

Beachy Head to Selsey Bill

Shoreline Management Plan

First Review

Final Report

May 2006



Worthing
SUSSEX COUNTY



Halcrow



The authorities have been party to the study but do not necessarily yet endorse the proposals. Formal adoption will only be considered after the public consultation period.

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1 INTRODUCTION

1.1 THE SHORELINE MANAGEMENT PLAN

A Shoreline Management Plan (SMP) provides a large-scale assessment of the risks associated with coastal evolution and presents a policy framework to address these risks in a sustainable manner with respect to people and to the developed, historic and natural environment. In doing so, an SMP is a high-level document that forms an important part of the Department for Environment, Food and Rural Affairs (Defra) strategy for flood and coastal defence (Defra, 2001).

This document provides the first revision to the original Selsey Bill to Beachy Head (South Downs) SMP adopted in 1997. Figure 1.1 shows the area covered by the South Downs SMP.

1.1.1 Guiding Principles

The SMP is a non-statutory, policy document for coastal flood and erosion risk management planning. It takes account of other existing planning initiatives and legislative requirements, and is intended to inform wider strategic planning¹. The SMP does not set policy for anything other than coastal defence management.

The SMP promotes management policies for the coastline into the 22nd Century, to achieve long-term objectives, while being technically sustainable, environmentally acceptable and economically viable. It is, however, recognised that given the difference between short and long term objectives, changes to management policy in the short term may be unacceptable. Thus, the SMP provides a step by step management change for meeting objectives with appropriate management change, i.e. a 'route map' for decision makers to move from the present situation towards the future.

The policies that comprise this Plan have been defined through the development and review of shoreline management objectives, representing both the immediate and longer term requirements of stakeholders, for all aspects of the coastal environment. Together with a thorough understanding of the coastal processes operating on the shoreline, these objectives provide a thorough basis upon which to appraise the benefits and impacts of alternative policies, both locally and Plan area wide. In this way, the selection of policy takes equal account of all relevant features in identifying the best sustainable management solutions.

¹ The planning reforms under the Planning and Compulsory Purchase Act 2004 identify a requirement for Regional Spatial Strategies (the new regional level statutory planning document) and Local Development Documents (the new local level statutory planning document). These are required to contribute to the achievement of sustainable development and are supported by a range of government planning policy advice and guidance, in particular Planning Policy Statements (PPSs) and their predecessors Planning Policy Guidance Notes (PPGs). Under the Act, Regional Planning Guidance for the South-East (RPG9) is being replaced by the South East Plan, which was approved by the Regional Assembly and submitted to the minister in March 2006. The South East Plan adopts a whole-catchment approach to water management and acknowledges the links between biodiversity and water quality, flood and erosion risk management. Policies NRM6: Coastal Management and NRM3: Sustainable Flood Risk Management are relevant, with Policy NRM6 advocating an integrated approach to coastal planning and management. These policies require local planning authorities to take account of SMPs both during the preparation of their Local Development Documents and in the determination of planning applications.

The original SMP for the Beachy Head to Selsey Bill (South Downs) coastline (identified as coastal process sub-cell 4d in a 1994 study for MAFF, now Defra) was one of the first to be completed in England or Wales. Since that time many lessons have been learned. Reviews funded by Defra (2001, 2003) have examined the strengths and weaknesses of various Plans and revised guidance has been issued. Some of this guidance is targeted at achieving greater consistency in the assessments and presentation of these Plans, but there are more fundamental issues that have been identified, which this and other SMPs must address.

One significant issue is the inappropriateness of certain policies which, when tested in more detail with a view to being implemented, may be found to be unacceptable or impossible to justify either economically or technically. It is therefore important that the SMP is realistic, given known legislation and constraints, both human and natural, and not promise what cannot be delivered. There will be no value in a long-term Plan which has policies that are driven by short-term politics and cannot be justified once implementation is considered several years in the future. Equally, whilst the affordability of each policy has been considered (Appendix H – Economics) in a broad brush fashion, the Plan's adoption by the local authorities involved does not represent a commitment to fund their implementation; similarly the adoption of a particular policy does not guarantee that funding (from any route) will be available. Ultimately, the economic worth of policy implementation must be considered in the context of budgetary constraints (whether private or government funding), and it cannot be guaranteed that budgets will be available for all policies. The Coastal Defence Strategies, which come after this Plan will examine in much greater detail the economic viability of the policies set out herein. A system of Outcome Measures is in place to assess nationally the priority of each scheme put forward against national targets set by central Government; this is only possible once an outline scheme has been produced, making available costings and benefits in greater detail than examined in the Plan – this is outside the scope of the SMP.

The SMP must also remain flexible enough to adapt to changes in legislation, politics and social attitudes. The SMP therefore considers objectives, policy setting and management requirements for three main epochs; the present day, the medium-term and the long-term, corresponding broadly to time periods of 0 to 20 years, 20 to 50 years and 50 to 100 years respectively. There is a need to have a long-term sustainable vision, which may change with time, but the Plan should be used to demonstrate that defence decisions made today are not detrimental to achievement of that vision.

1.1.2 Objectives

The objectives of the SMP are as follows:

- to define, in general terms, the risks to people and the developed, historic and natural environment of coastal evolution within the SMP area over the next century
- to identify the preferred policies for managing those risks
- to identify the consequences of implementing the preferred policies
- to inform planners, developers and others of the risks of coastal evolution and of the preferred policies when considering future development of the shoreline, land use changes and wider strategic planning

- to comply with international and national nature conservation legislation and biodiversity obligations
- to set out procedures for monitoring the effectiveness of the SMP policies
- to highlight areas where knowledge gaps exist.

1.1.3 The SMP policies

The shoreline management policies considered are those defined by Defra (2001):

Hold the line	maintain or upgrade the level of protection provided by defences.
Advance the line	build new defences seaward of the existing defence line.
Managed realignment	allowing retreat of the shoreline, with management to control or limit movement
No active intervention	a decision not to invest in providing or maintaining defences.

Further details of these policies are provided in Section 2.5.

1.2 STRUCTURE OF THE SMP

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

- the management plan
- a series of supporting documents presented as appendices to the management plan.

1.2.1 The Management Plan

The management plan sets out the preferred policies for managing the risks of coastal evolution over the next century. It is intended for general readership and is the main tool for communicating intentions. Whilst the justification for decisions is presented, it does not provide all of the information behind the recommendations, this being contained in the supporting documents.

The management plan is presented in six parts:

Section 1(this part)	gives details on the principles, structure and background to its development.
Section 2	presents the basis for meeting the requirements of the EU Council Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment (the Strategic Environmental Assessment Directive).
Section 3	presents the basis for development of the management plan, describing the concepts of sustainable policy and providing an understanding of the constraints and limitations on adopting certain policies.

- Section 4 presents a broad overview of the preferred policies, discussing their rationale, implications and requirements to implement and manage them.
- Section 5 provides a series of 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.
- Section 6 provides an action plan which is a programme for future activities that are required to progress the plan between now and its next review.

Although it is expected that many readers will focus upon the local details in Section 5, it is important to recognise that the SMP is produced for the South Downs coast as a whole, considering issues beyond specific locations. Therefore, these statements must be read in the context of the wider-scale issues and policy implications, as reported in Sections 2, 3 and 4 and the appendices to the Plan.

1.2.2 The Supporting Documents

The supporting documents provide all of the background information to the management Plan. These are provided to ensure that there is clarity in the decision-making process and that the rationale behind the policies being promoted is both transparent and auditable.

This information is largely of a technical nature and is provided in eight parts and two databases:

Appendix A: SMP Development: This reports the history of development of the SMP, describing more fully the policy decision-making process.

Appendix B: Stakeholder Engagement: Stakeholders have had an important role in shaping the plan. All communications from the stakeholder process are provided here, together with information arising from the consultation process.

Appendix C: Baseline Process Understanding: Includes baseline coastal process report, defence assessment, No Active Intervention (NAI) and With Present Management (WPM) assessments and summarises data used in the assessments. It also includes the assessment of breaching through the Medmerry Barrier.

Appendix D: Thematic Studies: This 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 SMP.

Appendix E: Issues & Objective Evaluation: Provides information on the issues and objectives identified as part of the Plan development, including an appraisal of their importance.

Appendix F: Initial Policy Appraisal and Scenario Definition: The impacts of a range of policy scenarios upon shoreline evolution have been evaluated, which has formed a key part of determining the acceptable sustainable policies and their combination into 'scenarios' for testing.

Appendix G: Preferred Policy Scenario Testing: A summary of the assessment and appraisal of the preferred policies, via (i) assessment of shoreline interactions and response against preferred policy; and (ii) assessment and achievement of the objectives against the baseline scenario (No Active Intervention) and the preferred policies. The assessments are based on the findings of Appendices E and F.

Appendix H: Economic Appraisal and Sensitivity Testing: This report provides a high-level assessment of the economic justification of each preferred policy, which is reported in terms of “justified”, “not justified” and “marginal”.

Appendix I: Meta-database and Bibliographic database: All supporting information used to develop the SMP is referenced for future examination and retrieval.

These documents are presented on a CD provided at the back of the Shoreline Management Plan.

1.3 THE PLAN DEVELOPMENT PROCESS

1.3.1 Revision of the SMP

The original Selsey Bill to Beachy Head (South Downs) SMP was adopted in 1997. Part of the SMP process is to regularly review and update the SMP, as necessary, taking account of new information and knowledge gained in the interim. This is the first revision to the South Downs SMP and has taken account of:

- latest studies (e.g. Futurecoast, climate change) and mapping (Environment Agency Indicative Flood Mapping)²
- issues identified by most recent defence planning (i.e. 5 coastal defence strategy plans which have now been produced to cover most of the SMP area between Selsey Bill and Beachy Head)
- changes in legislation (e.g. the EU Habitats and Birds Directives)
- changes in national defence planning requirements (e.g. the need to consider 100 year timescales in future planning, modifications to economic evaluation criteria, etc.)
- the results of coastal monitoring activities.

Further reviews will be carried out in future years, when deemed necessary. Future reviews may include changes to policies, particularly in light of more detailed studies of the coastline.

² Please note 2003 maps have been used during the development of this plan. The Environment Agency continually updates the flood map plans. To see the latest, please go to www.environment-agency.gov.uk

This plan does not account for proposed developments, only those that were constructed or were being progressed during the time that the SMP was being developed. At the time of writing, there are a number of proposed developments for the South Downs frontage, including:

- Brighton and Hove Waste Water Treatment Works (Southern Water) – proposal for new outfalls at Friars Bay and a combined storm water overflow (CSO) at Black Rock
- Shoreham Port – land reclamation to the east of the harbour entrance
- Worthing marine development
- Regeneration of Littlehampton Harbour
- Bognor Regis Marina.

The potential impacts that these will have on the coastline will be examined in the next review of the SMP. However, this does not stop these proceeding ahead of the next SMP review if it can be shown that they are sustainable and do not have adverse impacts on the adjacent sections of coastline.

1.3.2 Production of the 2006 SMP

Development of this revision of the SMP has been led by a project management group comprising selected members of the South Downs Coastal Group, including technical officers and representatives from Arun District Council, West Sussex County Council, Worthing Borough Council, Brighton and Hove City Council, the Environment Agency, English Nature and Defra.

The SMP process has involved up to 150 stakeholders who were kept informed of the SMP review and their views sought throughout the process. Up to 40 stakeholders participated at key decision-making points through the formation of a Key Stakeholder Forum (KSF). Meetings with the KSF have been held to help to identify and understand the issues, review the objectives and set direction for appropriate management scenarios, and to review and comment upon the preferred plan policies.

The SMP is based upon information gathered largely between January and September 2003 and provided by numerous parties contacted during this period.

The main activities in producing the SMP have been:

- development and analysis of issues and objectives for various locations, assets and themes
- thematic reviews, reporting upon human, historic and natural environmental features and issues, evaluating these to determine the relative importance of objectives
- analysis of coastal processes and coastal evolution for baseline cases of not defending and continuing to defend the coastline as at present
- agreement of objectives with the Key Stakeholders, to determine possible policy scenarios
- development of policy scenarios based on key objectives and primary drivers (agreed with the Key Stakeholders) for sections of the frontage

- examination of the coastal evolution in response to these scenarios and assessment of the implications for the human, historic and natural environment
- determination of the preferred plan and policies through review with the Key Stakeholders, prior to compiling the SMP document
- consultation on the proposed plan and policies
- consideration of consultation responses and finalisation of the SMP for formal adoption
- adoption of the SMP by the local authorities and dissemination.

2 ENVIRONMENTAL ASSESSMENT: MEETING THE REQUIREMENTS OF A SEA

2.1 BACKGROUND

Directive 2001/42/EC of the European Parliament (the Strategic Environmental Assessment Directive), and the associated Environmental Assessment of Plans and Programmes Regulations 2004, requires that a Strategic Environmental Assessment (SEA) be carried out for certain plans and programmes that are required by legislative, regulatory or administrative provisions. The objective of the SEA Directive is to: *“Provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes with a view to promoting sustainable development”* (Article 1 of the SEA Directive). The Directive is therefore intended to ensure that environmental considerations are incorporated into decision making, alongside other economic and social considerations, in an integrated way, during the development of plans and programmes.

Although SMPs are not required to be prepared by legislative, regulatory or administrative provisions, they do set a framework for future development and have much in common with the kind of plans and programmes for which the Directive is designed. Therefore, with the intention of pursuing best practice in environmental matters, Defra has recommended that the SMPs should broadly comply with the requirements of the Directive.

The Directive outlines the SEA procedure as follows:

- Preparing an Environmental Report which identifies the environmental baseline, environmental protection objectives and indicators, alternatives and the likely significant effect of the draft plan
- Carrying out consultation on the draft plan and the Environmental Report
- Taking into account the Environmental Report and results of consultation in decision making
- Providing information when the plan is adopted and showing how the results of the SEA have been taken into account.

A more detailed list of SEA stages and tasks, and their purpose, is shown in the table overleaf, which is taken from “A Practical Guide to the Strategic Environmental Assessment Directive” published by the Office of the Deputy Prime Minister (<http://www.odpm.gov.uk/index.asp?id=1143289>).

Although an Environmental Report has not been produced, the following sections identify how the Beachy Head to Selsey Bill SMP broadly achieves the requirements of the 2004 SEA Regulations. The text is sub-divided into sections representing the key requirements of the Regulations and identifies the parts of the SMP in which the relevant information is presented.

Figure 5 – Stages in the SEA process	
SEA stages and tasks	Purpose
Stage A: Setting the context and objectives, establishing the baseline and deciding on the scope	
Identifying other relevant plans, programmes and environmental protection objectives	To establish how the plan or programme is affected by outside factors, to suggest ideas for how any constraints can be addressed, and to help to identify SEA objectives.
Collecting baseline information	To provide an evidence base for environmental problems, prediction of effects, and monitoring; to help in the development of SEA objectives.
Identifying environmental problems	To help focus the SEA and streamline the subsequent stages, including baseline information analysis, setting of the SEA objectives, prediction of effects and monitoring.
Developing SEA objectives	To provide a means by which the environmental performance of the plan or programme and alternatives can be assessed.
Consulting on the scope of SEA	To ensure that the SEA covers the likely significant environmental effects of the plan or programme.
Stage B: Developing and refining alternatives and assessing effects	
Testing the plan or programme objectives against the SEA objectives	To identify potential synergies or inconsistencies between the objectives of the plan or programme and the SEA objectives and help in developing alternatives.
Developing strategic alternatives	To develop and refine strategic alternatives.
Predicting the effects of the plan or programme, including alternatives	To predict the significant environmental effects of the plan or programme and alternatives.
Evaluating the effects of the plan or programme, including alternatives	To evaluate the predicted effects of the plan or programme and its alternatives and assist in the refinement of the plan or programme.
Mitigating adverse effects	To ensure that adverse effects are identified and potential mitigation measures are considered.
Proposing measures to monitor the environmental effects of plan or programme implementation	To detail the means by which the environmental performance of the plan or programme can be assessed.
Stage C: Preparing the Environmental Report	
Preparing the Environmental Report	To present the predicted environmental effects of the plan or programme, including alternatives, in a form suitable for public consultation and use by decision-makers.
Stage D: Consulting on the draft plan or programme and the Environmental Report	
Consulting the public and Consultation Bodies on the draft plan or programme and the Environmental Report	To give the public and the Consultation Bodies an opportunity to express their opinions on the findings of the Environmental Report and to use it as a reference point in commenting on the plan or programme. To gather more information through the opinions and concerns of the public.
Assessing significant changes	To ensure that the environmental implications of any significant changes to the draft plan or programme at this stage are assessed and taken into account.
Making decisions and providing information	To provide information on how the Environmental Report and consultees' opinions were taken into account in deciding the final form of the plan or programme to be adopted.
Stage E: Monitoring the significant effects of implementing the plan or programme on the environment	
Developing aims and methods for monitoring	To track the environmental effects of the plan or programme to show whether they are as predicted; to help identify adverse effects.
Responding to adverse effects	To prepare for appropriate responses where adverse effects are identified.

2.2 THE CONTEXT OF THE SMP

A Shoreline Management Plan (SMP) provides a large-scale assessment of the risks associated with coastal evolution and presents a policy framework to address these risks in a sustainable manner with respect to people and to the developed, historic and natural environment. The SMP is a non-statutory, policy document for coastal flood and erosion risk management planning. It takes account of other existing planning initiatives and legislative requirements and is intended to inform wider strategic planning. It does not set policy for anything other than coastal flood and erosion risk management.

Full details of the procedure followed in development of the SMP are set out in [Appendix A](#).

2.3 THE EXISTING ENVIRONMENT

The coastline covered by this plan has a rich diversity in its physical form, human usage and natural environment: including cliffs of both habitat and geological interest, low-lying plains fronted by dunes and beaches, towns and villages along the coastal fringe and areas of agricultural land. This combination of assets creates a coastline of great value, with a tourism economy of regional importance.

The current state of the environment is described in the 'Thematic Review', presented in [Appendix D](#). This identifies the key features of the natural and human environment of the coastline and includes commentary on the characteristics, status, relevant designations and importance of the features and the 'benefits' they provide to the wider community. The benefits assessment is provided in support of the definition of objectives.

In addition to the review of the natural and human environment, the extent and nature of existing coastal defence structures and management practices are presented in [Appendix C](#) along with an assessment of shoreline dynamics and interactions, which identifies the contemporary physical form of the coastline and the natural processes operating upon it.

2.4 ENVIRONMENTAL OBJECTIVES

An integral part of the SMP development process has been the identification of issues and definition of objectives for future management of the shoreline. This was based upon an understanding of the existing environment, the aspirations of stakeholders and an understanding of the likely evolution of the shoreline under a hypothetical scenario of 'No Active Intervention' ([Appendix C](#)), which identifies the likely physical evolution of the coast without any future defence management and hence the potential risks to shoreline features. These objectives include all relevant plans, policies, etc, associated with the existing management framework, including all identified opportunities for environmental enhancements.

The definition and appraisal of objectives has formed the focus of engagement with stakeholders during development of the SMP (as identified in [Appendix B](#)). The full list of issues and objectives defined for this SMP are presented in [Appendix E](#).

[Appendix G](#) includes consideration of how the objectives, and hence the 'environment', would be affected under the preferred policy scenarios for each frontage, with consideration of international and

national designations and obligations and biodiversity. Section 5 of this document also details consideration of the potential environmental effects of the preferred policies.

2.5 IDENTIFICATION AND REVIEW OF ALTERNATIVE POLICY SCENARIOS

The SMP considers four generic policies for shoreline management:

- Hold the Line
- Advance the Line
- Managed Realignment
- No Active Intervention

These are defined in the following box.

- Hold the Line: defences are maintained and upgraded/replaced in their current position or renewed. There may be some residual risk in holding the line, whereby foreshore steepening and narrowing beaches could make this policy unsustainable sooner than anticipated. “Renewed defences” refers to the construction of new, more robust defences, immediately landward of the existing shoreline. This may require some land take. The aim of this is to retain the existing character and form of the coast with minimal disruption while maintaining all existing assets. An example of how this could be implemented is by placing the new defences immediately behind those existing and planning for any losses that may be incurred – see Figure 2.1.

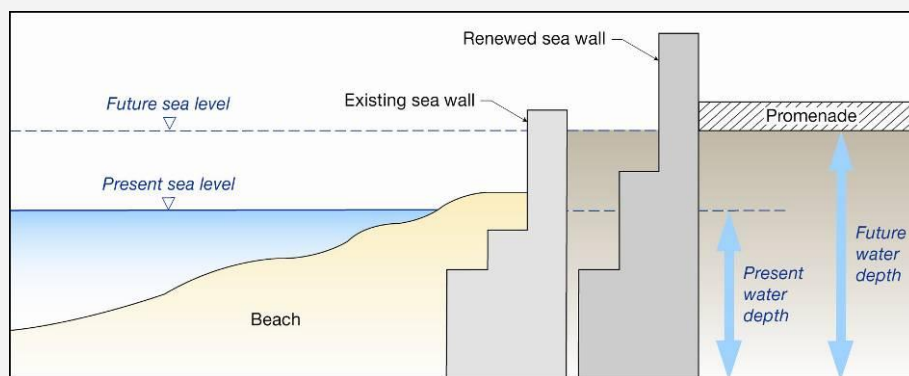


Figure 2.1: Hold the Line: Renewed Defences

- Advance the Line: build new defences seaward of the existing defence line.
- Managed Realignment: allowing retreat (or advance) of the shoreline, with management to control or limit that movement. Any increase of flood risk will also be managed.
- No Active Intervention: a decision not to invest in providing or maintaining any defences.

Appendix F presents the results of the initial consideration of the generic policies if they were applied over all three epochs at each location along the coastline. Using the findings of Appendix F, ‘policy scenarios’ have been defined. These policy scenarios identify the policy combinations (over the three epochs) taken forward for detailed consideration, and identifies why the alternatives have not been considered.

The 'policy scenarios' have then been appraised to assess the likely future evolution of the shoreline, from which the environmental impacts have been identified. An assessment of shoreline interactions and response for the preferred scenarios is presented in [Appendix G](#). The results of this assessment, in terms of risks to coastal features, were then used to appraise the achievement of objectives for the preferred policy scenarios. This is reported in the issues and objectives table in [Appendix G](#).

2.6 THE ENVIRONMENTAL EFFECTS OF THE PLAN

Based upon the output from the testing of policy scenarios, the preferred policy scenario has been defined. The preferred policy scenario for the whole coastline differs along its length, so to accommodate this, 27 Policy Units have been defined and a Policy Statement developed for each Policy Unit.

The Policy Statements present the preferred policy scenario for each Unit, identifying its justification and how it will be achieved over the 100 year period. They also present the detailed implications of the policies and identify any mitigation measures that would be required in order to implement the policy.

Section 4 of this document includes the 'Plan for Balanced Sustainability' (Section 4.1), defining the broad environmental impacts of the plan based upon the appraisal of the objectives. This Section also presents the 'Predicted Implications of the Preferred Policies' (Section 4.2) under thematic headings.

The Policy Statements for the 27 individual Policy Units are presented in Section 5. Each Statement presents the Preferred Plan for the Unit identifying its justification, and then presents the preferred policies to achieve the Plan over the 100 year period. The detailed implications of the policies are presented and any mitigation measures that would be required in order to implement the policy identified.

2.7 STAKEHOLDER ENGAGEMENT

Stakeholders have been involved in the SMP appraisal process primarily through the formation of a Key Stakeholders Forum (KSF). This involvement has:

- been undertaken throughout development of the SMP;
- given stakeholders an opportunity to comment on the environmental appraisal of options;
- allowed representations made by the stakeholders to be taken into account in the selection of policy options; and
- given the public the opportunity to comment on the preferred policies.

The KSF included representatives from, amongst others, local authorities, nature conservation bodies, industry and heritage organisations. Elected Members were also involved in reviewing the preferred policies prior to public consultation. In this way, the views of those whom the SMP policies affect were involved in its development, ensuring that all relevant issues were considered and all interests represented.

Full details of all stages of stakeholder engagement undertaken during development of the SMP are presented in [Appendix B](#).

2.8 MONITORING REQUIREMENTS

Where the preferred policies for any Policy Unit have specific monitoring/study requirements to clarify uncertainties, this is identified in the relevant 'Policy Unit Statement' (Section 5). Detailed monitoring could be undertaken within the existing South-East Strategic Regional Coastal Monitoring Programme or undertaken as part of coastal defence strategy studies. The latter will also define mitigation requirements.

3 BASIS FOR DEVELOPMENT OF THE PLAN

3.1 HISTORICAL PERSPECTIVE

The shoreline throughout much of the area covered by this SMP is retreating and has been doing so for centuries. Man has sought to limit this natural process, which has been taking place as sea levels have slowly risen and land levels have gradually dropped, the latter being the ongoing, very long-term consequences of the last ice-age. The erosion seen today therefore is nothing new. Flooding is also nothing new; prior to the major east coast floods of 1953 there had been numerous breaches along this coastline at Pagham, Elmer, Ferring and through the tidal river Ouse at Lewes.

There are well recorded losses of communities along the coast in the past few hundred years, which are evidence of this long-term natural change; these include Cudlow (south of Climping), parts of Middleton, including the church, and a number of houses and tidal mills around the Selsey Bill area. Clearly at one time these communities were situated inland, but today that same point now lies some distance off the present shoreline.

These events all took place well before the shorelines were defended to the extent they are at present, or before other activities such as dredging were taking place. Therefore, although humans may have impacted upon the change occurring at the shoreline, they have not caused it. Equally, there is no reason to suggest that this natural change is not still taking place, nor that we should assume that it will not continue to take place in the future. Human intervention will not halt this natural process; coastal defence works carried out over the last century have not prevented natural change from occurring, they have simply delayed its full implications from being felt. Coastal defence works are one approach to resisting erosion and shoreline retreat, but it is only sustainable for a limited time. The decision to be made now is how we are going to manage this shoreline change in the future.

3.2 SUSTAINABLE POLICY

3.2.1 Coastal Processes and Coastal Defence

Climate Change

The coastline is undergoing constant change due to large scale impacts of climate change, namely sea level rise, and the day-to-day effects of waves and tidal currents. It is the implications of climate change that will determine sustainable shoreline management into the future.

Sea level attained a level close to its present position about 5,000 years ago, and the modern hydrodynamic regime has been operating since that time. The role of sea level rise in shoreline evolution is thought to have been limited over the last 2,000 years, due to the low rates of change (averaging less than a millimetre per year), but we are now entering a period of accelerating sea level rise, which could result in the destabilisation of present coastal systems.

Recent climate studies have indicated that there are significant changes occurring within our climate; with bigger storms, increasing rainfall and rising sea levels. The amount of physical change for any one length of coast depends on the degree of exposure of the coast and the underlying geology. Increasing rainfall in between longer periods of drier weather can lead to increased weathering of cliff

faces, with potentially more cutback of chalk cliff face due to massive failure along internal joints (as per Beachy Head). These changes have usually taken place over long historical periods and many examples exist where settlements have been lost through erosion (e.g. Cudlow).

It is extremely important that the long-term policies in the SMP recognise these future issues and reflect likely future constraints to management planning. Thus, the SMP acts as early warning to those other plans and initiatives that are vital to the communities and infrastructure within the coastal zone.

Changes at the coast

We are also now living with a reduced resource of sediment on many of our coasts, as the sediment supply associated with the onshore transport of offshore sediments has diminished. This problem has been particularly exacerbated on this frontage where there is very limited contemporary sediment feed into, what is, a relict beach (one that receives no fresh supply of sediment), and upon which there has been substantial development.

As already discussed, the erosion of the shoreline is nothing new; this is an ongoing process, but we are more aware of it than in the past. However, it is not just the shoreline that is naturally changing, but the whole coastal system, i.e. the backshore, beach and nearshore (sub-tidal) zone. Along much of the South Downs coastline, this movement is occurring in a landward direction as sea levels rise and the shoreline responds to the increase in energy reaching it from the sea. This process is called transgression. Although attention is focussed upon the shoreline position, this process also produces a deepening of the seabed at any particular point. That change in seabed level is evidenced by narrower and steeper beaches along a lot of the frontage. Lost sandy and shingle beaches (e.g. at Middleton) associated with large sea defences are typical of the effects of accelerating sea level rise. Had the lost settlements of Middleton been defended at that time, this would not have prevented the same extent of foreshore lowering at those locations, i.e. they would today stand adjacent to very deep water. We should not expect the future to be any different and, as such, the foreshore level at existing defence locations may be anticipated to be much lower than present beach levels. Indeed, accelerated sea-level rise will increase the speed of change.

If we choose to continue to defend our shorelines in the same locations that we do at present, then the size of the defences will need to alter considerably; one consequence of deeper water is much larger waves at the defence. Defences will need to be wider to remain stable against bigger waves, have deeper foundations to cope with falling beach levels, and be greater in height to limit the amount of water passing over the top of them in storms.

Sediment movement

The alongshore movement of sediment brought onshore from the offshore sources at Selsey Bill is essential to supply beaches locally and further a field. The limited cliff erosion to the east provides very little material locally and is insufficient to add to the local protection of the frontage. Beaches provide a natural form of defence that reacts to storm waves; they do not prevent further erosion but do help to limit and control the rate at which it takes place, so a wide and high beach offers greater protection than a low and narrow one. Shingle beaches are especially dynamic, thus helping to reduce the erosive impact of waves upon the shoreline. They also help to provide environmentally important habitats. Along the South Downs SMP frontage groynes have been used extensively and are found along most beaches from Selsey Bill to Brighton Marina; offshore breakwaters at Elmer also retain

shingle that is carried eastwards along the foreshore by littoral drift (alongshore transport). The implementation of these and other management practices along virtually the entire coastline has led to a progressive denudation of sediment along downdrift frontages, causing narrowing and steepening of the foreshore and exposure of the upper shore and its defences to increased wave attack. Beach replenishment and recycling practices have been used as a method to reduce the rate at which this shoreline change is taking place.

A shoreline sediment system allowed to behave naturally without any disruption is considered to be sustainable. In some areas of the UK it can be demonstrated that long lengths of seemingly isolated coastline actually form one connected sediment system and that sediment movement from one source provides material to many locations further downdrift. Therefore, interference with the system at any point along the coast can have detrimental and sometimes unpredictable impacts considerable distances away.

However, the lack of sediment linkage along the South Downs SMP coastline due to the lack of contemporary sediment input to the west and the heavily defended nature of the shoreline means that the impact of any sediment interruption is significantly reduced in terms of consequence. This is not to say that defences cannot be introduced without creating adverse effect, rather that defence management needs to work with these processes and limit problems at other locations. In fact there has been a notable increase in beach widths along short sections of the South Downs coastline in the recent past, relating to more focused management of the coastline using softer engineering techniques, e.g. sediment recycling. However, it is thought that due to the relict nature of the shingle, these beach width increases are largely linked to sand and not shingle inputs.

Defence impacts

In general, there is less acceptance of coastal change than in the past and it is apparent, through the developments of SMPs and strategy studies, that there is often a public misconception that coastal change can be halted through engineering works. There is often a demand to continue to “hold the existing defence line”, in order to protect assets, but this is coupled with an expectation that the shoreline will continue to look exactly as it does now. Due to the dynamic nature of our shoreline, this is incorrect in many, if not most, instances.

The South Downs SMP coastline is heavily defended along both its low-lying frontages to the west and the cliffs to the east. The defences used along this coastline comprise mainly linear seawalls at the rear of shingle beaches which are, in turn, generally groyned to retain the beach material. In some locations the shingle beaches (retained by groynes) are the only means of defence to towns (for example Worthing and Rustington). Along the cliff frontages in the east of the SMP area, the base of cliffs and part of the wave cut platforms are protected from erosion through linear defences, limiting any erosion of the cliff edge. If the cliff edge were to erode, however, this could be the source of local beach building material leading to the development of a natural form of protection for the cliffs.

If we were to continue to defend the coastline into the future as we have done in the past, the long-term picture would be one of a very fragmented shoreline, characterised by a series of concreted headlands with embayments and tidal inlets in between. Seawalls would result in a series of large promontories, in some cases extending 100 to 200m out from the adjacent (undefended) eroded shoreline by the end of the century. These promontories would be highly exposed to waves in deep

water, requiring much more substantial defences to be constructed. These defences would also need to be extended landward to prevent outflanking of the present seawalls. There would be no beaches present along these frontages and the groynes would have become redundant; water will remain present at the structures at all times. The Middleton frontage today provides a good example of how some of the defended frontages within the South Downs SMP area might look in the future.

It must be recognised that, in the very long term, continuing to defend such stretches of shoreline may be technically unsustainable and consideration should be given to relocation, or mitigation for loss of assets.

3.2.2 Economic Sustainability

One of the difficulties facing us, as a nation, is the cost of continuing to protect shorelines to the extent that we do at present. Many of the defences that exist today have been the result of reactive management without consideration of the long-term consequences, including financial commitment.

Studies over the past few years have established that the cost of maintaining all existing defences is already likely to be at least 50% more than present expenditure levels. In simple terms this means that either more money needs to be invested in coastal defence, or defence expenditure has to be prioritised. Whilst the first option would clearly be the preference of those living or owning land along the coast, this has to be put into the context of how the general UK taxpayer wishes to see their money used. Given that the cost of providing defences that are both effective and stable currently averages between £3 million and £5 million per kilometre, the number of privately owned properties that can be protected for this investment has to be weighed up against how else that money could be used, for example in education, health and other social benefits.

Furthermore, because of the climate changes being predicted, which will accelerate the natural changes already taking place, these recent studies have also established that the equivalent cost of providing a defence will increase during the next century to between 2 and 4 times the present cost, excluding inflation or other factors, i.e. in excess of £6 million to £10 million per kilometre. Consequently, those areas where the UK taxpayer is prepared to continue to fund defence may well become even more selective and the threshold of when an area is no longer defended could well shift. Whilst it is not known how attitudes might change, it is not unreasonable to assume that future policy-makers will be more inclined to resist investing considerable sums in protecting property in high risk areas, such as the coast, if there are substantially cheaper options, such as constructing new properties further inland.

It is extremely important that the long-term policies in the SMP recognise these future issues and reflect likely future constraints. Failure to do so would not ensure future protection; rather it would give a false impression of a future shoreline management scenario that could not be justified and would fail to be implemented once funding was sought.

The implications of these national financial constraints are that protection is most likely to be focussed upon larger conurbations and towns, where the highest level of benefit is achieved for the investment made, i.e. more properties can be protected per pound of investment. The consequence is that rural communities will more often be affected, but from a national funding perspective, i.e. best use of the taxpayer's money, this makes economic sense.

3.2.3 Environmental Sustainability

Environmental sustainability is difficult to define as it depends upon social attitudes, which are constantly changing.

Historically, communities at risk from coastal erosion relocated, recognising that they were unable to resist change. In more recent times many coastal defences have been built without regard for the impacts upon the natural environment. Today, because we have improved technology, we are less prepared to accept change, in the belief that we can resist nature. Inevitably attitudes will continue to alter; analyses of possible 'futures' are already taking place (the Foresight programme run by the Office of Science and Technology), considering the implications for many aspects of life, including approaches to flooding and erosion under different scenarios. It is not possible to predict how attitudes will change in the future; therefore the SMP is based upon existing criteria and constraints, whilst recognising that these may alter over time to accommodate changing social attitudes.

Quality of life depends on both the natural environment and the human environment, which are discussed below.

Natural environment

The forces of nature have created a variety of landforms and habitats around the South Downs coastline. The special quality of the natural habitats and geological/ geomorphological features on this coast is recognised in a number of national and international designations (protected under statutory international and national legislation) as well as regional and local planning policies.

