is provided in twelve parts:

- **Appendix A: SMP2 Development** reports the history of development of the SMP2, providing more detail on the policy decision-making process.
- **Appendix B: Stakeholder Engagement** presents a summary of the stakeholder engagement process which was intended to build trust and understanding between all parties involved in the SMP. All communications from stakeholders are provided, together with information arising from the consultation process.
- **Appendix C: Baseline Process Understanding** details current understanding of how the coast functions, focussing on information that will inform decisions on future management of the coast over the SMP timescale to ensure that policy choices, in terms of coastal processes, are technically-sound and sustainable. It includes baseline coastal process reports, defence assessments, No Active Intervention (NAI) and With Present Management (WPM) baseline scenario assessments and summarises assumptions used in the assessments.
- **Appendix D: Strategic Environmental Assessment (SEA) Scoping Report** identifies and evaluates the environmental features of the coastline (human, natural, historical and landscape) in terms of their significance and how these need to be accommodated by the SMP2.
- **Appendix E: Policy Development and Appraisal** presents the consideration of generic policy options for each frontage, identifying possible alternative policies, and their combination into 'scenarios' for testing. This appendix also presents the appraisal of impacts upon shoreline evolution and the appraisal of objective achievement.
- **Appendix F: Preferred Policy Scenario Testing** presents the preferred policies agreed by the CSG and Elected Members, and the justification for the recommended policies. These are the policies carried forward and presented in the policy statements in Chapter 5.
- **Appendix G: Environmental Report (Strategic Environmental Assessment, SEA)** to fulfil the requirements of the EU Council Directive 2001/42/EC (the Strategic Environmental Assessment Directive).
- **Appendix H: Statement to inform a Habitats Regulations Assessment** presents an assessment of the SMP2 in relation to the UK Habitats Regulations.
- **Appendix I: Water Framework Directive Assessment** provides an assessment of the potential impacts of the SMP2 with respect to the Water Framework Directive 2000/ 60/ EC which provides a framework for the protection of inland surface, transitional, coastal and ground waters.
- **Appendix J: Economic Appraisal** presents the socio-economic analysis undertaken in support of the Preferred Plan.
- **Appendix K: Policy Sensitivity Analysis** presents a review of the sensitivity of the SMP2 policies with respect to a range of issues.

- **Appendix L: Metadata and Bibliographic Database** includes a database of supporting information used to develop the SMP2, referenced for future examination and retrieval.

The structure of the SMP2 documents, and how they relate to each other, is summarised in the flow chart below.



1.5 The Plan Development Process

1.5.1 How has the SMP2 been developed?

Development of the Lavernock Point to St Ann's Head SMP2 has taken account of:

- Welsh Assembly Government (WAG) New Approaches Programme which has adopted a more sustainable approach to coastal erosion and flood risk management;
- SMP1's (first generation Shoreline Management Plans developed in 2000 and 2001);
- Studies undertaken following the completion of SMP1s (e.g. Futurecoast (Halcrow, 2002⁴), various reports and mapping (e.g. Environment Agency Wales flood risk mapping, National Coastal Erosion Risk Mapping, and the Bristol Channel Marine Aggregates study);
- Issues identified by recent defence planning, i.e. coastal defence studies and schemes that cover parts of the SMP area that have been undertaken, or are in the process of being undertaken, since completion of SMP1s, such as Porthcawl Marina and Coast Protection Study, SA1 development and Caswell Bay/ Redcliffe coastal slope stabilisation works;
- A range of plans have been developed to co-ordinate works for coastal erosion and flood risk management along the South Wales coast which link with the SMP2 and include the Ogmore to Tawe (including Thaw and Cadoxton) Catchment Flood Management Plan (CFMP), Loughor to Taf CFMP and Pembrokeshire and Ceredigion Rivers CFMP;
- Results from beach monitoring undertaken for the Swansea and Carmarthen Bay Coastal Engineering Group;
- Changes in national flood and erosion risk planning requirements (e.g. the need to consider 100 year timescales in future planning, modifications to economic evaluation criteria, etc.);
- Changes in environmental legislation (e.g. the EU Habitats and Birds Directives, Water Framework Directive);
- Latest guidance on future climate change (ie. UKCP09), although it should be noted that there are significant uncertainties with climate change predictions over the next 20, 50 and 100 years;
- Convergence Programme. The West Wales and the Valleys region has been awarded the highest level of support known as Convergence, from the European Union for the Structural Funds programming round 2007–2013. Convergence, the successor to the Objective 1 programme 2000–2006, covers 15 local authority areas in the West Wales and the Valleys region. The Convergence programmes for West Wales and the Valleys comprise funding from two separate European Structural Funds: the European Regional Development Fund (ERDF) and the European Social Fund (ESF). Around £1 billion of ERDF funds will help progress the region's transformation into a sustainable and competitive economy by investing in the knowledge economy and helping new and

⁴ Halcrow (2002). Futurecoast project undertaken for Defra.

existing businesses to grow. It will also focus on regenerating Wales' most deprived communities, tackling climate change and improving transport. Over £690 million from the ESF will be used to tackle economic inactivity, increase skills and employment. Together, with match funding, Convergence will drive a total investment of £3.5 billion in West Wales and the Valleys (wefo.wales.gov.uk);

- EU Flood Directive. Recognising the continued risks of flooding, the European Commission drafted the Flood Directive. The European Parliament and the Council of the European Union adopted Directive 2007/60/EC on the assessment and management of flood risks. The directive entered into force on 26 November 2007. The Directive applies to inland waters as well as all coastal waters across the whole territory of the European Union. Transposition must be complete by November 2009. Member States are required to draw up a series of documents as follows: preliminary flood risk assessments by 22 December 2011; flood hazard maps and flood risk maps by 22 December 2013; and flood risk management plans by 22 December 2015. Meeting the Directive requirements in Wales. The requirements of the Directive can be met through the production of: one plan covering all of the flood risks, or a series of plans covering different risks (subject to their coordination at river basin district level). Wales is currently covered by three river basin districts: one wholly in Wales and two straddling the England-Wales border as follows: Western Wales river basin district (Wales only); Dee river basin district (cross-border); and Severn river basin district (cross-border). Coordinating plans at the river basin district means that to fully comply with the terms of the Directive, Welsh plans must be developed and coordinated in parallel with English ones (www.wales.gov.uk).
- The Pitt review was commissioned by the UK government and conducted by Sir Michael Pitt. Although the Pitt review was specifically targeting England following the flooding emergency which took place in summer 2007, Wales is equally vulnerable to such flooding. Sir Michael Pitt's final report entitled *The Pitt Review: Lessons learned from the 2007 floods*, was published on 25 June 2008. The report was written at the end of a year long inquiry which examined the emergency response to the flooding and investigated how the risk and impact of floods can be reduced in the future. It is a comprehensive report which has sought views from those involved in the floods, including affected residents, the emergency services, business and professional associations. One of the more significant conclusions is the need to update and streamline existing law about flood and coastal risk and its management. The current legislation stems from the 1930s. There is a need for it to be updated to: take account of all sources of flooding; to clarify roles and responsibilities; and to facilitate a move to a risk management approach to flood and coastal matters, as outlined in the Welsh Assembly Government's Environment Strategy. Taking forward various recommendations in the Pitt review will contribute to improving preparedness and resilience to flooding in Wales. The Welsh Assembly Government will also use existing Programmes such as the New Approaches programme to develop actions to implement the recommendations (www.wales.gov.uk).
- The Flood and Water Management Act 2010 provides for better, more comprehensive management of flood risk for people, homes and businesses, helps safeguard community groups from unaffordable rises in surface water drainage charges and

protects water supplies to the consumer. The Act implements Sir Michael Pitt's recommendations requiring urgent legislation, following his review of the 2007 floods. Serious flooding can happen any time. Climate projections suggest extreme weather will happen more frequently in the future. This Act is central to reducing the flood risk associated with extreme weather. The Act will need to be commenced by ministerial order before it comes into effect; however, it is important to recognize many of the authorities who will have new duties and powers under the Act are already getting on with managing flood risk (www.defra.gov.uk).

- A National Flood and Coastal Erosion Risk Management Strategy for Wales is required under the Flood and Water Management Act 2010. It will describe what needs to be done by all involved in flood and coastal risk management (Environment Agency, Local Authorities, Internal Drainage Boards, water and sewage companies and highways authorities) to reduce the risk of flooding and coastal erosion, and to manage its consequences. The Welsh Assembly Government (WAG) is developing a National Flood and Coastal Risk Management Strategy for Wales with support from the Environment Agency Wales. Consultation on the draft strategy was undertaken by WAG between July 2010 and October 2010. The consultation document proposes that the strategy will set out the long-term objectives and how these will be achieved. It should guide the production of local strategies, which will in turn deliver the improvements that are needed to help the communities who are at greatest risk. It should also aim to encourage more effective risk management by enabling people, communities, business and the public sector to work together to: ensure a clear understanding of the risks of flooding and erosion, nationally and locally, so that investment in risk management can be prioritised more effectively; set out clear and consistent plans for risk management so that communities and businesses can make informed decisions about the management of the remaining risk; encourage innovative management of flood and coastal erosion risks taking account of the needs of communities and the environment; ensure that emergency responses to flood incidents are effective and that communities are able to respond properly to flood warnings; help communities to recover more quickly and effectively after an incident. The strategy should also set out possible approaches to local community involvement in risk management, co-ordinated planning and sustainability. It will also emphasise the need to balance national and local activities and funding (www.environment-agency.gov.uk).

1.5.2 How has the work been managed?

Development of this SMP2 has been led by the Client Steering Group (CSG) which is comprised of engineering and planning representatives from each of the coastal local authorities (Vale of Glamorgan Council, Bridgend County Borough Council, Neath Port Talbot County Borough Council, City and County of Swansea, Carmarthenshire County Council and Pembrokeshire County Council) in addition to representatives from Environment Agency Wales, Welsh Assembly Government, Countryside Council for Wales, Ministry of Defence, regional archaeological trusts and the National Trust. The group also included technical advisors from Shoreline Management Partnership and CEDM Limited. Carmarthenshire County Council acted as lead authority and was responsible for the financial management of the project, including grant aid submission, and overall project administration.

The SMP2 development has been greatly assisted by inputs from a large number of stakeholders, whose views have been sought at key stages. Two Key Stakeholder Forums were held to assist in identifying and understanding issues, objectives and key policy drivers, and to consider alternative SMP policy options to test, which informed the development of the preferred SMP2 policy.

In addition, the SMP has engaged an Elected Members Group (Local Councillors) and Local Authority Cabinet Members, those who will ultimately need to adopt or support the SMP2 policies, at key stages to provide input and to review the preferred SMP2 policies.

1.5.3 What did the work involve?

The main activities involved in producing the SMP2 included:

- reviewing the human, natural, historic and built environment to identify features near the coast and issues which relate to shoreline management;
- developing and analysing issues and objectives which shoreline management should address;
- analysing coastal and estuarine processes and coastal change to identify the impacts of continuing, or not continuing, to defend the coast;
- developing, identifying and agreeing issue, objectives and key policy drivers with stakeholders to inform the development of alternative policy options and scenarios;
- examining coastal change in response to alternative policy options and scenarios to assess the implications for people and the natural, historic and built environment;
- determining the preferred plan and policies, following review by Stakeholders, Elected Members and the Client Steering Group; and
- compiling the SMP2 documents.

Public consultation on the draft SMP2 and draft preferred SMP2 policies was undertaken between 6 September 2010 and 6 December 2010.

Following the three month consultation period, the consultation responses were considered, discussion with the Client Steering Group and the SMP2 documents were finalised.

The Habitats Directive case (Appendix 20) for Imperative Reasons of Overriding Public Interest (IROPI), according to Regulations 62(5) and 66 of the Conservation of Habitats and Species Regulations 2010, in relation to the Lavernock Point to St Ann's Head SMP2 policies, was issued to the Welsh Assembly Government for consideration.

1.5.4 What will happen next?

Once the SMP2 documents have been finalised the following will be undertaken:

- WAG to consider and approve the IROPI case;
- adoption of the final SMP2 by maritime local authorities and the Environment Agency Wales;
- WAG sign off of the final SMP2; and
- dissemination of the final SMP2.

The final SMP2 will be implemented by the members of the Swansea and Carmarthen Bay Coastal Engineering Group who will also ensure that the action plan is progressed by the appropriate partners and where there are problems with delivery to seek to resolve issues through collaborative working.

2 Environmental Assessment

2.1 Introduction to Strategic Environmental Assessment

2.1.1 What is Strategic Environmental Assessment (SEA)?

Strategic Environmental Assessment (SEA) is the systematic appraisal of the potential environmental consequences of high level decision-making, such as policies, plans, strategies and programmes, before they are approved. The SEA provides environmental protection by ensuring that the environment is considered when preparing and adopting plans and programmes, with a view to promoting sustainable policy.

As SMP2s are not required by legislation, SEA is also not strictly required. However, SMP2s set a framework for future planning decisions, and have the potential to result in significant environmental effects, so in accordance with WAG and Defra guidance (Interim⁵, supplementary⁶, revised and current⁷), SEA has been undertaken for the Lavernock Point to St Ann's Head SMP2.

The SEA process has been fully integrated into the work involved in the development of the Lavernock Point to St Ann's Head SMP2, enabling the impacts of a more strategic proposal on the wider environment to be taken into account. The advantage of this approach is that it enables focus on not only the physical environment, but also on other external factors, such as economic, technical and social factors.

Appendix G documents the SEA process undertaken for the SMP2 and demonstrates how, when developing this SMP2, the natural, built and historic environment has been considered alongside social, technical and economic issues in line with the requirements of the SEA Directive.

A summary of the SEA carried out for the Lavernock Point to St Ann's Head SMP2 is provided below.

⁵ Defra (2003) Procedural Guidance for the Production of Shoreline Management Plans; Interim Guidance May 2003.

⁶ Defra (2004) Supplementary Procedural Guidance, 2004.