There is a *legal* requirement to consider the implications of any 'plan or 'project' that may impact on a Special Protection Area for Birds (SPA) or a Special Area for Conservation (SAC), through the European Union Habitats Directive (Council Directive 92/43/EEC) and Birds Directive (Council Directive 79/409/EEC). The Defra High Level Targets for Flood and Coastal Defence (Target 4 – Biodiversity) also require all local councils and other operating authorities to:

- avoid damage to environmental interest
- ensure no net loss to habitats covered by Biodiversity Action Plans
- seek opportunities for environmental enhancement
- monitor any changes to habitats, including contributions to SSSI/SPA conservation targets, loss and gain of habitats, and to keep records.

A key requirement for the SMP is therefore to promote the maintenance of biodiversity or enhancement, through identifying biodiversity opportunities.

Coastal management can have a significant impact on habitats and landforms, both directly and indirectly. In places, coastal defences may be detrimental to nature conservation interests, e.g. those seen along the cliff frontage east of Brighton Marina producing coastal squeeze, but in other locations defences may protect the interest of a site, e.g. freshwater sites behind the shore. Coastal habitats may also form the coastal defence, e.g. the spit complex at Pagham Harbour. Therefore, coastal management decisions need to be made through consideration of both nature conservation and risk management.

Although the conservation of ecological features in a changing environment remains important in terms of environmental sustainability, future management of the coast needs to allow habitats and features to respond and adjust to change, such as accelerated sea level rise. It is recognised that true coastal habitats cannot always be protected in situ because a large element of their ecological interest derives from their dynamic nature and this is important to ensure the continued functionality of any habitat. This poses a particular challenge for nature conservation and shifts the emphasis from site 'preservation' to 'conservation'. English Nature is actively seeking to ensure that coastal erosion and flood risk management proposals are designed to ensure that SSSIs are conserved and, where possible, enhancement opportunities that benefit ecology and geology are implemented, whilst also allowing the coast to remain naturally dynamic. Under Section 28G of the Countryside and Rights of Way Act 2000, English Nature is provided with the responsibility and power to safeguard England's finest and most vulnerable wildlife and geological features. Therefore, accommodating the objectives of environmental bodies, such as English Nature, and future shoreline change requires flexibility in the assessment of nature conservation issues, possibly looking beyond the designation boundaries to consider wider scale or longer term benefits.

The SMP also needs to consider opportunities for enhancing biodiversity throughout the SMP area, not just at designated sites. English Nature has published a Research Report (No 565), "Identifying Biodiversity Opportunities to Inform SMP Review" that includes proposals for the environmental enhancement of the East and West Sussex shoreline. Where possible, the opportunities identified within the report have been taken into consideration in the selection of the preferred policies to enable operating authorities to make progress with implementing the UK Biodiversity Action Plan and local Biodiversity Action Plans. There are several areas along the SMP frontage where biodiversity opportunities can be taken, e.g. allowing more natural coastal processes to take place along the stretches of low-lying areas at Climping (HR Wallingford, 2004), and exposure of the wave cut platforms along the cliff frontage east of Brighton Marina. This, however, needs to be balanced against the socio-economic objectives for the area and engineering feasibility to deliver long term sustainable management.

Human (socio-economic) environment

The human environment covers such aspects as land use (both current and future), heritage and landscape (which may be both natural and man-made).

(i) Land-use:

Historically, development of the coast has taken place unconstrained. Planning Policy Guidance 20 (PPG20) identifies that approximately 30% of the coastline of England and Wales is developed; however, much of this development took place before the introduction of the Town and Country Planning Act, 1947. Growth of built development, both commercial and residential, within the coastal zone over the centuries has increasingly required engineering works to defend properties against the risk of erosion and flooding. However, continued construction of hard-engineered coastal and flood defences to protect development may not be economically sustainable in the long-term (see Section 3.2.2. Local Development Frameworks now identify the need for 'sustainable development' and although the exact definition of this is uncertain, it recognises that opportunities for development on the coast are limited due to the risk of flooding, erosion, land instability and conservation policies (as discussed above). The PPG20 states that in the coastal zone, development plan policies should not normally permit development which does not require a coastal location.

Tourism/ recreation is one land-use that can require a coastal location and although the popularity of many British seaside resorts has declined in recent years, seaside tourism often still represents a substantial part of the local economy. In particular, the city of Brighton and Hove is the top destination for visitors from London with a vibrant international and multi-cultural community. It is also a commuter town for London. The towns of Worthing and Shoreham have particular attractions including an increasing retirement community in addition to Blue Flag beaches. Bognor Regis has numerous tourist attractions including the pier and the popular Butlins Southcoast World resort. Thus, the impacts of policy on the tourism industry need to be carefully considered.

In addition to the tourist industry, there are a number of other commercial interests along the coast. These tend to be concentrated in the larger towns such as Littlehampton, Worthing, Brighton and Shoreham. The continuation of these industries is essential to sustain the economy of the region as a whole.

The coastal strip also represents an important recreational and amenity resource; many activities rely on the presence of a beach or access to the sea. Although assets to landward of current defences and access routes may be protected through maintaining existing defences, it must be recognised that continuing such defence practices would, in the longer term, result in a significant alteration in the nature of the coast, with large concrete seawall structures, narrow beaches and limited access.

(ii) Heritage:

Heritage features are valuable for a number of reasons (English Heritage, 2003):

- they are evidence of past human activity
- they provide a sense of place (or roots) and community identity
- they contribute to the landscape aesthetics and quality
- they may represent an economic asset due to their tourism interest.

These assets are unique and, if destroyed, they can not be recreated; therefore they are vulnerable to any coastal erosion. Conversely, the very process of coastal erosion is uncovering sites of historical interest. Only a few sites are protected by statutory law, but many more are recognised as being of high importance. Government advice in PPG15 and PPG16 promotes the preservation of important heritage sites, wherever practicable. However, due to the dynamic nature of our coastlines, this is not always possible, or sustainable. Therefore, each site must be considered as an individual site and balanced against other objectives at that location.

(iii) Landscape:

Part of the South Downs coast, including Beachy Head, is designated as an Area of Outstanding Natural Beauty (AONB) in order to sustain this unique landscape by protecting the landscape and enhancing recreational opportunities in the area. There are now plans to include much of the area, including Beachy Head, in the South Downs national park. However, in general, landscape is difficult to value objectively as it is a mixture of the natural environment and social and cultural history. Therefore, defining a sustainable landscape is usually dependent upon the human and natural environment factors discussed above.

4 THE PREFERRED PLAN

4.1 PLAN FOR BALANCED SUSTAINABILITY

The SMP is built upon the aim of achieving balanced sustainability, i.e. it considers people, nature, historic and economic realities.

The proposed short term (first epoch-up to 20 years) policies for the South Downs SMP coastline provide a high degree of compliance with objectives to protect existing communities against flooding and erosion. The preferred long-term policies promote greater sustainability for parts of the shoreline and focus on sustaining and possibly enhancing the natural character of this coast. Long-term policies that continue to defend the shoreline in the present-day manner would produce a change in the nature of the coast, with a prominence of large concrete seawall structures and fewer beaches. However there is the social-economic justification to maintain these defences in the short to medium term, with opportunities to optimise management techniques to sustain those coastal assets important to the community in the longer term.

The rationale behind the proposed policies is explained in the following sections of text, which consider the SMP area as a whole. Details of the preferred policies for individual locations are provided by the individual Policy Statements in Section 5.

4.1.1 Sustainable Management

One of the main objectives in developing a Shoreline Management Plan is the definition of sustainable long term management policies for the coast. In Defra's Procedural Guidance for the Production of Shoreline Management Plans this is defined as avoiding "as far as possible, tying future generations into inflexible and expensive options for defence" (Defra, 2001). Given sea level rise predictions, this would generally best be achieved through the creation of a naturally functioning coast, allowed to move landwards or seawards at rates dictated by the natural processes of waves and tides.

However, on the South Downs coast the long history of intervention to reduce flooding and erosion risks to developments means that the shoreline is generally today in an 'unnatural' form and position, and one which would not necessarily revert to 'naturally functioning' if simply allowed to operate unmanaged from now on. Indeed, it is likely that for much of the SMP coastline, the removal/failure of defences would result in the breakdown of beaches, with little or no barrier to erosion and flooding for some time. In reality, due to the extensive defences along this shoreline protecting high density, urban developments in a low lying area, sediment is not free to move along the coastline, such that it is almost a completely man made frontage, with little opportunity to use natural coastal processes as a means of managing the shoreline. The consequences of these actions, given the extent of development of the coast, would be catastrophic in socio-economic terms, as thousands of homes and businesses lie within the potential risk areas.

As such, it is the social and economic sustainability of the SMP area which drives policy selection for the majority of this coastline; however, policies to adopt a more 'natural' shoreline in the long-term have been identified where feasible.

4.1.2 Beachy Head to Newhaven Harbour

Beachy Head to Newhaven Harbour is an Area of Outstanding Natural Beauty, rich in historical heritage with numerous important environmental sites. The shoreline is characterised by cliffs rising to the east of Seaford and broken only by the Cuckmere and Ouse River valleys. The dry valley at Birling Gap is comprised of rocks of a less resistant nature, which has resulted in cliff erosion taking place at a faster rate than in adjacent areas. The coastal area is largely undeveloped with the exception of the small town of Seaford and small settlements at Cuckmere and Birling Gap. This frontage is characterised by low rates of sediment transport and it is proposed to allow dynamic coastal processes to continue as before, enhancing and maintaining the landscape quality.

The importance of the natural landscape and biodiversity of the natural environment are the overriding drivers for the management policy along this part of the frontage, namely one of No Active Intervention with the exception of Cuckmere Haven and the Seaford Town Frontage. This policy benefits the natural environment, exposing cliff face to ongoing natural evolution and thereby allowing exposure and access to geological assets.

Cuckmere Haven and its valley is a geologically and biologically important area (designated a SSSI), as well as being of significant amenity value. The long-term policy of No Active Intervention for this frontage is to allow dynamic process to resume, sustaining these natural assets by no longer maintaining the existing defences and allowing them to fail. However, it is recommended that Managed Realignment be the policy set in the short term to allow necessary management measures, such as maintaining the west training wall and continuation of the beach re-cycling, while further studies are undertaken on managing the transition to a frontage that will be free to respond to changing coastal conditions. This is a change from the first SMP which recommended a short term policy of Hold the Line with a move to a managed realignment policy within 10 years. This review builds on those policy recommendations through the promotion of the managed realignment policy in the short term.

Seaford Town is a small seaside resort that supports some tourist economy in the area. Due to lack of sediment linkages along the frontage, the management policy of Hold the Line will have limited impact up and down drift. This is sustainable in the long term by continuing with the present practice of recycling material from the beaches at Seaford Beach to Tide Mills; or replenishing the beach possibly using recycled dredged material from the River Ouse.

Newhaven and the Ouse Valley sustain a major harbour development, with a wide trained channel and prominent breakwater; a large number of residential and commercial properties and infrastructure exists within the flood area of this Policy Unit. The long-term policy for this Unit is to 'Hold the Line' in order to protect the existing assets.

4.1.3 Newhaven to Brighton Marina

This reach of shoreline is characterised by chalk cliffs which are heavily developed with assets such as the A259 coast road and the residential developments at Rottingdean, Saltdean, and Peacehaven. There is also the associated support infrastructure integral to the region and the community as a whole. To the east is Newhaven harbour, with Brighton Marina to the west.

Increasing intensity, duration and frequency of rainfall resulting from climate change (as discussed in Section 3.2.1) in between longer periods of drier weather can lead to increased weathering of cliff faces, with potentially more cutback of the chalk cliff face due to massive failure along internal joints (as per Beachy Head). If weathering of the cliffs increases as expected with climate change, there will be difficult long term choices to be faced after 2050. This will be between, on one hand, accepting the loss of valuable cliff top property and infrastructure assets and the considerable cost of replacing them elsewhere or, on the other hand, accepting the significant environmental impacts and considerable financial costs of sustaining them. No detailed analysis of the costs and benefits of these two approaches is possible at this stage as the data for robust management decisions to be made is presently unavailable. Thus, a programme of monitor, manage and review is inherent to the future management of this frontage.

West of Newhaven at Peacehaven Heights, the cliffs are relatively undeveloped and the cliff base is fronted by a wide and healthy beach held in place, in part, by the Newhaven Harbour breakwater. The cliffs are prone to rapid weathering in wet conditions and as the climate changes this is likely to accelerate in future. This will lead to cliff top retreat and the need to consider long term relocation of mobile assets, for example the mobile homes in the Downland Caravan Park.

The longstanding policy on this frontage, from Newhaven Western Breakwater to Peacehaven Heights has been No Active Intervention for the immediate to medium term and Managed Realignment for the long-term and, because of the environmental value and the absence of any significant fixed assets at risk there, the No Active Intervention policy should remain in the short to medium term. Given the current understanding of the pressure on the foreshore due to sea level rise, the preferred long-term technical policy is to manage the realignment of the coast by allowing natural processes along the cliff face, but to maintain a terminal structure at the eastern end to hold the beach in place, thus protecting Newhaven Port. The current harbour breakwater acts in this manner at present, but should it not be maintained, an alternative will be needed to sustain the existing beaches that limit marine erosion of the frontage.

For the remaining length of frontage to the west up to Brighton Marina, the majority of the frontage is currently protected from marine erosion by substantial defences. These defences act to slow cliff top recession but do not stop it, since ongoing weathering of the cliff face, leading to cliff top retreat, is still a serious issue along this frontage. The current defences offer some protection to the important infrastructure links and to cliff top properties but they cannot hold the cliff top line indefinitely. In addition, there are significantly important natural environmental assets that are dependent on the ongoing erosion and exposure of the cliff base that are currently impeded by the presence of these defences. With the predicted sea level change expected in the longer term, bigger and more robust defences will be needed to limit marine erosion and slow cliff top recession; this may be more technically difficult and increasingly expensive to undertake.

Current estimates of erosion used in this analysis are based on numerous studies including Futurecoast, the previous SMP and coastal strategy studies for this stretch of coastline. Based on these sources, the rates of cliff top recession could range from 10 to 60 metres cliff top recession in places in 100 years. The mechanism of failure is generally localised and occurs in discrete events. The extent and frequency of these events is expected to increase based on current knowledge of climate change impacts. In order to inform on how to manage these risks in the 50 to 100 year epoch,

further study into the actual erosion occurring along the frontage should be undertaken, with detailed monitoring of the cliff face and more geological investigation in place. With a good database of cliff top movement records, and a better understanding of the geology and how it is being affected by climate change, detailed site specific data will enable identification of areas at risk and lead to confident management policy decisions. In addition, measures within the planning framework could be taken to sustain key assets such as the A259 (and any associated infrastructure).

In the short to medium term (the first 50 years) it is recommended that holding the cliff base is the more appropriate policy, managing and sustaining the existing defences to limit the impact of coastal processes on the marine erosion of the cliff base. While this offers some protection to those cliff top assets, they are still at risk from cliff erosion due to weathering of the cliff face.

Given the increasing impact of climate change, coupled with the cliff face weathering that is inherent to the environmental value of this coastal frontage, a long term technically feasible and environmentally acceptable management practice for these cliffs (given the current legislative requirements) balanced against sustaining the communities and infrastructure has to be developed. This can be planned for through an in-depth understanding of the weathering and erosion mechanisms (informed by ongoing monitoring) occurring along this frontage and how this is likely to increase due to climate change. Thus, it is recommended that appropriate detailed monitoring of the cliff movement is undertaken for the short to medium term. For the longer term this data will allow accurate predictions for the future cliff top erosion to be made and inform plans for change in managing those erosion risks to the cliff top assets.

4.1.4 Brighton Marina to Littlehampton

This shoreline is developed along its length and comprised of four key urban areas including the urbanised part of the City of Brighton and Hove and the three towns of Shoreham, Worthing and Littlehampton. The seafront is, in part, industrialised, for example by Shoreham Port, while Brighton and Hove combines residential areas with a significant tourist industry. The main aspect of this frontage is almost entirely urban with a predominantly residential character. Other than residential properties and roads, major infrastructure on or behind the frontage is limited to the harbours at Littlehampton and Shoreham-by-Sea which are integral to the economy of the area.

The only sediment feed along this frontage is a limited amount released from updrift. There is nominal onshore movement and any sediment from updrift sources is trapped on the heavily groyned beaches. There are significant seawalls along this frontage and while the long-term plan is to protect the assets of Brighton and Hove City, there will be significant losses of beach due to sea level rise. There is certainly the justification to maintain the defences in the long-term, however, there will be significant visual changes to the frontage, with higher, more robust defences required and narrower disappearing beaches. Shoreham and its port is located on potentially significant supplies of shingle being sited on spits which could, if re-exposed, supply natural re-worked sediment supplies to the Brighton frontage. This would be a short term pulse of material into the system and is probably not sustainable in the long term.

The coast between Brighton and Littlehampton is low lying, with limited sediment input and linkage along the frontage, and is susceptible to significant flood risk. The main defence along this section is the shingle beach which if not maintained will be susceptible to breaches, increasing in frequency,

particularly in the longer term. This will lead to loss of properties and important historical assets, and flood damage to many more. Thus, there is justification, economically, to maintain defences and hold the line. However, to maintain this Hold the Line policy in the longer term, linear hard defences would need to be maintained along the frontage with significant lengths of new defences constructed where at present only a beach offers protection from flood damage and erosion losses. Given the nature of sea level rise, these defences will become significantly large structures associated with narrower beaches, which would have an impact on the tourist and coastal industries in this area.

There may be some losses to the natural environment in this area following this long-term plan of protecting those existing social and economic assets. The shingle beaches will narrow and any vegetation that could be sustained along here would be lost. Widewater lagoon would experience more frequent saline intrusion, which could change the characteristics of the lagoon.

4.1.5 Littlehampton Harbour to Selsey Bill

This particular length of frontage is a mixture of the urban areas of Bognor Regis, Middleton-on-Sea and Selsey interspersed with a few open areas. These urban areas rely on tourism as the main economy for the region; however, they also provide other important services for the local community.

The natural behaviour of this coastline is largely influenced and constrained by past management practices and the presence of coastal defences, which are essential to protect the variety assets at risk. Along the developed frontages of Middleton, Bognor and Selsey, the long term plan is to maintain the defences and Hold the Line. However, due to the alignment of the frontage the sediment drift rates are quite high and there has been increasing beach drawdown, exposing the defences. It is expected that this may increase with the effects of sea level rise. As a consequence of this, significantly more robust hard defences will be needed along the frontage in the long-term where previously management of the existing beaches may have been adequate, which will lead to the narrowing and ultimately loss of the beach strip. While this may not be acceptable in terms of loss of amenity and recreational value, there are significant residential assets at risk which exist right up to the coastal strip which would be lost in the medium term should the defence be allowed to fail.

This policy will also lead to losses to natural habitats such as Bognor Reef SSSI. These features, in particular stable vegetated shingle, are significant nationally and of high importance but would be lost under a policy of holding the line. This may be environmentally unacceptable and, in certain circumstances, action may be required to offset the loss of such habitats through habitat creation initiatives.

Selsey is an important local holiday and tourist centre. It is also a critical geomorphological site acting as a control to the coastline to the east. While seawalls and embankments have fixed the landward limits of the beaches, the foreshore has narrowed and will continue to do so, increasing the risk and frequency of breaching. Whilst not in the study area, breaching of the Medmerry Shingle Barrier, in Bracklesham Bay, could result in large scale flooding of the Manhood Peninsula and the formation of Selsey Bill as an island. Thus, a management policy that holds the linear frontage in its current position will protect those assets at risk in Selsey, though the loss of the beach as an amenity would occur in the long-term. Foreshore lowering that would be associated with this management policy would re-expose notifiable geological features (inter-glacial deposits and associated fossils) that are of national importance.

Where the section of the frontage is not so developed, opportunities to benefit environmental biodiversity (and enable action to meet Defra High Level Target 4 – Biodiversity) through management policy change that can be technically sustainable in the longer term can be gained. By sustaining a more naturally functioning beach at Climping, which has European importance for its populations of protected bird species, valuable areas of vegetated shingle and sand dunes could function naturally, recreating nationally scarce habitat. While this naturally functioning system would release less material, significant quantities would still bypass downdrift, benefiting the beaches to the east. By following this long-term plan of managed realignment to a more naturally functioning coastline, a number of residential properties would be at risk, along with the Scheduled Ancient Monument of Littlehampton Fort. Steps may be needed to mitigate for these losses within the 100 year time epoch. Implementation of this policy may be affected by legal agreements covering the sea defences of part of this frontage.

Pagham Harbour is designated as an SPA, Ramsar site, SSSI and LNR for the diverse habitats and species that it supports and its geomorphological interests. Not only is it an important natural habitat, it also supports significant tourist revenue to the area with over 100,000 visitors annually to the reserve and local beaches. In addition, there are significant historical assets in this area, with the Scheduled Ancient Monuments of Becket's Barn to the north of Pagham Lagoon and Church Norton Earthworks and Priory. All are threatened by local flooding or erosion.

Pagham Harbour is regarded as an important coastal feature acting as a sink for much of the updrift sediment supply. Material that does bypass the mouth of Pagham Harbour, however, supplies the downdrift frontages to the east. Historically, the spits at the entrance to Pagham Harbour have shown great instability, with phases of extension and breaching, and the channel mouth has switched positions from north to south. It has most recently been stabilised by the new cut, training works (early 1960s) and coastal defence activities. Within the sheltered conditions of the harbour, the inner harbour bed, mudflat and saltmarsh have been accreting in the long-term, however, some recent (1956-2001) losses have been experienced (English Nature CHaMP, 2003) demonstrating that careful management of this important site is critical to sustaining the international designations already accorded to the area and meeting the criteria set within the Habitats Directive.

The careful management of this area is crucial to sustaining not only the important natural habitat and historical heritage at the site, but in also ensuring that sediment interruption is limited, to maintain the down drift beaches at Aldwick and Bognor Regis. To ensure that the most suitable policy was developed for this coastline, a separate study was carried out specifically for the SMP to assess the impacts of flooding that could occur between Pagham Harbour and Medmerry under a do-nothing scenario. The findings of this study are presented in [Appendix C](#). Sea level rise could cause rollback of the spits with an increased risk of inundation of the backshore tidal flats and marshes if they are not managed to some degree. If the spits are not maintained in their current position, the natural response of the shingle barrier at this location would be to continue to roll back causing the loss of significant residential assets as well as an undetermined effect on the inner harbour habitats. English Nature (2003) has added to this, suggesting that the low lying and reclaimed land around Medmerry could be subsequently flooded from Pagham, to form a new tidal channel, and Selsey Bill would form an island. New habitats of mudflats and saltmarsh would form at the head of the tidal channels. There is no reason why such radical and active management should not be taken, as has been done in the past.

Pagham Harbour itself has been subject to land reclamation in the late 19th Century to create grazing land from inter-tidal habitats by building a sea wall across the harbour mouth.

It is recognised that not enough is known about the effects of realignment in the harbour given the varying factors that could affect this important environmental asset. The management policy in the short term is to manage the alignment of the spits through, for example, some limited rollback of the southern spit (possibly through recharge of the back of the southern spit) and maintaining the current harbour entrance using the existing training wall. This would allow time for any monitoring of changes to habitat under this re-alignment policy to be undertaken, isolating cause and effect and allowing future management decisions to be taken based on robust data sets. For example, re-alignment at Church Norton could affect the "The Severals", which are freshwater lagoons and reedbeds within the SPA, and compensation maybe needed elsewhere. In the longer term, decisions can be made, based on further study, on the likely impact of removing the training wall, moving towards a more dynamically functioning and self sustaining coastline.

4.2 PREDICTED IMPLICATIONS OF THE PREFERRED POLICIES

In the longer term, there will come a point when it can no longer be justified, in economic, technical and environmental terms, to prevent coastal erosion and flooding given the nature of the almost closed sediment transport mechanisms along this frontage. Although in places we may not have reached this stage, we need to begin planning for this situation. Accepting that it is not possible or justified to continue to provide defences to the extent nationally that we have in the past century, the implications of this are presented below.

Direct comparison is made between the proposed policies and a No Active Intervention approach - this being the position if no money was spent on coastal defence. This comparison defines the benefits of the proposed policies.

The whole coastline, with the exception of the Shoreham Port frontage (Policy Unit ref 4d13) and the Aldwick Bay area (Policy Unit ref 4d24) falls under the jurisdiction of either the relevant local authority or the Environment Agency; a further exception is Brighton Marina, which is not considered within this Plan. The preferred policy for both Policy Unit Refs 4d13 and 4d24 (so called 3rd party defences) is to Hold the Line; These policies do not vary from the current practise and as such there is no need for 'change management'.

4.2.1 Implications for Property and Land Use

For much of the South Downs coastline the preferred policy is to maintain existing defences where economically viable in the long term. This is to minimise loss of property and assets along this mainly developed coastline. However, for some significant sections of the coast, a change in management policy has been identified for the longer term where a hold the line policy will be neither economically viable, technically sustainable, nor environmentally acceptable. The SMP has identified areas where a more naturally functioning coastline would be to the benefit of the natural environment, however, there are potential losses of assets should this policy be implemented. The key areas of management change are Cuckmere Haven, Seaford (Tide Mills), Newhaven to Brighton Marina, Littlehampton to Atherington (also known as Climping Gap) and Selsey East Beach, where the long term technical sustainability of a hold the line policy is questionable and where biodiversity opportunities can be

taken to meet national targets. These management policy changes are based on comprehensive consideration of multiple factors, including scientific fact and best technical knowledge. In situations where communities may be affected, it is critical to manage expectations and account for resistance to implementation of these policies.

For the preferred policies, the total loss of housing through the whole SMP up to year 2025, i.e. the end of the 1st epoch, is up to 15 houses and possibly 1 commercial property. This compares to the no active intervention baseline, when losses are slightly increased to 16 houses and possibly 10 commercial properties.

By year 2055, housing losses as a result of coastal erosion will total between 20 and 30, with cumulative losses of between 65 and 70 houses by the year 2105. This compares to the no active intervention baseline, when cumulative house losses could be up to 900 by 2055, and over 2,500 by 2105 if the protection measures were not afforded, i.e. the preferred policies deliver protection to well over 2300 'at risk' properties over the next 100 years. Similarly, the commercial losses under the preferred policies would increase by up to 10 by 2105, compared to the no active intervention baseline when losses could be up to 180 and 790 respectively. Consequently, the preferred policies also provide for protection to approximately 770 'at risk' commercial properties over the next 100 years. These figures relate to losses through coastal erosion only. As part of the frontage is very low lying, a breach through defences could lead to wide spread flooding, with over 19,000 residential properties and over 3,700 businesses at risk from flood damage.

Tourism is an important economic sector, with key centres at Brighton and Hove, Shoreham, Worthing, Littlehampton and Bognor Regis. Along these frontages there will be losses of up to 35 properties and some re-routing of major infrastructure will be required in the longer term under this Shoreline Management Plan. While the preferred policy for many of these areas is to hold the line in the long term, there may be a detrimental impact on tourism through loss of beaches at Bognor Regis and Middleton. Along the limited and relatively undeveloped frontages such as Climping Gap some properties will be lost due to coastal erosion in the medium term, but the preferred policy includes provision for management of the retreat at some of these locations. This could allow for relocation or mitigation measures to be implemented should there be the mechanisms to do so.

Agriculture and grazing also represents a share of the local economy and along the coast there are various grades of agricultural land. Along much of the South Downs coast, these are in the undeveloped stretches between the towns, where there is insufficient economic justification for maintaining or constructing defences, which would also be technically inappropriate. Under the preferred policies there will be loss of approximately 100 hectares by year 2105. This is comparable to a no active intervention policy under which predicted losses are over 400 hectares by 2105.

4.2.2 Implications for Nature Conservation

Along the Pagham and Aldwick frontage, the shingle beaches are designated under national and international legislation for their conservation interests and have associated biodiversity targets, which include that dynamic processes be allowed to occur and that the vegetated shingle be conserved. Both these targets will be met by the preferred policies, which allow the shingle beach to naturally function as it is accreting. There may be some losses associated with sea level rise as the frontage reacts to increasing pressure.

To the east of Brighton, the coast is characterised by high cliffs, which support a diverse range of invertebrate and maritime plant communities as well as being nationally important for their geology and geomorphology. There is also a biodiversity target associated with the littoral and sub-littoral chalk platforms that support hard rock marine communities. The preferred policy of recommending management change to allow managed cliff retreat at this location should provide for continued exposure of these platforms, which are likely to be revealed as the cliffs retreat in response to sea level rise. The management change cannot, however, combat the potential submergence of these areas as a result of accelerated sea level rise in the long-term.

To the west of Littlehampton training walls, there are areas of nationally significant dune habitat. These are designated both for the habitats that they support and for their morphological interest, which in part, is dependent upon a dynamic system; one of the Biodiversity Targets is to allow natural processes to operate. Part of the dune system is currently protected from erosion by the west training wall of the River Arun and therefore any change in policy along this frontage may result in some loss of this habitat. There is some uncertainty with respect to how the dunes may respond particularly if the golf course was not relocated to allow the dunes to roll back freely. However, it is possible that they would not roll back but instead would be eroded and lost. Therefore, it has been recommended that studies of beach-dune response are undertaken prior to the implementation of a retreated defence line policy.

Careful management of Pagham Harbour is needed to sustain the designated habitats already in place, while managing for the impact of sea level rise. The conflicting objectives of a more dynamically functioning coastline coupled with conserving existing habitat will rely on the adoption of the appropriate management policy. By making step changes based on analysis of monitoring data, changes to management policy can be made slowly, with limited impact on the habitat.

4.2.3 Implications for Landscape

The preferred long-term policies in this SMP are intended to sustain the current dense urban areas through proactive management of the existing beaches, recognising that new linear defences may be needed in the longer term. However, opportunities for forming a free functioning natural coastline in limited areas have been taken, to create a more natural coastal landscape and reducing piecemeal man-made structures on the beach. This is more beneficial to the landscape than a policy of defending the whole coastline, which would involve construction of new, more substantial defences. However, it is recognised that loss of some coastal properties, to which the AONB designation refers, may affect the quality of the landscape should they be of special character.

4.2.4 Implications for the Historic Environment

There are a wide range of heritage sites along the coast and many more of these will be protected through the preferred policies than would survive a no active intervention policy. Many features are retained and protected through the preferred policies, however, there are three possible significant losses in the longer term:

- Castle Hill Fort, Military Fort and Lunette Battery at Newhaven;
- the Belle Tout lighthouse at Beachy Head;
- Seaford Head Camp; and
- Littlehampton Fort.

Other potential losses include Cuckmere Haven Second World War defences, nationally important archaeological remains and monuments at Belle Tout enclosure, Peacehaven Cliffs, Pagham Harbour, Church Norton and Selsey Bill.

Many of the listed buildings within the South Downs SMP area are located within the towns of Bognor Regis, Littlehampton, Worthing and Shoreham, and in the City of Brighton and Hove, all of which would be protected, under the preferred policies.

4.2.5 Implications for Amenity and Recreational use

The coast is an important area for tourist and recreation use, with key interests concentrated along the coastal strip and at Brighton. Under the preferred long-term policies, the key centres of tourism and recreation of Brighton and Hove, Shoreham, Worthing, Littlehampton and Bognor Regis will continue to be protected to maintain assets currently protected by the existing defences. However, this will be at the expense of beaches along these frontages, which are unlikely to be retained as the frontages become more prominent and therefore more exposed. The promenades along these sections will also become more exposed and less accessible.

Although in the long term there are losses of beach expected from rising sea levels and coastal squeeze, there will also be potential access issues, with existing accesses to the beach often being lost or becoming redundant. There is potential, and in some places a necessity due to safety issues, for these to be re-established if funding is available.

4.3 MANAGING THE CHANGE

The consequences of the long-term management policies and the inevitability of having to change past policies cannot be overstated. By continuing to defend the coastline by following the same approach that has been taken in the past, is unsustainable in the very long-term for particular frontages and it is unrealistic to present proposed policies that indicate continued defence of an area where this is unlikely to be sustainable or economically justifiable.

To achieve this change will, however, require consideration of the consequences at various levels of planning and government. There will be matters that need to be debated at a national level, as the issues that have been identified by this Shoreline Management Plan will exist several times over around the UK. It is not possible to achieve complete sustainability from all perspectives and quite probably national policies will need to be developed to help resolve the dichotomies.

4.3.1 Recommendations

It is expected that implementing this Shoreline Management Plan 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, there may need to be compensatory provisions made to offset the losses that will result from this Plan and others. These provisions may, for example, include making other land available for building. Regional planning needs to consider the messages being delivered by this Plan, and 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 Shoreline Management Plan 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 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.

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

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 to erosion. 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 will 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, which will need to make provision for this long-term change when upgrading or replacing existing facilities in the shorter term. They should also consider how they will relocate facilities that will become lost to 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 churches, golf clubs, etc).

Private land and property owners will also need to consider how they will deal with these changes. The terms of the Acts under which the 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. There is no reason at present to assume that this will change in the future or that individual losses would be recompensed from central funds.

However, the Shoreline Management Plan provides a long lead time for the changes that will take place, which in general will not happen now, but will occur at some point in the future. To manage these changes effectively and appropriately, the approach put forward in this SMP needs to be considered now, not in several decades time. Refer to the Action Plan in Section 6.

A good example of this would be the caravan park near Newhaven; the owners of the park have taken on board the policies and have the ability within their ownership to 'roll back' the Park to ensure safe continuity of the business.