⁷ Defra (2006) SMP Guidance, March 2006

2.2 Baseline Environment

2.2.1 What does the SEA say about key environmental issues?

An SEA Environmental Baseline Report (Theme Review – **Appendix D**) was prepared, which summarises the existing environment within the SMP2 area and identifies key issues, including:

- Population and human health – safety, security and social/physical well-being for occupants of properties within areas at coastal flood or erosion risk; population and properties are concentrated within the city of Swansea and towns of Barry, Ogmore-by-Sea, Porthcawl, Port Talbot, Neath, Gorseinon, Pontarddulais, Llanelli, Burry Port, Carmarthen, Saundersfoot, Tenby, Pembroke Dock, Neyland and Milford Haven. Other villages are also present. Recreation and tourism in the study area is centred on coastal holiday resorts (e.g. towns with promenades, pleasure piers and tourist attractions), cycle routes and coastal footpaths, bathing beaches and formal recreational pursuit venues such as golf courses.
- Land Use, Infrastructure and Material Assets – much of the land along the coastal frontage comprises a combination of good/moderate quality agricultural land, urban areas (see population above), Ministry of Defence (MoD)/ QinetiQ land, ports, harbours, marinas and major industrial sites. Infrastructure within the SMP2 area varies from rural roads to major transport linkages (e.g. railway lines, motorways and A-roads). The SMP2 area is also important for energy production comprising power stations, oil refineries, onshore wind farms and potential sites for offshore wind farms.
- Biodiversity, Flora and Fauna – the importance of the plan area for wildlife is reflected in the designation of international, national and local nature conservation sites. The study area supports a variety of habitats including maritime cliffs and slopes, mudflats and saltmarsh, estuaries, sand dunes, coastal vegetated shingle, coastal grazing marsh, lowland deciduous woodland, lowland meadow, fen, heathland and lowland dry acid or calcareous grassland and reedbeds. Opportunities exist to create intertidal and wetland habitat in low-lying parts of the study area.
- Landscape Character and Visual Amenity – Some areas of the SMP2 lie within nationally important landscapes including Gower Area of Outstanding Natural Beauty (AONB) and four Heritage Coasts.
- Historic Environment – the study area contains a complex array of historic buildings (many of which are scheduled or listed), historic settlements and landscapes including Registered Parks and Gardens, and known archaeological sites that are a fundamental component of the regional identity. The study area also includes seven Registered Landscapes of Outstanding Historic Interest in Wales. Numerous sites of local archaeology are present within the SMP2 boundary.
- Earth Heritage, Soils and Geology – there are numerous geological sites of national and local importance within the study area. Potential areas of contamination and known landfills are also present.
- Air and Climate – the long term effects of rising sea levels expected due to climate change could have significant implications for future flood risks to the natural, historic and built environment across large areas of low-lying land in the study area.

- Water – There are numerous coastal, freshwater, transitional (areas of water near river mouths, which are partially saltwater but are influenced by freshwater) and groundwater bodies in the SMP2 area that have the potential to be affected by SMP2 policies.

2.3 Strategic Environmental Assessment Objectives

2.3.1 What are the Strategic Environmental Assessment (SEA) objectives?

Strategic Environmental Assessment objectives were identified for the SMP2 to appraise the preferred policy options during the assessment process. The following objectives were developed, following identification of the key environmental features (or assets) and an understanding of the strategic environmental issues along the coastline, to:

- Support natural processes and maintain and enhance the integrity of internationally designated nature conservation sites and maintain/ achieve favourable condition of their interest features (habitats and species).
- Maintain/ achieve favourable condition, avoid adverse impacts, conserve and where practical enhance the designated interest of nationally designated nature conservation sites.
- Avoid adverse impacts on, conserve and where practical enhance the designated interest of locally designated conservation sites.
- Avoid adverse impacts on, conserve and where practical enhance national and local BAP habitats.
- Support natural processes and maintain/enhance geological exposures throughout nationally designated geological sites.
- Maintain and enhance natural features to reduce coastal erosion and flood risk.
- Manage and minimise risk of pollution from contaminated sources.
- Conserve and enhance nationally designated landscapes to reduce coastal erosion and flood risk whilst avoiding conflict with AONB and National Park Management Plan Objectives.
- Minimise coastal flood and erosion risk to scheduled and other internationally and nationally important cultural heritage assets, sites and their setting.
- Minimise the impact of policies on marine operations and activities.
- Minimise coastal erosion and flood risk to critical infrastructure and maintain critical services.
- Minimise coastal erosion and flood risk to agricultural land and horticultural activities.
- Minimise coastal erosion and flood risk to people and unity, recreational and amenity facilities.
- Minimise coastal erosion and flood risk to industrial, commercial, economic and tourism assets and activities.
- Minimise coastal erosion and flood risk to residents, residential properties and commercial properties.
- Minimise coastal erosion and flood risk to Ministry of Defence (MoD)/ QinetiQ ranges.

2.4 Consultation

2.4.1 How were the public consulted about the SEA?

An initial consultation leaflet was produced and widely distributed in March and April 2009 at the start of the SMP2, to encourage participation and help gather data and identify interested parties. The SEA Scoping Report (**Appendix D**) was issued to the CSG and statutory consultees (including CCW, Cadw and the Environment Agency Wales) in May 2009, this report was updated following comments received and re-issued to the CSG in October 2009. The draft SEA (**Appendix G**) was issued to the CSG in February 2010 and was updated in line with comments received. Various baseline reports have been developed, issued to the CSG for review and comment and updated as required during the development of the SMP2. A three month public consultation on the draft SMP2, including the SEA was undertaken between 6 September 2010 and 6 December 2010. Full details of the consultation process including consultation materials, comments made to date and comments on how they have been taken into account are documented in **Appendix B**.

2.5 Identification and Review of Alternative Policy Scenarios

In addition to the four standard SMP2 policy options described in Table 1.2 a 'with present management' baseline scenario was also assessed during the development of the SMP2. With present management assumes that present management practices will continue until technically impossible (for example, if existing defences fail), or when current practice becomes ineffective. It also identifies where maintenance or improvements may be required (for example to maintain the current standard of protection in response to rising sea levels).

Based on the background understanding of how the coast responds to 'no active intervention' and the 'with present management' baseline scenario, potential risks to environmental assets were identified (see **Appendix G**).

In order to ensure that the potential wider impacts of SMP2 policy decisions are considered the SMP2 guidance suggests developing a 'policy scenario area' rather than looking at individual policy units. This brings together individual policy units that interact with adjacent units (i.e. a group of policy units). This approach has been followed for this SMP2, using a 'string' of SMP2 policy options over a discrete stretch of coastline. Policy scenario areas were defined in terms of their geology, coastal processes and features.

'Policy units'⁸ should enable the most effective future management of the coast. Policy unit boundaries were identified within each policy scenario area, defined following consideration of a number of factors including: the character of the coast (both natural and human), coastal processes and operating authority boundaries.

For initial appraisal up to three alternative policy scenarios were developed for each policy unit. Each scenario assigned one of the four SMP2 policy options to each of the three epochs: 0 to 20 years (short-term), 20 to 50 years (medium-term) and 50 to 100 years (long-term).

The resulting 'policy scenarios' were appraised against SMP2 issues and objectives agreed with stakeholders, including environmental features (i.e. SEA receptors) along the coastline. This involved an assessment of the likely future coastal change that would occur as a result of these scenarios. By comparing achievement of objectives, preferred SMP2 policy unit boundaries and policies were developed, discussed and agreed with the CSG and Elected Members.

Appendix G identifies the environmental impacts of each of the alternative scenarios developed through an assessment of the SEA receptors set out in the SEA Directive. It has helped to identify the preferred SMP2 policy for each policy unit.

⁸ a 'policy unit' has been defined by Defra (2006) as: 'a length of shoreline with similar characteristics in terms of coastal processes and assets at risk that can be managed efficiently'.

2.6 Environmental Impacts of the SMP2

The environmental effects of the preferred SMP2 policies on the standard SEA receptors are described in detail in Annex 2 of **Appendix G** and summarised in the SMP2 Policy Statements which are included in **Chapter 5** of this document. An overview is provided below.

Biodiversity, Flora and Fauna: The SMP2 seeks to support natural processes and maintain wildlife (including the condition of designated sites) along the coastline. The SMP2 recommends the preferred policies of no active intervention or managed realignment where it would be possible to enhance and/or create new areas of wetland habitat within or adjacent to designated conservation sites, which would have beneficial impacts.

However, in some locations, holding the line is essential to reduce the risk of coastal erosion or flooding to cities or towns. In some of these locations, coastal habitats such as sand dunes, saltmarsh, mudflats and/or sandbanks may be adversely affected or lost in the long term due to future sea level rise as they may become squeezed against fixed defences or cliffs. Where impacts on international conservation sites are possible, further assessment (a Habitats Regulations Assessment) has been undertaken. It is not proposed to hold the line in any previously undefended areas. In other areas, where defences would continue to be maintained, some designated freshwater or terrestrial habitats may benefit from holding the line and be protected from coastal flooding.

There are often conflicts between allowing the coastline to evolve naturally (benefiting marine or intertidal habitats) and maintaining designated terrestrial/freshwater sites on the land. In such areas, any SMP2 policy would result in some loss of habitat. Careful management of the shoreline would therefore be necessary to sustain the designated habitats in place wherever possible, while managing and adapting to changes due the impact of future sea level rise.

Earth Heritage, Soils and Geology: The preferred SMP2 seeks to support natural processes and maintain the visibility of and accessibility to geological features wherever possible. There are however, some areas where continued protection of urban settlements is required and in some of these areas the SMP2 policies may damage geology or earth heritage features. The SMP2 is not recommending the construction of new defences (to reduce coastal erosion and flood risk to assets) where there are currently no defences.

Air and Climate: No impacts on air and climate are anticipated as a result of the preferred SMP2 policies. The implementation of options could have an impact however, but that this would be investigated at plan/scheme level.

Water: In most areas along the coast, the preferred SMP2 reduces the risk of coastal erosion or flooding to the majority of potentially polluting features such as landfill sites. However, there are some areas where changes to flooding or erosion risks at landfill sites may be experienced. In these areas, potential or known contamination sources should be investigated further at a more detailed stage to confirm the approach to policy delivery and manage pollution risks to water resources. It is envisaged that the SMP2 policies could be implemented in a manner that avoids pollution of surface water. However, there is the potential for saline intrusion to affect groundwater in three areas (due to the preferred SMP2 policies of either managed realignment or no active intervention in some or all epochs).

Again, in these areas further investigation of the approach to policy delivery and monitoring would be recommended at a more detailed stage.

Landscape Character and Visual Amenity: The preferred SMP2 policies seek to achieve a free functioning natural coastline wherever possible, thus creating a more natural coastal and estuarine landscape and reducing piecemeal man-made structures on the shore. This is more beneficial to the landscape, which is currently undeveloped and rural in many areas, than a policy of defending the whole coastline, which would involve construction of new, or more substantial defences, which in some places would also be unlikely to be technically sustainable or economically viable.

Generally, the preferred SMP2 policies conserve nationally designated landscapes and avoid conflicts with AONB Management Plan or National Park objectives. Localised changes in landscape (e.g. landscape changes resulting from the potential loss of coastal features) would need to be considered further at a more detailed level when approaches to delivering policy are determined.

Historic Environment: Some nationally designated heritage sites would be retained and protected through the preferred SMP2. However, in areas where there are benefits in continuing with or reverting to natural processes either by no active intervention or through managed realignment, there may be increased coastal erosion or flood risk with associated negative impacts on isolated historic assets (e.g. Grade I/II listed buildings and non-scheduled local archaeological features). Important historic assets that may be affected mainly lie within the Nash Point to Port Talbot frontage, the Three Rivers Estuarine complex and localised areas along the coast of south Pembrokeshire.

Land Use, Infrastructure and Material Assets: For much of the coastline, the preferred SMP2 policies would not affect critical infrastructure or crucial services. However, in the long term it will become increasingly difficult to minimise the risk to infrastructure and material assets in some areas as sea level rise means that holding the line becomes less acceptable in terms of economics, technical sustainability and environmental acceptability. Infrastructure affected may include railway lines, A, B and minor roads, community facilities, agricultural land, pumping stations and sewage works etc, particularly in areas that are realigned or that experience overtopping of defences during storm surges. Consequently, it may be necessary to re-align or re-locate some critical infrastructure in the longer term.

The preferred SMP2 policies are generally beneficial to industrial and commercial premises and/or activities, reducing coastal erosion and flood risk. However, some isolated industrial or commercial facilities may be affected, as policies are implemented which lead to a more 'natural' and sustainable shoreline in the long-term.

The preferred SMP2 may result in increased coastal erosion and flood risk to parts of the MoD/ QinetiQ ranges as these generally lie within dunes/ undeveloped stretches of coastline. In the future the RAF Pembrey Sands Air Weapons Range is likely to experience an increased risk of tidal flooding and parts of the QinetiQ Pendine weapons testing and development range are likely to be at increased risk from coastal erosion and flooding, since it is not sustainable to artificially fix a line of dunes. Monitoring of these risks is recommended and future plans for these sites need to be considered.

Population and Human Health: For much of the coastline, where there are existing defences, the preferred SMP2 policies would continue to hold the line, typically this policy does not include maintaining the existing standard of protection against coastal flooding in line with sea level rise. However where significant numbers of residents or assets are at risk it may be viable to continue to maintain the existing standard of protection in line with sea level rise, thus having a beneficial impact on people, their health and property. However, there are some isolated properties, community areas, recreational and amenity facilities where although the existing defence line will be maintained, the standard of protection will not be improved such that residents and assets will be at increasing risk from tidal flooding. Elsewhere it may not be viable to continue to hold the existing line and defences may eventually be lost which will allow the coastline to retreat naturally.

The preferred SMP2 policies recommend a continuation of coastal erosion and flood risk management to reduce the risk to the majority of key centres of tourism and recreation. However, due to sea level rise this is likely to result in narrowing of these beaches.

Along some areas beach or dune management is proposed to maintain natural features, particularly in the short-term. However, where holding the existing line of defence is proposed to protect significant residential communities or assets, future sea level rise may result in the narrowing of the amenity features such as beaches or dunes.

2.7 Habitats Regulations Assessment

2.7.1 Introduction

In many locations along the South Wales coastline, between Lavernock Point and St Ann's Head, policies would be implemented within or adjacent to international conservation sites (European sites). A Habitats Regulations Assessment has therefore been undertaken in accordance with the requirements of the EC Habitats Directive (92/43/EEC) and the European Union Birds Directive (79/409/EEC) and their implementation in the UK under the Conservation (Natural Habitats &c.) Regulations 1994, under Regulation 48(1) ("Habitats Regulations").

Countryside Council for Wales and the Environment Agency Wales were involved in the development of the Habitats Regulations Assessment and the CSG have reviewed the Habitats Regulations Assessment. Further details on the approach adopted and the conclusions of the Habitats Regulations Assessment are provided in **Appendix H**.

2.7.2 What is the overall finding of the Habitats Regulations Assessment?

The overall conclusion of the Habitats Regulations Assessment is that the SMP2 policies will lead to adverse effects on the Integrity of the following Natura 2000 sites:

- Pembrokeshire Marine Special Area of Conservation (SAC);
- Carmarthen Bay and Estuaries SAC;
- Burry Inlet Special Protection Area (SPA); and
- Burry Inlet Ramsar Site.

A Statement of Case has been prepared, and submitted to WAG for consideration, which has demonstrated that there are no less damaging, appropriate alternative policies for the frontages concerned and that there are Imperative Reasons of Overriding Public Interest (IROPI) for pursuing the preferred SMP2 policies. The Statement of Case has outlined the compensatory measures (managed realignment to provide compensatory intertidal habitats) that will be delivered to offset the adverse effects of implementing the SMP2. It is anticipated that the mechanism for delivering intertidal compensation identified in the SMP2 will be the National Habitat Creation Programme (NHCP) for Wales. The programme will be delivered in co-operation with the relevant operating authority whose coastal erosion and flood risk management operations will result in coastal squeeze losses of designated intertidal habitats and wider estuary functions, such as the City and County of Swansea, Carmarthenshire County Council, Pembrokeshire County Council and Environment Agency Wales. There is currently no dedicated or additional budget available to fund creation of compensatory habitat. At present it will have to be funded from existing flood and coastal erosion risk management budgets.

Regulation 48 of the Habitats Regulations requires the likely significant effect of a plan or programme on an international site of nature conservation importance to be assessed in combination with other plans or projects (i.e. additive and synergistic effects). An 'in combination' assessment refers to the total effect of all influences acting on a feature from all plans and projects in the context of prevailing environmental conditions. No effects were identified that might, in combination with the Lavernock Point to St Ann's Head SMP2, adversely affect the integrity of the SAC, SPA or Ramsar designations present.

2.8 Water Framework Directive Assessment

2.8.1 Introduction

A Water Framework Directive (WFD) assessment has been prepared and has been provided as **Appendix I** of the SMP2.

Ecological and water quality can be influenced by SMP2 Policy as changes in coastal management may result in different hydrological regimes and water body morphology. The WFD assessment takes into consideration the potential effects of SMP2 policy options on the ecological and water quality elements of the coastal and transitional (estuary) water bodies directly affected by the SMP2. It also incorporates an assessment of adjacent river water bodies, which may also experience some indirect effects due to SMP2 policies, such as shifting in the upper tidal limit in rivers. The potential effects on ecological quality elements are associated with changes in hydrological regimes and water body morphology, including such factors as changes in current velocities, sediment accretion/erosion, water quality (turbidity, salinity) and tidal inundation.

The WFD assessment also considers whether the SMP2 policies may have adverse consequences for water bodies protected under other EU legislation, in particular SPAs and SACs (related to the Birds Directive and Habitats Directive, respectively). Additionally, the potential for changes in groundwater bodies are considered insofar as such changes could affect dependent ecology, i.e. groundwater dependent ecosystems.

A further consideration of possible impacts on groundwater bodies relates to their use for public (or other) water supply. Such considerations are primarily related to 'no active intervention' and 'managed realignment' policies, which could result in a geographical change in the shoreline in the vicinity of a groundwater Source Protection Zone (SPZ).

2.8.2 What is the overall finding of the WFD Assessment?

Further details of the approach adopted and the findings of the WFD assessment are provided in **Appendix I**.

There are no "high" status coastal or transitional water bodies in the SMP2 study area, and therefore **WFD environmental objective 1 does not apply**. The majority of the policies proposed in the SMP2 do not present a notable risk of deterioration in ecological status or potential of the associated transitional or coastal water bodies, nor do they present a risk of them failing to achieve at least good status or potential in the future.

Indeed, a number of the proposed policies directly support the likely mitigation measures identified in the River Basin Management Plan (RBMP) as required to achieve at least good potential in modified water bodies. Therefore **WFD environmental objective 2 will be met for the majority of the SMP2 policy units**. The **exceptions** are where HTL policy is proposed and could promote coastal squeeze of saltmarsh and other intertidal habitats or narrowing of coastal wetlands (primarily dune complexes) which will adversely affect conditions for associated biological quality elements. The policy units in question are along the Port Talbot and Swansea frontages (Policy Scenario Areas 8 and 9, respectively) in Swansea Bay and along the eastern part of the northern coast of the Loughor inlet/estuary (Policy Scenario Area 12). In these locations, some coastal squeeze and / or accelerated erosion is likely,

particularly in longer term epochs. However, **the preferred policies pass all WFD Article 4.7 tests**, although some mitigation measures need to be expanded upon as the proposed SMP2 policies are progressed into projects / schemes. It is also important to note that in the future there may be environmentally better alternatives to the HTL policy proposed along the northern coast of the Loughor estuary (Policy Units 12.8 to 12.12 in the Loughor and Loughor Outer water bodies). This depends on the outcome of investigations into contaminated land remediation, on future decisions about strategic assets (in particular the railway and the Millennium Coastal Path), and on how estuarine processes evolve.

For some additional policy units, notably along the Pembrokeshire coast, HTL is proposed and will promote coastal squeeze. However, since natural erosion processes would be slow, due to erosion resistant geology, natural coastal squeeze would arise as a result of sea level rise. Thus, considering these natural consequences of climate change, the proposed policy is not considered to have significant consequences for biological quality elements. In very few cases, HTL is likely to support sediment accretion and increase habitat diversity with benefits for biological quality elements.

A large number of river water bodies are associated with the study area. The majority of these will be unaffected by the proposed SMP2 policies because either: (a) the associated coastline is undefended and NAI will allow natural processes to continue; (b) MR is proposed and will introduce a degree of naturalisation of the saline-freshwater interface; or (c) HTL is proposed but is not having any adverse consequences for river water body status. Four river water bodies are Highly Modified Water Bodies due to flood protection but also due to urbanisation. Changing the tidal defence structure on any of these water courses would only be one of several measures needed to restore natural conditions, and collectively these measures are not likely to be feasible due to their urban locations.

Those SMP2 policies which will modify coastal (or estuarine) processes will only do so in localised areas, with any constraints on alongshore movement of eroded material being limited by the natural coastal morphology (e.g. cliffs with pocket beaches). Considering this jointly with the assessment of river water bodies above, **WFD environmental objective 3 will be met**. A Habitats Regulations Assessment (Appropriate Assessment) of the SMP2 has concluded that an adverse effect on the integrity of the Carmarthen Bay and Estuaries SAC and the Burry Inlet SPA and Ramsar site are anticipated to result from implementing HTL proposed for Policy Units 12.8 to 12.12. To offset this, appropriate compensatory measures (i.e. alternative habitat creation) have been included as an integral part of the SMP2.

No SMP2 policy selection will significantly change the extent to which saltwater might overlies a groundwater SPZ. Furthermore, none of the groundwater bodies in the SMP2 study area are considered to be at risk of saline intrusion as a result of abstraction, which could make it more vulnerable to further saline risk. Thus, no changes in groundwater quality are anticipated, and **WFD environmental objective 4 will be met**.

A review of SMP2 policy unit boundaries has identified where they do not coincide with water body boundaries, resulting in a number of policy units overlapping two water bodies. However, in each instance the policy unit boundaries are located according to important

process or physical changes in the coastline (e.g. from undefended to defended, or low-lying to raise topography). Thus no changes to the policy unit boundaries are proposed.

The SMP2 presents opportunities to contribute to the delivery of good ecological status or potential in a number of transitional and coastal (TraC) water bodies that are currently moderate (Bristol Channel Outer North, Carmarthen Bay, Loughor, Tywi & Cywyn & Gwendraeth, Milford Haven Outer, Milford Haven Inner, Pickleridge Lagoon) or bad (Swansea Bay). This would be generally by reducing physical modification by reviewing redundant flood defence structures and identifying where modification, mitigation or removal may be appropriate. Specific mitigation measures (identified in the Western Wales RBMP for Swansea Bay but potentially relevant to any of these TraC water bodies) are:

- Managed realignment of flood defence;
- Preserve and, where possible, restore historic aquatic habitats;
- Removal of hard bank reinforcement / revetment, or replacement with soft engineering solution;
- Bank rehabilitation / reprofiling;
- Operational and structural changes to locks, sluices, weirs, beach control, etc;
- Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone;
- Remove obsolete structures.

3 The Preferred Plan

3.1 Planning for Balanced Sustainability

One of the main objectives of the SMP2 is to achieve 'balanced sustainability' by considering the needs and objectives of people, nature, historic and economic realities. However, it is clearly impossible to achieve all of these often conflicting objectives. For example, building large-scale defences to reduce the risk of coastal erosion and flooding to a coastal town would not comply with objectives to allow the coastline to develop naturally. Careful planning and management, through development of this SMP2, has allowed a balanced plan to be reached which considers these issues both now and into the future.

SMP2 Guidance recommends that preferred policies are as sustainable as possible into the long term, defining sustainable policies as "those which take account of the relationships with other defences, developments and processes, and which avoid, as far as possible, committing future generations to inflexible and expensive options for defence" (Defra, 2006). From this statement, it is apparent that the best theoretical policy would be to allow the coastline to change naturally. However since it is also necessary to consider the balanced needs of the human, natural and historic environments, this is not always acceptable or appropriate.

WAG requested that a transition period was adopted in the short term (0 to 20 years) prior to adoption of more radical approaches, which agrees with the typical residual life of existing defences along the SMP2 study area, which it will be possible to continue to maintain, although the risk of flooding is likely to increase over this period. It should be understood that a risk management approach to coastal erosion and flood risk management has only recently been adopted in Wales and some period of transition is necessary. The National Flood and Coastal Erosion Strategy for Wales has recently been published which has established a delivery framework to meet the needs of Wales both now and in the future.

3.2 Overview of the Preferred Plan

3.2.1 Introduction

This SMP2 aims to achieve balanced sustainability, i.e. optimising the achievement of objectives for people, nature, historic and economic realities. In doing so it recognises that achievement of this goal will not be instantaneous and will be the outcome of the managed plan.

The SMP2 is based on the result of numerous studies and assessments, drawing together latest information on a wide range of issues which affect the coast, including geology, geomorphology, coastal processes, condition of existing defences, the natural, built and historic environment, socio-economic factors and future climate change. Preferred SMP2 policies have been developed building upon this understanding.

The proposed short term (first epoch-up to 20 years) policies for the Lavernock Point to St Ann's Head coastline provide a high degree of compliance with objectives to reduce the risk of coastal erosion and flooding to existing communities. The preferred long-term policies promote greater sustainability for parts of the shoreline where natural process and evolution provide a practical means of managing the shoreline.

In the longer term, ongoing coastal change combined with the impacts of future climate change, including sea level rise, mean that policies which continue to reduce the risk of coastal erosion and flooding will require higher and more substantial defences. As well as being increasingly difficult to afford, such policies will change the nature of the coast with increased visual intrusion as a result of larger defences and associated coastal squeeze resulting in beach narrowing or inter-tidal habitat loss. In some locations existing defences should be maintained in the short/ medium term, until they fail to be effective and would need to be replaced. At this stage, due to the limited socio-economic assets at risk and issues with respect to future affordability, it is more appropriate to adopt an alternative management approach (no active intervention or adaptation measures such as property level flood resistance/ flood resilience measures or relocation of assets). In such locations it will be vital to engage the local community in identifying the problem, developing and assessing alternative management approaches and initiating measures to adapt and respond to future coastal change sooner rather than later.

A summary of the preferred plan for each SMP2 Policy Scenario Area has been provided in the following sections, see Table 3.1. Further details are provided in the SMP2 Policy Statements, see **Chapter 5**.

Table 3.1: Extent of Policy Scenario Areas and Policy Units

Policy Scenario Areas		Policy Units	
1	Lavernock Point to Bendrick Rock	PU 1/1	Lavernock Point to St Mary's Well Bay
		PU 1/2	St Mary's Well Bay to Swanbridge
		PU 1/3	Swanbridge East
		PU 1/4	Swanbridge West
		PU 1/5	Sully to Bendrick Rock
2	Barry Island and Docks	PU 2/1	Barry Docks (Bendrick Rock to West Breakwater)
		PU 2/2	Jackson's Bay and Nell's Point
		PU 2/3	Whitmore Bay, Barry Island
		PU 2/4	Friars Point
		PU 2/5	Barry Harbour (Breakwater to Watch House Bay)
		PU 2/6	Cold Knap Point
3	The Knap to Watch House Beach	PU 3/1	The Knap (Cold Knap Point to Bull Cliff)
		PU 3/2	Bull Cliff
		PU 3/3	Bull Cliff to Watch House Beach
4	Aberthaw	PU 4/1	Aberthaw (Watch House Beach to Limpert Bay)
5	Limpert Bay to Nash Point	PU 5/1	Limpert Bay to Cwm Col-huw
		PU 5/2	Llantwit Major (Cwm Col-huw)
		PU 5/3	Cwm Col-huw to Nash Point
6	Nash Point to Porthcawl	PU 6/1	Nash Point to Ogmore River
		PU 6/2	Ogmore River to Newton (Merthyr Mawr)
7	Porthcawl to Sker Point	PU 7/1	Newton
		PU 7/2	Newton Point to Rhych Point (Trecco Bay)
		PU 7/3	Rhych Point to Porthcawl Point (Sandy Bay)
		PU 7/4	Porthcawl (Porthcawl Point to Hutchwns Point)
		PU 7/5	Hutchwns Point to Sker Point (Rest Bay)
8	Sker Point to Swansea Docks	PU 8/1	Sker Point to Afon Cynfig (Kenfig and Margam Burrows
		PU 8/2	Port Talbot steelworks
		PU 8/3	Port of Port Talbot
		PU 8/4	Port of Port Talbot to Baglan Burrows (Aberavon Beach)
		PU 8/5	Baglan Burrows
		PU 8/6	Neath Estuary
		PU 8/7	Crymlyn Burrows
		PU 8/8	Former BP tank farm
9	Swansea Bay	PU 9/1	Swansea Docks and Channel

		PU 9/2	Swansea Docks to Singleton Park
		PU 9/3	Singleton Park to Norton
		PU 9/4	Norton to Mumbles Head
10	Mumbles Head to Worms Head	PU 10/1	Mumbles Head to Rothers Sker
		PU 10/2	Langland Bay
		PU 10/3	Snaple Point to Caswell Bay
		PU 10/4	Caswell Bay
		PU 10/5	Caswell Bay to Three Cliffs Bay
		PU 10/6	Three Cliffs Bay
		PU 10/7	Tor Cliffs
		PU 10/8	Oxwich Bay
		PU 10/9	Oxwich Point to Horton
		PU 10/10	Port Eynon Bay
		PU 10/11	Port Eynon Point to Worms Head
11	Worms Head to Whiteford Point	PU 11/1	Worms Head to Hillend Burrows
		PU 11/2	Hillend Burrows to Burry Holms
		PU 11/3	Burry Holms to Twlc Point
		PU 11/4	Twlc Point to Hills Tor (Broughton Bay)
		PU 11/5	Hills Tor to Whiteford Point (Whiteford Burrows)
12	Loughor Estuary	PU 12/1	Whiteford Point to Llanrhidian Marsh
		PU 12/2	Crofty to Penclawdd
		PU 12/3	Gowerton (Dan-y-lan to Island Bridge)
		PU 12/4	Loughor (Island Bridge to Bwlchymyndd)
		PU 12/5	River Loughor East Bank (Bwlchymyndd to NTL, south of Pontardulais)
		PU 12/6	River Loughor West Bank (NTL, south of Pontardulais to Loughor Bridge)
		PU 12/7	Morfa Baccas (Loughor Bridge to Wildfowl and Wetlands Centre)
		PU 12/8	Wildfowl and Wetlands Centre to Penrhyn Gwyn
		PU 12/9	Machynys (Penrhyn Gwyn) to the northern end of Llanelli Beach
		PU 12/10	Pwll railway frontage (Llanelli Beach to Tywyn Bâch)
		PU 12/11	Burry Port east (Tywyn Bâch to the slipway)
		PU 12/12	Burry Port west (the slipway to Burry Port Marina)
		PU 12/13	Burry Port Marina to The Nose
13	Pembrey Burrows	PU 13/1	Pembrey Sands (The Nose to South of Tywyn Point)
14	Three Rivers	PU 14/1	Tywyn Point to Banc-y-Lord