4.3.2 Policy changes from SMP1 to SMP2

The following Table sets out the policies for each unit – it should be noted that there has been some changes to Policy Unit boundaries; thus the policies shown are aligned as far as practicable in tabular form: reference should be made to the detail of the policy units for each Plan to find the precise boundaries

SMP 1			SMP 2				
Unit	Location	Policy	Unit	Location	Policy Epoch 1	Policy Epoch 2	Policy Epoch 3
1	Selsey Bill	Hold the Line	27	Selsey Bill	Hold the Line	Hold the Line	Hold the Line
			26	Church Norton to Selsey East Beach	Managed Realignment	Managed Realignment	Managed Realignment
2	Pagham Harbour	Hold the Line	25	Pagham Harbour to Church Norton	Managed Realignment	Managed Realignment	Managed Realignment
3	Pagham /West Bognor	Do Nothing	24	Aldwick to Pagham	Hold the Line	Hold the Line	Hold the Line
4	Bognor to Elmer	Hold the Line	23	Felpham to Aldwick	Hold the Line	Hold the Line	Hold the Line
			22	Middleton	Hold the Line	Hold the Line	Hold the Line
5	Elmer B/water	Hold the Line	21	Elmer	Hold the Line	Hold the Line	Hold the Line
6	Elmer to Littlehampton Harbour	Hold the Line	20	Littlehampton to Poole Place	Managed Realignment	Managed Realignment	Managed Realignment
7	Littlehampton	Hold the Line	19	River Arun	Hold the Line	Hold the Line	Hold the Line
8a	Littlehampton to Goring	Hold the Line	18	Angmering to Littlehampton	Hold the Line	Hold the Line	Hold the Line
8b	Worthing to Lancing	Hold the Line	17	Kingston / Ferring	Hold the Line	Hold the Line	Hold the Line

9a	Lancing to Shoreham Harbour	Hold the Line	16	Worthing to Goring	Hold the Line	Hold the Line	Hold the Line
9b	Shoreham to Aldrington	Hold the Line	15	Shoreham to Worthing	Hold the Line	Hold the Line	Hold the Line
10	W.Hove to Brighton Marina	Hold the Line	14	River Adur	Hold the Line	Hold the Line	Hold the Line
			13	Shoreham Harbour	Hold the Line	Hold the Line	Hold the Line
11	Brighton Marina	Hold the Line	12	B Marina to Portslade	Hold the Line	Hold the Line	Hold the Line
12	Marina to Telscombe	Hold the Line	11	Rottingdean to B Marina	Hold Cliff base	Hold Cliff base	Monitor, Manage & Review
13a	Telscombe	Hold the Line	10	Saltdean to Rottingdean	Hold Cliff base	Hold Cliff base	Monitor, Manage & Review
13b	Peacehaven	Hold the Line	9	Telscombe	No Active Intervention	No Active Intervention	No Active Intervention
14	Peacehaven to Harbour Heights	Do Nothing	8	Peacehaven	Hold Cliff base	Hold Cliff base	Monitor, Manage & Review
15a	Newhaven Harbour	Hold the Line	7	Newhaven to Peacehaven	No Active Intervention	No Active Intervention	Managed Realignment
			6	Newhaven & Ouse	Hold the Line	Hold the Line	Hold the Line

15b	Tide Mills to Seaford	Hold the Line	5	Seaford (Tide Mills)	No Active Intervention	Managed Realignment	Managed Realignment
			4	Seaford	Hold the Line	Hold the Line	Hold the Line
16	Seaford Head	Do Nothing	3	Seaford Head	No Active Intervention	No Active Intervention	No Active Intervention
17	Cuckmere Haven	Hold the Line	2	Cuckmere Haven	Managed Realignment	No Active Intervention	No Active Intervention
18a	Cuckmere to Birling Gap	Do Nothing		Beachy Head to Cuckmere	No Active Intervention	No Active Intervention	No Active Intervention
18b	Birling Gap	Do Nothing	1				
18c	Birling to Beachy Head & Holywell	Do Nothing					

5 POLICY STATEMENTS

5.1 INTRODUCTION

This section contains a series of statements presenting the preferred policies and implications for individual locations. Each statement refers to a Policy Unit (as defined in Section 2.7). These are to provide local detail to support the overall SMP presented in Section 4, and consider locally-specific issues and objectives, which are presented in Appendix E. Consequently, these statements must be read in conjunction with those wider objectives and in the context of the wider-scale issues and policy implications as reported therein.

5.2 CONTENT

Each Policy Statement contains the following:

Location reference This provides the general name used for reference to each policy unit and a number identifier which is sequential along the shoreline from east to west (to accord with a new national notation).

Summary of the SMP recommendations and justification This is a statement summarising the Plan for the location and describing the rationale behind it. These statements focus upon the long-term policy but also note any different short-term requirements.

Preferred policies This describes the preferred policies and activities to be adopted in the short, medium, and long-term. In this respect, “immediate” is broadly representative of the next 20 years, “Medium-term” 20 to 50 years, and “Long-term” 50 to 100 plus years. These timescales should not be taken as definitive, however, but should instead be considered as phases in the management of a location.

Predicted implications of the preferred policies for this location This table summarises the consequences *at this location only* resulting from the preferred policies. These are categorised as “Property & Land Use”, “Nature Conservation”, “Landscape”, “Historic Environment” and “Amenity & Recreational Use”, and correspond with information being entered into the national database of SMPs. The implications have been assessed for the situation by years 2025, 2055 and 2105, again to provide a nationally consistent picture.

Maps The maps show the indicative erosion that is expected to occur under a preferred option of no active intervention or managed realignment. 2003 indicative flood plain maps have been used. The reader should note that these are continually updated by the Environment Agency.

5.2.1 Policy units

Statements are provided for the following Policy Units:

Beachy Head to Cuckmere Haven	Peacehaven	Shoreham Harbour to Worthing	Middleton-on-Sea
Cuckmere Haven	Telescombe Cliffs	Worthing to Goring-by-Sea	Felpham to Aldwick
Seaford Head	Saltdean to Rottingdean	Ferring/ Kingston	Aldwick to Pagham
Seaford	Rottingdean to Brighton Marina	Angmering-on-Sea to Littlehampton	Pagham Harbour & Church Norton
Seaford (Tide Mills) to Newhaven Harbour	Brighton Marina to Portslade by Sea	River Arun	Church Norton to Selsey East Beach
Newhaven Harbour and River Ouse	Shoreham Harbour (Southwick)	Littlehampton Harbour to Poole Place	East Beach to Selsey Bill
Newhaven Harbour to Peacehaven Heights	River Adur	Elmer	

Location reference: Beachy Head to Cuckmere Haven

Policy Unit reference: 4d01

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

The recommended long-term plan for Beachy Head (including Birling Gap) to Cuckmere Haven is to continue to allow the unprotected cliffs to erode and allow the shoreline and coastal processes to remain free functioning. This policy is considered sustainable in technical terms due to the hard geological nature of the coastline, low transport rates and therefore limited linkages to adjacent shorelines. By not intervening with this coastline, the geological and biological assets should be maintained in the long term, which adheres to the requirements of a SSSI.

Preferred policies to implement Plan:

Immediate: The short-term policy for Beachy Head is to allow the cliffs to erode and natural processes to take place. There are currently no defences along the frontage, so the cliffs and wave-cut platform will be free to erode at their present rate. This policy is consistent with the medium and long-term policies of No Active Intervention.

Medium-term: The medium-term policy is to continue to allow the cliffs and wave-cut platform to erode, which will continue into the long term. It is expected that the rate of cliff erosion will increase as sea levels rise. Sediment released via erosion will be trapped within the local pocket beaches and coves. This policy is consistent with the long-term aim of No Active Intervention.

Longer-term: The long-term policy is to continue to allow the chalk cliffs to erode, and the wave-cut platform to widen and lower. Sediment supplied via erosion will continue to feed the local pocket beaches and bays, with no unnatural impact on the coastal processes or sections of coastline downdrift.

This policy is sustainable in the long term, and ensures that this section of coastline will remain free functioning. The coastline position is expected to erode parallel to its present alignment, with little change to the existing character of the frontage.

Location reference: Beachy Head to Cuckmere Haven

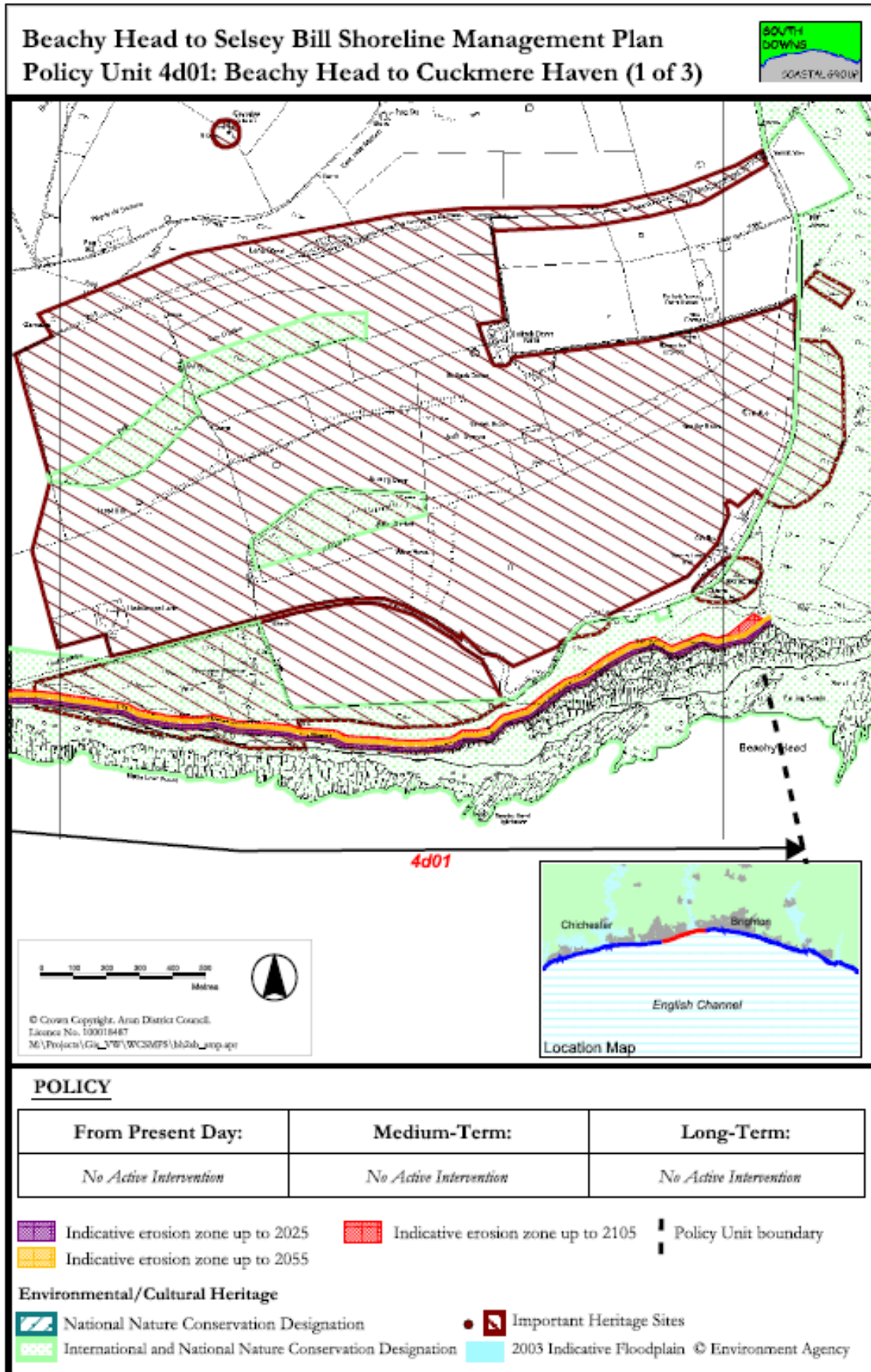
Policy Unit reference: 4d01

IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

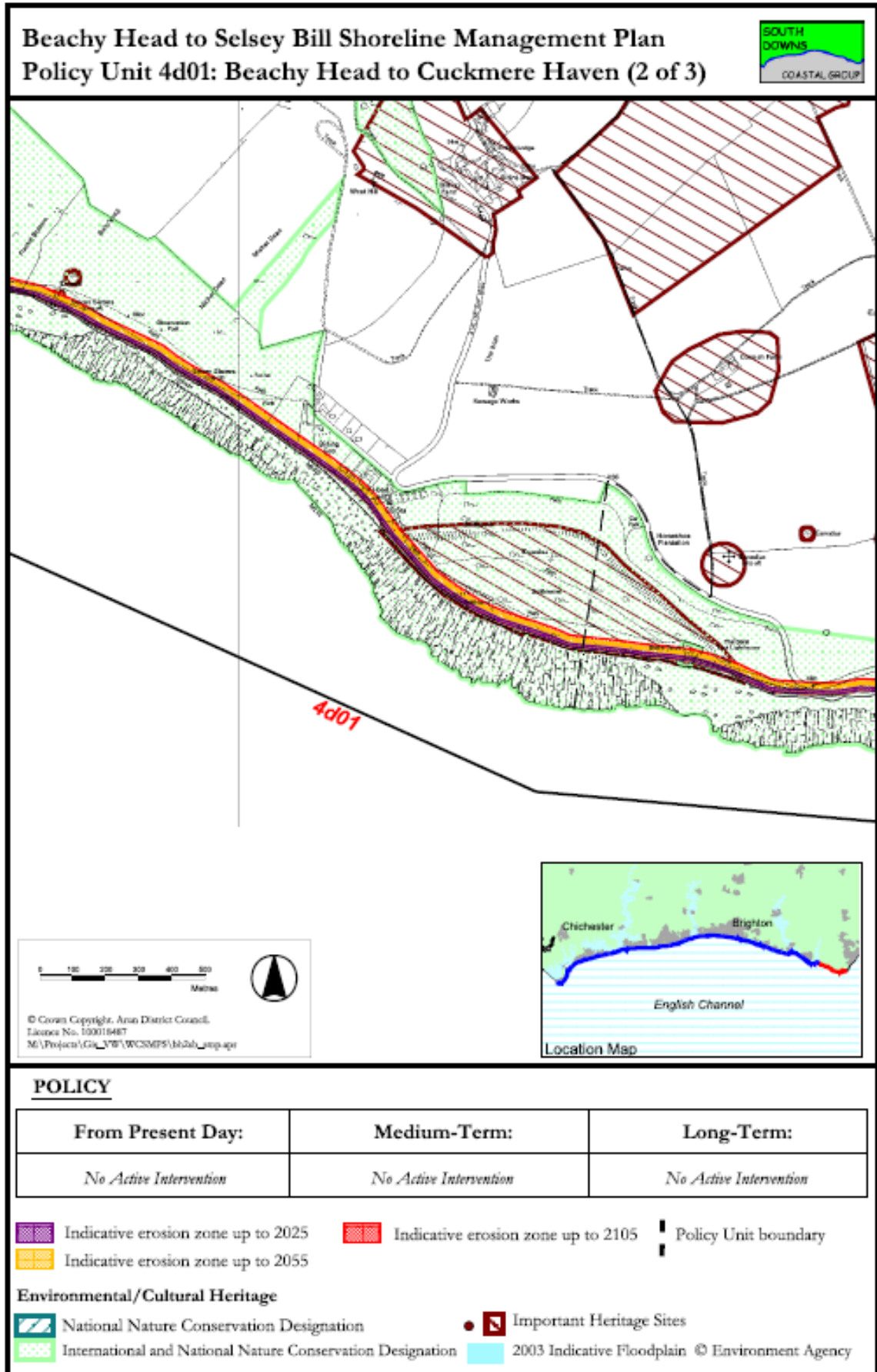
Time Period	Management Activities	Property, Built Assets & Land Use	Landscape	Nature Conservation	Historic Environment	Amenity & Recreational Use
2005 – 2025	Cliff erosion will continue, providing a minimal supply of sediment to the local pocket beaches.	No loss of property, land or infrastructure.	No change to landscape, cliff or shoreline character	The continued erosion of the cliffs maintains the biological and geological assets, although some areas of habitat will be lost due to natural cliff erosion.	Loss of inshore archaeology	South Downs Way National Trail will be at risk of erosion
2025 – 2055	Cliff erosion will continue, providing a minimal supply of sediment to the local pocket beaches.	Some loss of property at Birling Gap, although no other loss of property along this frontage. Potential loss of sections of the coastal road (C89). Risk to already diverted South Downs Way National Trail. Belle Tout Lighthouse will be at risk.	No change to landscape, cliff or shoreline character	The continued erosion of the cliffs maintains the biological and geological assets, although losses will result due to natural cliff erosion.	Loss of SAM and inshore archaeology	Loss of parts of South Downs Way National Trail
2055 – 2105	Cliff erosion will continue, providing a minimal supply of sediment to the local pocket beaches.	Predicted loss of some residential properties by year 100. Loss of sections of the coastal road (C89). It is expected that up to 30ha of agricultural land could also be lost	No change to landscape, cliff or shoreline character	The continued erosion of the cliffs maintains the biological and geological assets, although losses will result due to natural cliff erosion.	Loss of SAM and inshore archaeology	Loss of parts of South Downs Way National Trail

The above provides the local details in respect of the SMP-wide policy presented in the preceding sections of this Plan document. These details must be read in the context of the wider-scale issues and policy implications, as reported therein.

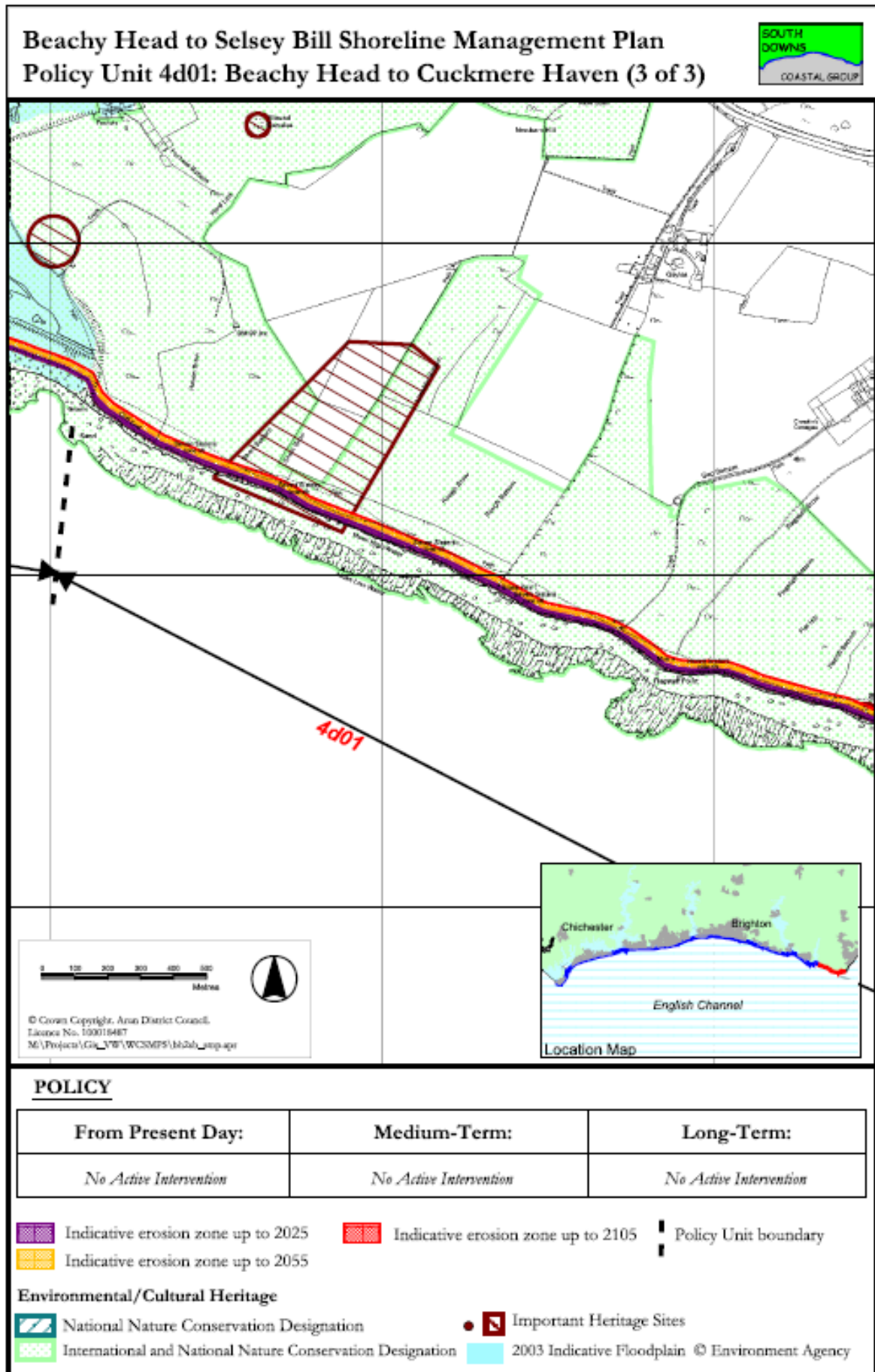
		between 2005 and 2105. Likely loss of Belle Tout Lighthouse.				
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The above provides the local details in respect of the SMP-wide policy presented in the preceding sections of this Plan document. These details must be read in the context of the wider-scale issues and policy implications, as reported therein.



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Location reference: Cuckmere Haven

Policy Unit reference: 4d02

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

The recommended long-term plan for Cuckmere Haven is to allow natural processes to determine shoreline behaviour and re-create a self-sustaining system. This may be achieved by managing the realignment of the coastline in the immediate term only, but in a way that the outcome is not detrimental to the long term aims.

Cuckmere Haven is of national importance (SSSI, AONB and a HC) and this policy is therefore considered to be technically sustainable. This policy needs to be considered in relation to impacts upstream, within the estuary and further studies will be required for the management and implementation of this long-term policy, e.g. the issues of planning, renewed defences for the A259 and necessary footpath diversions.

Preferred policies to implement Plan:

Immediate:

The policy for this frontage is to manage the existing defences with decreasing investment to enable the coastline to realign and allow the creation of a naturally functioning estuary and mouth. This will prepare the coastline for the medium and long term policy of no active intervention. Existing management practices on the coastal frontage, including recycling of beach material and maintenance of the training walls at the mouth of the river, should be continued for the present time whilst further studies of the Cuckmere estuary are completed.

Medium-term:

Subject to the implementation of the Immediate policy, the medium-term policy for this area is No Active Intervention.

The entrance to the estuary would follow a cycle of breaching and resealing and the estuary mouth and channel would return to its pre-trained/managed, wider form. The spits would begin to realign to their pre-trained form by migrating landwards and the beaches would widen and lower.

The growth and renewal of intertidal habitat would continue through the medium-term.

Through this policy of No Active Intervention the Cuckmere coastline will be free to continually evolve as a self-sustaining system.

Longer-term:

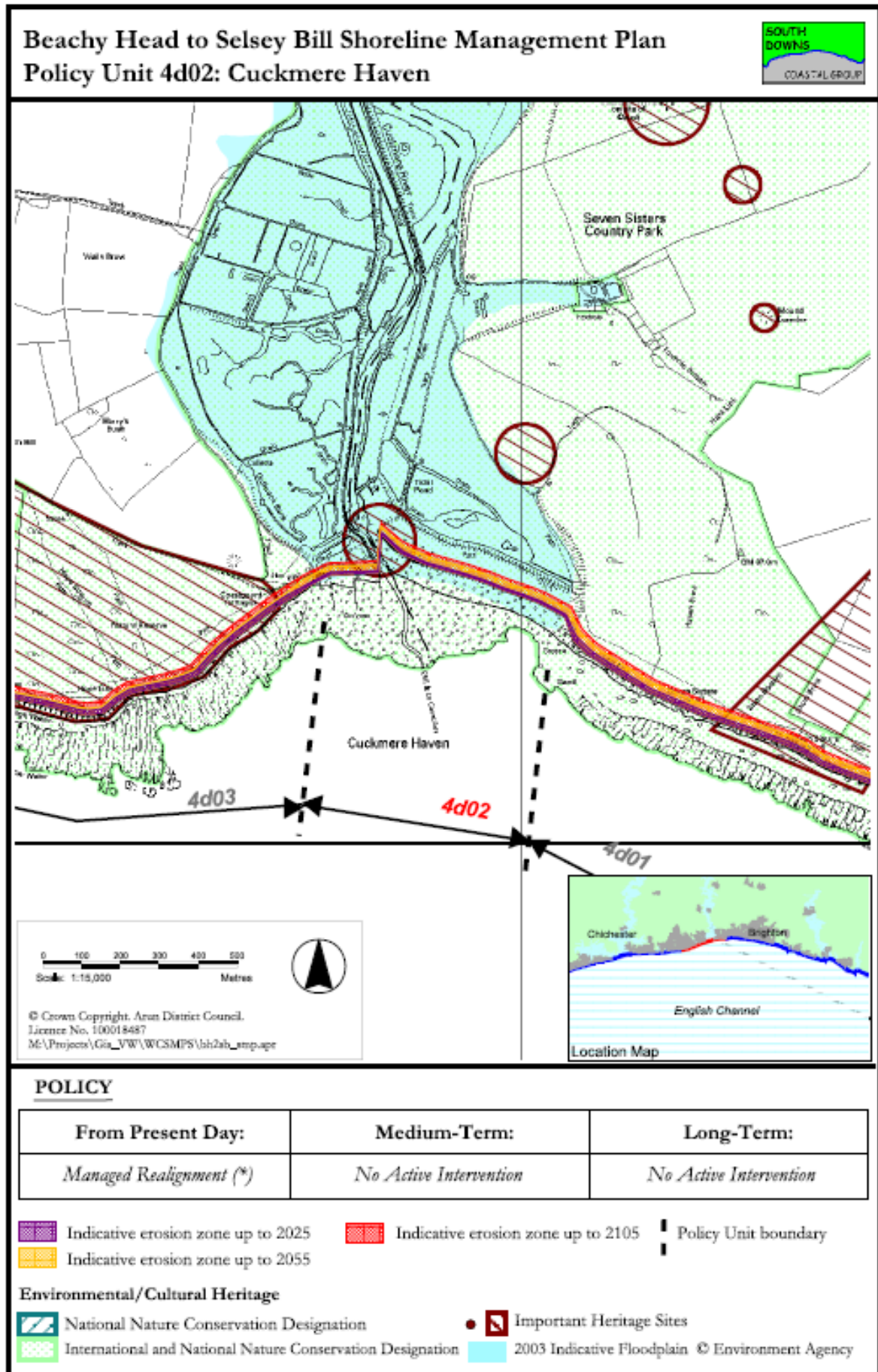
The long-term policy is to continue to allow natural cyclic processes to take place. The formation of the tidal inlet is expected to change, although this policy is sustainable in the long term. It ensures that Cuckmere Haven will be a free functioning system, with a wide distribution of well developed intertidal habitats.

Location reference:	Cuckmere Haven
Policy Unit reference:	<i>4d02</i>

IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

Time Period	Management Activities	Property, Built Assets & Land Use	Landscape	Nature Conservation	Historic Environment	Amenity & Recreational Use
2005 – 2025	Defences will be maintained with decreasing investment and existing management practices continued until further studies on how a more naturally functioning estuary can be achieved are completed. Localised protection may be required to the A259 causeway and bridge.	No loss of property or infrastructure behind the existing coastal defences in the immediate term. Loss of agricultural land behind the existing defences. There is a risk that property access will be restricted.	Change to the character of the river valley, but the Sussex Downs coastal landscape will not change. Some agricultural land loss.	Geological and habitat assets maintained through policy of no defences.	Loss of both coastal and inshore heritage sites.	Amenity beach preserved. Some footpaths in the area may be affected, but access will still be possible.
2025 – 2055	Subject to the implementation of the Immediate term policy, Cuckmere Haven will form a free-functioning system.	No loss of property. Possible loss of infrastructure if A259 is not protected. Some agricultural land loss.	Change to the character of the river valley, but the Sussex Downs coastal landscape will not change.	Intertidal habitats encouraged to grow and regenerate.	Loss of both coastal and inshore heritage sites.	Amenity beach still present. Some footpaths in the area may be affected, but access will still be possible.
2055 – 2105	Cuckmere Haven will form a self-sustaining system.	No loss of property. Possible loss of infrastructure if A259 is not protected. Some agricultural land loss.	Change to the character of the river valley, but the Sussex Downs coastal landscape will not change.	Intertidal habitats encouraged to grow and regenerate.	Loss of both coastal and inshore heritage sites.	Amenity beach still present. Some footpaths in the area may be affected, but access will still be possible.

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Location reference: Seaford Head

Policy Unit reference: 4d03

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

The recommended long-term plan for Seaford Head is to continue to allow the unprotected cliffs to erode and allow the shoreline and coastal processes to remain free functioning. Seaford Head is of high environmental importance (SSSI, AONB and a HC) and this policy is therefore considered to be sustainable as it will allow the cliffs to function naturally. Erosion losses will be minimal due to hard geology of the shoreline, and since rates of erosion, sediment feed and transportation along this frontage are low, this policy will have a nominal impact on the adjacent frontage.

Preferred policies to implement Plan:

Immediate: The short-term policy for Seaford Head is no active intervention. The gabions at Hope Gap would no longer be maintained and their effectiveness will reduce throughout the immediate period. There are currently no defences elsewhere along the frontage, so the cliffs and wave-cut platform will be free to erode at their present rate. This policy is consistent with the medium and long-term policies of No Active Intervention.

Medium-term: The medium-term policy is to continue to allow the cliffs and wave-cut platform to erode, which will continue into the long term. It is expected that the rate of cliff erosion will increase as sea levels rise. Sediment released via erosion will be trapped within the local pocket beaches and coves.

Longer-term: The long-term policy is to continue to allow the chalk cliffs to erode, and the wave-cut platform to widen and lower. Sediment supplied via erosion will continue to feed the local pocket beaches and bays, with no unnatural impact on the coastal processes or sections of coastline downdrift.

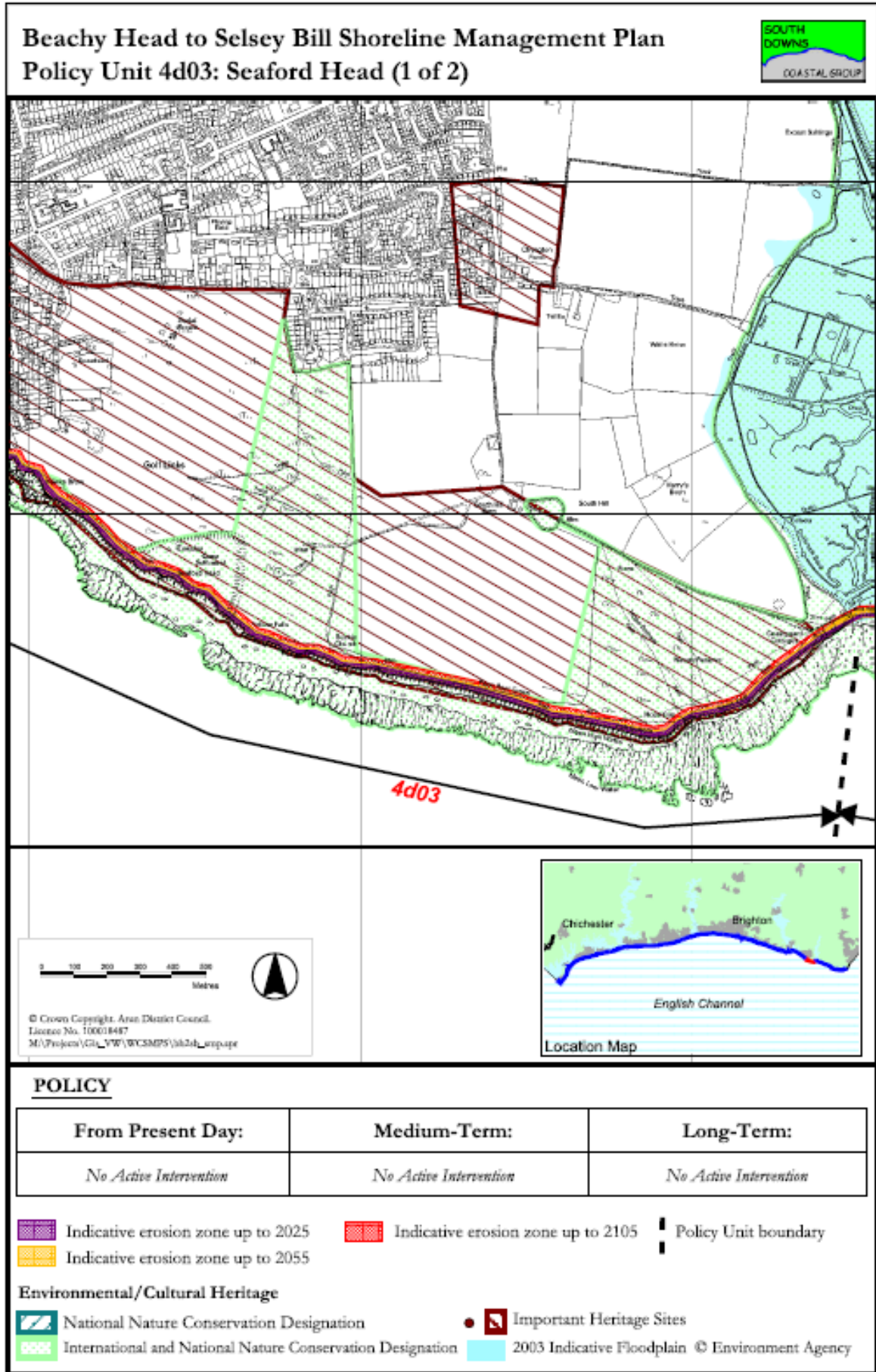
This policy is sustainable in the long term, and ensures that this section of coastline will remain free functioning. The coastline position is expected to erode parallel to its present alignment, with little change to the existing character of the frontage. Allowing the cliffs to erode meets the requirements of a SSSI, by allowing natural processes to take place, and the geological and biological assets along the frontage to remain free functioning.

Location reference:	Seaford Head
Policy Unit reference:	4d03

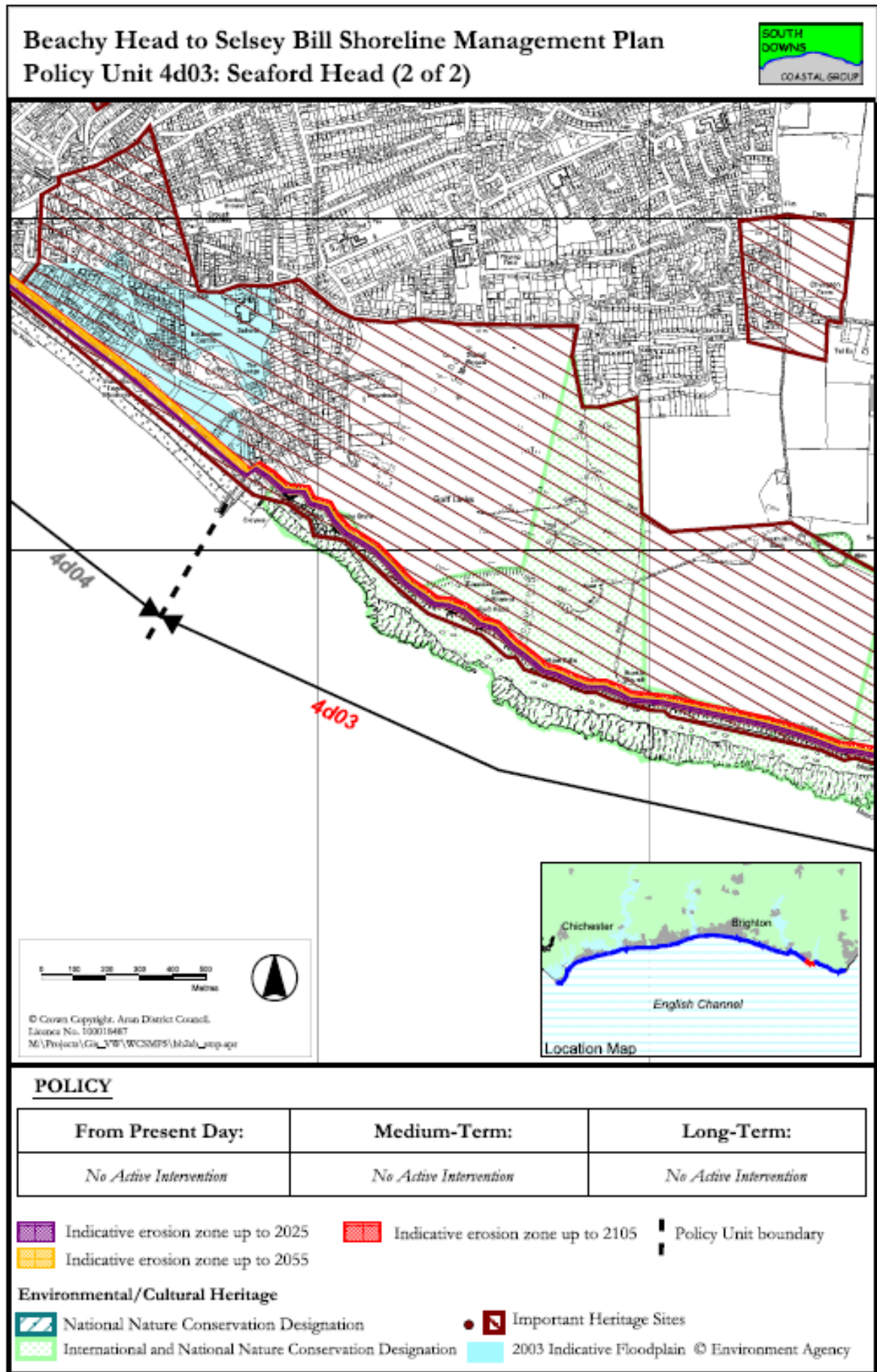
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

Time Period	Management Activities	Property, Built Assets & Land Use	Landscape	Nature Conservation	Historic Environment	Amenity & Recreational Use
2005 – 2025	Cliff erosion will continue provide a small source of sediment to the local pocket beaches.	No loss of property, land or infrastructure.	No change to coastal landscape.	Continued erosion of the cliffs maintains the biological and geological value of the coastline.	Damage and loss of SAM (Seaford Head Camp) heritage site as the cliffs erode.	The beach currently provides little scope for amenity due to their accessibility.
2025 – 2055	Cliff erosion will continue provide a small source of sediment to the local pocket beaches.	Minimal loss, with only one residential property at risk.	No change to coastal landscape.	Continued erosion of the cliffs maintains the biological and geological value of the coastline.	Damage and loss of SAM (Seaford Head Camp) heritage site as the cliffs erode.	Some cliff top erosion result in the loss of amenity assets.
2055 – 2105	Cliff erosion will continue provide a small source of sediment to the local pocket beaches.	It is expected that there is potential for loss of 4 residential and one commercial property by year 100. Up to 10ha of agricultural land loss could also take place by year 100.	No change to coastal landscape.	Continued erosion of the cliffs maintains the biological and geological value of the coastline.	Damage and loss of SAM (Seaford Head Camp) heritage site as the cliffs erode.	Some cliff top erosion result in the loss of amenity assets.