	Estuarine Complex	PU 14/2	Banc-y-Lord to Commissioner's Bridge
		PU 14/3	Kidwelly (Commissioner's Bridge to Kidwelly Quay)
		PU 14/4	Gwendraeth Fach Eastern Bank (Kidwelly Quay to NTL at A484 bridge)
		PU 14/5	Gwendraeth Fach Western Bank (NTL at A484 bridge to railway bridge)
		PU 14/6	Kidwelly railway bridge (western bank) to Carmarthen Bay Holiday Centre
		PU 14/7	Carmarthen Bay Holiday Centre
		PU 14/8	Carmarthen Bay Holiday Centre to south of Ferryside
		PU 14/9	Ferryside
		PU 14/10	River Towy Eastern Bank (North of Ferryside to Aalton river bend)
		PU 14/11	River Towy Western Bank (Aalton river bend to North of Llansteffan)
		PU 14/12	Llansteffan
		PU 14/13	South of Llansteffan to Wharley Point
		PU 14/14	Wharley Point to Black Scar
		PU 14/15	River Taf Eastern Bank (Black Scar to NTL south of St Clears)
		PU 14/16	St Clears South
		PU 14/17	River Taf Western Bank (St Clears to Laugharne)
		PU 14/18	Laugharne
		PU 14/19	South of Laugharne to Ginst Point
15	Ginst Point to Dolwen Point	PU 15/1	Pendine Burrows (Ginst Point to Pendine village)
		PU 15/2	Pendine village
16	Dolwen Point to Giltar Point	PU 16/1	Dolwen Point to Amroth
		PU 16/2	Amroth
		PU 16/3	Amroth to Wiseman's Bridge
		PU 16/4	Wiseman's Bridge
		PU 16/5	Wiseman's Bridge to Coppet Hall
		PU 16/6	Coppet Hall to Saundersfoot
		PU 16/7	Saundersfoot
		PU 16/8	Saundersfoot to Monkstone Point
		PU 16/9	Monkstone Point to First Point
		PU 16/10	Tenby North Beach (First Point to Castle Hill)
		PU 16/11	Tenby South Beach (Castle Hill to The Burrows, including St Catherine's Island)
		PU 16/12	The Burrows, Tenby South Beach

		PU 16/13	Caldey Island
17	Giltar Point to St Govan's Head	PU 17/1	Giltar Point to Lydstep Haven
		PU 17/2	Lydstep Haven
		PU 17/3	Lydstep Point to Freshwater East
		PU 17/4	Freshwater East
		PU 17/5	Trewent Point to Broadhaven
		PU 17/6	Broadhaven to St Govan's Head
18	St Govan's Head to Thorn Island	PU 18/1	St Govan's Head to Frainslake Sands
		PU 18/2	Frainslake Sands and Freshwater West
		PU 18/3	Freshwater West to Thorn Island
19	Thorn Island to Cleddau Bridge	PU 19/1	Thorn Island to Angle Point
		PU 19/2	Angle Bay (Angle Point to Sawdern Point)
		PU 19/3	Sawdern Point to Pembroke River
		PU 19/4	Pembroke River
		PU 19/5	Pembroke River to Martello Tower, Llanreath
		PU 19/6	Martello Tower, Llanreath to Cleddau Bridge
20	Cleddau Bridge to Little Castle Head	PU 20/1	Cleddau Bridge to Neyland Marina
		PU 20/2	Neyland Marina to Hazelbeach
		PU 20/3	Hazelbeach to Newton Noyes Pier
		PU 20/4	Milford Haven (Newton Noyes Pier to Fort Hubberston)
		PU 20/5	Hakin to Gelliswick Bay
		PU 20/6	Gelliswick Bay
		PU 20/7	Gelliswick Bay to Sandy Haven
		PU 20/8	Sandy Haven
21	Little Castle Head to St Ann's Head	PU 21/1	Little Castle Head to Pickleridge (The Gann)
		PU 21/2	Pickleridge (The Gann to Black Rock)
		PU 21/3	Dale (Black Rock to Dale south)
		PU 21/4	Dale to St Ann's Head

At present Welsh Government do not use priority scoring in the assessment of a scheme's eligibility for funding (Guidance for submissions to Welsh Assembly Government (WAG), Environment Agency Document No.99_05, August 2003). The recently published National Strategy for Flood and Coastal Erosion Risk Management in Wales (Welsh Government, November 2011) has identified that a national funding policy and prioritisation methodology for the assessment of applications for funding for all flood and coastal erosion risk management activities funded from the Welsh Government will be provided by the end of 2013.

Preferred SMP2 policy justification has therefore been based on an examination of all benefits with a focus on reducing the risk of coastal erosion and flooding to people and maintaining

the tourist/ recreation value of existing coastal amenities which have socio-economic benefits to the wider community.

Following the completion of the Welsh SMP2s, and once the Flood and Coastal Erosion Risk Management Strategy for Wales has been finalised, high level decisions will need to be made on priorities with respect to future public funding of coastal erosion and flood risk management. Private funding may also be required for particular coastal erosion and flood risk management schemes. The justification for a particular preferred SMP2 policy may also change in the future due to other uncertainties, discussed further in **Appendix K**.

3.2.2 Policy Scenario Area 1: Lavernock Point to Bendrick Rock

This frontage is bounded by the headland of Lavernock Point to the east (which is the SMP2 boundary) and Bendrick Rock to the west. There are various assets along the shoreline including: residential properties at Lavernock Point, St Marys Well Bay, Swanbridge and Sully, a public house at Swanbridge West, two minor roads which provide access to Swanbridge East and Swanbridge West, three caravan parks/ camping sites, playing fields at Sully, Hayes Point apartments, Barry industrial estate and local infrastructure. Tourism is important to the local economy in this area. Archaeological assets within this frontage include locally important World War Two (WW2) structures.

The cliffs along this section of the coast are typically undefended and are eroding slowly. There are a number of Sites of Special Scientific Interest (SSSIs) and Geological Conservation Review sites, including the Penarth Coast SSSI which is designated for the cliff top habitats and geological exposures; the Lavernock Point to St Mary's Well Bay Geological Conservation Site for exposures representing the Early Jurassic Epoch; Sully Island SSSI for sea-cliff exposures and geology, as well as for the wading bird habitats; and Hayes Point to Bendrick Rock SSSI for geological exposures and the fossilised human footprints near Bendrick Rock.

The shoreline is sheltered from south-westerly and westerly swell waves, but is exposed to locally generated wind waves. Strong tidal currents flow close to the shore.

The cliffs are fronted by rock platforms and the foreshore is dominated by formations of exposed bedrock. The resistant nature of the rocks means that the underlying rate of coastal erosion is slow, localised rock falls are unpredictable and can result in several metres recession. There is little sediment on the foreshore, other than sediment at the top of the beach which appears to have been eroded from the cliffs.

Much of the frontage is undefended, apart from Swanbridge where there are various defences fronting residential properties, car park, public house, caravan park and local access roads. Sections of defences have failed and the remaining defences are in poor condition.

The long term vision for this frontage is to continue to allow natural erosion of the undefended coastline, thus preserving the landscape character and environmental interest. At Swanbridge, there will also be an increased risk of coastal erosion and flooding to assets along the shore. In this location it is recommended that best use is made of the existing defences by maintaining them for as long as possible, undertaking no defence improvement or raising, and moving towards a policy of no active intervention in the medium to long term. Defence improvements would be unlikely to attract public funding due to the limited socio-economic assets at risk. It may be necessary to consider adaptation measures such as property level flood protection, resistance or resilience measures or relocation/ realignment of assets. The preferred policy will result in an increased risk of coastal erosion to residential properties and the playing fields at Sully, Hayes Point development and to parts of the industrial estate at the eastern edge of Barry.

3.2.3 Policy Scenario Area 2: Barry Island and Docks

This frontage is dominated by Barry Island, a feature which has been shaped both by natural processes, with the resistant cliffs forming headlands which affect littoral drift of sediment, and human intervention, following land reclamation associated with the construction of Barry

Docks, Barry Harbour and associated structures. Barry Docks was constructed at the former mouth of the Cadovton River and is important to the local economy. Barry Harbour is now derelict and is infilling with sediment. Barry Island is a key tourist area, and includes the sandy amenity beach at Whitmore Bay, the promenade and surrounding resort. Inshore of the tourist facilities is a residential area and associated amenities. Access to the Barry Island is via the A4055 and the railway, inshore of Barry Harbour.

Barry Island is a SSSI, designated for its exposure of Triassic rocks where mudstones and limestones meet. The coastline is predominantly comprised of cliffs fronted by rock platforms, with the exception of Barry Harbour and sandy pocket beaches within the sheltered embayments of Whitmore Bay and Jackson's Bay (the latter was created following construction of the western breakwater at the entrance to Barry Docks). There is little sediment transport along this frontage. The majority of sediment is trapped within the bays. Although the shoreline is sheltered from south-westerly and westerly swell waves it is exposed to locally generated wind waves and strong tidal currents which flow close to the shore.

For the purpose of the SMP2 it has been assumed that structures associated with Barry Docks and Barry Harbour will continue to be maintained. Maintenance of dock and harbour structures is the responsibility of the relevant authorities, and are not covered by coastal erosion and flood risk management funding. There are various defences within Barry Harbour which reduce the risk of coastal erosion and flooding to the A4055 and railway links to Barry Island, a car park and Watch House Bay. These structures have an influence on coastal processes, providing shelter and retaining sediment. Any change in the management or functioning of these assets would require a review of the recommended SMP2 policies.

Policies within this area vary. Along undefended frontages natural erosion will be allowed to continue, maintaining geological exposures for which the frontage is noted. Along defended frontages, a policy of hold the line is recommended through maintenance and upgrading of existing defences to reduce the risk of coastal erosion and flooding to key assets, subject to the future availability of public funding for coastal erosion and flood risk management.

The beach at Whitmore Bay is a key amenity/ tourist asset. The Whitmore Bay seawall and promenade were built slightly seaward of the natural shoreline position. As a result of future sea level rise, holding the existing line in the long term is therefore likely to result in beach narrowing and increased erosion of beach material at the toe of the near vertical seawall during storm events. In order to maintain an attractive, wide tourist amenity beach, a policy of managed realignment has been recommended in the long term, which could also include wider regeneration of the resort, including the construction of a new set-back defences, promenade and facilities. However, this policy is subject to further detailed studies which will consider the technical, environmental and socio-economic merits/ impacts of alternative managed realignment options within Whitmore Bay. It is also subject to the future availability of public funding for coastal erosion and flood risk management.

3.2.4 Policy Scenario Area 3: The Knap to Watch House Beach

This frontage is mainly undefended and is characterised by geologically important cliffs and fringing shingle beaches. At the eastern end of this frontage are a number of residential properties inshore of a cobble/ shingle ridge at the Knap, which would be at risk from coastal flooding if the ridge were breached, and residential properties at risk from coastal erosion along the cliffs along Bull Cliff. Further west along this frontage are Cold Knap Park, Porthkerry

Country Park, a number of caravan parks and Rhoose Point residential development. There are also archaeological assets at risk from coastal erosion including Roman remains and the Porthkerry Iron Age hill fort, both which are designated as Scheduled Monuments.

The shoreline is predominantly cliffs, comprising mudstones and limestones, fronted by a narrow rock platform which tends to be overlain by a cobble and gravel beach. Eastward transportation of sediment has led to the accumulation of a wide cobble/ shingle ridge to the west of Cold Knap Point which prevents ongoing eastward transport. The ridge is backed by cliffs at the western end (Bull Cliff) and by low-lying land at the eastern end (The Knap). Historic rates of cliff erosion have been low, typically comprising isolated rock fall events which are difficult to predict but could cause up to several metres of recession. This is particularly the case near Rhoose Point where the quarrying works have led to instability in the cliffs, breaking through the cliffs to the rock foreshore at two locations.

At the Knap the cobble/ shingle ridge acts a natural defence, although it is thought to be eroding. The vision for this frontage is to allow the undefended coastline to continue eroding naturally, maintaining the landscape character and natural beauty of the area. At the Knap, the promenade will be maintained for as long as possible, followed by a policy of managed realignment in the medium and long term. This would enable the shingle ridge to continue acting as a defence, allowing it to naturally roll landwards in response to future sea level rise, which may improve its function as a defence. However, if necessary, secondary landward defences could be constructed in order to continue to reduce the risk of coastal erosion and flooding to assets inshore.

3.2.5 Policy Scenario Area 4: Aberthaw

Aberthaw is a highly modified frontage at the mouth of a river valley which is dominated by the coal-fired power station and associated infrastructure. The power station was constructed in 1971 has been recently upgraded and there are plans for further development. The power station lies on the western bank of the River Thaw which originally meandered along the valley towards the coast. The river was trained and culverted and an area to the east of the river was reclaimed following the deposition of fly ash. Existing defences at the power station include a recurved concrete seawall, shingle beach and a groyne field along the south-facing frontage.

To the east of the power station a short section of railway line, adjacent to the coast, is used to transport coal to the power station.

There is environmental interest at the eastern end of the frontage, including the freshwater lagoon, which is part of the East Aberthaw Coast SSSI and is designated for its coastal habitats.

The policy for this frontage is to continue to hold the line to reduce the risk of coastal erosion and flooding to the power station and to minimise the risk of contamination following coastal erosion of potentially contaminated landfill. The existing private defences can be maintained and upgraded as necessary to provide a suitable standard of protection, in response to future climate change/ sea level rise, and to maintain freshwater lagoon/ coastal habitats at the east end of the frontage. However, future management is dependent upon the future strategy for the power station, which is beyond the scope of the SMP2.

3.2.6 Policy Scenario Area 5: Limpert Bay to Nash Point

This frontage is largely undeveloped, with a few, isolated stretches of defences. Early Jurassic limestone and mudstone cliffs are typically fronted by narrow rock platforms. In places, these platforms are covered by a thin layer of beach material, ranging in size from sand to boulders. There is a small river valley at Cwm Col-huw (Llantwit Major) beach where the river discharges across a sand and cobble beach with a lower sandy foreshore. The cliffs are eroding slowly, although localised cliff falls can result in several metres of retreat.

Land use is mainly agricultural. A coastal footpath extends along this frontage. There are amenity facilities at Cwm Col-huw (Llantwit Major) beach including a car park, café, shop and lifeguard station, and this is a popular location for accessing the coastal path point and surfing. The main village is situated a kilometre upstream along the river valley. Other small settlements along the coast include Tresilian, comprised of a small number of residential properties, and St Donat's Atlantic College and Arts Centre.

The cliffs are designated SSSI and are nationally important for their geological exposures. The frontage is also part of the Glamorgan Heritage Coast.

The vision for this frontage is to allow erosion of the undefended coastline to continue, maintaining geological exposures.

At Cwm Col-huw (Llantwit Major) beach there is a rock revetment to the west of the river. The seawall and car park to the east of the river have recently been set back. Whilst there is a policy of hold the line in the short term, it is recommended that the defences and assets to the west of the river are also set back as soon as possible. These defences would then be maintained, although further managed realignment is proposed in the long term subject to further detailed studies and the future availability of public funding for coastal erosion and flood risk management.

At Tresilian and St Donat's, private funding of defence maintenance and upgrading, along the existing line, is acceptable subject to obtaining necessary licences, consents and approvals.

3.2.7 Policy Scenario Area 6: Nash Point to Porthcawl

This frontage is largely undeveloped, comprising Jurassic mudstone and limestone cliffs with small embayments at Traeth Bach, Dunraven, Traeth Mawr, Ogmore River and the dune system at Merthyr Mawr Warren. The cliffs are eroding slowly, although localised cliff falls can result in several metres of retreat. Sandy beaches have accumulated in the shelter of headlands such as Trwyn y Witch, with shingle backshores.

There is a car park and beach access at Dunraven Bay, where the access road has been recently realigned inshore to reduce the risk of coastal erosion. Residential properties within the village of Ogmore-by-Sea are located on high resistant cliffs.

There are significant historic assets, including three Scheduled Monuments, along the cliffs, Cwm Bach Camps, Dunraven Castle Hill fort at Trwyn y Witch and Nash Point Camp, along with local archaeology at Trwyn y Witch and Merthyr Mawr Warren Scheduled Monument which contains evidence of prehistoric occupation.

The natural landscape is a key policy drive for this shoreline, with the cliffs part of Monknash Coast SSSI, designated for Liassic Limestone cliffs and wave-cut platforms. Southerndown

Coast SSSI, designated for the cliffs, sea caves, intertidal areas and cliff top habitats. Dunraven Bay is designated as a SAC primarily for its population of shore dock. Merthyr-mawr Warren is designated SSSI and SAC for the dune environment.

To the south of Ogmore River the recommended policy is no active intervention to allow coastal erosion of the undefended coastline to continue, maintaining geological exposures. Subject to the availability of public funding, the car park and facilities at Dunraven Bay could be maintained, provided necessary consents, licences and approvals are obtained. North of Ogmore River the recommended policy is managed realignment to enable Merthyr-mawr dunes to evolve naturally, with dune management as required.

3.2.8 Policy Scenario Area 7: Porthcawl to Sker Point

This developed frontage includes the coastal resort town of Porthcawl which includes various amenity and tourist facilities including: sandy bathing beaches at Rest Bay and Sandy Bay, Trecco Bay caravan park, Coney Beach amusement park, Eastern promenade, Porthcawl Harbour, Western Breakwater, Town Beach promenade, Marine Drive and the Royal Porthcawl Links golf club. The beaches of Porthcawl are also popular with surfers and kite-surfers.

The coastline is dominated by resistant rocky outcrops and former dune systems bounded by headlands at Newton Point, Rhych Point and Porthcawl Point (Western Breakwater). The coast between Porthcawl Point and Hutchwns Point is rocky. Rest Bay is a volatile sandy beach exposed to south-westerly swell waves which is bounded by resistant rocky outcrops at Hutchwns Point and Sker Point.

There are various defences along this frontage at Newton (seawall, rock revetment and groynes), the western half of Sandy Bay (including various seawalls fronting Coney Beach amusement park, Eastern Promenade/ Salt Lake car park seawall, Porthcawl Harbour structures and the Western Breakwater), Town Beach seawall and revetment, Marine Drive (various localised lengths of seawall) and Rest Bay (seawall at the lifeguard station/ slipway and various defences at the golf course including earth embankments and a short length of rock revetment).

The main policy driver for this frontage is to reduce the risk of coastal erosion and flooding to the developed area of Porthcawl, through a policy of hold the line by maintaining and upgrading defences at Trecco Bay, Sandy Bay, Town Beach and Marine Drive, subject to the future availability of public funding for coastal erosion and flood risk management and private funding for proposed future development at Trecco Bay and Sandy Bay. Along other frontages there is unlikely to be sufficient socio-economic justification for public coastal erosion and flood risk management funding to provide new defences or to upgrade existing defences. At Newton, existing defences will be maintained for as long as possible, before allowing the shoreline to evolve naturally. At Rest Bay the shoreline will be allowed to evolve naturally. However, public or privately funded defences/ defence improvements may be acceptable, subject to obtaining the necessary licences, permissions and consents.

3.2.9 Policy Scenario Area 8: Sker Point to Swansea Docks

This frontage comprises the eastern half of Swansea Bay. Prior to development the shoreline would have been characterised by large areas of saltmarsh and brackish marsh, fronted by sand dune barriers. Little of this original landscape remains since the shoreline of Port Talbot

and the Neath Estuary has been heavily modified by industrial development and the construction of various defences and port structures. Coastal and natural processes have therefore been significantly altered. The Port Talbot steelworks revetment, Port of Port Talbot breakwaters and navigation channel, Aberavon revetment, River Neath training walls and navigation channel and Swansea Docks breakwaters, Queens Dock seawall/ revetment and navigation channel continue to have a significant impact on sediment transport.

The frontage also includes more natural landscapes which remain from the original extensive dune fields. Kenfig and Margam Burrows, an extensive dune field fronted by a wide sand beach, bounded by Sker Point and the Kenfig River and designated as a SAC, SSSI and a National Nature Reserve (NNR). Baglan Burrows, a small area of dunes on the eastern bank of the river Neath. Crymlyn Burrows, to the west of the River Neath, is a smaller dune system backed by the low-lying barrier area of Crymlyn Bog.

The future management and evolution of this entire frontage relies heavily on the future strategies for Port Talbot steelworks, the Port of Port Talbot and the Neath Estuary. The policy for the majority of the shoreline is to hold the line through maintenance and upgrading of existing defences to reduce the risk of coastal erosion and flooding to industrial assets and residential properties and to prevent the erosion of potentially contamination material into Swansea Bay, subject to the future availability of public funding for coastal erosion and flood risk management. A policy of managed realignment for the dune systems will allow them to continue to evolve naturally, whilst enabling dune management as required, for example to restore blow outs or to build secondary defences to reduce the risk of erosion or flooding to the developed hinterland at Baglan Burrows. A long term policy of hold the line has been recommended at the former BP tank farm site, to the west of Crymlyn Burrows, which is currently being decontaminated in advance of the proposed Bay Science and Innovation Campus development, which will involve the construction of new defences, subject to obtaining the necessary consents, licences and approvals. Without development it is unlikely that construction of defences along the former BP tank farm frontage would attract public coastal erosion and flood risk management funding.

3.2.10 Policy Scenario Area 9: Swansea Bay

This frontage comprises the western half of Swansea Bay between Swansea Docks and Mumbles Head. This developed urban frontage has been highly modified.

The shoreline is characterised by the promenade and a series of seawalls, revetments and groynes. The defences are fronted by a sandy beach (of variable width) and a wide mud foreshore. The beach is over a kilometre wide at Blackpill, narrowing to the north and south towards Swansea Docks and Mumbles Head respectively. The beach is designated as a SSSI habitat for migratory birds. Along this frontage there are a number of small stretches of embryo dunes which have formed at Black Pill, between Black Pill and County Hall and immediately to the west of the West Pier of Swansea Docks.

Inshore of the promenade and extending along the bay are the A4067 (which provides an important local access route), Swansea Docks, SA1 development, Swansea Marina, retail park, Swansea Museum, National Waterfront Museum, LC2 (the upgraded former Swansea Leisure Centre), County Hall, residential properties, numerous hotels of various capacities, Swansea University and various recreation, tourist and amenity facilities.

Swansea Docks are a key feature at the eastern end of this frontage shoreline and although their future management is beyond the scope of the SMP2 it has been assumed that the dock structures will continue to be maintained. Similarly it has been assumed that the Swansea Barrage will continue to be maintained.

Reducing the risk of coastal erosion and flooding to residential, commercial and industrial assets is the main policy driver along this frontage, and therefore the recommended policy is to hold the line by maintaining and upgrading existing defences, subject to the future availability of public funding for coastal erosion and flood risk management.

3.2.11 Policy Scenario Area 10: Mumbles Head to Worms Head

This frontage comprises the south coast of the Gower Peninsula which is characterised by resistant rock cliffs and various embayments. The embayments typically enclose sandy beaches, with dune systems at Oxwich Bay and Port Eynon Bay. Much of the frontage is undeveloped, with small residential and tourist areas, which tend to be located adjacent to the embayments at Mumbles, Langland, Caswell, Oxwich and Port Eynon. Gower is an important tourist destination for the South Wales economy, with people visiting to enjoy the beaches and countryside. Surfing is also popular.

The shoreline is valued for its natural beauty and undeveloped nature, and much of the shoreline is designated for its environment importance, including the Limestone Coast of South West Wales SAC, the Carmarthen Bay and Estuaries SAC, Oxwich Bay NNR and numerous SSSIs.

Within the embayments there are several localised defences (seawalls and revetments) which reduce the risk of coastal erosion and flooding to promenades, tourist facilities or residential properties.

Whilst there are no nationally designated historic sites within this frontage, there is a large and diverse amount of locally important archaeology, including Listed Buildings, evidence of prehistoric cave occupation, fish traps, a submerged forest and coastal Iron Age promontory forts.

The preferred policy is to allow the shoreline to evolve naturally through no active intervention along undefended/ cliffed frontages, managed realignment to allow dune systems to evolve naturally, whilst enabling dune management to be undertaken as required. Due to the tourist value, existing defences at Langland Bay, Caswell Bay and Port Eynon Bay will be maintained (and may be improved, subject to socio-economic justification) through a policy of hold the line, subject to the future availability of public funding for coastal erosion and flood risk management. Privately owned defences within Oxwich Bay and Port Eynon Bay could be maintained for as long as possible, before the shoreline is allowed to evolve naturally, since improvements are unlikely to attract public funding. Private landowners may be able to fund defence improvements subject to obtaining the necessary licences, permissions and consents.

3.2.12 Policy Scenario Area 11: Worms Head to Whiteford Point

The shoreline between Worms Head and Whiteford Point (at the mouth of the Loughor Estuary) is largely undeveloped, and is characterised by rocky headlands and large sand dune and beach systems. The shoreline extends northwards from Worms Head along Rhossili

Bay, a wide sandy beach backed by high ground at the southern end and a barrier dune system at the northern end which fronts the low-lying area of Llangennith Moors. At Burry Holms the shoreline abruptly changes direction and consists of a rocky cliffed section, before changing to a long barrier dune system to the east of Twlc Point.

The shoreline in this region is sensitive to changes in the Loughor Estuary, and any changes in alignment of the low water channels.

There are a number of properties with Broughton Bay including two caravan and camping parks, one of which is fronted by a rubble revetment. Otherwise, the coastline is undeveloped and valued for its natural landscape. Much of the coastline is designated for its environmental interest, including the Limestone Coastline of South West Wales SAC, The Gower Common SAC, the Carmarthen Bay and Estuaries SAC and the Carmarthen Bay SPA.

The policy is to continue to allow the undeveloped coastline to evolve naturally, with dune management as required. The existing defences in Broughton Bay should not be maintained and should be removed if they were found to be having an adverse impact on the surrounding natural environment.

3.2.13 Policy Scenario Area 12: Loughor Estuary

The Loughor Estuary (Burry Inlet) is a large shallow estuary surrounded by steeply rising ground to the south and various flood defences to the north. The southern shore of the lower estuary (Whiteford Point to Loughor Bridge) is characterised by wide inter-tidal saltmarsh and mudflats which are backed by undeveloped cliffs. Along the northern shore are various defences which reduce the risk of flooding and coastal erosion to the low-lying residential, industrial and reclaimed areas of Llanelli and Burry Port and the railway line. The Millennium Coastal Park is an important tourist destination which extends from Llanelli to Pembrey and includes water parks, a coastal footpath and an earth sculpture. Upstream of Loughor Bridge, the river meanders across a narrower area of inter-tidal saltmarsh and mudflats, apart from at Loughor the eastern shore is undeveloped, the railway line follows the western bank.

The recommended policies within the Loughor Estuary are to allow natural development of undefended shores, through a policy of no active intervention. Where there are key assets, such as at Crofty, Penclawdd, Loughor, the railway line, Llanelli and Burry Port, the policy is to hold the line by maintaining/ upgrading existing defences to reduce the risk of coastal erosion and flooding, subject to the future availability of public funding for coastal erosion and flood risk management. At Morfa Bacas, policy is to maintain existing defences in the short term but to adopt a policy of managed realignment in the medium and long term, to reduce the risk of coastal squeeze of designated inter-tidal habitats, which would require realigning part of the Millennium Coastal Path. Managed realignment would also be implemented between Burry Port Marina and the Nose at the southern extent of Pembrey Burrows, to enable the dunes to evolve naturally, with dune management as required to reduce the risk of a breach.

3.2.14 Policy Scenario Area 13: Pembrey Burrows

Pembrey Burrows is a 10km long barrier beach and dune system characterised by a broad belt of sand dunes (1km to 2km wide), which is fronted by a wide sandy beach. This frontage is vulnerable to changes in the behaviour and form of the adjacent estuaries, in particular the alignment and extent of low water channels and spits. Inshore of the dunes are Pembrey Country Park, with associated recreational facilities, and Pembrey Forest. At the northern end

is RAF Pembrey Sands air weapons range which is primarily used for air-to-ground bombing and strafing practice. The frontage is generally undefended, apart from two sections of small rock armour breakwaters adjacent to localised RAF assets.

The area is valued for its landscape and habitat, and is designated as part of the Carmarthen Bay and Estuaries SAC and the Pembrey Coast SSSI.

The main policy driver is to allow the dune and beach system to continue to evolve naturally, through managed realignment, which will also allow dune management to be undertaken as required. Existing defences would be unlikely to be technically sustainable in the medium to long term and may affect the adjacent areas of shoreline. It is therefore recommended that existing defences are removed and adaptation measures such as property level flood protection, resistance or resilience measures or asset relocation are adopted.

3.2.15 Policy Scenario Area 14: Three Rivers Estuarine Complex

The Three Rivers Estuarine Complex comprises the Gwendraeth, Towy and Taf estuaries, which are defined by Tywyn Point and Ginst Point at the extremities of the barrier spits which have formed at their mouths. The river channels are largely narrow and constrained by steep and resistant geology. The estuary mouths are dominated by sand, although there are a number of boulder scars at St Ishmael's Scar, Salmon Point Scar and Pastoun Scar.

The estuaries are thought to be part of a complex pattern of sediment transport and are currently infilling. Sediment enters the estuary complex from offshore and the barrier and dune systems from the south-east and west (Pembrey Burrows and Pendine Burrows respectively). Sediment is either deposited on the spits and linear sand banks at the estuary mouth or saltmarshes within the estuaries.

The area is predominantly undeveloped with a few small key settlements including Kidwelly, Ferryside, Llansteffan, St Clears and Laugharne. The railway is a key asset, running parallel to the shoreline within the Gwendraeth and Towy estuaries. There has been significant reclamation of marshland for use in agriculture and industry, particularly between the 16th and 19th centuries. There are tourist and heritage interests at a number of locations including Dylan Thomas's boathouse at Laugharne and St Clears Mound and Bailey Castle, and a variety of caravan parks including the Carmarthen Bay Holiday Centre in the Gwendraeth Estuary.

The landscape is valued both for its natural appearance and conservation interest, as part of the Carmarthen Bay SPA, the Carmarthen Bay and Estuaries SAC and numerous SSSIs, and for the historic interest, with the Towy Valley Registered Landscape of Outstanding Historic Interest in Wales and the Taf and Towy Estuary Registered Landscape of Outstanding Historic Interest in Wales.