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Location reference: Seaford

Policy Unit reference: 4d04

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

The recommended long-term plan for Seaford is to continue to protect assets within the town through defending the present position. The town has a relatively high number of residential properties and recreational assets. It is a small tourist resort and service centre for the sub region, providing a range of facilities that support surrounding communities. It is recognised that in order to sustain these assets in the long-term, it will be necessary to continue with current management practices. This policy is considered sustainable in technical terms, as any adverse affects that defending the coastline has on coastal processes, will be mitigated against via the existing Seaford Beach Renourishment Scheme.

Preferred policies to implement Plan:

Immediate:

The present-day policy for this area is to continue to protect the town frontage through maintaining existing seawall, revetment, breastwork, and groynes, and continue to renourish the beach.

This will protect the maximum number of assets, as the defences and beach renourishment, will be of sufficient standard to maintain the required standard of defence.

This is consistent with the long-term plan for this section of shoreline.

Medium-term:

The medium-term policy is to continue defending the frontage beyond the immediate term. Defence of this frontage would most likely be provided through maintaining and upgrading the existing structures and continuing with a programme of beach renourishment.

During the next 20 to 50 years, it is likely that a beach would remain in position, although sea level rise will begin to offset the gains of placing the present quantities of material on the beach. To solve this increased beach renourishment will be required. This will in turn provide a method of protection to the defences from marine attack, which is consistent with the long-term plan for this section of shoreline, of maintaining the present coastline position.

Longer-term:

The long-term policy is to continue defending the frontage. Defence of this frontage would most likely be provided through maintaining, upgrading and potentially replacing defence structures. The beaches would be expected to narrow, steepen and lower as sea levels rise and beach renourishment would have to be increased to prevent coastal squeeze.

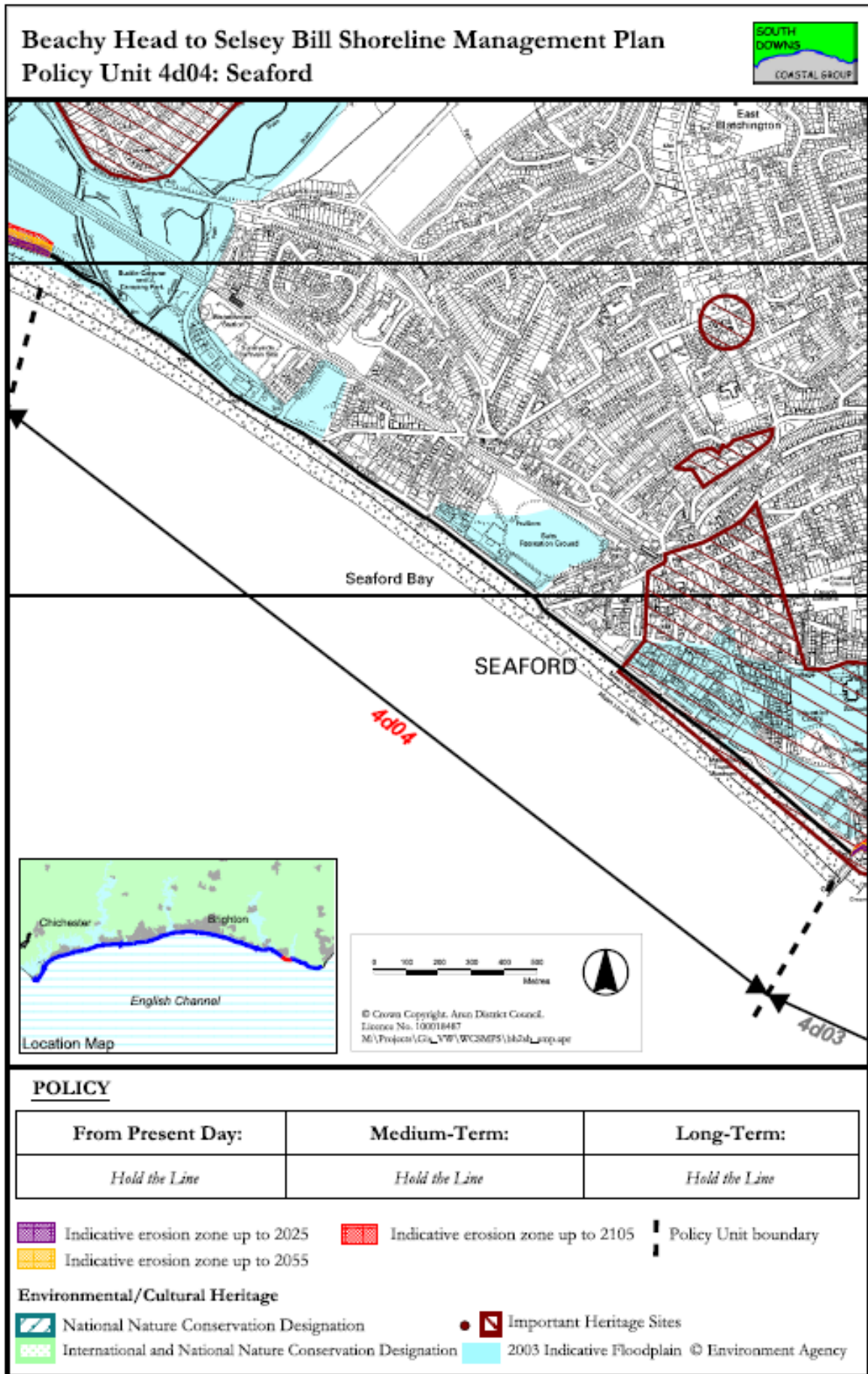
Although this should continue to protect assets within the town, the character of the frontage may however be changed from the present day, with high seawalls and low beaches present in front of the town.

Location reference:	Seaford
Policy Unit reference:	<i>4d04</i>

IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

Time Period	Management Activities	Property, Built Assets & Land Use	Landscape	Nature Conservation	Historic Environment	Amenity & Recreational Use
2005 – 2025	Continue with current practices.	No loss of property, land or infrastructure behind the existing defences.	No change to the existing landscape of character of the seafront.	Geological and biological features maintained.	No assets are at risk.	No loss of community or recreational facilities landward of the defences. Existing beach maintained.
2025 – 2055	Continue with current practices.	No loss of property, land or infrastructure behind the existing defences.	No change to the existing landscape of character of the seafront.	Geological and biological features maintained.	No assets are at risk.	No loss of community or recreational facilities landward of the defences. Beach access and beach quality is expected to decline during this period.
2055 – 2105	Maintain, replace and where necessary upgrade existing defences.	No loss of property, land or infrastructure behind the existing defences. Agricultural land losses would be minimal, with 1 ha of loss predicted to take place by year 2105.	No change to the existing landscape of character of the seafront.	Geological and biological features maintained, although some loss of Seaford Green SNCI.	Some loss of heritage sites.	No loss of community or recreational facilities landward of the defences. Reduction in beach, so that beach access and beach quality declines during this period.

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Location reference: Seaford (Tide Mills) to Newhaven Harbour

Policy Unit reference: 4d05

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

The recommended long-term plan for Seaford (Tide Mills) to Newhaven Harbour is to manage the realignment of the shoreline landwards, but under a managed regime. The frontage would be free to operate as a free functioning system, fixed only at its landward limit by set back flood defences (implemented after strategic study). Some habitat assets may be lost, although, this policy is considered sustainable due to the large amount of diverse habitat gain, low transport rates and limited linkages to adjacent shorelines.

Preferred policies to implement Plan:

Immediate: The present-day policy for this area is to not intervene with the coastline. This policy is designed to work in unison with the long-term plan for this section of shoreline of achieving a realigned coastline.

There are currently no defences along this frontage. The beaches will continue to accrete and it is expected there will be little change from the existing condition. The beach will therefore remain relatively stable, and the majority of assets will only generally be threatened by overtopping during storms.

Medium-term: The medium-term policy is to realign this section of coastline. There are no defences along this shoreline, so realignment will take the form of set back flood embankments, designed to manage the extent of flooding that is expected to occur as a result of sea level rise during the medium term.

During the next 20 to 50 years, the beaches are expected to narrow, steepen and roll back as sea levels rise. Use of this beach as a source of material for the beach replenishment at Seaford Town should be reconsidered as the sediment supply reduces. Maintenance dredging for navigation purposes will continue. Overtopping and breaching of the beach will increase in frequency and intensity, providing a potential area for intertidal habitat formation. This is consistent with the long term policy for this section of coastline.

Longer-term: The long-term policy is to continue to manage the realignment of this coastline. The extent of flooding and habitat formation will be controlled by maintaining and upgrading the flood defence structures. Maintenance dredging for navigation purposes will continue.

This should continue to protect the existing infrastructure and assets around the area. The character of the frontage will change from the present day, with the potential for the formation of an embayment and continued evolution of intertidal habitats. It is expected that there will be

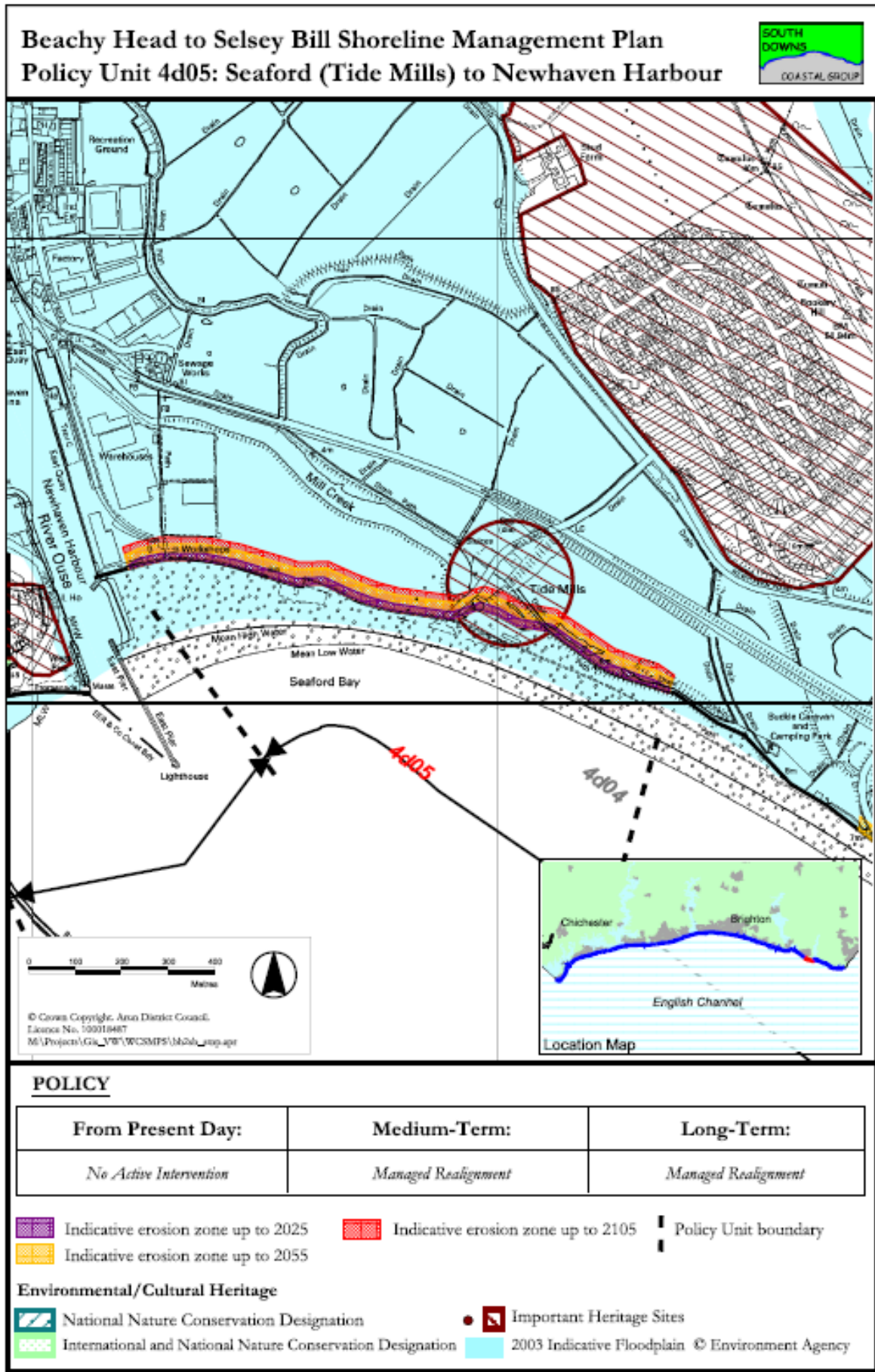
some loss of the peripheral intertidal habitat over the longer term as it becomes squeezed against the flood defences with sea level rise.

Location reference:	Seaford (Tide Mills) to Newhaven Harbour
Policy Unit reference:	4d05

IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

Time Period	Management Activities	Property, Built Assets & Land Use	Landscape	Nature Conservation	Historic Environment	Amenity & Recreational Use
2005 – 2025	No defences along this coastline.	No loss of property, land or infrastructure.	No change to landscape character of seafront.	No nature conservation gains during this period.	No loss of heritage sites, including Chailey Heritage Museum and Tidemills.	No loss of community or recreational facilities landward of the defences. Some narrowing of amenity beaches.
2025 – 2055	Construction of flood embankments required.	No loss of property, land or infrastructure.	No change to landscape character of seafront.	Environmental change of lagoon as flooding of lagoon behind existing beach occurs.	No loss of heritage sites, including Chailey Heritage Museum and Tidemills.	No loss of community or recreational facilities landward of the defences. Narrowing of amenity beach.
2055 – 2105	Maintain and upgrade flood embankments.	No loss of property, land or infrastructure. It is anticipated that up to 30ha of land loss could occur by years 2105.	No change to landscape character of seafront.	Environmental change of lagoon as flooding of lagoon behind existing beach occurs. Loss of stable shingle and saltmarsh adjacent to flood embankments, which could reduce the biological value as SNCI and national BAP habitat.	No loss of heritage sites, including Chailey Heritage Museum and Tidemills.	Potential loss of coastal path. Reduced beach width as the shingle ridge rolls back.

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Location reference: Newhaven Harbour and River Ouse

Policy Unit reference: 4d06

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

The recommended long-term plan for Newhaven Harbour and the mouth of the River Ouse is to continue to protect assets within the town through defending the present position. The harbour supports an international port and related industries, and is an important source of employment for the local area. The town itself is a key service centre for the sub region, providing a range of facilities and recreational amenities and the Ouse Valley is important for its environmental wealth. It is therefore recognised that in order to sustain the existing socio-economics of this area and the sediment transport linkages, current management practices must continue.

Preferred policies to implement Plan:

Immediate:

The present-day policy for this area is to continue to fix the position of the harbour mouth and protect this and the frontage at the mouth of the River Ouse by maintaining existing seawall and breakwaters. This policy does not include the banks of the River Ouse. Maintenance dredging for navigation purposes and recycling of sediment across the harbour mouth to Tide Mills will continue.

This will protect the maximum number of assets, but over this period beaches will start to become narrower and defences more exposed.

This is consistent with the long-term plan for this section of shoreline.

Medium-term:

The medium-term policy is to continue defending the frontage beyond the immediate term. Maintenance dredging of the main channel for navigation purposes will continue.

During the next 20 to 50 years, the frontage would be lacking a protective foreshore and the seawall, breakwaters and quaysides will be subject to increased marine wave exposure as sea levels rise. Defence of this frontage would most likely be provided through maintaining, upgrading and replacing structures.

Longer-term:

The long-term policy is to continue defending the frontage. Defence of this frontage would most likely be provided through maintaining, replacing and upgrading seawall, breakwaters and quaysides. Maintenance dredging for navigation will continue.

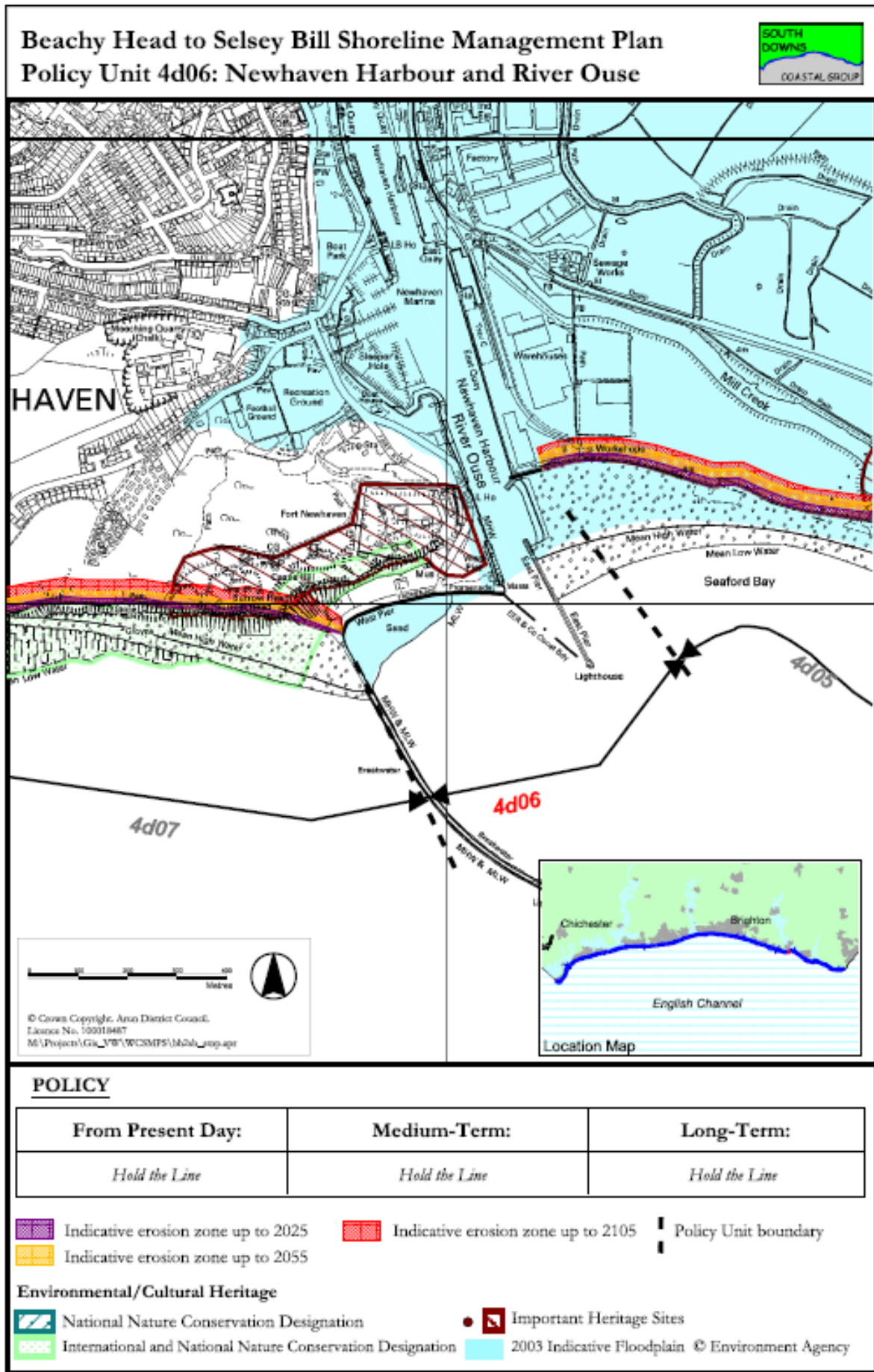
However, although this should continue to protect assets within the town, the character of the frontage may however be changed from the present day, with high seawalls and low beaches present in front of the town.

Location reference:	Newhaven Harbour and River Ouse
Policy Unit reference:	<i>4d06</i>

IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

Time Period	Management Activities	Property, Built Assets & Land Use	Landscape	Nature Conservation	Historic Environment	Amenity & Recreational Use
2005 – 2025	Continue with current management practices.	No loss of property, land or infrastructure behind the existing defences.	No change to landscape or seafront character.	There are no environmental or habitat gains.	No loss of heritage sites.	No loss of existing recreational facilities.
2025 – 2055	Continue with current management practices.	No loss of property, land or infrastructure behind the existing defences.	No change to landscape or seafront character.	There are no environmental or habitat gains.	Historical assets on the foreshore could be lost / damaged (due to sea level rise & construction).	No loss of existing recreational facilities.
2055 – 2105	Increase engineering and management practices.	No loss of property, land or infrastructure behind the existing defences. Agricultural land loss is minimal (in the region of 0.1 ha).	No change to landscape or seafront character.	There are no environmental or habitat gains.	Historical assets on the foreshore could be lost / damaged (due to sea level rise & construction).	No loss of existing recreational facilities.

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Location reference: Newhaven Harbour to Peacehaven Heights

Policy Unit reference: 4d07

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

The recommended long-term plan for Newhaven Harbour to Peacehaven Heights is to manage the realignment of the coastline. The frontage is dominated by high cliffs, that are of great geological value (SSSI, GCRS, RIGS), but is also rich in environmental and archaeological assets. There are some assets along this frontage that will be at risk to coastal erosion, but could be relocated. This policy is considered sustainable in the long-term as the unprotected cliffs will be free to erode and the shoreline and coastal processes will remain free functioning, whilst the harbour and other built assets will be protected.

Preferred policies to implement Plan:

Immediate:

The present-day policy for this area is to continue to allow the cliffs to erode, but continue to maintain a terminal structure (the harbour breakwater acts as such at present) that holds the beach in front. This will protect the maximum number of assets, and it is expected that the beach will continue to accrete in the lee of the Newhaven Harbour breakwater.

The policy for this coastline is devised of a series of stages, and the policy for the immediate term is designed to work in conjunction with the long-term plan for this section of shoreline.

Medium-term:

The medium-term policy is to continue to allow the cliffs and wave-cut platform in the west to erode, but to manage the realignment of the coastline where assets are at risk through maintaining some sort of terminal structure fulfilled by harbour breakwater at present.

Sediment released via erosion will be trapped within the local pocket beaches and coves, or supply the beach in the lee of the Newhaven Harbour Breakwater. It is expected that the rate of cliff erosion will increase as sea levels rise, threatening the integrity of the assets that line the cliff top (*OS Reference: TV443998*).

This policy is consistent with the long-term aim of No Active Intervention.

Longer-term:

The long-term policy is to continue to allow the cliffs to erode naturally, but to manage the frontage where assets are at risk. The harbour entrance training walls, breakwater and any new defence structures would be maintained, replaced and upgraded where necessary.

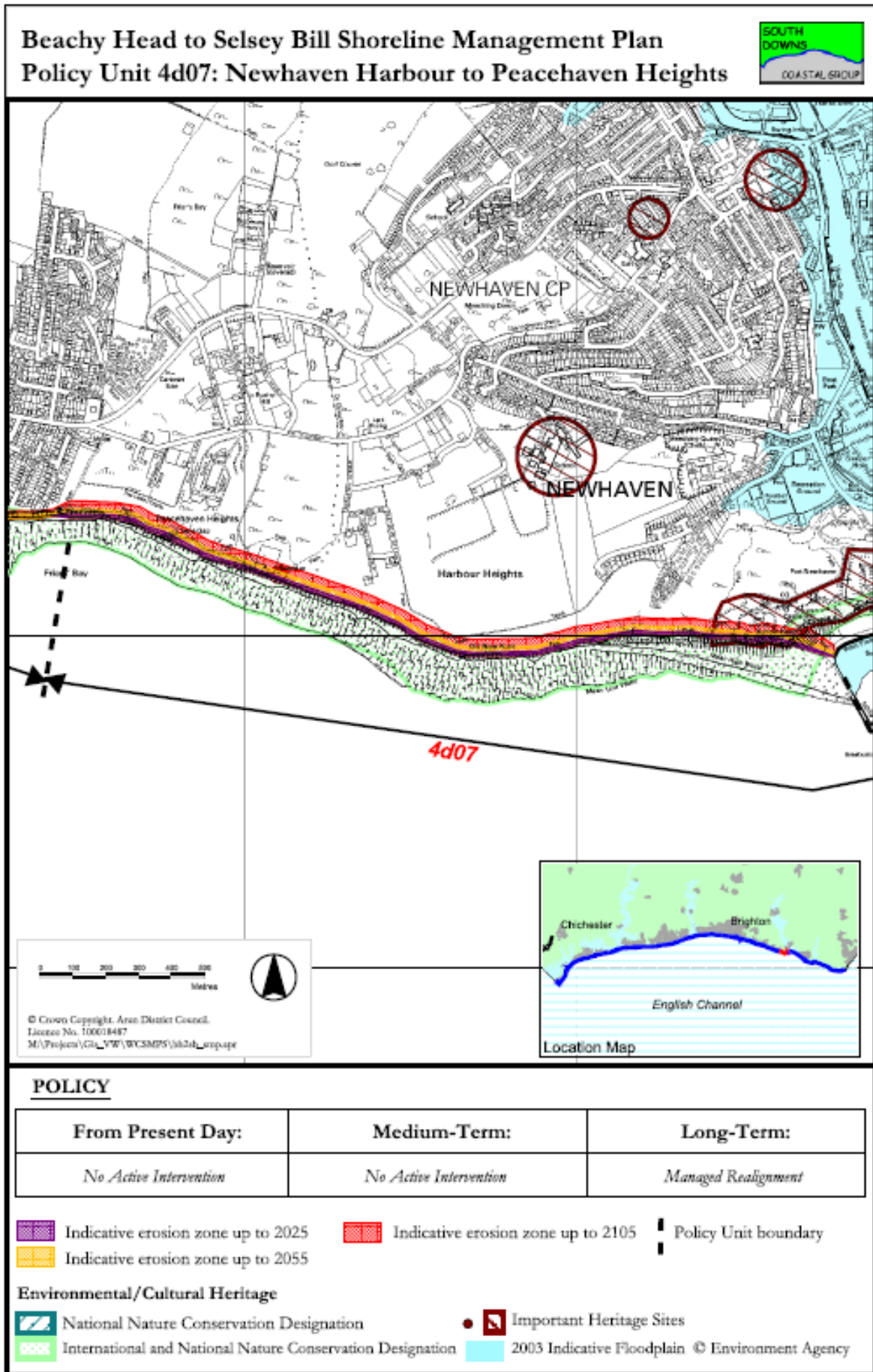
The beach to the west of the breakwater is expected to accrete, and the assets at risk protected, although the character of the cliffs may be changed from the present day, with seawalls fronted by low beaches.

Location reference:	Newhaven Harbour to Peacehaven Heights
Policy Unit reference:	<i>4d07</i>

IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

Time Period	Management Activities	Property, Built Assets & Land Use	Landscape	Nature Conservation	Historic Environment	Amenity & Recreational Use
2005 – 2025	Continue with present management practices.	Loss of one residential property.	No change to landscape character or seafront.	Geological and biological conservation status maintained.	Existing assets maintained.	No loss of community or recreational facilities landward of the defences. No change to existing beach.
2025 – 2055	Maintain terminal structure (harbour breakwater).	Increased engineering and management will protect properties, although some loss expected by the end of year 50 (5 houses to a value of £200,000).	No change to landscape character or seafront in the west. Increased engineering at the cliff toe will alter the existing seafront.	Geological and biological conservation status maintained in the west. Increased engineering and management could detract from geological and biological value of the cliffs.	No loss of heritage sites.	Assets unprotected in the west will be lost, although increased engineering and management will assets at OS Reference TV443998.
2055 – 2105	Maintain harbour entrance training walls, breakwater and any new defence structures/cliff works and undertake any appropriate management as required.	Expected loss of built assets – up to 14 residential properties with losses valued at £200,000. Over 10ha of agricultural land loss predicted by year 100.	No change to landscape character or seafront in the west. Increased engineering at the cliff toe will alter the existing seafront.	Geological and biological conservation status maintained in the west. Increased engineering and management could detract from geological and biological value of the cliffs.	Loss of heritage sites. Cliff erosion will result in loss historical assets that line the undefended coastline.	Potential for loss of amenity and recreational facilities as the cliffs retreat. Beach reduction as sea levels rise.

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Location reference: Peacehaven

Policy Unit reference: 4d08

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

There has been a history of cliff erosion along this frontage, and for the last century coastal defences have been used to slow the marine erosion of the cliff face. While this has had some success at stopping the cliff base from eroding, records show that the cliff top has still eroded landwards due to weathering of the cliff face. Studies show that this weathering process is likely to increase due to climate change culminating in increasing rock falls, more frequently. This mechanism of cliff retreat, while inherent to the quality of the environmental habitat, does place significant assets at risk along this frontage. These assets include over 100 residential properties near the cliff edge with the seacliffs being of high geological and biological importance. Due to the considerable assets at risk and the uncertainty of how the coastline could evolve, it is recommended that in the short-term the policy should be to hold the cliff base defences. However, in order to manage the future change it is recommended that in the short to medium-term the present defences are maintained while more detailed investigation through a number of studies to determine the viability, approach, timing, consequences, and any measures that would need to be put in place to manage the erosion risk. Such studies should generate recommendations regarding mitigation for the displacement of people and the loss of property and assets.

Preferred policies to implement Plan:

Immediate: The present-day policy for this area is to continue to protect the town frontage through maintaining existing seawall and groyne. This will reduce the risk to the maximum number of assets, although the beaches are expected to steepen, narrow and lower within the confines of the groyne. The potential for cliff retreat in the immediate term is expected to be nominal however monitoring will be undertaken to inform future proactive management of the risks in the longer term.

Medium-term: The medium-term policy is to continue defending the frontage beyond the immediate term. Defence of this frontage would most likely be provided through maintaining and upgrading structures.

It is likely that a beach would remain for the beginning of this term, as long as the groyne are maintained and replaced; although their effectiveness will gradually reduce as sea levels rise. Beyond this, however, the groyne will eventually become redundant and there will no longer be beaches in front of the cliffs.

This policy is consistent with the long-term plan of monitor and manage, but only when defences are maintained and replaced to last the lifetime of this period and new defences that will last longer than the length of this period are not constructed.

Longer-term: The long-term policy is to manage the erosion risks through proactive

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management of the cliff alignment while mitigating for those losses.

The cliff face and base are an important environmentally designated site, which require their continued exposure to natural weathering conditions. However, the current defences located at the cliff base impact on part of this process. There are significant assets at risk along this frontage and pro active management based on the historical monitoring will allow accurate predictions for the future cliff top erosion to be made and inform plans for change in managing those erosion risks to the cliff top assets. Further studies will be required to inform on the extent and effect of this erosion.