The recommended plan for this frontage is to allow natural development of undefended shores, where there are few assets at risk. To reduce the risk of flooding and erosion, continue to hold the line thorough maintenance and upgrading of existing defences at residential communities such as Ferryside, Llansteffan, St Clears and Laugharne (the line of defences has already been set-back at Llansteffan and Laugharne), subject to the future availability of public funding for coastal erosion and flood risk management, and where the railway runs parallel to the coastline (along the northern bank of the Gwendraeth estuary and the eastern bank of the Towy estuary) where defence improvements or construction of new defences will be privately funded. In places where there are small-scale localised privately owned

defences, including the Carmarthen Bay Holiday Centre, public funding will not be available to maintain and therefore a policy of no active intervention has been recommended. However private funding of defence maintenance and upgrading will be permitted subject to obtaining the necessary consents, licences and approvals and provided that defence improvements are not likely to have an adverse impact on the adjacent shoreline of the wider estuarine system.

Areas where there is potential to implement managed realignment to create compensatory intertidal habitat have been identified inshore of Laugharne and Pendine Burrows and along the eastern bank of the Taf, which will be subject to further detailed study.

3.2.16 Policy Scenario Area 15: Ginst Point to Dolwen Point

This frontage encompasses the large, mainly undeveloped beach and dune barrier of Laugharne and Pendine Burrows where the (weak) eastward transport of beach sediment (predominantly sand) has led to the formation of the spit at Ginst Point. This frontage is vulnerable to changes in the behaviour and form of adjacent estuaries, in particular the alignment and extent of low water channels and spits.

Seaward of the dunes is a wide, flat sand beach. The dunes are backed by an area of reclaimed former marshland up to 2km wide. The system is designated as part of the Carmarthen Bay Dunes Special Area of Conservation for its dune habitat, and the area is also a Site of Special Scientific Interest.

Much of the area of Laugharne Burrows and Pendine Burrows is owned by the QinetiQ and used as a weapons testing and evaluation facility. To the western end of this facility is the village of Pendine. The original village lies on high ground, but in the late 1800s a hotel was built within the dunes, instigating development of the dunes and low-lying area behind as a tourist resort, with significant modification of the original landscape. The sands have significant historic interest, being used for car and motorbike racing in the early 1900s, including the setting of a number of land speed records, and this is now commemorated by The Museum of Speed is situated at the eastern end of the village on an area of former dunes.

Much of the frontage is undefended, although erosion of the dunes in the late 1960s and 1970s led to MoD/ QinetiQ undertaking works and placing rock armour in several areas, which now act as hard points and influence shoreline behaviour. The defences at Pendine village, including a seawall and revetment, hold the shoreline seaward of its natural position and have recently been extended eastwards to reduce the risk of outflanking.

The recommended plan is managed realignment to allow the dunes to function naturally, with minimal interference, allowing localised dune management as required to reduce the risk of coastal erosion and flooding to QinetiQ assets, which may include adaptation measures such as asset level flood protection, resistance or resilience measures or asset relocation. It is recommended that no further defences are constructed adjacent to or within the dunes and that existing defences should be removed if they begin to have an adverse impact on the natural functioning of the dune system. Existing defences at Pendine village will be maintained in the short to medium term through a policy of hold the line. A policy of managed realignment is recommended in the long term, subject to further detailed investigations, to enhance the amenity beach and tourist facilities at Pendine.

3.2.17 Policy Scenario Area 16: Dolwen Point to Giltar Point

This frontage forms the western part of Carmarthen Bay and is characterised by cliffs interspersed with small embayments containing pocket beaches. Much of the shoreline is undefended and is renowned for its natural beauty. Intertidal areas and the cliff habitats are environmentally designated. The resistant rock cliffs are eroding slowly, with potential for localised rock falls and landslides to result in several metres recession at any one time. Limited sediment transport, due to the numerous rock headlands along the coast which interrupt drift, and low rates of erosion mean that the coastline has not changed significantly during the last century. At the southern end of the frontage, cliffs give way to The Burrows/ Tenby South Beach, dunes which are fronted by a wide sandy beach. Caldey Island is a fragment of the mainland which became cut off as sea level rose following the end of the last ice age. Caldey Island is home to a population of monks and there is also a village community. It is a popular tourist attraction with access provided via ferry from Tenby.

The frontage is designated for intertidal habitats, and geological exposures, as part of the Carmarthen Bay and Estuaries SAC, the Carmarthen Bay SPA and a series of SSSIs along the coast. It is also part of the Pembrokeshire Coast National Park, Britain's only coastal National Park.

There are several settlements, including Amroth, Wiseman's Bridge, Saundersfoot and Tenby, which comprise small villages or towns and associated tourist facilities. Whilst various defences have been constructed at these settlements the majority of the undeveloped coastline is undefended. Although the future management of harbour structures at Saundersfoot and Tenby (which may reduce the risk of coastal erosion and flooding to adjacent areas) is outside the remit of the SMP2, it has been assumed that these structures will be maintained throughout the period of the SMP2.

The preferred policy for this frontage is to allow the undeveloped coastline to continue evolving naturally through no active intervention. At Amroth, Wiseman's Bridge and between Wiseman's Bridge and Coppet Hall existing defences will be maintained (through a policy of hold the line) for as long as possible (short to medium term) depending on their current condition followed by a reversion to natural processes through no active intervention. At Saundersfoot the short and medium term policy is to hold the line by maintaining existing defences to manage the risk of coastal erosion for as long as is sustainable and affordable. Subject to further detailed investigation, consultation and the future availability of funding the long term policy for Saundersfoot may be managed realignment which could involve the provision of flood resilience measures for properties, assets and infrastructure in the centre of Saundersfoot and abandonment of properties and assets in areas such as the Strand. Private funding could be used to maintain/ upgrade existing defences, subject to obtaining the necessary consents, licences and approvals. At Tenby existing defences will be maintained (and upgraded, subject to the future availability of public funding for coastal erosion and flood risk management) through a policy of hold the line, which will continue to manage coastal erosion and flood risk to this residential settlement. The dunes at The Burrows/ Tenby South Beach will be allowed to function naturally through managed realignment, which will enable dune management to be undertaken to reduce the risk of a breach in the dunes, which could lead to flooding of the low-lying hinterland.

3.2.18 Policy Scenario Area 17: Giltar Point to St Govan's Head

The coastline between Giltar Point and St Govan's Head is largely undeveloped, characterised by rocky cliffs fronted by narrow rocky platforms with a series of indented sheltered embayments, or pocket beaches, within which sediment tends to accumulate. In places, these beaches are backed by dunes, such as at Freshwater East, Barafundle Bay and Stackpole Warren. Much of the landscape is designated for the cliff and dune habitats. Stackpole Warren is a NNR as well as a SSSI for its biological diversity, which includes the dune system, where dunes overly a rock platform and the man-made freshwater ponds at Bosherton which support nationally important species.

This area is a popular tourist destination, with visitors attracted by the rugged landscape and the numerous sandy beaches. The area is part of the Pembrokeshire Coast National Park and the Pembrokeshire Coast Path runs along the cliffs throughout. There are a number of small resorts and caravan parks, typically situated within the embayments, at Lydstep, Manorbier and Freshwater East.

The frontage is renowned for its heritage landscape, included within the South Pembrokeshire Heritage Coast. Both Manorbier and the prehistoric landscape of Stackpole Warren are designated Registered Landscapes of Outstanding Historic Interest in Wales.

The key policy driver for this frontage is to enable the natural evolution of the coastline, to preserve its environmental interest and the tourist economy it supports. Therefore along undeveloped sections of coast the policy is no active intervention. A policy of managed realigned will be adopted for the dune system at Freshwater East to enable natural functioning, with limited dune management as required. Public funding will not be available to continue to maintain existing defences (rock revetment) at Lydstep Haven holiday village, due to the limited socio-economic assets at risk. Therefore the recommended policy is to hold the line in the short term, to maintain the existing defences for as long as possible, moving to no active intervention as the defences fail. Private funding could be used to maintain/upgrade existing defences, subject to obtaining the necessary consents, licences and approvals.

3.2.19 Policy Scenario Area 18: St Govan's Head to Thorn Island

This frontage is characterised by limestone cliffs to the south and sandstone cliffs to the north, separated by the dunes at Frainslake Sands and Freshwater West. The dune systems have developed in the shelter provided by rock headlands to the north and south. However, their seaward edges are eroding and there are large blow outs in places. This shoreline is important for the landscape and habitats it supports, being within the Limestone Coast of South West Wales SAC and Castlemartin Coast SPA, as well as a number of SSSIs.

The Castlemartin MoD training area covers 2,390 hectares, extending between St Govan's Head and Frainslake Sands and is used for realistic training, especially for various types of live firing. Military ownership and management has prevented other land use, preserved the natural landscape and is partially responsible for the high conservation value of this area.

This area remains an important tourist destination, since it is within the Pembrokeshire Coast National Park and is on the Pembrokeshire Coast Path (although this diverts inland between

Stack Rocks on the Castlemartin Peninsula and Freshwater West). The MoD permit access when they are not firing, and the area is popular with walkers and climbers.

West Angle Bay is the only defended frontage, with a short length of seawall reducing the risk of coastal erosion and flooding to a small number of assets including a car park and a café.

The recommended policy along much of this frontage is no active intervention to allow the coastline to evolve naturally and preserve the environmental interest. Within the dune systems at Frainslake Sands and Freshwater West a policy of managed realignment will enable the dunes to function naturally, whilst allowing dune management to be undertaken as required. It is considered unlikely that public funding will be made available to maintain existing defences at West Angle Bay due to the limited socio-economic value of assets at risk, and therefore a policy of no active intervention is recommended which will allow existing defences to fail. Existing defences could be maintained/ improved subject to the availability of private/ other funding and obtaining necessary consents, licences and approvals.

3.2.20 Policy Scenario Area 19: Thorn Island to Cleddau Bridge

This frontage comprises the southern bank of Milford Haven and includes Angle Bay and Pembroke River upstream to the barrage. Milford Haven is a deep estuary formed by flooding of the Cleddau river valley. It is constrained by the steep resistant geology which provides the main influence on its structure and shape. The area is important for conservation and is part of the Pembrokeshire Marine SAC, as well as encompassing a number of SSSIs. There are areas of intertidal mudflats which form important habitats within Angle Bay. The frontage is sheltered from swell waves by topography and the headlands at the entrance to the Haven.

The western (outer) section of the frontage is largely undeveloped, consisting of sandstone cliffs fronted by rocky foreshores, and is within the Pembrokeshire Coast National Park. East of Angle Bay the landscape is urban and industrialised. Industry includes Rhoscrowther Oil Refinery, Pembroke power station (which is being redeveloped), Pembroke Dock and various other industrial sites.

There is significant heritage interest, Milford Haven is designated as a Registered Landscape of Outstanding Historic Interest in Wales. Archaeological sites date from the Medieval period, and the 19th and 20th Centuries, with key assets being Angle Medieval Settlement and Pembroke Medieval town.

The policy for the undeveloped frontage is to allow natural evolution of the coastline to continue through no active intervention, which includes monitoring of the risk of coastal erosion and flooding to the oil refinery, power station and associated facilities. Should the risk increase significantly, intervention would be permitted to continue to reduce coastal erosion and flood risks to these assets and to prevent contamination. The policy within Angle Bay is no active intervention, since it is considered unlikely that public funding would be made available to reduce the risk of coastal erosion and/ or flooding to the limited number of socio-economic assets at risk. Existing defences would therefore be allowed to fail. Adaptation measures such as property level flood protection, resistance or resilience measures or asset relocation should be considered for properties/ assets at risk. It is assumed that the access road to the lifeboat station, just north of Angle Point, would be maintained or realigned as required. A policy of hold the line between Llanreath (Martello Tower) eastwards to Cleddau Bridge to reduce coastal erosion and flood risk by maintaining and upgrading existing

defences, subject to the future availability of public funding for coastal erosion and flood risk management. It is assumed that Cleddau Bridge and associated structures will be maintained in order to preserve this strategic access route, which is outside the scope of the SMP2.

3.2.21 Policy Scenario Area 20: Cleddau Bridge to Little Castle Head

This frontage comprises the northern shore of Milford Haven between Cleddau Bridge and Little Castle Head. Milford Haven is a deep estuary formed by flooding of the Cleddau river valley. It is constrained by the steep resistant geology which provides the main influence on its structure and shape. The area is important for conservation and is part of the Pembrokeshire Marine SAC, as well as encompassing a number of SSSIs. Along much of this shoreline the intertidal area is narrow, although sand beaches have accumulated in sheltered embayments such as Gelliswick Bay and Sandy Haven.

There is significant industrial and residential development along this frontage, with the key socio-economic assets located at Neyland and Milford Haven which includes a marina and dock facilities, controlled by a lock, as well as industrial, commercial and residential assets. There are smaller settlements at Llanstadwell, Hazelbeach and Hakin. Along the cliffs are two Liquid Natural Gas (LNG) facilities Dragon LNG terminal at Waterston, between Neyland and Milford Haven, and South Hook LNG at South Hook Point.

The main policy driver for this frontage is to reduce the risk of coastal erosion and flooding to developed frontages along Neyland and Milford Haven by maintaining and upgrading existing defences, subject to the future availability of public funding for coastal erosion and flood risk management. At Gelliswick it is unlikely that public funding will be available to upgrade existing defences. The recommended plan is therefore to maintain existing defences for as long as possible, with a policy of no active intervention in the medium and long term once defences have failed. Existing defences could be maintained/ upgraded in the medium and long term subject to the availability of private/ other funding and obtaining necessary consents, licences and approvals. A policy of no active intervention has been adopted for less developed/ undeveloped, cliffed sections of coast, and within Sandy Haven, acknowledging that this would ultimately require road traffic between the Dale Peninsula and St Ishmaels and Milford Haven to be re-routed. The risk of coastal erosion to LNG assets would be monitored. Should the risk increase significantly, intervention would be permitted to continue to reduce coastal erosion to these assets.

3.2.22 Policy Scenario Area 21: Little Castle Head to St Ann's Head

This frontage comprises the northern shore of Milford Haven between Little Castle Head and St Ann's Head. Milford Haven is a deep estuary formed by flooding of the Cleddau river valley. It is constrained by the steep resistant geology which provides the main influence on its structure and shape. The area is important for conservation and is part of the Pembrokeshire Marine SAC, as well as encompassing a number of SSSIs, including the Dale and South Marloes Coast SSSI which is designated for its rocky and sandy shore marine communities. The frontage is mainly cliffed with a number of small embayments including Lindsway Bay and Watwick Bay. There is a shingle/ sand barrier at Pickleridge which encloses the Gann Estuary and a tidal lagoon which was established following gravel extraction in the early 1900s.

Although the frontage is mainly undeveloped, the residential area of Dale is an important centre for the local economy with its tourist facilities, community centre and beach which is used for various watersports.

The frontage forms the eastern part of the Marloes and Dale Heritage Coast, designated for heritage features including Dale Fort, now used as a Field Studies Centre, and West Blockhouse Fort.

The key policy driver is to continue to allow the undeveloped coast to evolve naturally to preserve environmental and tourist interest through a policy of no active intervention. The recommended policy at Pickleridge is managed realignment to allow the shingle ridge to retreat naturally, whilst managing the risk of coastal erosion or flooding to the B4327 minor road, which provides the only access to Dale, or developing an alternative solution, such as realignment. There is a risk of flooding to the B4327 at Mullock Bridge during severe storm events following a breach in the shingle ridge. The recommended policy at Dale is to maintain existing defences for as long as possible (short to medium term), prior to managed realignment (in the long term) to reduce beach narrowing as a result of future sea level rise, upon which the recreational value of the area is dependent. The nature and timing of this realignment is subject to further detailed studies.