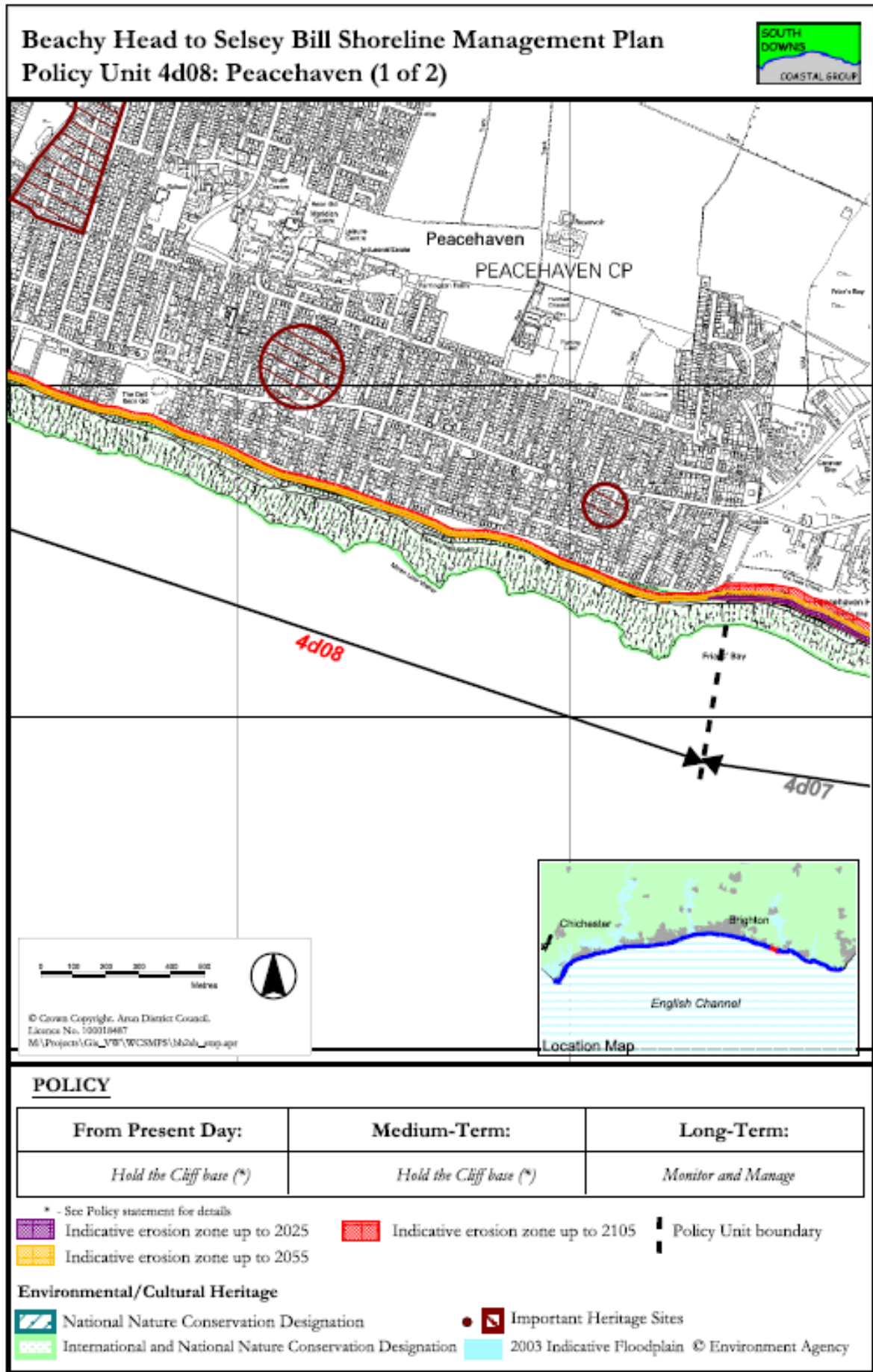
Location reference: Peacehaven

Policy Unit reference: 4d08

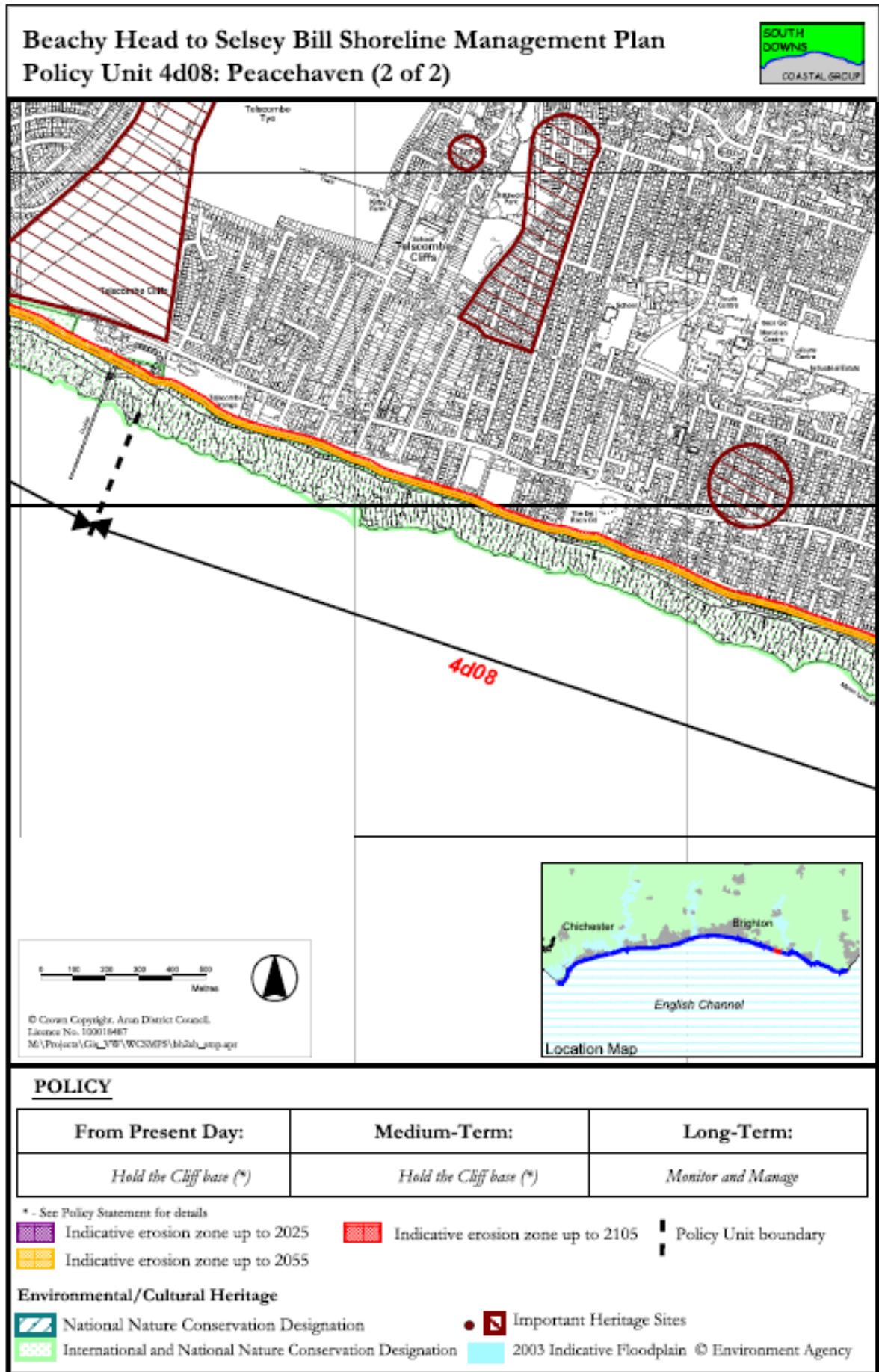
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

Time Period	Management Activities	Property, Built Assets & Land Use	Landscape	Nature Conservation	Historic Environment	Amenity & Recreational Use
2005 – 2025	Continue with present defence practices.	Possible loss of property or land behind the existing defences.	No change to landscape character or seafront.	No nature conservation gains.	No loss of heritage sites.	No loss of recreational facilities landwards of the defences. Reduction in beach width.
2025 – 2055	Continue with present defence practices.	Possible loss of property or land behind the existing defences.	No change to landscape character or seafront.	No nature conservation gains.	No loss of heritage sites.	No loss of recreational facilities landwards of the defences. Loss of beach.
2055 – 2105	Cessation of all engineering and management practices.	Loss of some residential and commercial property is anticipated,. Up to 6ha of agricultural land loss could take place by year 100.	No change to cliff top landscape, although loss of defences will change to character of the seafront.	Reactivation of coastal processes, increasing the geological and biological value of the cliffs.	Historical assets on the cliff top and foreshore could be lost / damaged due to reactivation of cliff processes and sea level rise.	Community and recreational facilities located landwards of the defences will be relocated outside of the risk zone. Reformation of beach as defences fail and eroded material from the cliffs forms small pocket beaches.

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Location reference: Telscombe Cliffs

Policy Unit reference: 4d09

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

The recommended long-term plan for Telscombe Cliffs is to sustain a naturally functioning coastline in the long term, but manage the Portabello Marine Treatment Works through appropriate management of its current position in the immediate and medium term. The outfall provides an important service to the local community and sub region. This is considered to be sustainable in technical terms, naturally due to low transport rates and, therefore, limited linkages to adjacent shorelines.

Preferred policies to implement Plan:

Immediate:

The present-day policy for this area is to continue to protect the outfall through maintaining the concrete seawall and groynes. Elsewhere, there are currently no defences along the frontage, so the cliffs and wave-cut platform will be free to erode at their present rate. This is consistent with the medium-term plan for this section of shoreline, but will not impact on the implementation of the long-term policy.

Medium-term:

The medium-term policy is to continue to allow the cliffs and wave-cut platform to erode, which will continue into the long term, but protect the Portabello Marine Treatment Works. Defence of the outfall would most likely be provided through maintaining and upgrading structures. It would not be compliant with the long-term plan to replace or build new structures that would survive beyond the medium term.

During the next 20 to 50 years, it is expected that the rate of cliff erosion will increase as sea levels rise. Sediment released via erosion will be trapped within the local pocket beaches and coves.

Longer-term:

The long-term policy is managed realignment, by allowing the defences that protect Portobello Marine Treatment Works to fail. The Marine Treatment Works would be relocated landward in alignment with the cliffs. Re-routing of infrastructure would be required, with some cliff stabilisation/ monitoring to slow erosion.

Elsewhere along the frontage, the chalk cliffs would be allowed to erode, and the wave-cut platform to widen and lower. Sediment supplied via erosion will continue to feed the local pocket beaches and bays, with no unnatural impact on the coastal processes or sections of coastline downdrift.

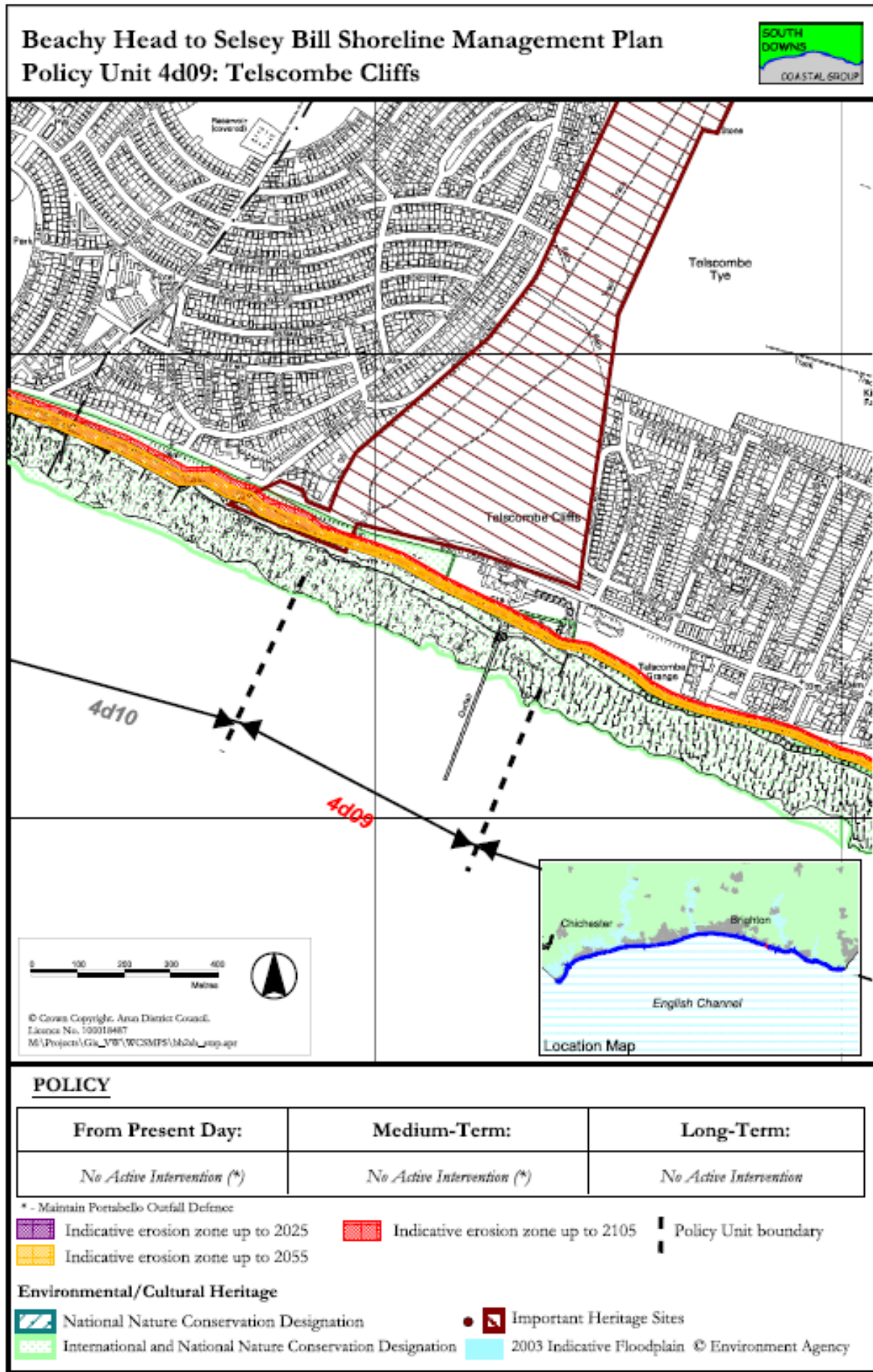
This policy is sustainable in the long term, and ensures that this section of coastline will remain free functioning. The coastline position is expected to erode parallel to its present alignment, with little change to the existing character of the frontage.

Location reference:	Telscombe Cliffs
Policy Unit reference:	<i>4d09</i>

IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

Time Period	Management Activities	Property, Built Assets & Land Use	Landscape	Nature Conservation	Historic Environment	Amenity & Recreational Use
2005 – 2025	Continue with present defence practices at outfall.	No loss of property along the frontage, although loss of land is expected with cliff retreat.	No change to landscape character or seafront-landscape quality maintained.	Geological and biological value of the cliffs maintained.	Historical assets on the cliff top/foreshore could be lost / damaged as sea levels rise.	No loss of amenity or recreation facilities.
2025 – 2055	Continue with present defence practices at outfall.	Land loss is expected with cliff top erosion, but no loss of property or built assets.	No change to landscape character or seafront-landscape quality maintained.	Geological and biological value of the cliffs maintained.	Historical assets on the cliff top/foreshore could be lost / damaged as sea levels rise.	Cliff erosion will result in the loss of recreation and amenity assets, such as the coastal path.
2055 – 2105	Cessation of all engineering and management practices.	Potential for up to 2ha of agricultural land lost by year 100.	No change to landscape character or seafront-landscape quality maintained.	Geological and biological value of the cliffs maintained.	Historical assets on the cliff top/foreshore could be lost / damaged as sea levels rise.	Cliff erosion will result in the loss of recreation and amenity assets, such as the coastal path.

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Location reference: Saltdean to Rottingdean

Policy Unit reference: 4d10

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

There has been a history of cliff erosion along this frontage, and for the last century coastal defences have been used to slow the marine erosion of the cliff face. While this has had some success at stopping the cliff base from eroding, records show that the cliff top has still eroded landwards due to weathering of the cliff face. Studies show that this weathering process is likely to increase due to climate change with cliff falls occurring more frequently. This mechanism of cliff retreat, while inherent to the quality of the environmental habitat, does place significant assets at risk along this frontage, not only lengths of the A259 (the main link to these communities) but also a number of properties are potentially at risk of loss in the longer term.

Given the expected 50 year lifespan of the defences and the increasing impact of climate change, coupled with the cliff face weathering that is inherent to the environmental value of this coastal frontage, a technically feasible and environmentally acceptable management practice (given the current legislative requirements) for these cliffs has to be developed for the longer term. This can be planned for through an in-depth understanding of the weathering and erosion mechanisms occurring along this frontage and how this is likely to increase due to climate change. Thus the SMP recommends that for the short to medium term, the present defences are maintained and detailed monitoring of the cliff movement is undertaken while more detailed investigation through a number of studies to determine the viability, approach, timing, consequences, and any measures that would need to be put in place to manage the erosion risk.

Preferred policies to implement Plan:

Immediate:

The present-day policy for this area is to continue to defend the cliff base from marine erosion through maintaining the existing seawall, rock revetment, concrete and rock groyne. Ongoing weathering of the cliff face will continue, and in order to manage this risk to the cliff top assets, monitoring of the cliff face losses will inform future management practice that is both technically appropriate and environmentally acceptable.

This approach aims to limit the risks to the maximum number of assets, but over this period beaches will start to become narrower and defences more exposed.

This is consistent with the medium-term plan for this section of shoreline, but is not detrimental to the implementation of the long-term plan.

Medium-term:

The medium-term policy is to continue defending the frontage beyond the immediate term. During the next 20 to 50 years, it is likely that the beach will no longer exist, the groyne will no longer be effective and the defences will become more exposed.

Defence of this frontage would most likely be provided through

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maintaining and where necessary upgrading defences. This is consistent with the medium-term plan for this section of shoreline. Monitoring of the cliff face weathering will inform the longer term management of the frontage.

Longer-term:

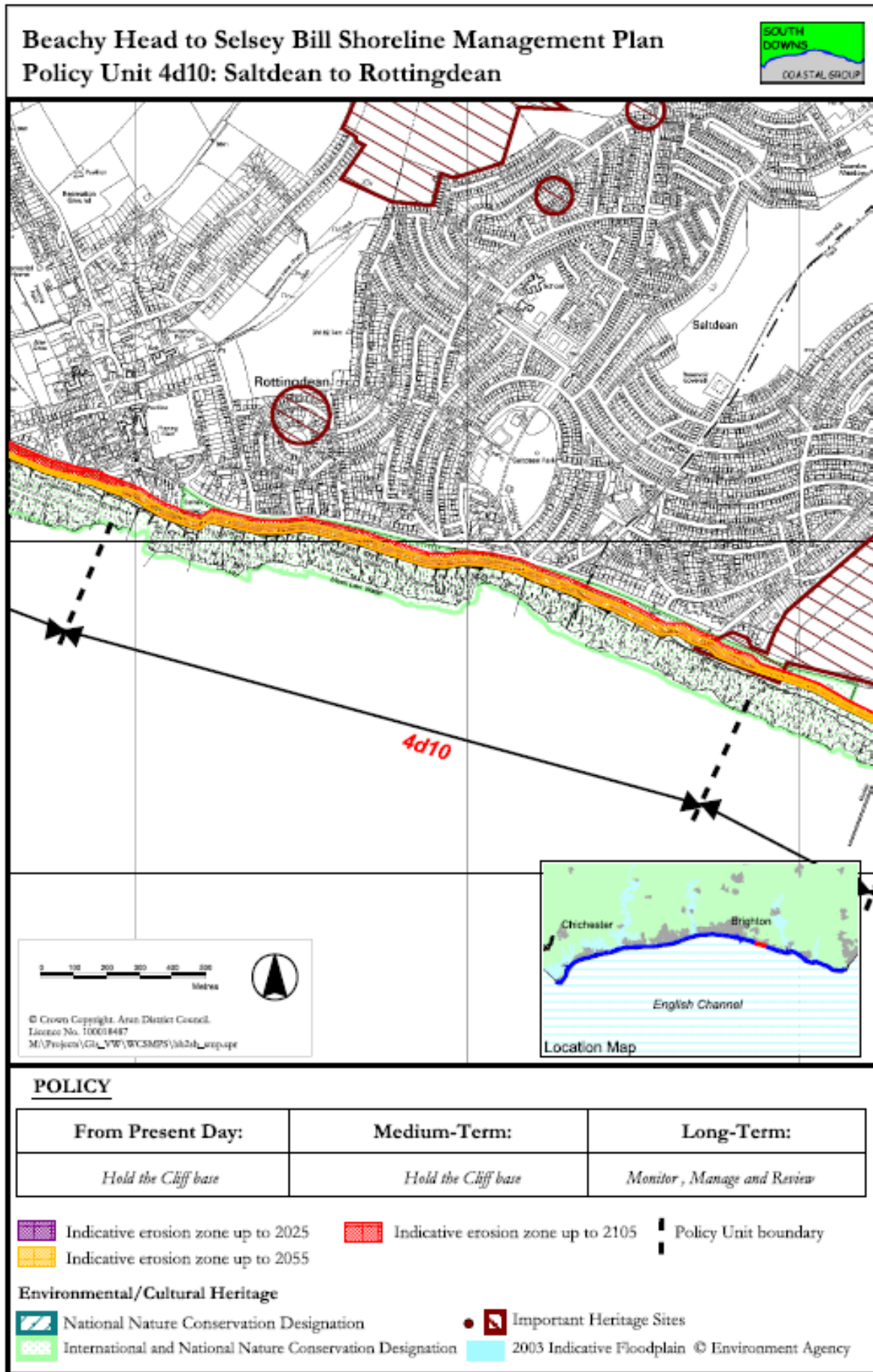
The cliff face and base are important environmentally designated sites, which require their continued exposure to natural weathering conditions. However, the current defences located at the cliff base impact on part of this process. There are significant assets at risk along this frontage and pro active management based on the historical monitoring will allow accurate predictions for the future cliff top erosion to be made and inform plans for change in managing those erosion risks to the cliff top assets. Properties may still be at risk of loss along the cliff top, in addition to lengths of the A259, as the cliff top recedes. Further studies will be required to inform on the extent and effect of this erosion.

Location reference:	Saltdean to Rottingdean
Policy Unit reference:	<i>4d10</i>

IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

Time Period	Management Activities	Property, Built Assets & Land Use	Landscape	Nature Conservation	Historic Environment	Amenity & Recreational Use
2005 – 2025	Continue with current management practices.	No loss of property or land behind the existing defences.	No change to landscape character or seafront.	No nature conservation gains, although natural habitat maintained.	No loss of heritage sites landwards or seaward of the defences.	No loss of community or recreational facilities landward of the defences. Beach width would decline.
2025 – 2055	Continue with current management practices.	No loss of property or land behind the existing defences.	No change to landscape character or seafront.	No nature conservation gains, although natural habitat maintained.	Heritage assets on the foreshore could be lost / damaged (due to sea level rise & construction).	No loss of community or recreational facilities landward of the defences. Loss of beach, compromising safe access to the promenade.
2055 – 2105	Monitor, manage and review	Potential for increased risk to property and A259.	Without defences, the seafront will be altered; however there will be no overall change to the quality of the landscape.	Reactivation of cliff erosion will affect the geological and biological value of the habitats and conservation areas.	Heritage assets on the cliff top/foreshore could be lost / damaged as cliff erosion is reinstated and sea levels rise.	Amenity and recreational assets on the cliff top/foreshore could be lost / damaged as cliff erosion is reinstated and sea levels rise.

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Location reference: Rottingdean to Brighton Marina

Policy Unit reference: 4d11

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

In the short to medium term (the first 50 years) the SMP recommends holding the cliff base is the more appropriate policy as managing and sustaining the existing defences will offer some protection to those cliff top assets (roads, properties and services) at risk. However, given the expected 50 year lifespan of the defences, coupled with the cliff face weathering mechanisms and impact of climate change, a technically feasible and environmentally acceptable management practice for these cliffs has to be developed for the longer term. Through appropriate monitoring of cliff top erosion mechanisms, informed decisions can be made on how to manage those risks can be made.

Thus the SMP recommends that for the short to medium term, the present defences are maintained. There should also be a detailed programme of monitoring and investigation so as to determine the viability, approach, timing and consequences of any measures that would need to be put in place to manage the erosion risk in the long term.

Preferred policies to implement Plan:

Immediate:

The present-day policy for this area is to continue to defend the cliff base through maintaining the existing seawall, rock revetment and concrete/rock groynes.

This will limit cliff base erosion offering some protection to cliff top assets, but over this period beaches will start to become narrower and defences more exposed.

A detailed monitoring and reporting regime will inform on how and where cliff face weathering is occurring and provide data upon which proactive management practices can be developed that is both technically appropriate and environmentally acceptable.

This is consistent with the long-term plan for this section of shoreline.

Medium-term:

The medium-term policy is to continue defending and monitoring the frontage beyond the immediate term. Defence of this frontage would most likely be provided through maintaining and where necessary upgrading new defences.

This is consistent with the medium-term plan for this section of shoreline.

During the next 20 to 50 years, it is likely that the beach will no longer exist and the defences would be even more exposed. This period will instead be used to plan for future management of the cliff top alignment.

Longer-term:

This length of relatively open frontage does have one major asset, the A259 which is at risk from cliff top recession. There are also a mains and gas sewer located within the cliffs and significant heritage features to the

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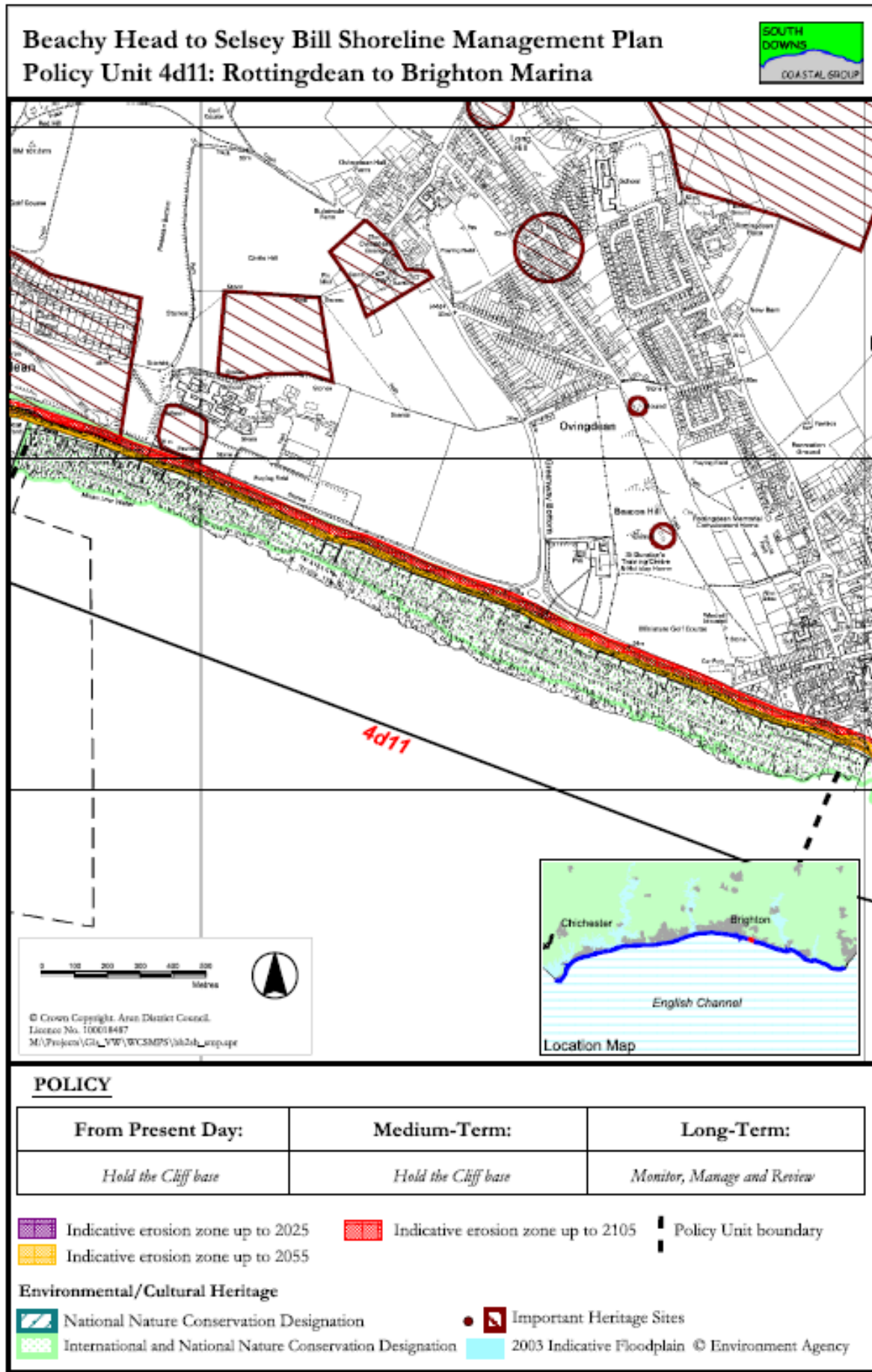
east of this 'unit'. Given the expected 50 year lifespan of the defences, coupled with the cliff face weathering mechanisms and impact of climate change, a view on replacing those defences or providing an alternative form of cliff management that would meet the equally important environmental objectives has to be considered. This could be achieved in the long term, by managing the impact of cliff top recession on those assets, while also maintaining important environmental assets. Further studies will be required to inform on these issues.

Location reference:	Rottingdean to Brighton Marina
Policy Unit reference:	<i>4d11</i>

IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

Time Period	Management Activities	Property, Built Assets & Land Use	Landscape	Nature Conservation	Historic Environment	Amenity & Recreational Use
2005 – 2025	Continue with current management practices.	No loss of property or land behind the existing defences. Reduced risk to property and A259.	No change to landscape character or seafront.	No nature conservation gains, although natural habitat maintained.	No loss of heritage sites landwards or seaward of the defences.	No loss of community or recreational facilities landward of the defences. Beach width would decline.
2025 – 2055	Continue with current management practices.	No loss of property or land behind the existing defences. Reduced risk to property and A259.	No change to landscape character or seafront.	No nature conservation gains, although natural habitat maintained.	Heritage assets on the foreshore could be lost / damaged (due to sea level rise & construction).	No loss of community or recreational facilities landward of the defences. Loss of beach, compromising safe access to the promenade.
2055 – 2105	Monitor, manage and review approach.	Potential risk to property and A259, Potential for up to 10ha of agricultural land loss by year 2105.	Without defences, the seafront will be altered; however there will be no overall change to the quality of the landscape.	Reactivation of cliff erosion will improve the geological and biological value of the habitats and conservation areas.	Heritage assets on the cliff top/foreshore could be lost / damaged as cliff erosion is reinstated and sea levels rise.	Amenity and recreational assets on the cliff top/foreshore could be lost / damaged as cliff erosion is reinstated and sea levels rise.

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Location reference:	Brighton Marina to Portslade-by-Sea
Policy Unit reference:	<i>4d12</i>

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

The recommended long-term plan for Brighton Marina to Portslade-by-Sea is to continue to protect assets within the towns along this frontage through holding the line, defending the present position; the towns along this frontage are key tourist resorts and service centres for the sub region, providing a range of facilities that support surrounding communities, whilst the marina is an important economic and recreational facility for the local area. This policy is sustainable in the long-term as it protects an area of high economic and environmental value. Low transport rates and limited linkages to adjacent shorelines means that this policy is also technically sustainable.

Preferred policies to implement Plan:

Immediate:

The present-day policy for this area is to continue to protect the town frontage through maintaining the seawalls, rubble defences, rock groynes, concrete groynes, timber groynes and bypassing/recycling; and the Brighton Marina structures (breakwaters, sheet-piled walls, artificial shingle beach).

This will protect the maximum number of assets, but over this period beaches will start to become narrower and defences more exposed.

This is consistent with the long-term plan for this section of shoreline.

Medium-term:

The medium-term policy is to continue defending the frontage beyond the immediate term. Defence of this frontage would most likely be provided through maintaining, upgrading and replacing structures, and introducing beach recycling and renourishment to this coastline.

During the next 20 to 50 years, it is likely that a beach would remain as long eroded material would be artificially replaced, although their effectiveness may gradually reduce as sea levels rise.

This is consistent with the long-term plan for this section of shoreline.

Longer-term:

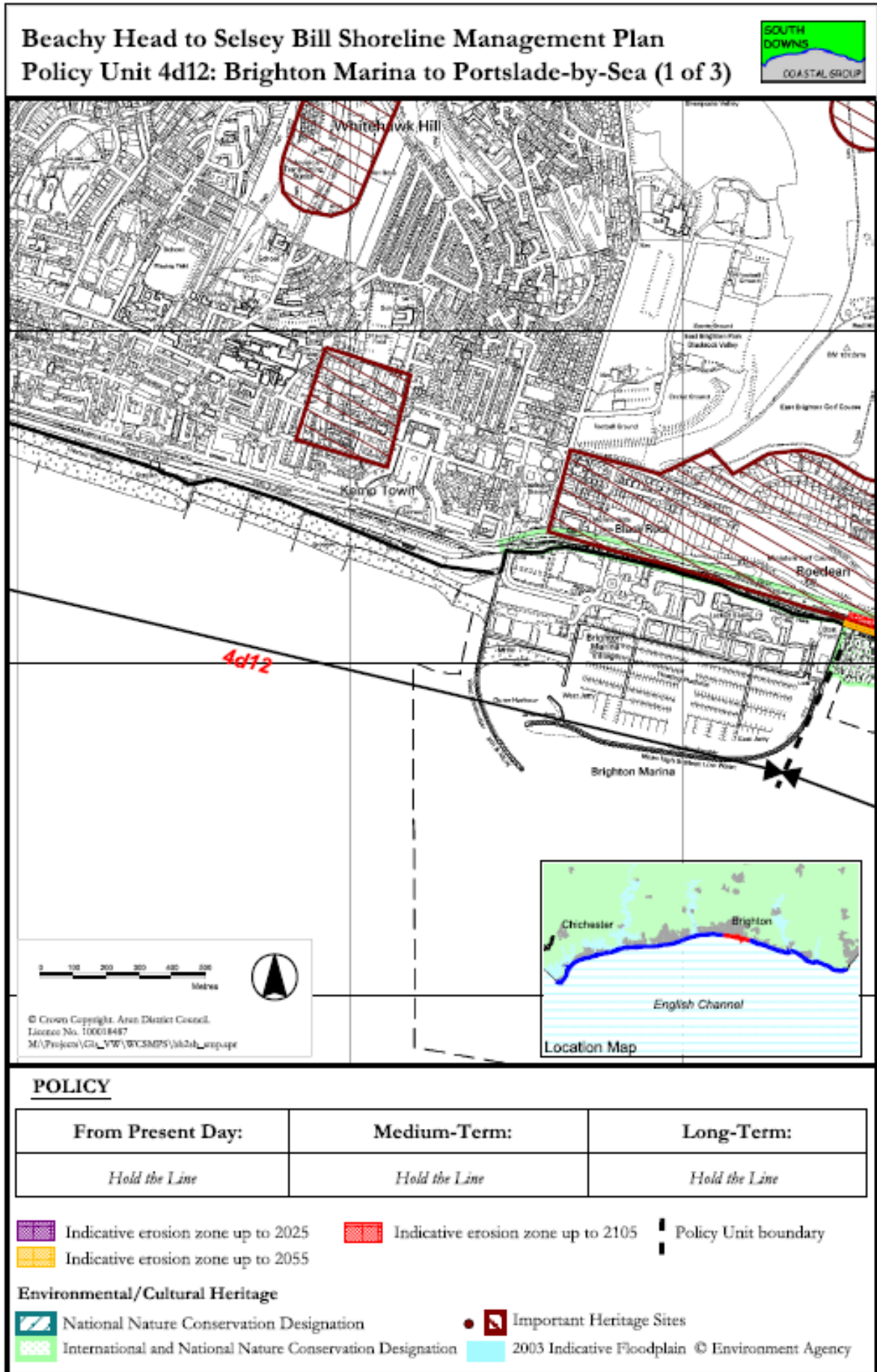
The long-term policy is to continue defending the frontage. Defence of this frontage would most likely be provided through maintaining, replacing and upgrading seawall structures. Beach recycling and renourishment would continue, as long as it remains technically feasible.

Location reference:	Brighton Marina to Portslade-by-Sea
Policy Unit reference:	4d12

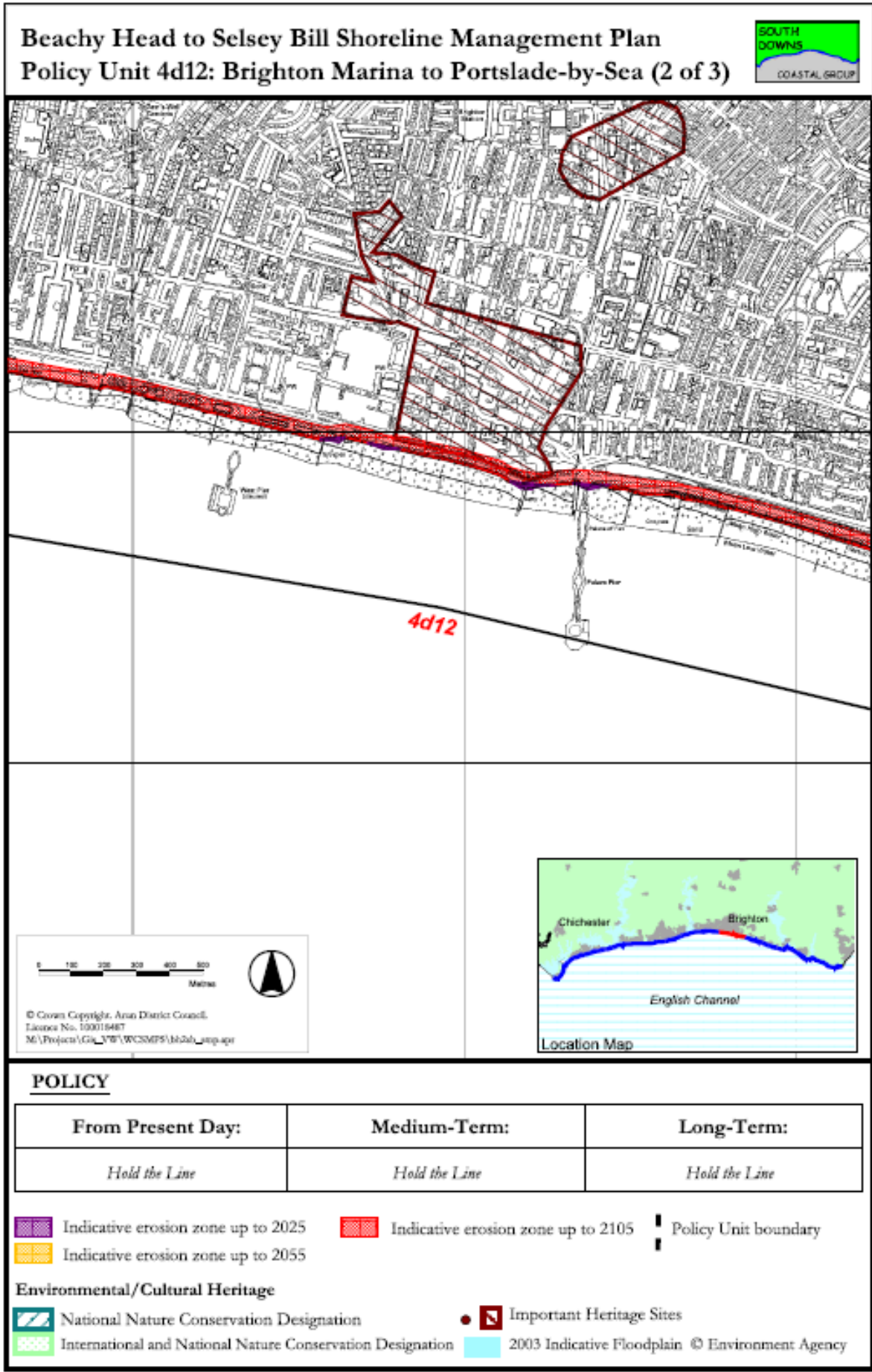
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

Time Period	Management Activities	Property, Built Assets & Land Use	Landscape	Nature Conservation	Historic Environment	Amenity & Recreational Use
2005 – 2025	Continue with current management practices.	No loss of property or land behind the existing defences.	No change to landscape character or seafront.	The existing habitats are maintained.	No loss of heritage sites landward of the defences.	No loss of community or recreational facilities landwards of the defences. Some narrowing of the beaches.
2025 – 2055	Continue with current management practices.	No loss of property or land behind the existing defences.	No change to landscape character or seafront.	The existing habitats are maintained.	No loss of heritage sites landward of the defences.	No loss of community or recreational facilities landwards of the defences. Narrow beach.
2055 – 2105	Renewed defences.	No loss of property, however some land behind the existing defences may be required for the construction of renewed defences.	No change to landscape, although potential change to seafront as defences are renewed.	The existing habitats are maintained. Increased engineering has an adverse effect on habitat development and diversity	No loss of heritage sites landward of the defences. Potential threat to inshore archaeology as defences are renewed.	No loss of community or recreational facilities landwards of the defences, but potential loss of promenade as defences are renewed. Reformation of a wider beach.

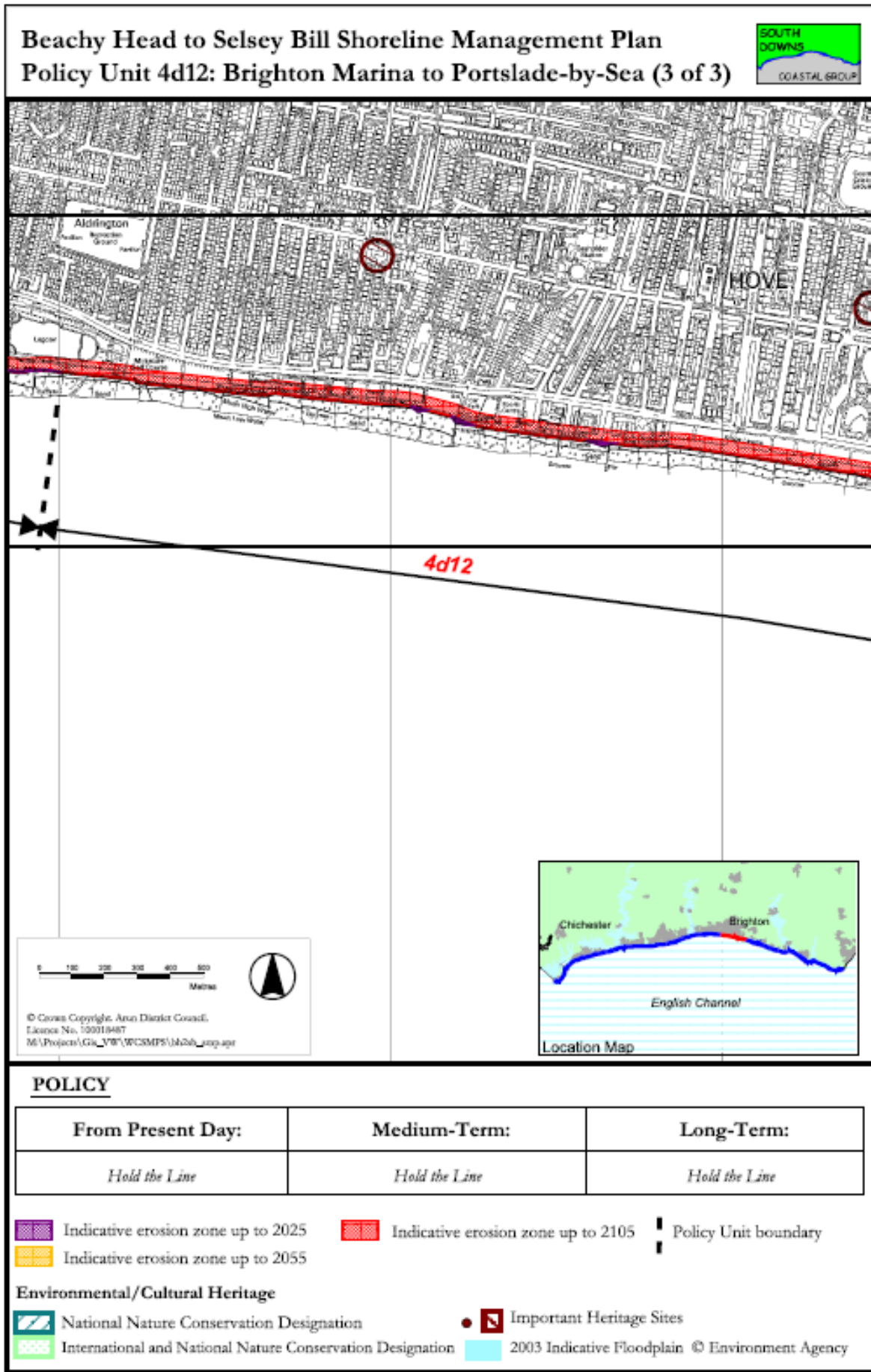
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Location reference: Shoreham Harbour (Southwick)

Policy Unit reference: 4d13

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

The recommended long-term plan for Shoreham Harbour (Southwick) is to continue to protect the harbour and the assets that surround it through defending the present coastline position. The harbour is a key commercial port and of high socio-economic importance. There are a high number of assets surrounding the harbour including Shoreham Power Station, residential properties and recreational facilities. This policy is considered to be sustainable in the long-term as it protects an area of high commercial and economic value. It is recognised that it will only be technically sustainable if sediment bypassing across the harbour entrance continues.

Preferred policies to implement Plan:

Immediate:

The present-day policy for this area is to continue to protect the harbour town frontage through maintaining the existing steel sheet-piled wall, revetment, splash wall, east pier and eastern harbour breakwater (all at the harbour entrance). Sediment bypassing across the harbour entrance would continue.

This will protect the maximum number of assets, but over this period beaches will start to become narrower and defences more exposed.

This is consistent with the long-term plan for this section of shoreline.

Medium-term:

The medium-term policy is to continue defending the frontage beyond the immediate term. Defence of this frontage would most likely be provided through maintaining, replacing and upgrading structures and by providing new defences between those existing to prevent embayments occurring.

During the next 20 to 50 years, it is likely that a beach would continue to narrow as sea levels rise and they become squeezed against the defences behind. Defences may need to be raised or renewed (refer to Section 2.6.2 for definition), which will be consistent with the long-term plan for this section of shoreline.

Longer-term:

The long-term policy is to continue defending the frontage. Defence of this frontage would most likely be provided through maintaining, replacing and upgrading the existing and renewed structures.

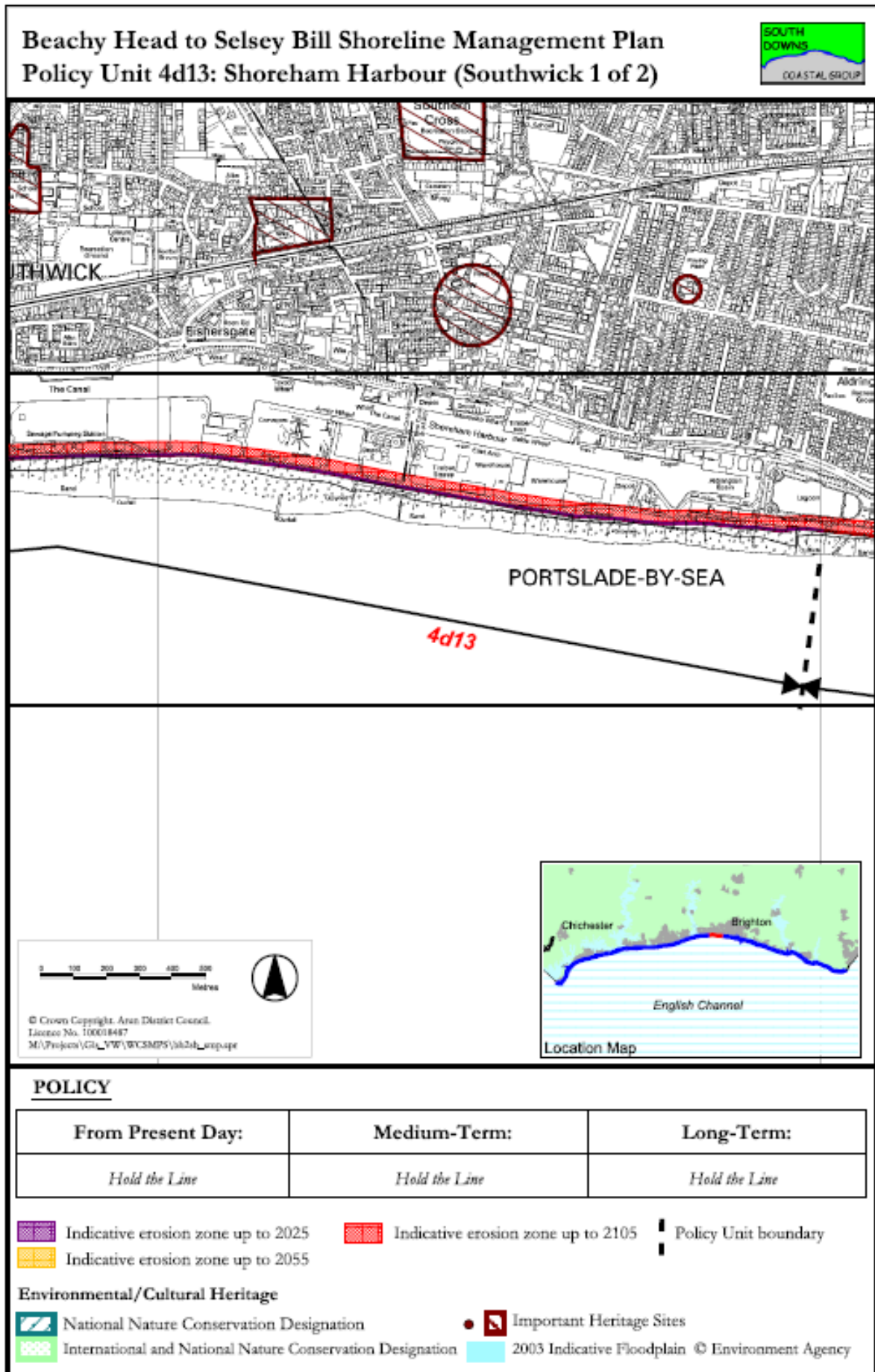
However, although this should continue to protect assets within the town, the character of the frontage may however be changed from the present day, with high seawalls and low beaches present in front of the existing assets.

Location reference:	Shoreham Harbour (Southwick)
Policy Unit reference:	4d13

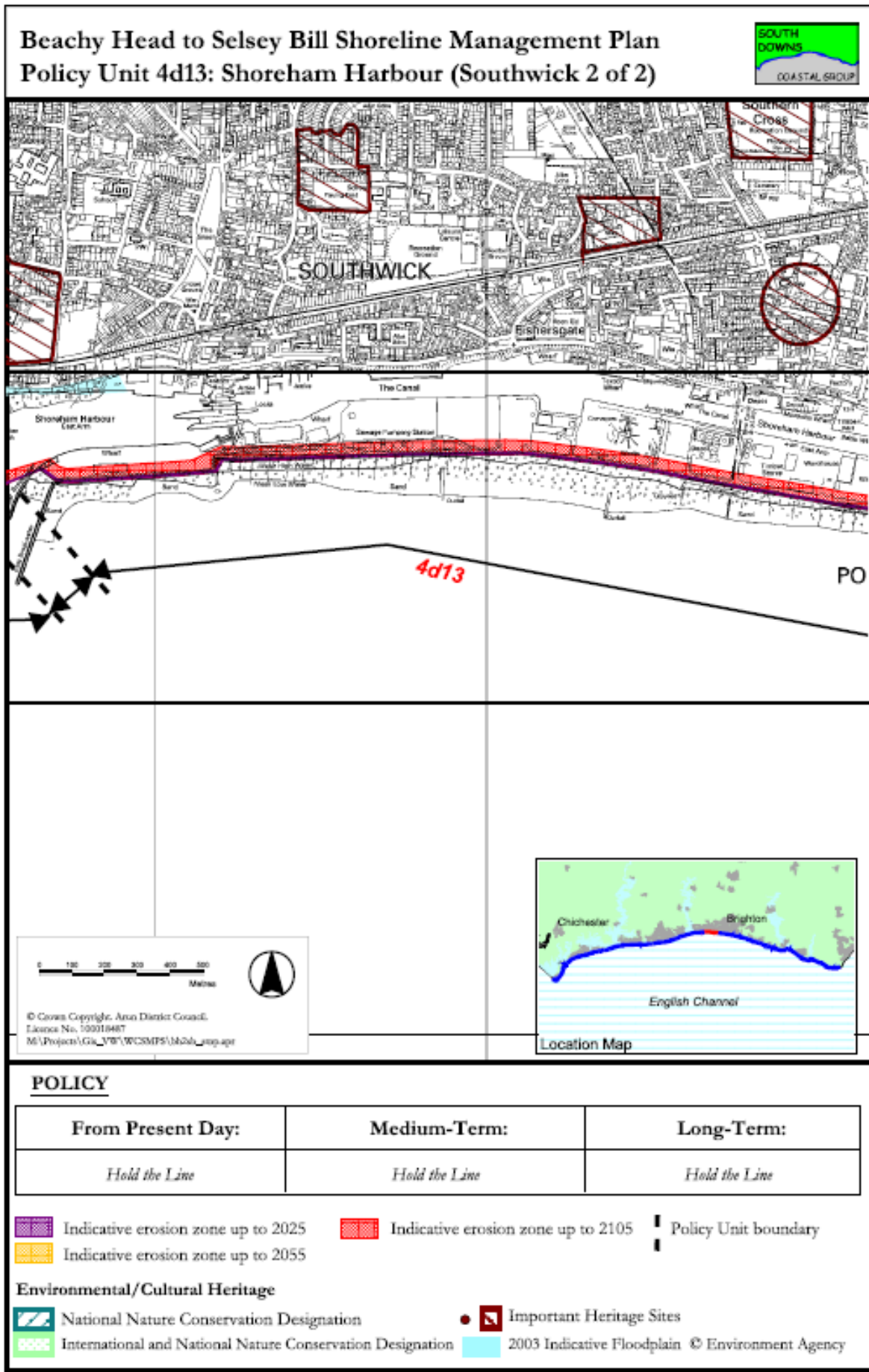
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

Time Period	Management Activities	Property, Built Assets & Land Use	Landscape	Nature Conservation	Historic Environment	Amenity & Recreational Use
2005 – 2025	Continue with current management practices.	No loss of property or land behind the existing defences.	No change to landscape character or seafront.	The existing habitats are maintained.	No loss of heritage sites landward of the defences.	Narrow beach retained.
2025 – 2055	Continue with current management practices, although they will be renewed by the end of this period.	No loss of property or land behind the existing defences.	No change to landscape, although potential change to seafront as defences are renewed.	Beach reduction seawards of the defences will reduce the biological value of the proposed SNCI and national BAP shingle beach habitat.	No loss of heritage sites landward of the defences. Some heritage loss as beaches narrow, sea levels rise and new defences are constructed.	Reduction in beach, with loss of safe access and bathing beaches.
2055 – 2105	Maintain new defences. Increase engineering and management, with construction of new groynes. Sediment bypassing will continue.	No loss of property or land behind the existing defences.	No change to landscape, although potential change to seafront as defences are renewed.	Beach reduction seawards of the defences will reduce the biological value of the proposed SNCI and national BAP shingle beach habitat.	No loss of heritage sites landward of the defences. Some heritage loss as beaches narrow and sea levels rise.	Beach quality improved with increased management practices, although this will be offset by sea level rise.

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Location reference: River Adur

Policy Unit reference: 4d14

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

The recommended long-term plan for the mouth of the River Adur is to continue to protect assets through holding the line, defending the present position. Within the valley, there are a high number of residential and commercial properties, and the towns along its length provide a range of facilities that support the surrounding communities. The river and valley are of high environmental value and a key tourist resort for the sub region. It is recognised that in order to achieve a sustainable coastline, these assets will need to be protected at the cost of natural processes.

Preferred policies to implement Plan:

Immediate: The present-day policy for this area is to continue to protect the frontage through maintaining the existing river walls and embankments.

This is consistent with the long-term plan for this section of shoreline.

Medium-term: The medium-term policy is to continue defending the frontage beyond the immediate term. Defence of this frontage would most likely be provided through maintaining existing river walls and embankments, and upgrade them if required.

This is consistent with the long-term plan for this section of shoreline.

Longer-term: The long-term policy is to continue defending the frontage. Defence of this frontage would most likely be provided through maintaining, replacing and upgrading the river walls and embankments. Construction of new defences would be required if it is no longer technically feasible to maintain the existing defences.

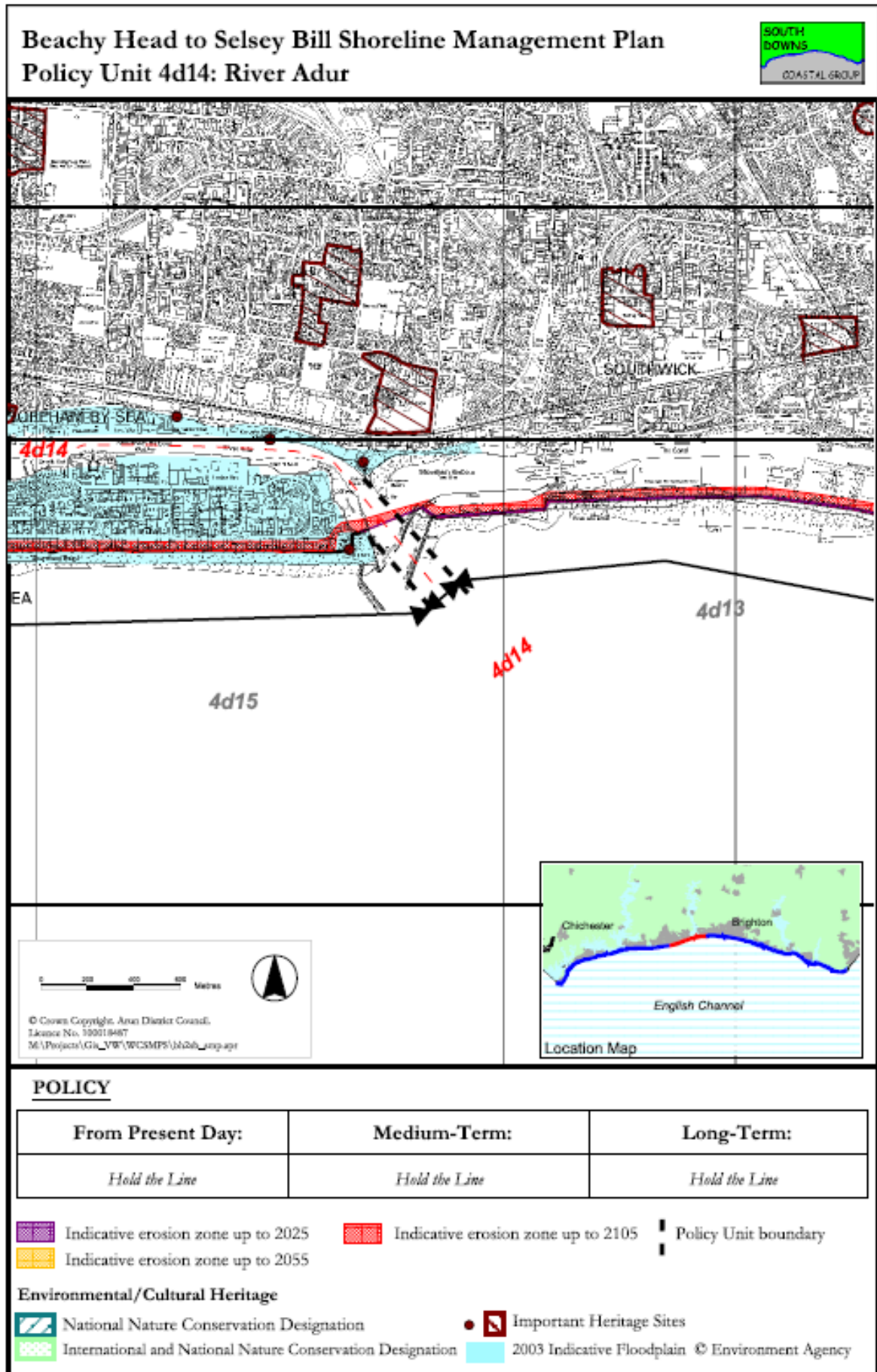
Although this policy should continue to protect assets within the valley, the character of the frontage may however be changed from the present day, with new defences and low beaches present in from the towns.

Location reference:	River Adur
Policy Unit reference:	<i>4d14</i>

IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

Time Period	Management Activities	Property, Built Assets & Land Use	Landscape	Nature Conservation	Historic Environment	Amenity & Recreational Use
2005 – 2025	Continue with current management practices.	No loss of property behind the existing defences.	No change to landscape character or frontage.	No nature conservation gains or losses.	No loss of heritage sites landward of the defences.	No loss of community or recreational facilities landward of the defences.
2025 – 2055	Increased engineering and beach management practices.	No loss of property behind the existing defences.	No change to landscape character, although increased engineering practices could affect the existing character of the frontage.	No nature conservation gains or losses.	No loss of heritage sites landward of the defences.	No loss of community or recreational facilities landward of the defences.
2055 – 2105	Significant investment required to sustain the standard of defence protection.	No loss of property behind the existing defences.	No change to landscape character, although increased engineering practices could affect the existing character of the frontage.	No nature conservation gains or losses.	No loss of heritage sites landward of the defences	No loss of community or recreational facilities landward of the defences, unless it becomes necessary to renew the existing defences.

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Location reference: Shoreham Harbour to Worthing

Policy Unit reference: 4d15

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

The recommended long-term plan for Shoreham Harbour (River Adur) to Worthing is to continue to protect assets along the frontage through holding the line, defending the present position. The urban areas of Shoreham-by-Sea, Lancing and Sompting are key tourist resorts and service centres for the sub region, providing a range of amenities and recreational facilities that support the surrounding communities. The area also supports a high number of environmental and historical assets. This policy is sustainable in the long-term as it protects an area of high economic and environmental value. It is recognised that in order to achieve this, there would be minimal change to current management practices, but there may be an alteration to the existing sediment transport links.

Preferred policies to implement Plan:

Immediate:

The present-day policy for this area is to continue to protect the town frontage through maintaining and upgrading the existing sections of seawall, revetment breastwork and groynes. The western harbour breakwater would also be maintained. Renourishment at Lancing and bypassing across the harbour entrance would continue.

This will protect the maximum number of assets from both flood damage and erosion loss, but over this period beaches will start to become narrower and defences more exposed. This is consistent with the long-term plan for this section of shoreline.

Medium-term:

The medium-term policy is to continue defending the frontage beyond the immediate term. Defence of this frontage would most likely be provided through maintaining, replacing and upgrading structures.

During the next 20 to 50 years, it is likely that a beach would remain as long as the groynes are maintained and replaced, although their effectiveness will gradually reduce as sea levels rise and the beaches narrow. Embayments could form between defended and undefended sections of coastline. Beyond this, however, the groynes will eventually become redundant and there will no longer be beaches in front of parts of the town.

Longer-term:

The long-term policy is to continue defending the frontage. Defence of this frontage would most likely be provided by replacing the existing structures, but at a renewed location; embayment formation would cease and the coastline would return to a more linear form. The western harbour breakwater or alternative terminal structure would be maintained and renourishment at Lancing and bypassing across the harbour entrance would continue.

Although this policy should continue to protect assets within the town,

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the character of the frontage may however be changed from the present day with low beaches present in front of the town. In addition the characteristics of the saline Widewater lagoon may change due to increased saline incursions.

Location reference:	Shoreham Harbour to Worthing
Policy Unit reference:	<i>4d15</i>

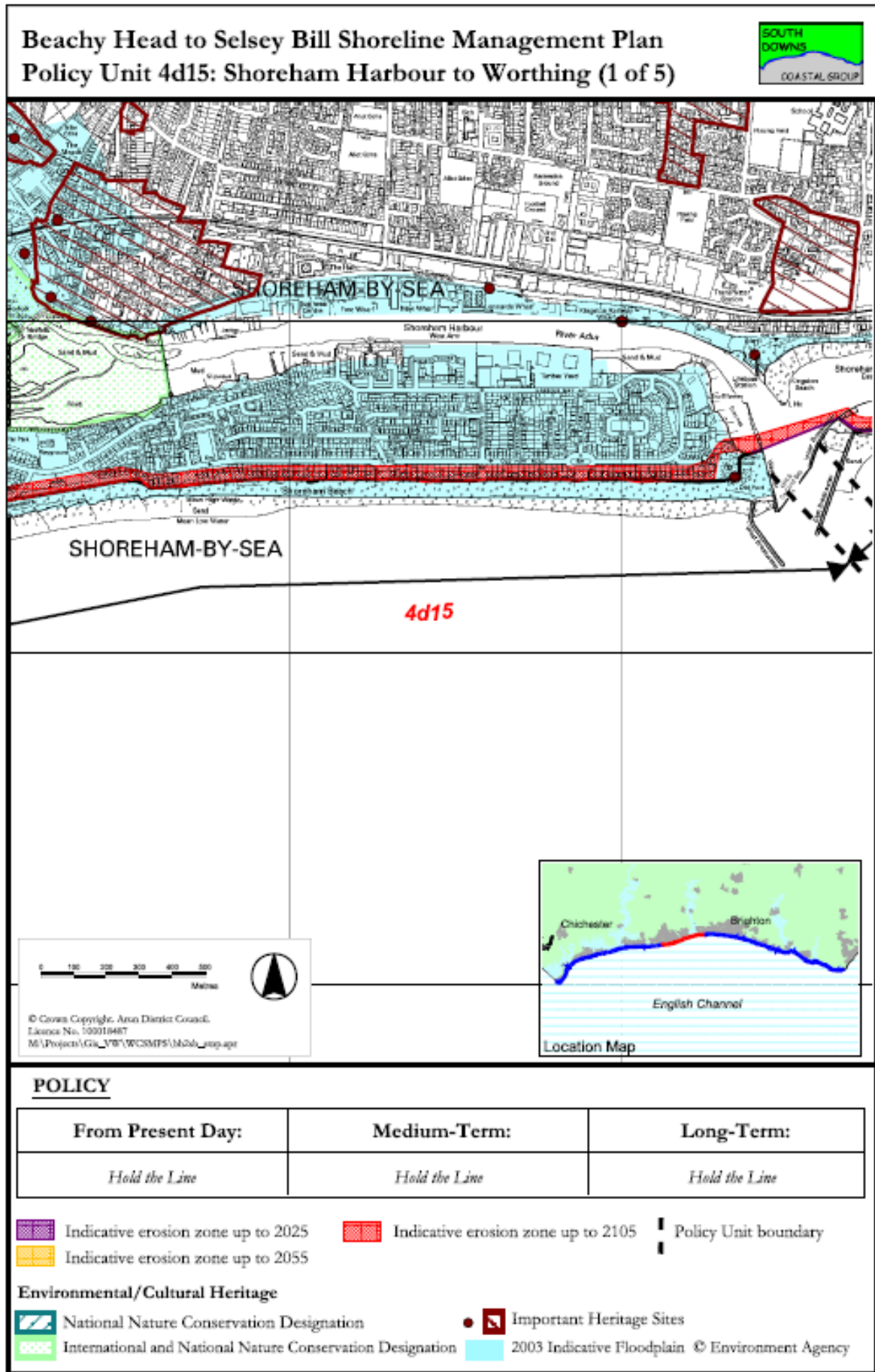
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

Time Period	Management Activities	Property, Built Assets & Land Use	Landscape	Nature Conservation	Historic Environment	Amenity & Recreational Use
2005 – 2025	Continue with current management practices-increase engineering and management practices to offset impacts of sea level rise.	No loss of property or land behind the existing defences.	No change to landscape character or seafront.	The existing habitats are maintained.	No loss of heritage sites landward of the defences.	No loss of community or recreational facilities landward of the defences. Narrow beach retained.
2025 – 2055	Continue with current management practices. Increase engineering and management practices to offset impacts of sea level rise.	No loss of property or land behind the existing defences. Increased risk of overtopping.	No change to landscape character or seafront.	Beach reduction seawards of the defences will reduce the biological value of the proposed SNCI and national BAP shingle beach habitat.	No loss of heritage sites landward of the defences.	Reduction in beach, with loss of safe access and bathing beaches.
2055 – 2105	Maintain new defences, and renewed during this period. Sediment bypassing will continue.	No change to the quality of the landscape, although, there is potential for some loss of residential and commercial assets as the defences are renewed. Despite a policy of “hold the line”, there is	No change to landscape, although potential change to seafront as defences are renewed.	Beach reduction seawards of the defences will reduce the biological value of the proposed SNCI and national BAP shingle beach habitat.	No loss of heritage sites landward of the defences.	Beach quality improved with increased management practices, although this will be offset by sea level rise, with some loss of amenities.