3.3 Predicted Implications of the Preferred Plan

This chapter provides a summary of the predicted implications of the preferred plan, as a whole, in terms of the SMP objectives as defined in the SEA report (**Appendix G**). More specific detail on the implications of the plan for each location is provided in SMP2 Policy Statements (Chapter 5).

3.3.1 Property, Land Use and Recreation

Along much of the SMP2 frontage the coastline is natural and undefended. Where there are existing defences and significant socio-economic assets at risk, the preferred policy is to maintain (these defences into the long term. If justified, by the socio-economic value of assets at risk, the defences will be upgraded in line with sea level rise. The aim is to continue to reduce the risk of coastal erosion and flooding primarily to people but also to critical infrastructure, industry, tourist facilities and other assets along developed shorelines.

Where there are existing defences the short term policy is to continue to hold the existing line. In the medium or long term a change in policy, to either managed realignment or no active intervention, has been recommended in some locations where holding the existing line is no longer justifiable or sustainable in terms of socio-economics, affordability, technical sustainability or the environment. As a result of the change in policy people, properties and assets will become at increased risk of coastal erosion and flooding. It will therefore be necessary to engage the affected parties in the short term in developing appropriate strategies and schemes to be implemented in the medium and long term which may include flood resistance measures, flood resilience measures, flood warning, adaptation measures or relocation/ abandonment of properties or assets in line with the WAG New Approaches Programme. Where defences do not have an adverse impact on the environment or the shoreline private landowners may be able to fund defence improvements subject to obtaining the necessary licences, permissions and consents.

The main areas where there is a change in the existing policy typically in the medium and/ or long term which will affect people, properties and assets include: Swanbridge, Whitmore Bay (Barry Island), The Knap (Barry), Llantwit Major, Newton, former BP tank farm (adjacent to Swansea Docks), Morfa Baccas, Burry Port Marina to the Nose, Laugharne Burrows and Pendine Burrows, Pendine village, Amroth, Wiseman's Bridge, Lydstep Haven, Angle Bay, Gelliswick Bay, Pickleridge and Dale.

There are 13,000 residential and 2,600 non-residential properties (including major industrial sites, power generation assets and strategically important infrastructure) and 30,500 residents currently at risk from coastal erosion and flooding during a 0.1% annual probability of occurrence (1 in 1,000 year return period) extreme flood event, without existing defences. It is predicted that the probability, extent and depth of flooding will increase over time as a result of climate change. The preferred SMP2 policies will manage the risk of coastal erosion and flooding to 12,000 residential properties and 2,250 non-residential properties and 28,000 residents in the long term.

Tourism and recreation is vital to the South Wales economy, with visitors attracted to the beaches and coastal resorts at Barry Island, Porthcawl, Aberavon, Swansea, Mumbles, Gower, Llanelli, Pembrey, Pendine village, Saundersfoot and Tenby. The preferred long term policy in

many of these locations is to hold the line in order to reduce the risk of coastal erosion and flooding to people, properties and assets inshore. However this may lead to narrowing and/or loss of beaches as a result of sea level rise, with a detrimental impact on tourism. In some locations managed realignment has been recommended in the long term, for example at Whitmore Bay (Barry Island) and Pendine village, to set back defences in order to maintain beach widths, subject to further detailed studies, which could also enable regeneration of these coastal resorts.

Agriculture and farming are vital to the local economy. 8,000 ha of agricultural land is presently at risk from coastal erosion and flooding along the entire SMP2 frontage, which is a small percentage of existing agricultural land due to low rates of coastal erosion. Therefore there is insufficient socio-economic or environmental justification to construct new defences along agricultural and grazing land and preservation of the natural coastline is the main policy driver. In some locations existing defences may be breached and agricultural land flooded to provide intertidal habitat (for example at Laugharne Burrows and Pendine Burrows) under a policy of managed realignment, to compensate for coastal squeeze of inter-tidal habitats elsewhere along the SMP2 frontage.

There are a number of Ministry of Defence (MoD) ranges and one QinetiQ weapons testing and evaluation facility along undeveloped parts of the Carmarthen Bay and Pembrokeshire coast. At RAF Pembrey Sands Air Weapons Range and Pendine weapons testing and evaluation facility, the SMP2 recommends managed realignment to allow the dunes to function naturally, with minimal interference, allowing localised dune management as required to reduce the risk of coastal erosion and/or flooding to MoD/ QinetiQ assets, which may include adoption of flood resistance/ flood resilience measures. It is recommended that no further defences are constructed adjacent to or within the dunes and that existing defences should be removed if they begin to have an adverse impact on the natural functioning of the dune system.

3.3.2 Nature Conservation

Beaches, dunes and intertidal areas along large sections of the SMP2 frontage are designated under national and international legislation for their conservation interests with associated biodiversity targets to ensure that dynamic processes are allowed to continue. The shoreline management policies therefore seek to support natural processes and maintain wildlife habitats (including the condition of designated sites) where appropriate. Policies of no active intervention or managed realignment have been proposed wherever possible to allow natural processes to continue or the conservation value of these sites to be enhanced.

However, in some locations, holding the line is essential to reduce the risk of coastal erosion and flooding to cities, towns, strategic infrastructure or other assets. In these locations, coastal habitats such as sand dunes, saltmarsh, mudflats and/or sandbanks may be adversely affected by sea level rise as they become squeezed against fixed defences or cliffs. Further assessment has been undertaken to identify potential impacts on international conservation sites (Habitats Regulations Assessment, **Appendix H**). In general, the SMP2 is not recommending the construction of new defences to along currently undefended shores and has identified sites which could be developed to provide intertidal habitats as compensation for losses elsewhere.

There are a variety of cliff types along the SMP2 frontage, many of which are nationally and internationally important for their geology and geomorphology. The most significant threat at these sites is the installation of man-made coastal structures which would affect the natural processes of erosion or obscure exposed geology. Proposed SMP2 policies seek to balance protection of natural features against reducing the risk of coastal erosion and flooding to people, property, strategic infrastructure and other assets. Policies of no active intervention or managed realignment have been recommended in areas along undeveloped sections of coast, or where there are limited properties/ assets at risk, to preserve geological interest.

There are inherent conflicts between allowing the coastline to evolve naturally whilst maintaining designated terrestrial or freshwater sites. In such areas, policies of no active intervention or managed realignment will result in some loss of habitat. Careful management of the shoreline is therefore necessary to sustain designated habitats wherever possible, while managing the impact of sea level rise. The conflicting objectives of a dynamic coastline against conserving existing habitats will require development of an appropriate management regime. By making step changes, based on analysis of monitoring data, changes to management policy can be made slowly, with limited impact on the habitat.

3.3.3 Water

In most areas the preferred policies reduces the risk of coastal erosion or flooding to potentially polluting features, such as industrial sites in and around Port Talbot. However, there are some areas where potentially contaminated sites should be investigated further at strategy or scheme level to determine whether coastal erosion and flood risk management is required (and if so how it should be implemented) to reduce the risk of pollution of water resources (coastal, surface and groundwater). For example the site of a former power station in the Loughor Estuary, between Burry Port and Cefn Padraig. The former BP tank farm (adjacent to Swansea Docks) is currently being decontaminated.

3.3.4 Landscape

Along developed frontages the preferred long term shoreline management policies will typically reduce the risk of coastal erosion and flooding through management, maintenance and improvement (if justified) of existing defences, whilst allowing undeveloped areas of shoreline to continue to evolve naturally. Where possible, opportunities have been taken to create a more natural functioning coastal landscape by reverting to no active intervention and managed realignment. This is more beneficial to the landscape than a policy of simply maintaining and improving existing defences, which would require the construction of new, more substantial defences, which would be socio-economically unviable in places.

The policies therefore aim to conserve nationally designated landscapes and comply with AONB Management Plans (Gower) or National Park objectives (along the Pembrokeshire coast) though localised changes in landscape (e.g. by recommending policies of no active intervention or managed realignment where possible along the Gower coastline to maintain natural habitats) will need to be considered in greater detail at strategy or scheme level.

3.3.5 Historic Environment

There are a wide range of heritage sites along the coast, including Scheduled Monuments, Registered Parks and Gardens, Conservation Areas and Listed Buildings. The risk of coastal erosion and flooding to some of these will sites be managed through the recommended SMP2

policies, which may otherwise be at risk under a no active intervention policy. However, many of the key heritage assets (hill forts and remains of prehistoric occupation etc.) are situated on areas of undeveloped natural coastline. In such instances, maintaining the natural landscape is the key policy driver, and it is not considered likely that public funding would be available to reduce the risk of coastal erosion and/or flooding to these features. Providing defences in these locations is also likely to have an adverse visual impact on the site. Examples of such features which will continue to be at risk from coastal erosion and flooding include:

- Porthkerry Iron Age hill fort Scheduled Monument;
- Dunraven Castle hill fort Scheduled Monument;
- Morfa-Bychan Burial Chambers Scheduled Monument; and
- Old Castle Head Promontory Fort Scheduled Monument.

Sites where there are benefits in reverting to a more natural shore, which is currently defended, with a resultant increased risk of coastal erosion, flooding and associated impacts include the following historic assets:

- The Knap Roman site Scheduled Monument;
- The Salthouse Scheduled Monument at Port-Eynon; and
- Pembrey Old Harbour Scheduled Monument.

3.3.6 Amenity and Recreational Use

Coastal tourism contributed £648 million to the Welsh economy in 2006 (Wales Coastal Tourism Strategy, WAG, July 2008). The preferred long term shoreline management policies will reduce the risk of coastal erosion and flooding by maintain (and improving if justified) existing defences at key centres of tourism and recreation such as at Barry Island, Porthcawl, Aberavon, Swansea, Mumbles, Gower, Llanelli, Pembrey, Pendine village, Saundersfoot and Tenby. However, this will be at the expense of beaches along many of these frontages, which likely to narrow as a result of climate change/ sea levels rise. In some locations managed realignment has been recommended in the long term, for example at Whitmore Bay (Barry Island) and Pendine village, to set back defences in order to maintain beach widths, subject to further detailed studies, which could also enable regeneration of these coastal resorts.

4 Action Plan

4.1 Approach

The purpose of the SMP2 Action Plan is to identify the steps that need to be taken in order to put the SMP2 policies into practice. This primarily includes ensuring that the SMP2 policies are taken forward in the short term but also to provide a strategic basis for more detailed studies and plans for managing and/or improving coastal management.

It is also vitally important that information provided by the SMP2 on the future coastal risks and their management is disseminated to Local and Regional Planning Authorities so that people involved with the development of and implementation of land use plans can make informed decisions.

As well as short term activities, the SMP2 Action Plan needs to ensure that activities to facilitate the implementation of the longer-term policies are initiated as appropriate. This includes actions to:

- Facilitate implementation of the Shoreline Management Plan (SMP2) policies through more detailed local studies and consultation on the best approaches to delivery;
- Identify studies to improve understanding or reduce uncertainty where this is required to resolve policy and/or implementation;
- Facilitate the development of a prioritised programme of strategy plan development and outline plan of possible schemes;
- Deal with the consequences of the plan;
- Promote use of the SMP2 recommendations in spatial planning of land use;
- Establish a process for informing stakeholders of progress with SMP2 implementation;
- Establish a framework to monitor and manage progress against the action plan and initiate future SMP2 review.

Action Plans for individual policy areas have been included in each policy statement within **Chapter 5**. These identify the steps to be taken in the period up to the next review of the plan. This is nominally a 5 to 10 year process, however, the plan provides for reassessment of this timescale should an earlier review be considered necessary.

In the most part, the policy recommendations in this plan will be implemented through development of coastal erosion and flood risk management schemes or actions. The process of implementation will be underpinned by shoreline monitoring to identify ongoing behaviour (to confirm assumptions made in policy development), together with targeted study and investigation where specific uncertainties need to be addressed to enable policy (short or longer term) implementation.

Where the Action Plan tables refer to undertaking monitoring, this includes the proper storage and analysis of data to inform management practices under the supervision of the Wales Coastal Monitoring Centre. In some areas environmental appraisal has recommended that monitoring is undertaken to provide data to assess impacts, assist in the specification of any required mitigation and to feed into future SMP2 revisions. Undertaking strategic regional monitoring is an essential part of the shoreline management processes. There is already a strategic coastal monitoring programme in place within Swansea Bay and Carmarthen Bay (Lavernock Point to St Govans Head) and it is recommended that this is extended along the

coast of Pembrokeshire (between St Govans Head and St Ann's Head) and up to the tidal limits of estuaries (in particular Loughor, Gwendraeth, Towy, Taf and Milford Haven).

4.2 Broad Scale SMP2 Actions

It is expected that implementing this and other SMP2s across Wales and England may require changes at local planning, regional and national government levels. At a time when regions are being charged with increasing the national housing stock, compensatory provisions could be required to offset and adapt to the expected losses highlighted in SMP2s. These provisions may, for example, include making other land available for building, thus facilitating adaptation to changing risks. Regional planning needs to consider the messages being delivered by this SMP2 to ensure that future proposals for regional development and investment are made accordingly. Such planning needs to be looking beyond the current 20 year horizon.

Local planning should consider the risks identified in this SMP2 and avoid approving development in areas at risk of flooding and erosion. Local planning also needs to consider that relocation of displaced people and property may require land set back from the coast to be made available within the same settlements to maintain the same level of community and may need to become increasingly flexible to enable this. Locations for new developments may need to be identified. Within a national context, Pathfinder projects to help develop approaches to coastal adaptation are presently being planned by Defra following a consultation process undertaken between July and September 2009. Further information is available at:

<http://www.defra.gov.uk/environment/flooding/manage/coastalchange.htm>

In the short-term the need to ensure that conservation interests within designated sites or in the wider environment are appropriately addressed by coastal erosion and flood risk management should be done in a way that engages the public and involves local communities in finding long-term solutions to issues. To help deliver this objective Natural England has published a Maritime Strategy entitled 'Our coasts and seas: making space for people, industry and wildlife'.

To accommodate retreat and loss of property and assets, whether due to coastal erosion or flooding, local operating authorities will need to develop action plans. These will need to address the removal of buildings and other cliff-top facilities well in advance of their loss. The plans for relocation of people also need to be established and clear for all affected. However, mitigation measures do not fall solely upon national and local government and should not be read as such within this Plan. Business and commercial enterprises need to establish the measures that they need to take to address the changes that will take place in the future. This includes providers of services and utilities, who will need to make provision for long-term change in coastal risks when upgrading or replacing existing facilities in the shorter term. They should also consider how they will relocate facilities that will become lost to coastal erosion or flooding and the need to provide for relocated communities. Other parties needing to consider mitigation measures will be the local highways authorities and bodies responsible for local amenities (including golf clubs, recreational playing fields etc).

Private land and property owners will also need to consider how they will deal with the changing shoreline. The terms of the Acts under which the coastal defence operating authorities work confer only “permissive powers” and, as such, there is currently no general obligation on the part of operating authorities or national government to assure protection against flooding or erosion or to provide any compensation for losses. Defra and Department of Communities and Local Government) has recently consulted on adaptation to changing coastal risks, but there is no reason at present to assume that this will change the present approach in the future or that individual losses would be recompensed from central funds.