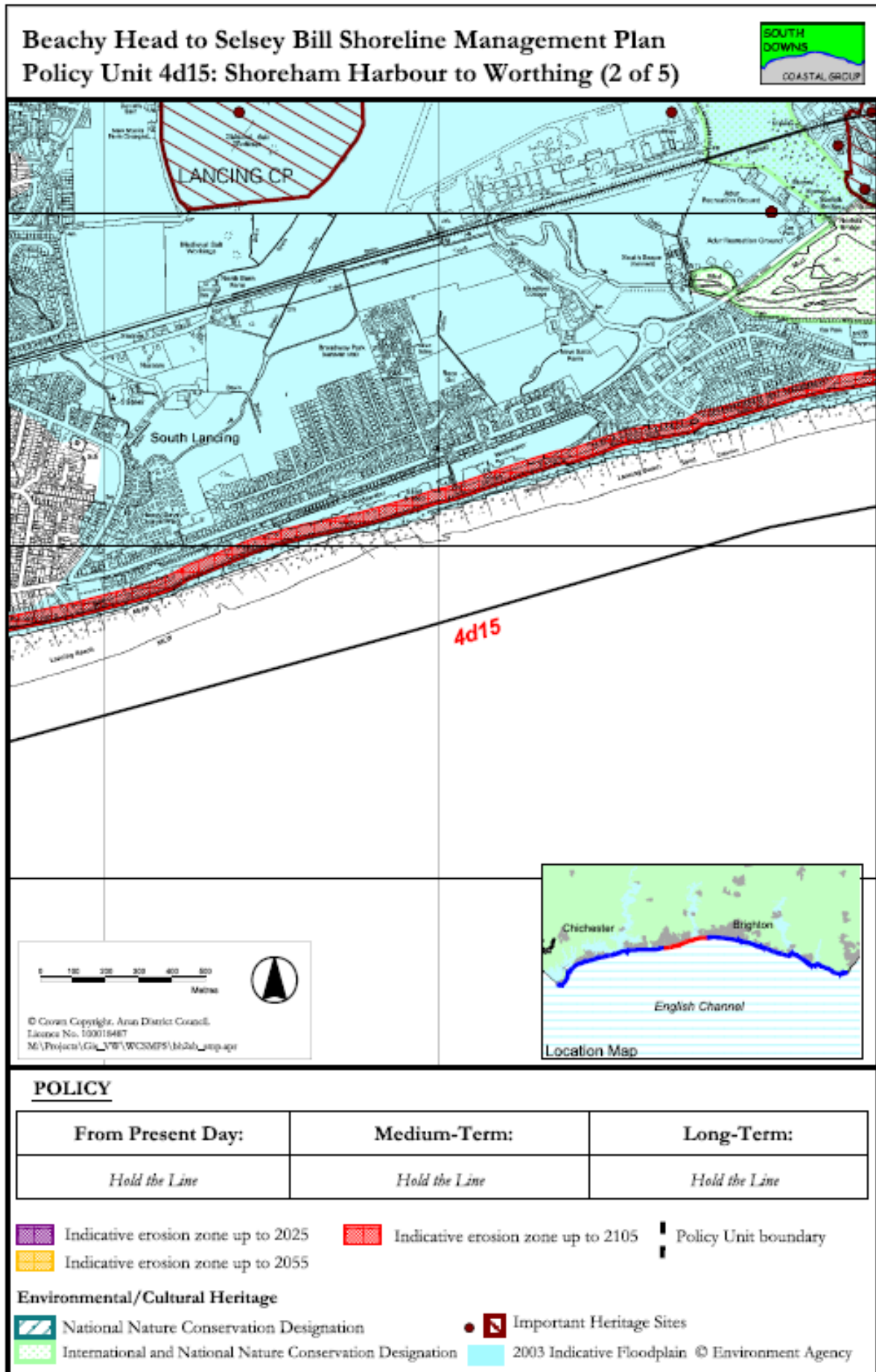
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		potential for an increased risk of overtopping.				
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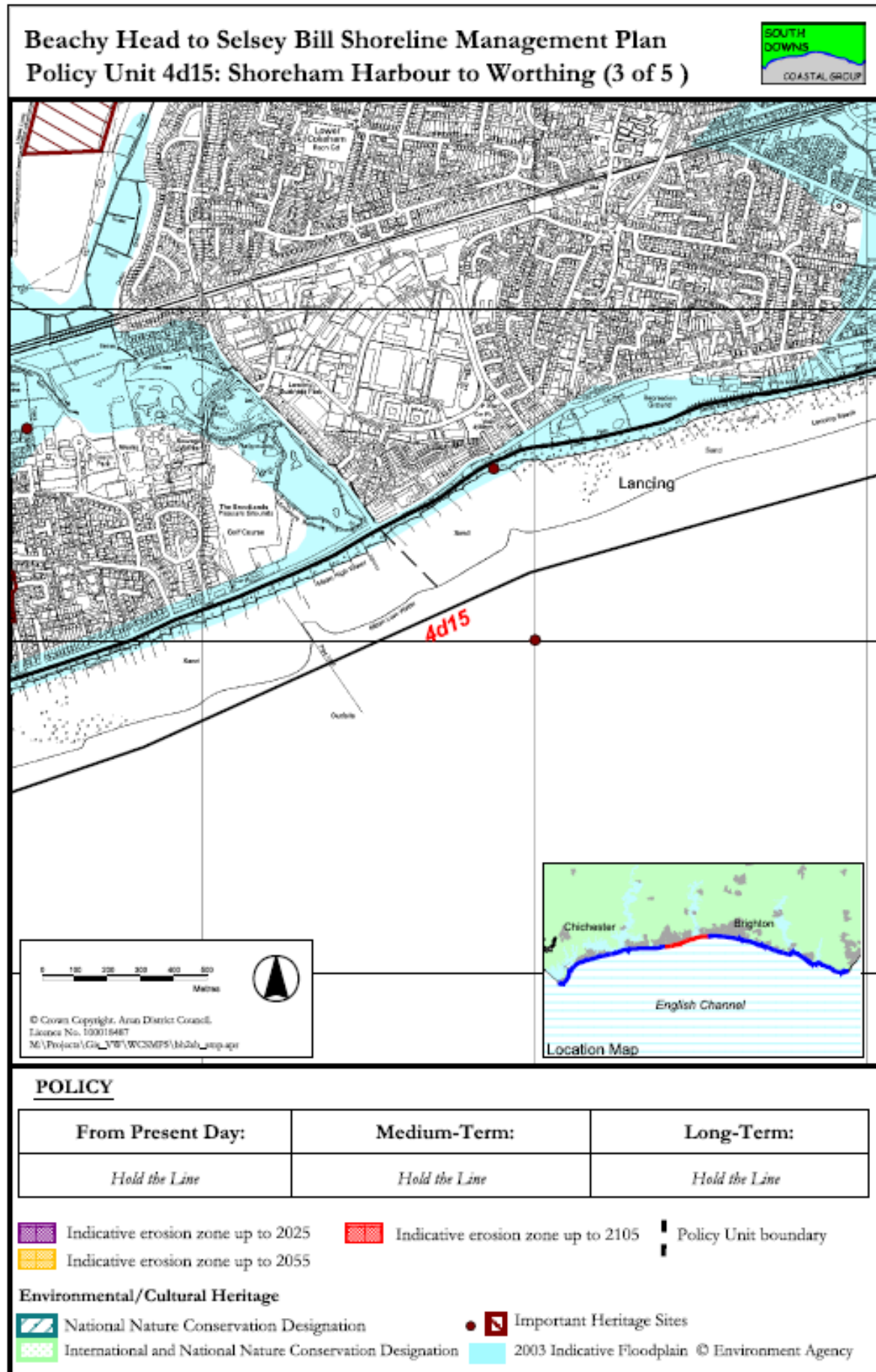
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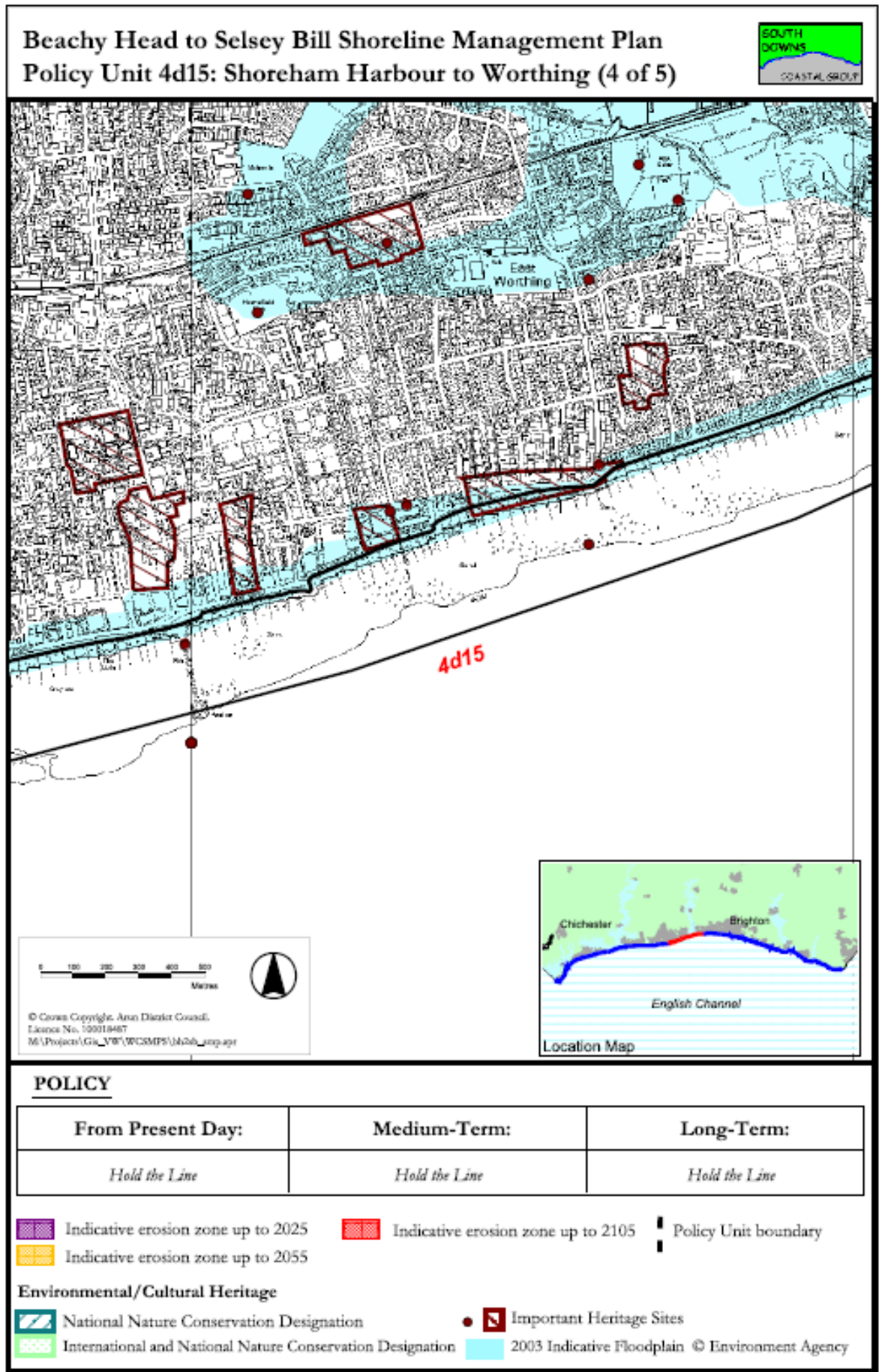
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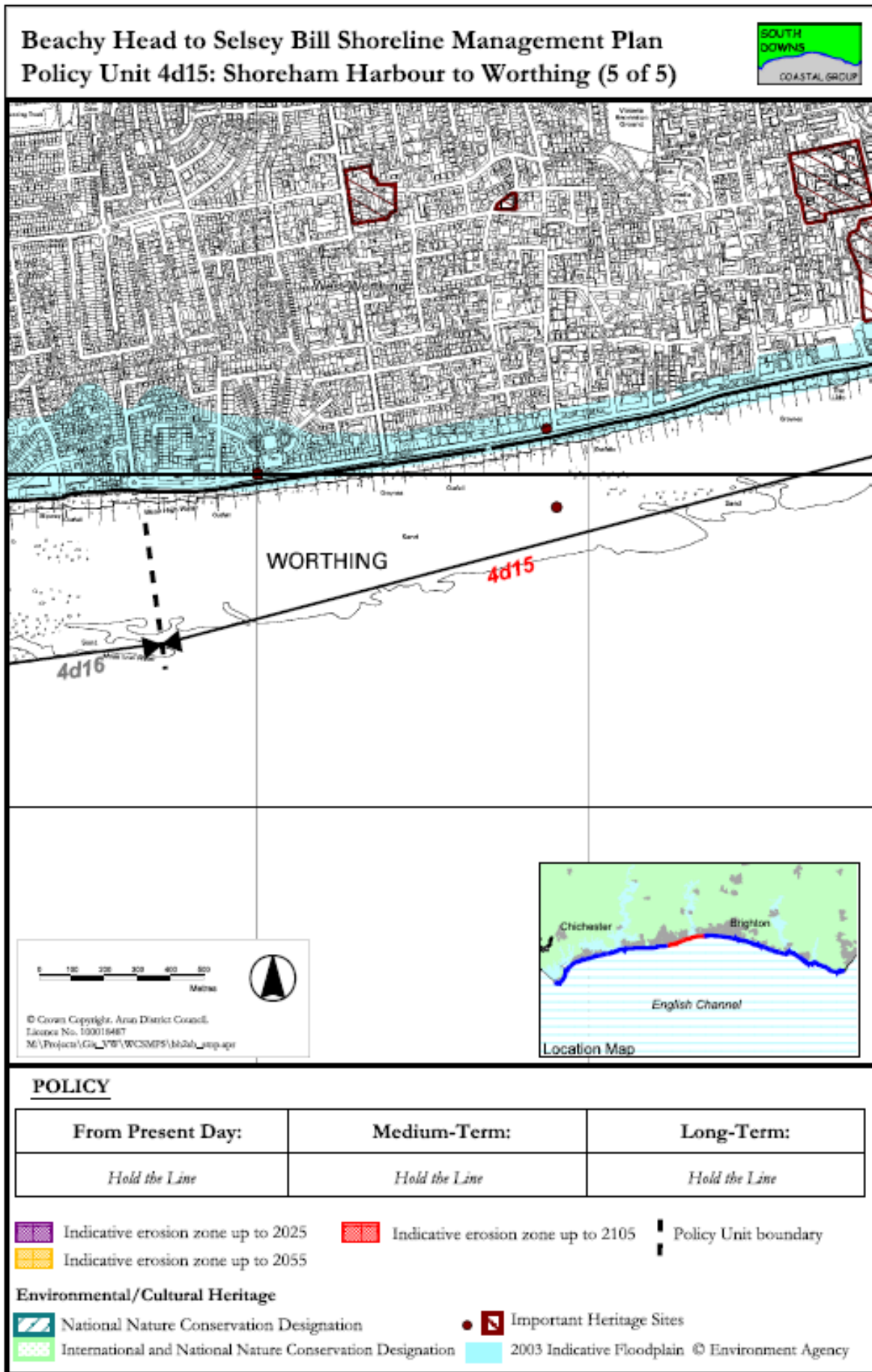
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Location reference: **Worthing to Goring-by-Sea**

Policy Unit reference: *4d16*

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

The recommended long-term plan for Worthing to Goring-by-Sea is to continue to protect assets within the town through holding the line, defending the present position; the town is an important seaside town and is a key service centre for the sub region, providing a range of facilities that support surrounding communities. The frontage has a high number of residential, commercial and recreational assets, and it is recognised that in order to achieve a sustainable coastline, the existing defences would have to be maintained at the cost of some interference to the natural processes.

Preferred policies to implement Plan:

Immediate:

The present-day policy for this area is to continue to protect the town frontage through maintaining the existing rock and timber groynes.

This will protect the maximum number of assets, but over this period beaches will start to become narrower, the shoreline will erode and the defences more exposed. It is expected for the groynes to fail during this period and would be replaced during the next.

This is consistent with the long-term plan for this section of shoreline.

Medium-term:

The medium-term policy is to continue defending the frontage beyond the immediate term. Defence of this frontage would most likely be provided through maintaining, replacing and upgrading structures and by providing new defences to hold the line. Secondary flood defences will protect the hinterland from flooding. This is consistent with the long-term plan for the shoreline.

During the next 20 to 50 years, it is likely that a beach would remain as long as the groynes are maintained and replaced, and located to a renewed position. The likelihood of overtopping and breaching will increase as sea levels rise and storm activity increases.

Longer-term:

The long-term policy is to continue defending the frontage. Defence of this frontage would most likely be provided through maintaining, replacing and upgrading the defence structures.

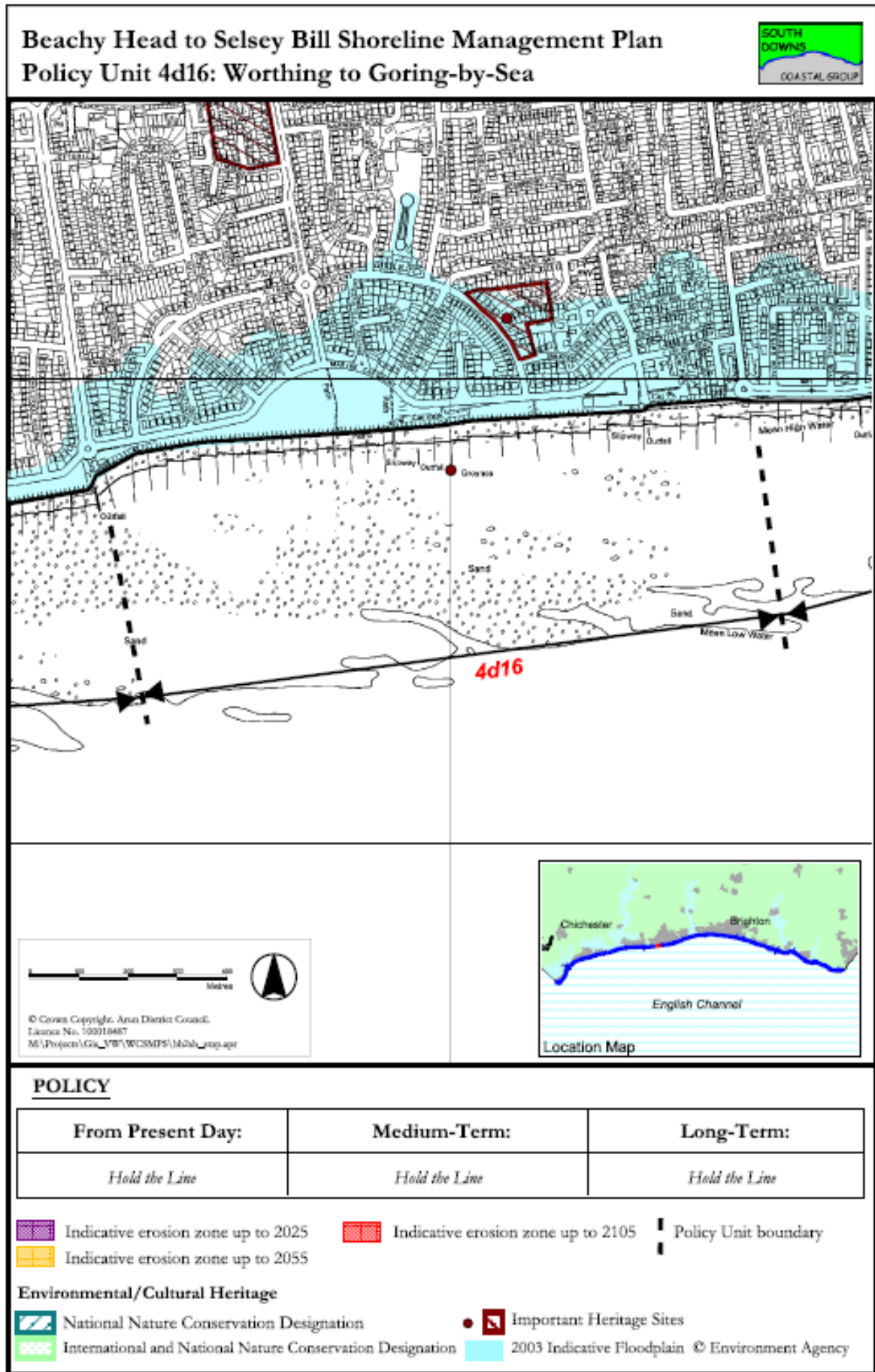
However, although this should continue to protect assets within the area, the character of the frontage may be changed from the present day, with alternative defences and low beaches present in front of the new defences.

Location reference:	Worthing to Goring-by-Sea
Policy Unit reference:	4d16

IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

Time Period	Management Activities	Property, Built Assets & Land Use	Landscape	Nature Conservation	Historic Environment	Amenity & Recreational Use
2005 – 2025	Continue with current management practices.	No loss of property or land behind the existing defences.	No change to landscape character or seafront.	No nature conservation gains or losses.	No loss of heritage sites landward of the defences.	No loss of community or recreational facilities landward of the defences. Narrow beach retained.
2025 – 2055	Increase engineering and management practices to offset impacts of sea level rise.	No loss of property or land behind the existing defences.	No change to landscape character, although increased engineering practices would alter the existing seafront.	No nature conservation gains or losses.	No loss of heritage sites landward of the defences.	No loss of community or recreational facilities landward of the defences. Reduction of beach.
2055 – 2105	Increase engineering and management practices to offset impacts of sea level rise.	No loss of property or land behind the existing defences.	No change to landscape character, although increased engineering practices would alter the existing seafront.	No nature conservation gains or losses.	No loss of heritage sites landward of the defences.	No loss of community or recreational facilities landward of the defences. Increased engineering and management would result in the loss of amenities that line the seafront.

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Location reference: Ferring/ Kingston

Policy Unit reference: 4d17

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

The recommended long-term plan for Ferring/Kingston is to continue to protect assets within the area through holding the line, defending the present position; the area provides a range of facilities that support surrounding communities. This policy is considered to be technically sustainable in the long-term due to its consistent approach with adjacent frontages.

Preferred policies to implement Plan:

Immediate: The present-day policy for this area is to continue to protect the town frontage through maintaining the existing breastwork and groynes.

This will protect the maximum number of assets, but over this period beaches will start to become narrower and defences more exposed.

This is consistent with the long-term plan for this section of shoreline.

Medium-term: The medium-term policy is to continue defending the frontage beyond the immediate term. Defence of this frontage would most likely be provided through maintaining, replacing and upgrading structures and by providing new defences to prevent flooding and outflanking. This is consistent with the long-term plan for this section of shoreline.

During the next 20 to 50 years, it is likely that a beach would remain as long as the groynes are maintained and replaced, although their effectiveness will gradually reduce as sea levels rise and erosion to the east and west of the town continues. But beyond this, however, the groynes will eventually become redundant and there will no longer be beaches in front of the town.

Longer-term: The long-term policy is to continue defending the frontage. Defence of this frontage would most likely be provided through maintaining, replacing and upgrading seawall structures; and providing new defences at Ferring.

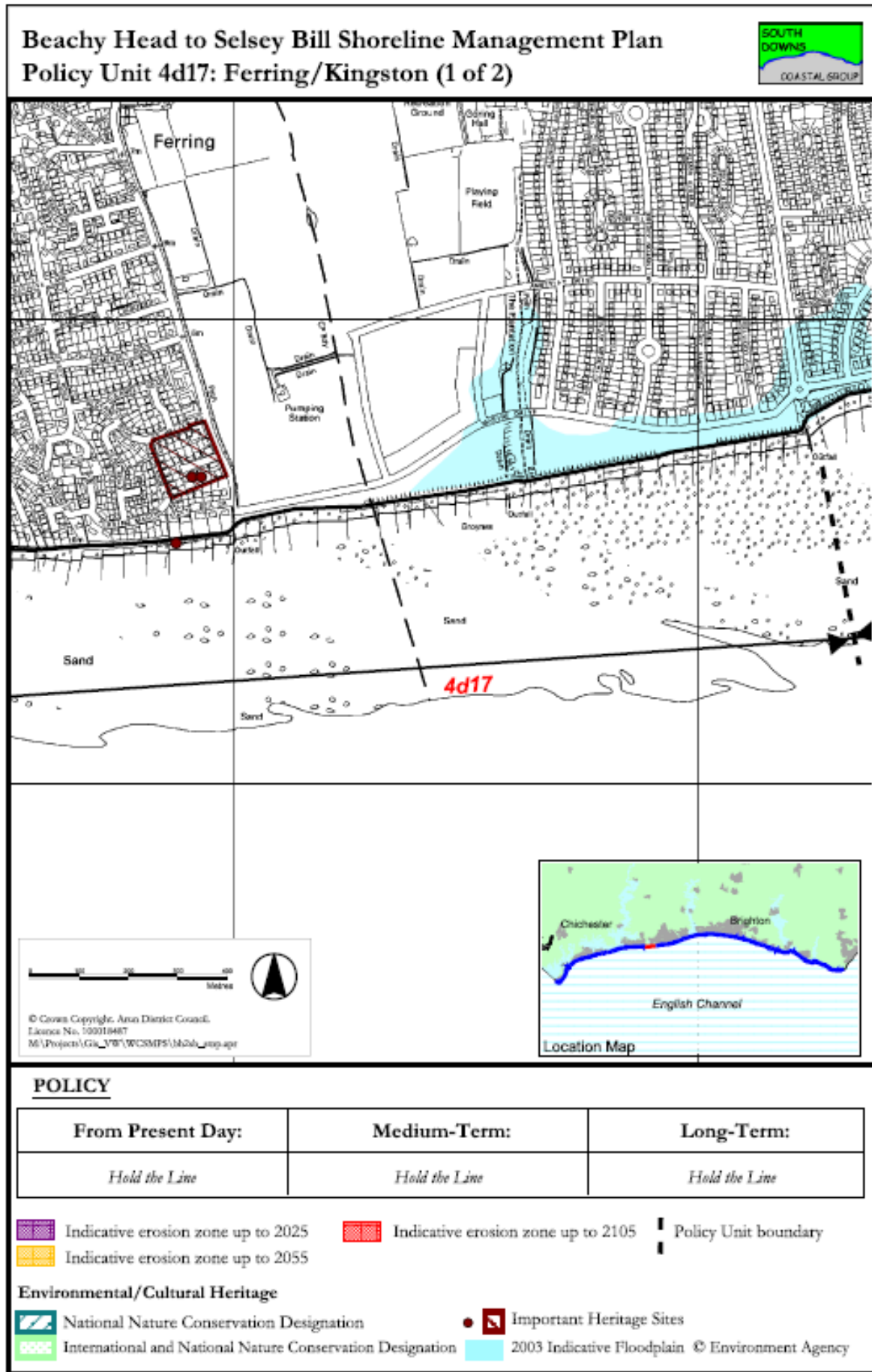
However, although this should continue to protect assets within the area, the character of the frontage may however be changed from the present day, potentially with seawalls/other alternative defences and low beaches present in front of the town.

Location reference:	Ferring/ Kingston
Policy Unit reference:	4d17

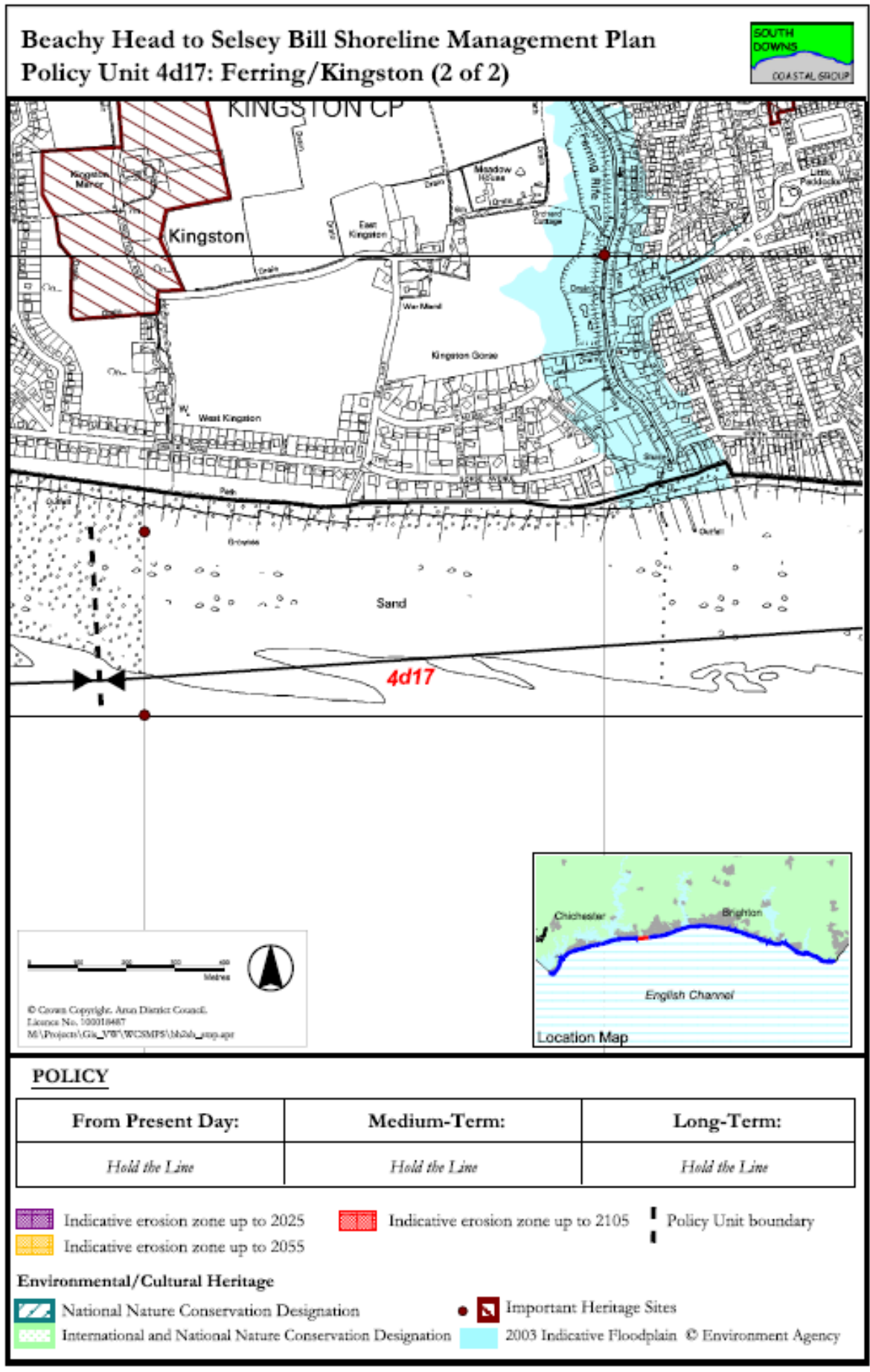
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

Time Period	Management Activities	Property, Built Assets & Land Use	Landscape	Nature Conservation	Historic Environment	Amenity & Recreational Use
2005 – 2025	Continue with current management practices.	No loss of property behind the existing defences.	No change to landscape character or seafront.	No nature conservation gains or losses.	No loss of heritage sites landward of the defences.	No loss of community or recreational facilities landward of the defences. Reduction of beach.
2025 – 2055	Increased engineering and beach management practices.	No loss of property behind the existing defences.	No change to landscape character, although increased engineering practices could affect the existing character of the seafront.	No nature conservation gains or losses.	No loss of heritage sites landward of the defences.	No loss of community or recreational facilities landward of the defences. Loss of beach as an amenity during this period.
2055 – 2105	Increased engineering and beach management practices, with the construction of new defences and beach re-profiling.	No loss of property behind the existing defences.	No change to landscape character, although increased engineering practices could affect the existing character of the seafront.	No nature conservation gains or losses.	No loss of heritage sites landward of the defences.	Possible loss of community or recreational facilities landward of any new defences. Beach may be permanently lost during this period.

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Location reference: Angmering-on-Sea to Littlehampton

Policy Unit reference: 4d18

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

The recommended long-term plan for Angmering on Sea to Littlehampton is to continue to protect assets within the town through holding the line and defending the present position; the town is a key tourist resort and service centre for the sub region, providing a range of facilities that support surrounding communities. This is considered sustainable in technical terms due to low transport rates and therefore limited linkages to adjacent shorelines.

Preferred policies to implement Plan:

Immediate: The present-day policy for this area is to continue to protect the town frontage through maintaining existing eastern training wall, seawalls, beach and groynes.

This will protect the maximum number of assets, but over this period beaches will start to become narrower and defences more exposed.

This is consistent with the long-term plan for this section of shoreline.

Medium-term: The medium-term policy is to continue defending the frontage beyond the immediate term. Defence of this frontage would most likely be provided through maintaining, replacing and upgrading structures and by providing new defences between those existing to prevent embayments occurring.

During the next 20 to 50 years, it is likely that a beach would remain as long as the groynes are maintained and replaced, although their effectiveness will gradually reduce as sea levels rise and continuing erosion to the east of the town limits updrift sediment feed. But beyond this, however, the groynes will eventually become redundant and there will no longer be beaches in front of the town.

Longer-term: The long-term policy is to continue defending the frontage. Defence of this frontage would most likely be provided through maintaining, replacing and upgrading seawall structures.

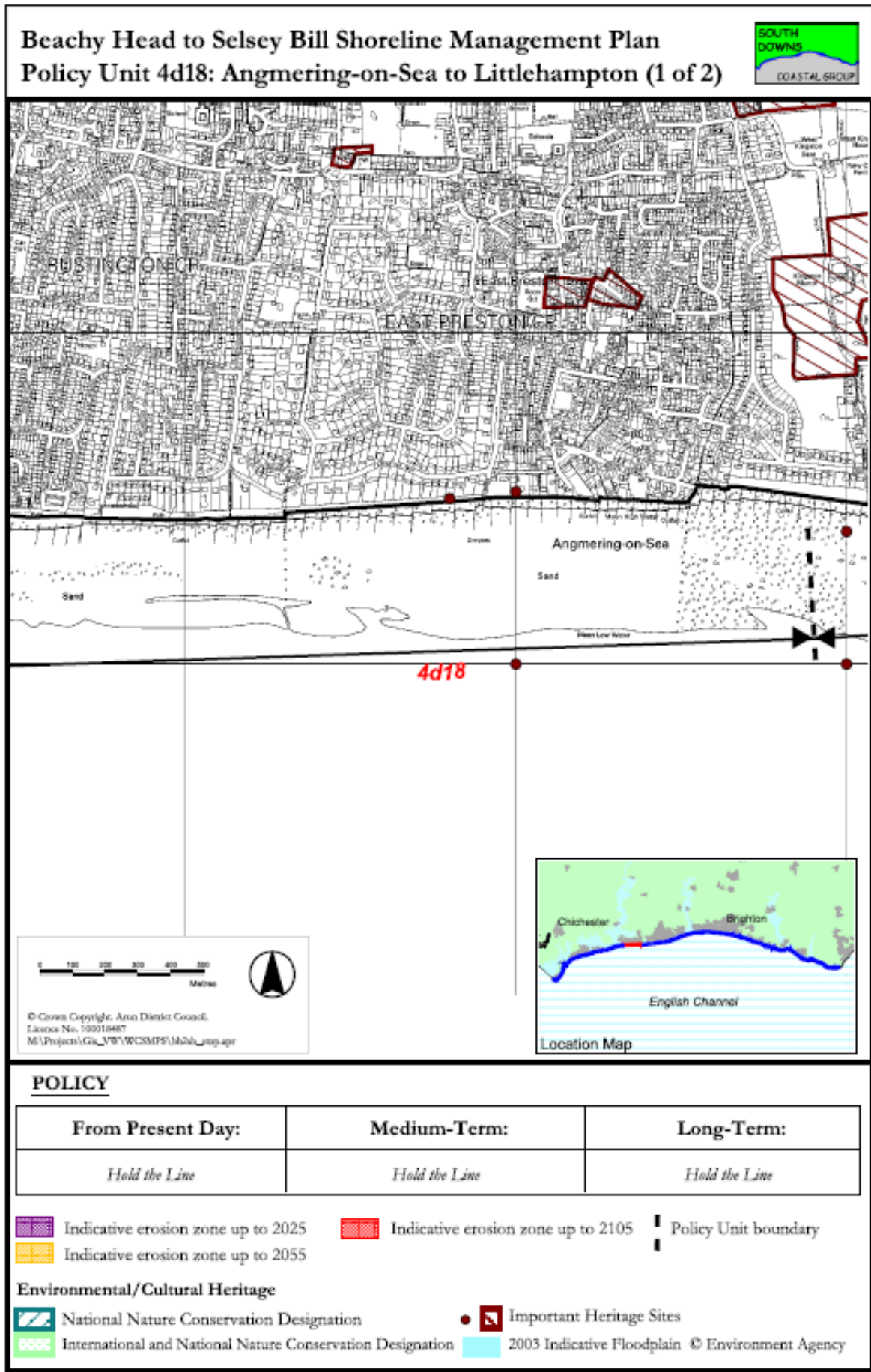
However, although this should continue to protect assets at Littlehampton, the character of the frontage may however be changed from the present day, with high seawalls and low beaches present in front of the town.

Location reference:	Angmering-on-Sea to Littlehampton
Policy Unit reference:	<i>4d18</i>

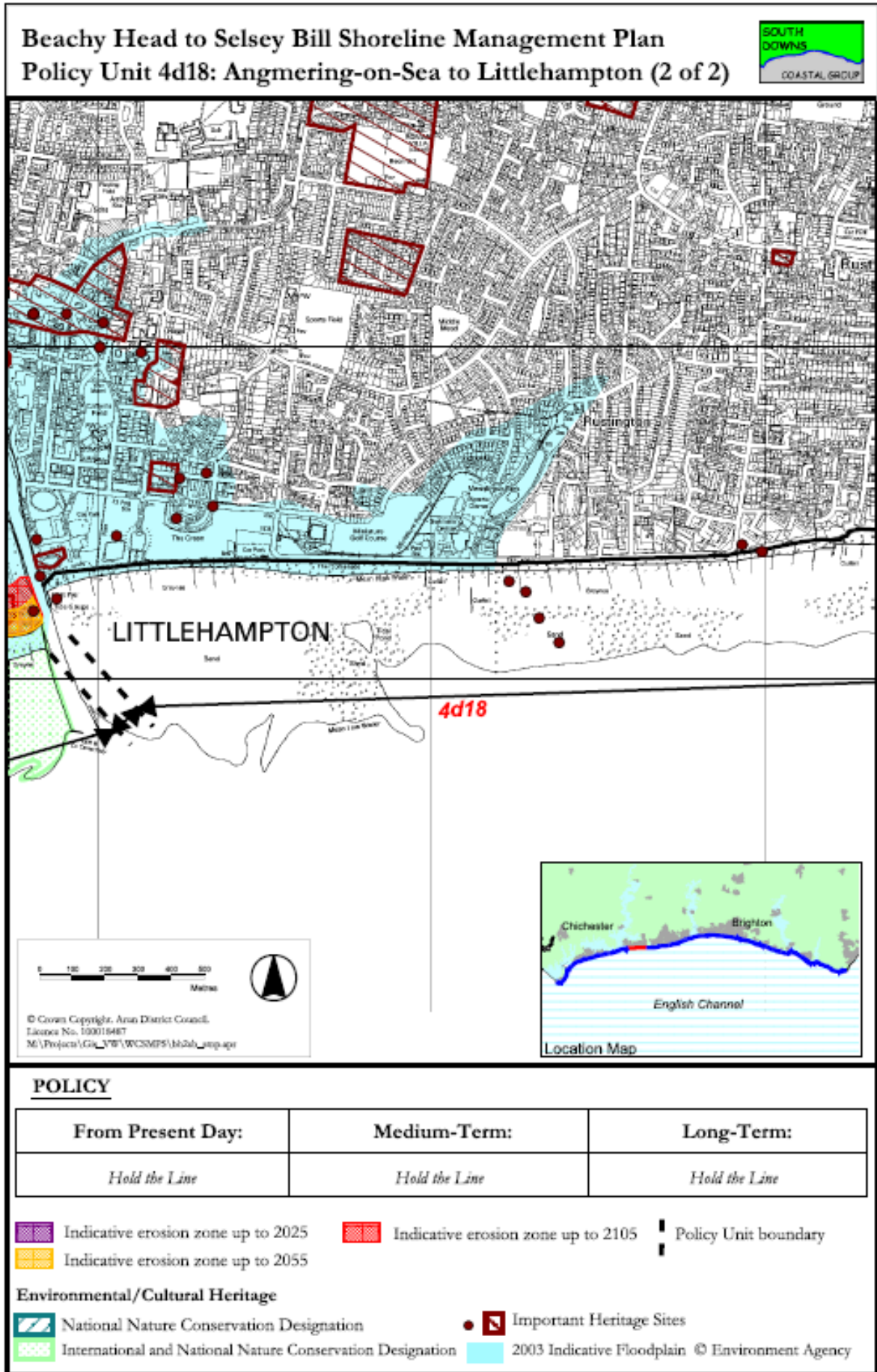
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

Time Period	Management Activities	Property, Built Assets & Land Use	Landscape	Nature Conservation	Historic Environment	Amenity & Recreational Use
2005 – 2025	Continue with current management practices.	No loss of property or land behind the existing defences.	No nature conservation gains or losses.	No loss or gains to landscape character of seafront.	No loss of heritage sites landward of defences.	No loss of community or recreational facilities landward of defences. Narrow beach retained.
2025 – 2055	Increased engineering and beach management practices.	No loss of property or land behind the existing defences.	No nature conservation gains or losses.	Landscape character of seafront may change due to greater defence works, with possible loss of beach habitat.	No loss of heritage sites landward of defences.	No loss of community or recreational facilities landward of defences. Some land may need to be sacrificed to establish new defences Reduction in beach.
2055 – 2105	Increased engineering and beach management practices. New replacement defences required. Esplanade may need to be relocated/ set back	No loss of property or land behind the existing defences. Properties may become more exposed and subject to overtopping and flood damage.	No nature conservation gains or losses.	Landscape character of seafront may change due to greater defence works.	No loss of heritage sites landward of defences. Some potential loss of conservation areas.	No loss of community or recreational facilities landward of defences. Blue Flag status may be lost due to reduced beach width.