However, the SMP2 provides a long lead time for the changes that will take place, which in general will not happen in the short term (0 to 20 years), but will occur in the medium and long term (20 to 100 years). To manage these changes effectively and appropriately, the approach put forward in this SMP2 needs to be considered now, not in several decades time.

Spatial Planning Actions

As discussed above, the risk management policies set out in the SMP2 cannot be implemented through engineering or coastal defence management alone. There is a need for spatial planning to adopt the policies and understand their consequences, such that risk areas are avoided by development, and future changes in policy are facilitated to allow a more sustainable approach to management of coastal risks and avoid increasing risks by allowing development in areas which are prone to coastal erosion and flooding.

Strategic Flood Consequence Assessments (SFCAs) are intended to guide development decisions and meet the requirements of the TAN 15: Development and Flood Risk. Local and regional planning authorities should monitor the development of SFCAs for their areas and put them into practice. Where appropriate, coastal erosion risks should also be captured.

Table 4.1 includes actions which aim to ensure that the SMP2 policies are appropriately reflected in the relevant Regional Plan and Local Development Plans, such that long term coastal erosion and flooding risks are a material consideration in the planning process.

Table 4.1: Actions for spatial planning

Action	Responsibility
1) Communicate the completion of the SMP2 to WAG Planning Department to ensure appropriate reflection in the next revision to the Wales Spatial Plan.	Swansea and Carmarthen Bay Coastal Engineering Group (Chairman)
2) Inform Planning Officers of final SMP2 recommendations and implications.	Local Authority Engineering Officers
3) Submit SMP2 to Local Authority Planning Committees with recommendation to approve the SMP2 for consideration in preparation of planning documents and for development control purposes.	Local Authority Planning Officers to report to planning committee
4) Inclusion of the SMP2 as reference material for, or an annex to, Local Development Plans.	Local Authority Planning Officers & Planning Committees

Action	Responsibility
5) Promote the use of Strategic Flood Consequence Assessments as part of the preparation of development framework documents.	Local Authority and Environment Agency Wales Planning Officers
6) Ensure that SMP2 policies are integrated into Development Control activities to control development and flood risk. Development Control Teams should pay particular attention to managed realignment and no active intervention policies and any associated drainage issues.	Local Authorities & Environment Agency Wales
7) Promote the development of planning policies to facilitate adaptation to coastal change and address potential housing and other future losses through implementation of 'realignment' and 'no active intervention' policies.	Local Authority and Environment Agency Wales Planning Officers
8) Promote the consideration of the relocation of land uses that are at risk from erosion or flooding, within the preparation of Local Development Plans. Identify elements of the preferred SMP2 policies where this may apply.	Local Authority and Environment Agency Wales planning officers

Actions to Facilitate Medium / Long Term Policies

In addition to the specific actions outlined in each Policy Statement in **Chapter 5**, there is also a need for some activities to be progressed, which require consideration at a broader scale. It is important that the need for these broader scale studies is promoted by the relevant bodies.

These studies/initiatives and the actions for the Coastal Engineering Group are outlined in Table 4.2.

Table 4.2: Further Actions to facilitate medium / long term policies

Action	Responsibility
1) Formal adoption of the SMP2 by the WAG Review Group, Coast Protection Authorities, Environment Agency Wales, CCW and other partner authorities.	Swansea and Carmarthen Bay Coastal Engineering Group, Elected Members and Local Authority Officers.
2) Promote a formal, policy, link between SMP2s and Local Development Frameworks/ Local Development Plans and Regional Plans. This will require WAG to review current arrangements.	Swansea and Carmarthen Bay Coastal Engineering Group to promote with WAG through Coastal Group Chairs forum.

Action	Responsibility
3) Promote WAG funding for all consultation/stakeholder activities in the development of SMP2s, and strategies/schemes.	Swansea and Carmarthen Bay Coastal Engineering Group to promote with WAG through Coastal Group Chairs forum.
4) Take account of overall SMP2, i.e. other immediate-term needs and long-term planning, when considering implications for strategies/ schemes within the plan area and related nature conservation commitments.	Countryside Council for Wales, Environment Agency Wales and other regulatory/stakeholder organisations.
5) Promote the investigation, and implementation, of a broad range of mechanisms to facilitate the removal of 'at risk' assets (properties, infrastructure, etc), to enable community adaptation to NAI or MR policies.	Swansea and Carmarthen Bay Coastal Engineering Group promote with WAG, through the ongoing Defra 'Making Space for Water' and WAG New Approaches Programme initiatives.
6) Develop exit strategies/management plans for the relocation of communities and removal of assets when they become at risk from erosion.	Local Authority Technical Officers and Planning officers.
7) Develop medium to long-term plans for relocation of community services and facilities that will be lost to erosion, e.g. outfalls, highways.	Service and utility providers, highways agencies.
8) Develop and promote a communication strategy/ awareness raising/ education of the public with regards to potential future coastal erosion and flood risk issues and SMP2 recommendations.	Swansea and Carmarthen Bay Coastal Engineering Group to promote in conjunction with the Environment Agency Wales.
9) Develop the existing strategic coastal monitoring programme to include the entire coast of the SMP2 including estuaries.	Swansea and Carmarthen Bay Coastal Engineering Group in conjunction with the Environment Agency Wales, under the supervision of the Wales Coastal Monitoring Centre.

4.3 Managing the SMP2 until the next review

Through the implementation of actions outlined in each Policy Statement and in Section 4.2 it is likely that the technical understanding of this coastline, the basis of some SMP2 policies, and the wider shoreline management framework may change. As such, it is important that progress against these actions is monitored by the Coastal Engineering Group so that any developments which might affect policy, and hence works, are notified, and also so that the need for revision of the SMP2 can be monitored. Adjacent projects should be monitored for potential implications along the SMP2 frontage.

The Action Plan will be managed by the Swansea and Carmarthen Bay Coastal Engineering Group. The Action Plan should be a working document which needs to be reviewed regularly at Coastal Group meetings and updated as and when required. The Action Plan will be retained on the agenda for all future Coastal Group meetings. It will be the responsibility of the Coastal Group to promote and monitor progress and to ensure that the action plan is progressed by the appropriate partners and where there are problems with delivery to seek to resolve issues through collaborative working.

The Lavernock Point to St Ann's Head Shoreline Management Plan website (<http://www.southwalescoast.org>) could be maintained to include updates on progress against the action plan. This could also include identification of the implications of any study outputs or wider developments for the relevant SMP2 policies. The updates would provide an important means of disseminating progress to stakeholders and, as such, the existence of this information should be reported during the final SMP2 dissemination process. The responsibility for maintaining the website will remain with the Swansea and Carmarthen Bay Coastal Engineering Group.

It is not possible at this time to set a date for the next review of the SMP2. It is considered likely that a 5 to 10 year period may be appropriate. However, it is vital that changes in understanding or the shoreline management framework are monitored to establish if there comes a point (within the next 5 to 10 years) that the SMP2 policies become sufficiently out of date as to warrant a full review of the plan. This will be a judgment made by the Swansea and Carmarthen Bay Coastal Engineering Group.

Regardless of other developments, it is considered that a review of the SMP2 should be undertaken in 10 years (if not before) in order to ensure the policies remain appropriate.

5 Policy Statements

5.1 Introduction

Further to the summary of SMP2 policies, provided in Chapter 3, this chapter presents the SMP2 policy statements which also consider Policy Units (shorter sections of shoreline with similar characteristics in terms of coastal processes and assets at risk that can be managed efficiently) within each of the Policy Scenario Areas (which interact in terms of coastal processes, have similar key issues, or land uses, or for which the management objectives are broadly the same) to address issues and implications in greater detail, refer to Section 3.2.1 for further details.

Whilst the SMP2 policy statements outline the preferred shoreline management policy for each area and the implications of that policy, the statements should be read in conjunction with the supporting information contained in the SMP2 appendices, including the context, wider-scale issues and objectives. The SMP2 policy statements provide a brief summary of key issues which have been used to inform the development of the preferred SMP2 policies and do not provide a complete list of all issues (technical, socio-economic, environmental, archaeological and recreational-amenity) that have been considered to develop the preferred SMP2 policies, further details are provided in the supporting appendices.

At present Welsh Government do not use priority scoring in the assessment of a scheme's eligibility for funding (Guidance for submissions to Welsh Assembly Government (WAG), Environment Agency Document No.99_05, August 2003). The recently published National Strategy for Flood and Coastal Erosion Risk Management in Wales (Welsh Government, November 2011) has identified that a national funding policy and prioritisation methodology for the assessment of applications for funding for all flood and coastal erosion risk management activities funded from the Welsh Government will be provided by the end of 2013.

Preferred SMP2 policy justification has been based on an examination of all benefits with a focus on reducing the risk of coastal erosion and flooding to people and maintaining the tourist/ recreation value of existing coastal amenities which have socio-economic benefits to the wider community. However, following the completion of SMP2s, high level decisions will need to be made on the appropriate distribution of public funds across the whole of Wales. Private funding may also be available for particular coastal erosion and flood risk management schemes. The justification for a particular preferred SMP2 policy may also change in the future due to other uncertainties, discussed further in **Appendix K**.

5.2 Content

The policy statements are presented in four parts, as described below.

5.2.1 Summary of SMP2 recommendations

This table provides an overview of the policy scenario area and the recommendations for future management:

Long term plan – provides a brief description of the character of the policy scenario area, key policy drivers prior and a summary of the long term plan for coastal erosion and flood risk management.

Location – each policy statement covers a single policy scenario area and related policy units, numbered sequentially east to west around the coastline. Policy units should not be considered as immovable boundaries since the SMP is based upon a high-level assessment. More detailed studies may justify the need to move boundaries to appropriately deliver policies.

Preferred policy and proposed approach to implementing the Plan – describes, for each policy unit, the preferred SMP2 policies, along with an indication of the proposed approach that could be taken to implementing the policies in the short term (up to 20 years), medium term (20 to 50 years) and long term (50 to 100 years). It should be noted that these periods are not fixed and should be considered as phases in the future management of coastal erosion and flood risk at a particular location.

Policy sensitivities and key uncertainties – provides an outline of key sensitivities and uncertainties for each policy unit. This includes assumptions made with respect to: residual life of existing defences, future rates of erosion, future climate change (including sea level rise) and associated impacts, provision of private defences. This section also summarises key policy sensitivities such as whether the policy would be sensitive to changes in predicted rates of sea level rise or the future availability of public or private funding. Further detail on policy sensitivities and uncertainties is provided in Appendix K: Policy Sensitivity Analysis.

Changes from present management / SMP1 policy – the recommended policies are compared with present management practices and recommended SMP1 policies. Any changes are identified and justification for the change is provided.

5.2.2 Predicted implications of the preferred SMP2 policies

This table provides a summary of the potential impacts of preferred SMP2 policies at each location. These are categorised in the form of a series of standard questions organised in accordance with requirements for the Strategic Environmental Assessment of the SMP2 as follows:

- Property, population and human health;
- Land use, infrastructure and material assets;
- Amenity and recreational use;
- Historic environment;
- Landscape and visual amenity;
- Biodiversity, flora and fauna;
- Earth heritage, soils and geology;
- Water.

The appraisal has been colour coded to identify positive, neutral and negative impacts. Further details are provided in Appendix G: SEA Report.

5.2.3 Action Plan

The action plan provides a summary of recommended future actions for each policy scenario area and policy unit in order to implement the preferred SMP2 policies and to inform the next SMP review. These identify the steps to be taken in the period up to the next revision of the SMP. Responsibilities for these actions and potential sources of funding are identified, along with the timescale involved.

5.2.4 Policy Maps

Policy maps have been provided to support each of the Policy Statements. The maps define the extent of the policy scenario areas and policy units and identify the preferred shoreline management policies (in the short, medium and long term). The Environment Agency flood risk map is shown on the map (identifying the area which is at risk of flooding, without defences, during a 0.1% annual probability of occurrence (1 in 1,000 year return period) extreme flood event). An indication of potential future rates of coastal erosion (in the short, medium and long term) have been provided where the preferred policy is no active intervention. The maps also define the extent of international and national conservation designations and Scheduled Monuments.

5.3 Additional policy information

5.3.1 Heritage features

Where there is potential loss of heritage features, of both national and local importance, there is a requirement, where appropriate, for monitoring, assessment and mitigation measures to be devised in response to ongoing and future erosion.

5.3.2 Footpaths

A number of the preferred policies may lead to the future loss of coastal footpaths, which would not alone justify the construction of coastal defences. Subject to planning consents and land purchase agreements, plans should be developed to realign coastal footpaths in advance of coastal erosion and/or when defences are realigned.

5.3.3 Land use within defended areas or those affected by policies

Coastal erosion and flood risk management reduces the risk to the assets inshore but does not remove the risk completely. Decisions on future land use should avoid/ restrict development in areas at risk from coastal erosion and flooding. Coastal erosion and flood risk management measures implemented for existing developments should be appropriately adaptable, resilient and resistant to future climate change.

Where the SMP policy recommends managed realignment of existing defences, the effect on parties currently protected by defences will be part of the 'management' of that change.

5.3.4 Health and safety and removal of defences

All of the preferred policies will need to be supported by appropriate strategic coastal monitoring and must, when implemented, take due account of existing health and safety legislation in particular in respect to the failure and removal of existing defences which have reached the end of their residual life.

5.3.5 Erosion risk

The number of properties, assets and strategic infrastructure which are at risk has been based on an assessment of the maximum likely extent of erosion over the 100 year SMP period. However, erosion is not linear and rates of erosion will vary along the coast. This is particularly the case along much of the South Wales coastline, where in addition to ongoing coastal erosion there is risk of periodic localised rock falls/landslides.

5.3.6 Socio-economic viability

Appraisal of the socio-economic benefits of the preferred SMP2 policies has been provided in **Appendix J**. In Wales, coastal erosion and flood risk management schemes no longer need to attain a benefit cost ratio of at least unity in order to justify public investment. Preferred SMP2 policy justification has therefore been based on an examination of all benefits with a focus on reducing the risk of coastal erosion and flooding to people and maintaining the tourist/ recreation value of existing coastal amenities which have socio-economic benefits to the wider community. However, following the completion of SMP2s, high level decisions will need to be made by WAG on the appropriate distribution of public funds across the whole of Wales.

5.3.7 Private defences

Various lengths and types of defence have been constructed and maintained along the SMP frontage by private landowners. The policy statements indicate where existing private defences could be maintained, improved, provided, extended or removed for technical and/or environmental reasons. Private defences may be provided or improved subject to obtaining necessary consents, licences and approvals

5.3.8 Port and harbour operations

Maintenance of port, dock, harbour and marina structures is the responsibility of the relevant authority and is outside the scope of the SMP since they are not covered by public funding of coastal erosion and flood risk management. For the purpose of the SMP2 it has been assumed that existing port, dock, harbour and marina structures will remain and will continue to be maintained over the 100 year SMP period, unless otherwise stated. Whilst the SMP would not preclude the right of landowners to privately maintain or upgrade existing defences, the necessary consents, licences and approvals would need to be obtained.