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Location reference: River Arun

Policy Unit reference: 4d19

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

The recommended long-term plan for the River Arun up to the A259 is to continue to protect assets through holding the line. However, it is recognised that this policy may need to be revised, particularly with respect to the west bank and mouth of the river, during future reviews of the Shoreline Management Plan and in light of more detailed studies. Within the valley, there are a high number of residential and commercial properties, and the settlements along its length provide a range of facilities that support the surrounding communities. The river and valley are of high environmental value and a key tourist resort for the sub region.

Preferred policies to implement Plan:

Immediate: The present-day policy for this area is to continue to protect the frontage through maintaining the existing clay embankment and vertical walls, revetment and rock slope.

Medium-term: The medium-term policy is to continue defending the frontage. Defence of this frontage would most likely be provided through maintaining or renewing existing structures.

Longer-term: The long-term policy is to continue defending the frontage. Defence of this frontage would most likely be provided through maintaining, renewing and upgrading defences structures or, where necessary, constructing new ones.

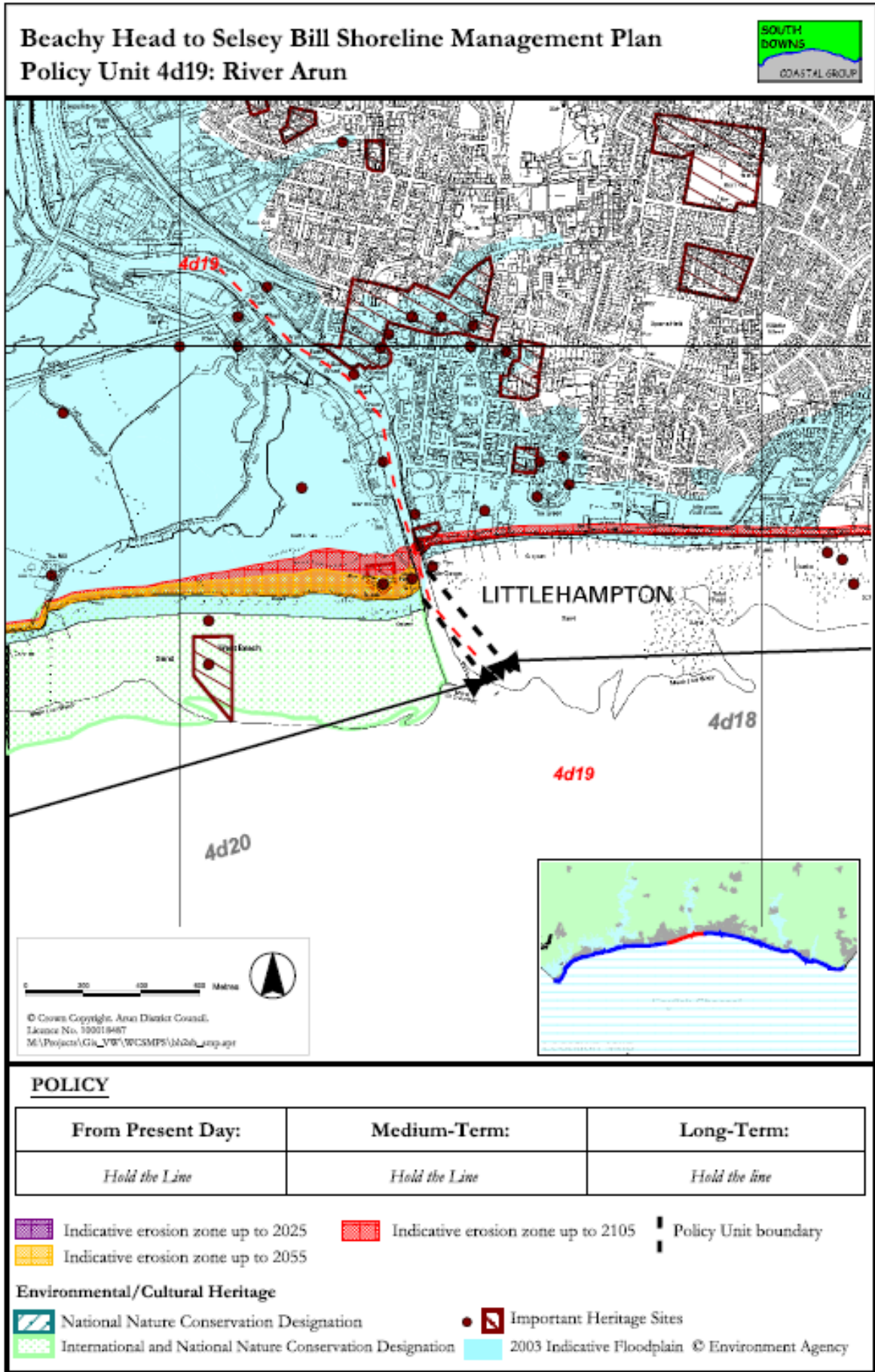
Although this should continue to protect assets around the mouth of the River Arun and upstream within the valley, the character of the frontage may change from that of the present day.

Location reference:	River Arun
Policy Unit reference:	<i>4d19</i>

IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

Time Period	Management Activities	Property, Built Assets & Land Use	Landscape	Nature Conservation	Historic Environment	Amenity & Recreational Use
2005 – 2025	Continue with current management practices.	No loss of property behind the existing defences.	No change to landscape character or frontage.	No nature conservation gains or losses.	No loss of heritage sites landward of the defences.	No loss of community or recreational facilities landward of the defences.
2025 – 2055	Increased engineering and management practices.	No loss of property behind the existing defences.	No change to landscape character, although increased engineering practices could affect the existing character of the frontage.	No nature conservation gains or losses.	No loss of heritage sites landward of the defences.	No loss of community or recreational facilities landward of the defences, unless it becomes necessary to renew the existing defences.
2055 – 2105	Significant investment required to sustain the standard of defence protection.	No loss of property behind the existing defences.	No change to landscape character, although increased engineering practices could affect the existing character of the frontage.	Potential loss of mudflats, otherwise no conservation gains or losses.	No loss of heritage sites landward of the defences	No loss of community or recreational facilities landward of the defences, unless it becomes necessary to renew the existing defences.

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Location reference: Littlehampton Harbour to Poole Place

Policy Unit reference: 4d20

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

The recommended long-term plan for Littlehampton Harbour to Poole Place is to allow the coastline to realign to a more naturally functioning system, whilst continuing to provide flood defence to the large hinterland floodplain. The area behind the dunes/defences is naturally low-lying, and is of high environmental importance; there are a few properties immediately behind the dunes/defences, including one isolated property at Poole Place. There are also some link roads to isolated buildings, but otherwise the land is agricultural. However, the low-lying area extends to the residential settlements of Climping, Littlehampton (west bank of the River Arun) and Ford, resulting in an extensive floodplain. The harbour is an important asset, both for the local economy and recreation. It is recognised that this section of coastline provides an opportunity for environmental enhancements and this could be achieved through a managed realignment policy and a more naturally functioning coastline. This policy is considered to be sustainable in the long-term, but on the basis that overall flood defence is maintained to the large floodplain, whilst also adhering to the requirements to conserve the SSSI. Implementation of this policy may be affected by legal agreements on part of this frontage.

Preferred policies to implement Plan:

Immediate:

The present-day policy for this area is to begin to realign the coastline landwards in a proactive manner. This may be achieved by either reconfiguring the primary defences to create a number of larger, swash-aligned bays, or allowing the existing primary defences to roll back/fail and the shoreline to erode whilst maintaining flood defence to the hinterland by constructing secondary defences. The coastline will be fixed in position to the east and west in accordance the policies for those adjacent Policy Units. A new linear defence/flood embankment may need to be constructed at Poole Place to prevent erosion and outflanking of the flood defences at Elmer. Periodic recycling or renourishment of the beach may be required. As the coastline realigns, intertidal habitat will develop through the natural roll back/breaching of the shingle beach and through dune rollback east of Climping. The exact nature of shoreline response and the managed realignment works to be implemented will be the subject of further studies.

This is consistent with the long-term plan for this section of shoreline, and will help with its implementation throughout the medium term.

Medium-term:

The medium-term policy is to continue to realign the coastline, but in a managed way. The reconfigured primary defences or secondary defences will require maintenance. Periodic recycling or renourishment of the beach may be required. The aim of this policy is to work towards achieving a more naturally functioning coastline. The coastline will be fixed at its eastern and western ends as described above. As the shoreline realigns the intertidal habitat will develop further.

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Longer-term:

The long-term policy is to continue to realign the coastline, but in a managed way. The reconfigured primary defences or secondary defences will require maintenance. Periodic recycling or renourishment of the beach may be required. As in the medium term, the coastline will be fixed at its eastern and western ends, but will principally be free functioning in between. It is expected that the intertidal habitat will be well-established.

Location reference: Littlehampton Harbour to Poole Place

Policy Unit reference: 4d20

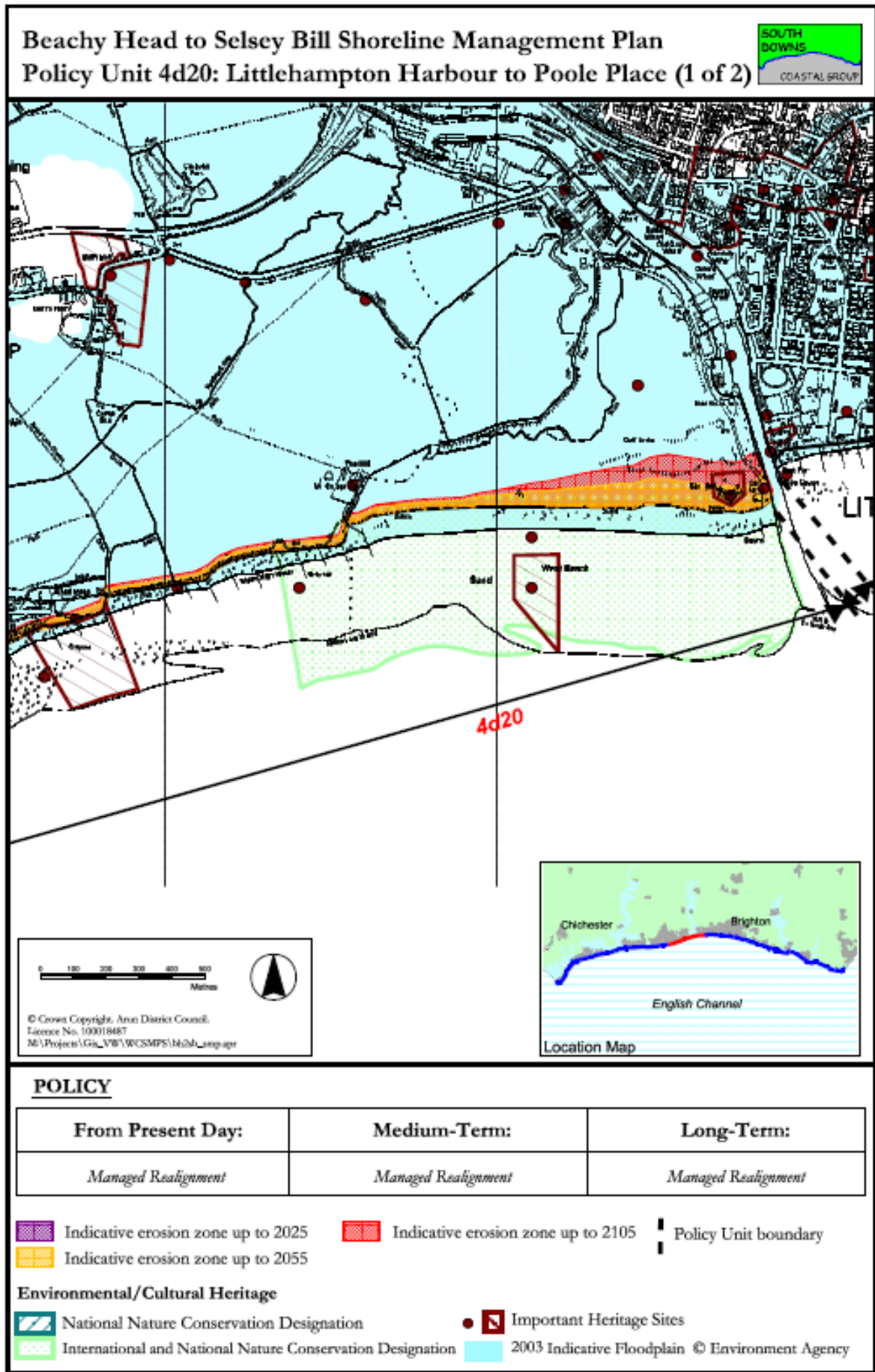
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

Time Period	Management Activities	Property, Built Assets & Land Use	Landscape	Nature Conservation	Historic Environment	Amenity & Recreational Use
2005 – 2025	Reconfigure the primary defences along the frontage or allow the primary defences to roll-back/fail and construct new secondary defences to promote realignment of the shore. If necessary, construct a new access road to The Mill and a new flood embankment/defence at Poole Place to prevent outflanking of defences to the west. Periodic recycling or renourishment of the beach may be required. Implementation of this policy may be affected by legal agreements covering part of this frontage.	There is a risk of flooding to property at Atherington and flooding/erosion of land.	No change to landscape character, although a switch in management practices may alter the balance of terrestrial to intertidal habitat along the frontage.	Potential loss of sand dunes, but return to a more free-functioning coastal system, which should maintain the biological value as SSSI, SNCI, LNR and national (vegetated shingle) or local (sand dune) BAP habitats.	No loss of heritage sites landward of defences.	No loss of community, but may be some loss of recreational facilities.
2025 – 2055	Maintain reconfigured primary/secondary defences. Periodic recycling or	There is a risk of flooding to property at Atherington and flooding/erosion of land.	No change to landscape character, although a switch in management practices may alter the	Potential loss of sand dunes, but return to a more free-functioning coastal system, which	No loss of heritage sites landward of defences.	No loss of community, but may be some loss of recreational facilities.

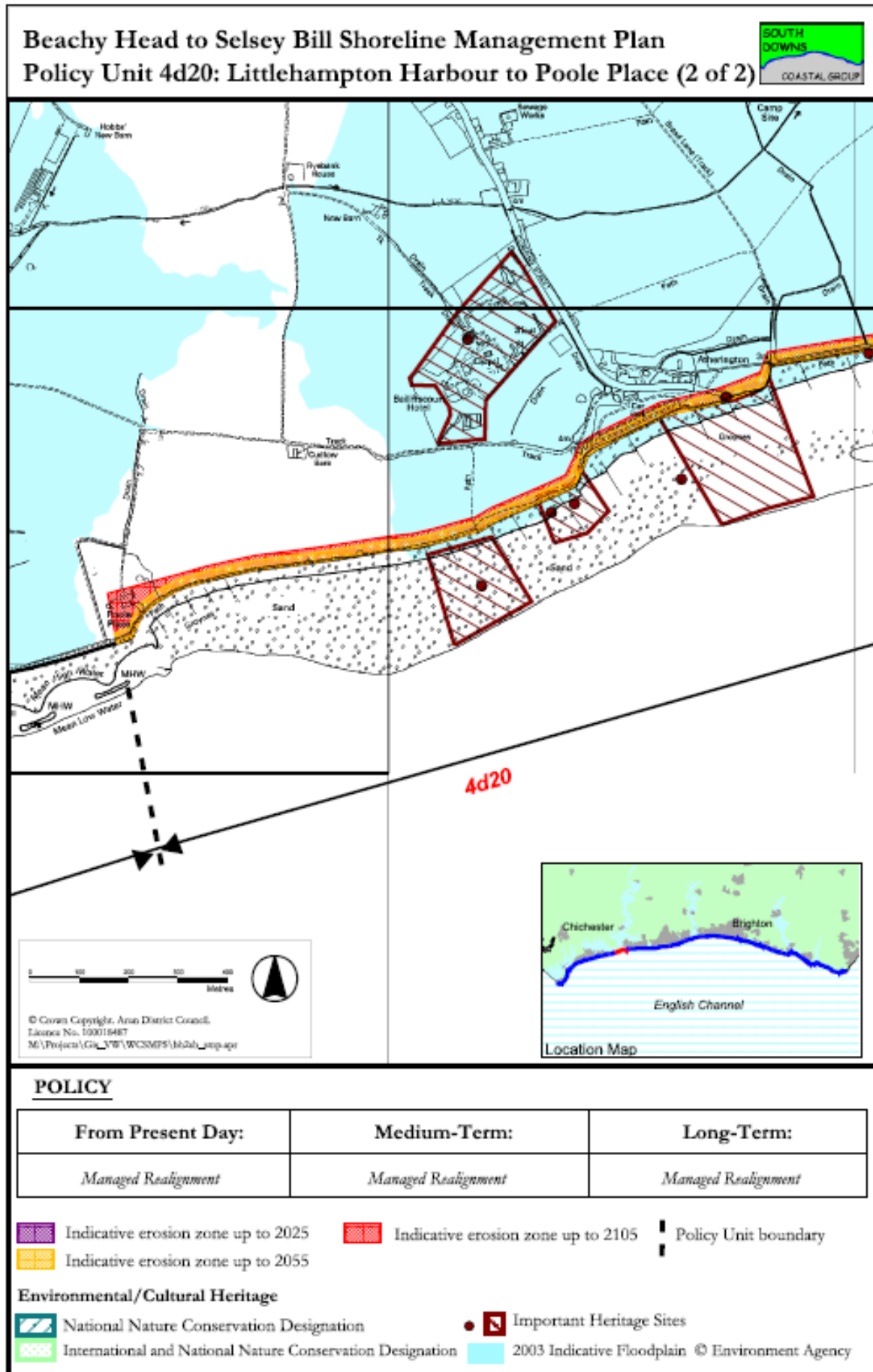
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	renourishment of the beach may be required. Continue realigning the coastline.		balance of terrestrial to intertidal habitat along the frontage.	should maintain the biological value as SSSI, SNCI, LNR and national (vegetated shingle) or local (sand dune) BAP habitats.		
2055 – 2105	Maintain reconfigured primary/secondary defences. Periodic recycling or renourishment of the beach may be required. Continue realigning the coastline.	There is a risk of flooding/erosion to property at Atherington. Up to 10ha of land could be lost by 2105 depending on the method of managed realignment adopted.	No change to landscape character, although a switch in management practices may alter the balance of terrestrial to intertidal habitat along the frontage.	Potential loss of sand dunes, but return to a more free-functioning system, which should maintain the biological value as SSSI, SNCI, LNR and national (vegetated shingle) or local (sand dune) BAP habitats.	Potential loss of Littlehampton Fort as sand dunes roll back.	No loss of community, but may be some loss of recreational facilities.

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Location reference: Elmer (Breakwaters)

Policy Unit reference: 4d21

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

The recommended long-term plan for Elmer (breakwaters) is to continue to protect assets within the village through holding the line, thus defending the present position. Elmer is an urban area with a high number of recreational assets. It is recognised that a sustainable shoreline at Elmer is a defended one. Without the defences, the shoreline would rapidly erode, resulting in the loss of a high number of residential and commercial assets; in turn this would impact on the free transport of material along this frontage.

Preferred policies to implement Plan:

Immediate:

The present-day policy for this area is to continue to protect the village frontage through maintaining the detached breakwaters and continue using beach renourishment/recycling practices.

This will protect the maximum number of assets, but will continue to interrupt longshore transport and reduce the volume of sediment reaching the coast further east.

This is, however, consistent with the long-term plan for this section of shoreline.

Medium-term:

The medium-term policy is to continue defending the frontage beyond the immediate term. This is consistent with the long-term plan for this section of shoreline.

Defence of this frontage would most likely be provided through maintaining the detached breakwaters and terminal groyne (at Poole Place) and continuing with renourishment/ recycling practices.

Longer-term:

The long-term policy is to continue defending the frontage. Defence of this frontage would most likely be provided through maintaining the detached breakwaters and terminal groyne, and increasing the volume of beach renourishment when required,

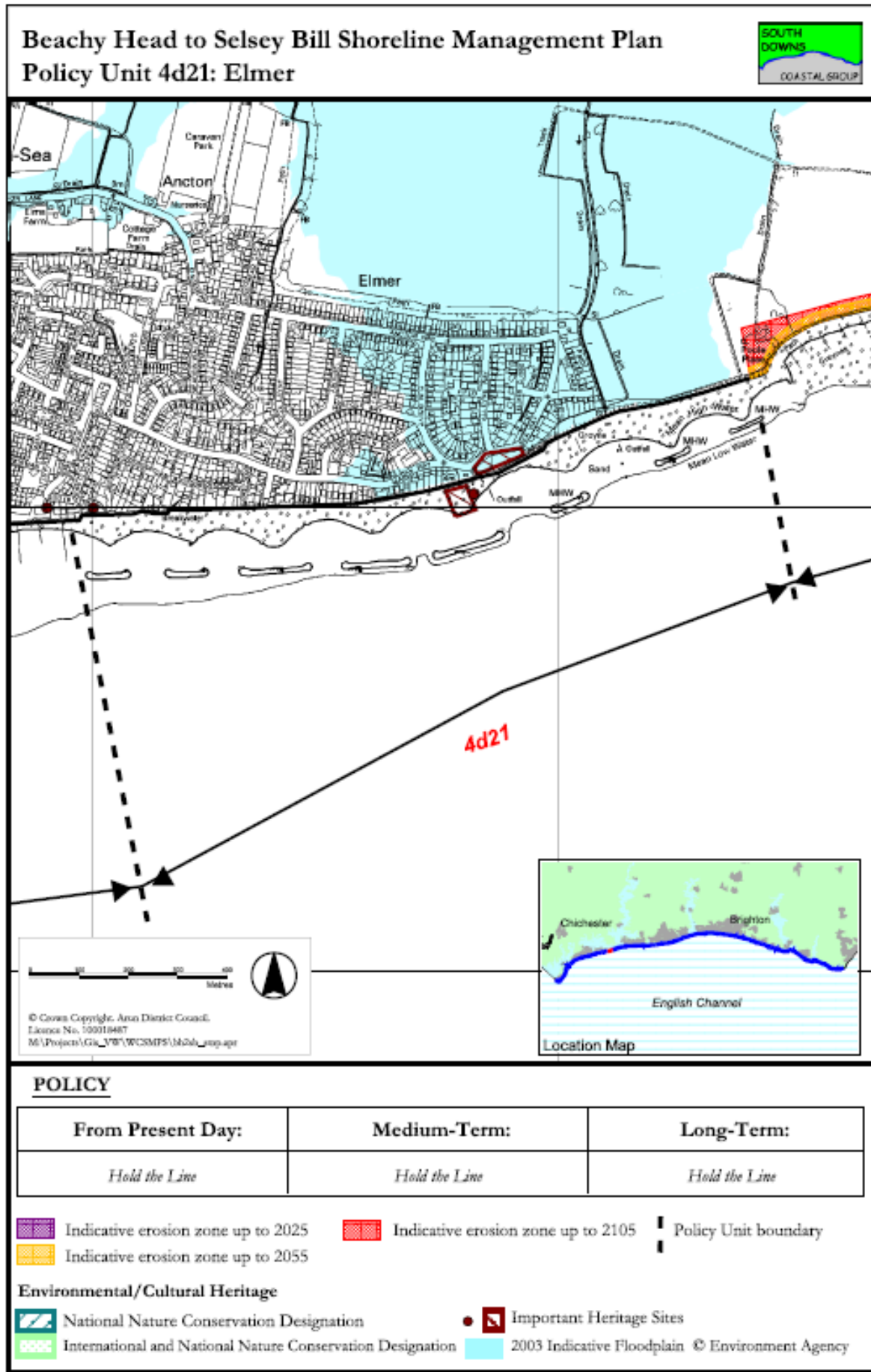
This policy will ensure that the assets are protected and that there will be no significant change to the existing character of the frontage, only that determined by sea level rise.

Location reference:	Elmer (Breakwaters)
Policy Unit reference:	<i>4d21</i>

IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

Time Period	Management Activities	Property, Built Assets & Land Use	Landscape	Nature Conservation	Historic Environment	Amenity & Recreational Use
2005 – 2025	Continue with current management practices.	No loss of property behind the existing defences.	No change to landscape character or seafront.	No nature conservation gains or losses.	No loss of heritage sites landward of the defences.	No loss of community or recreational facilities landward of the defences. Existing beach maintained.
2025 – 2055	Continue with current management practices throughout this period.	No loss of property behind the existing defences.	No change to landscape character. Increased engineering practices could affect the existing character of the seafront.	No nature conservation gains or losses.	No loss of heritage sites landward of the defences.	No loss of community or recreational facilities landward of the defences. Beach narrowing mitigated against with renourishment.
2055 – 2105	Increased engineering and beach management practices.	No loss of property behind the existing defences.	No change to landscape character. Increased engineering practices could affect the existing character of the seafront.	No nature conservation gains or losses.	No loss of heritage sites landward of the defences.	No loss of community or recreational facilities landward of the defences. Beach narrowing mitigated against with renourishment, although this may be offset by sea level rise.

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Location reference: Middleton-on-Sea

Policy Unit reference: 4d22

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

The recommended long-term plan for Middleton-on-Sea (Southdean) to Middleton-on-Sea (west) is to continue to protect assets within the village through holding the line. Middleton-on-Sea is an urban area, with a high density of residential properties and a large-scale infrastructure network, as well as an abundance of recreational assets. The village provides a range of facilities that support surrounding communities; and this policy is therefore considered sustainable in socio-economic terms.

Preferred policies to implement Plan:

Immediate: The present-day policy for this area is to continue to maintain the shoreline in its present position. The seawall and timber groynes would function adequately throughout this period, protecting the frontage and the maximum number of assets. This policy is consistent with the long-term plan of Hold the Line.

Medium-term: The medium-term policy is to continue defending the frontage beyond the immediate term. Defence of this frontage would most likely be provided through maintaining, replacing and upgrading the seawall and groynes, although new structures may be required to prevent beach loss at Middleton Point.

This will affect the existing character of the coastline, but will protect the assets of Middleton, which is compliant with the long-term policy for this coastline.

Longer-term: The long-term policy is to continue to maintain the present shoreline position by defending the frontage. This will be achieved through maintenance and upgrading of the existing seawall, and by constructing renewed defences, including a seawall and groynes, at Middleton Point.

The character of this frontage will change over the longer term, with a switch to a coastline that is dominated by hard defences. It will become increasingly difficult to maintain a beach in front of the seawall as sea levels rise and there is insufficient sediment supply to maintain the beaches. Despite the loss of amenity beaches, this policy is considered to be sustainable both due to the value of the assets at risk to erosion and flooding, and due to the limited impact on the sediment transport regime at this location.

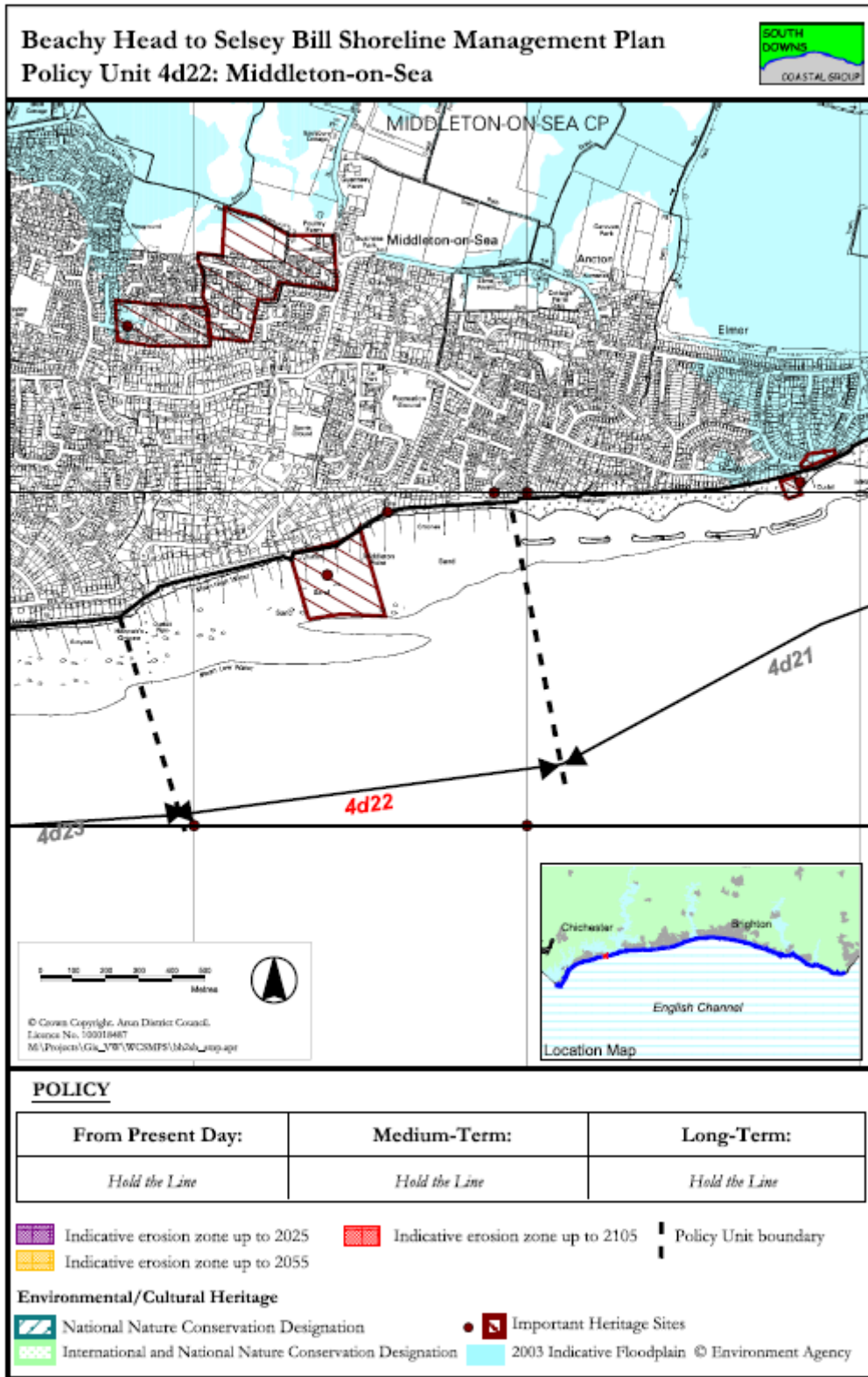
Location reference:	Middleton-on-Sea
Policy Unit reference:	<i>4d22</i>

IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

Time Period	Management Activities	Property, Built Assets & Land Use	Landscape	Nature Conservation	Historic Environment	Amenity & Recreational Use
2005 – 2025	Continue with current management practices.	No loss of property behind the existing defences.	No change to landscape character or seafront.	No nature conservation gains or losses.	No loss of heritage sites landward of the defences.	No loss of community or recreational facilities landward of the defences. Existing beach maintained, although some narrowing expected towards the end of this period.
2025 – 2055	Continue with current management practices, but possibly setback during this period.	No loss of property behind the existing defences.	No change to landscape character, although a change to existing engineering practices could affect the existing character of the seafront.	No nature conservation gains or losses.	No loss of heritage sites landward of the defences.	No loss of community or recreational facilities landward of the defences. Beach narrowing offset by setting defences back landwards. Potential for some loss of beach access and use as a recreational beach.
2055 – 2105	Maintain and upgrade existing defences. Renew and construct new defences where necessary.	No loss of property or built assets behind the existing defences.	No change to landscape character, although a change to existing engineering practices would alter the existing character of the	No nature conservation gains or losses.	No loss of heritage sites landward of the defences.	No loss of community or recreational facilities landward of the defences. Beach narrowing offset by setting defences

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			seafront.			back landwards. Potential for some loss of beach access and use as a recreational beach.
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Location reference: Felpham to Aldwick

Policy Unit reference: 4d23

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

The recommended long-term plan for Felpham to Aldwick (including Felpham and Bognor Regis) is to continue to protect assets within the area through defending the present position; villages along the frontage act as a service centre for the sub region, providing a range of facilities and infrastructure that support surrounding communities. The frontage itself is an important tourist resort, offering a range of amenities for recreation, whilst the surrounding area is environmentally important, both geologically and biologically. The long term policy is considered sustainable in socio-economic, environmental and also technical terms, since the most number of assets will be protected, without detrimental loss of the beach.

Preferred policies to implement Plan:

Immediate:

The present-day policy for this area is to continue to protect the village and sea side frontage through maintaining the existing seawall and groynes. Renourishment practices at Felpham will also be used to help maintain the beaches there. During this period, there would be little change from the existing situation. This policy is consistent with the long-term plan of Hold the Line.

Medium-term:

The medium-term policy is to continue defending the frontage. As sea levels rise during this period, the defences will need to be maintained, replaced and upgraded, and the volume of beach renourishment at Felpham increased. Investing in defences at this stage will help to achieve the long-term policy of maintaining the shoreline in its present position.

During the next 20 to 50 years, it is anticipated that despite efforts made to improve the defences, the beaches will begin to disappear, to leave a hard coastline with very narrow beaches. This will impact on the existing character of the frontage, but will protect the assets from flooding and erosion. The beaches at Felpham will be maintained through the implementation of beach renourishment. It should be recognised that this method of defence may permanently obscure geological interest and therefore mitigation or a reduction in the impact will need to be sought at scheme level.

Longer-term:

The long-term policy is to continue defending the frontage. Defence of this frontage would most likely be provided through maintaining, upgrading and replacing the existing defences; and providing new renewed defences. There will be continued narrowing of beaches, and it is expected that by the end of this period the beaches will have disappeared.

At Felpham it is expected that the beaches would rebuild as long as the

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existing groynes are replaced with new groynes. Increased renourishment at Felpham would be needed to sustain beach levels. It should be recognised that this method of defence may permanently obscure geological interest and therefore mitigation or a reduction in the impact will need to be sought at scheme level.

Location reference:	Felpham to Aldwick
Policy Unit reference:	<i>4d23</i>

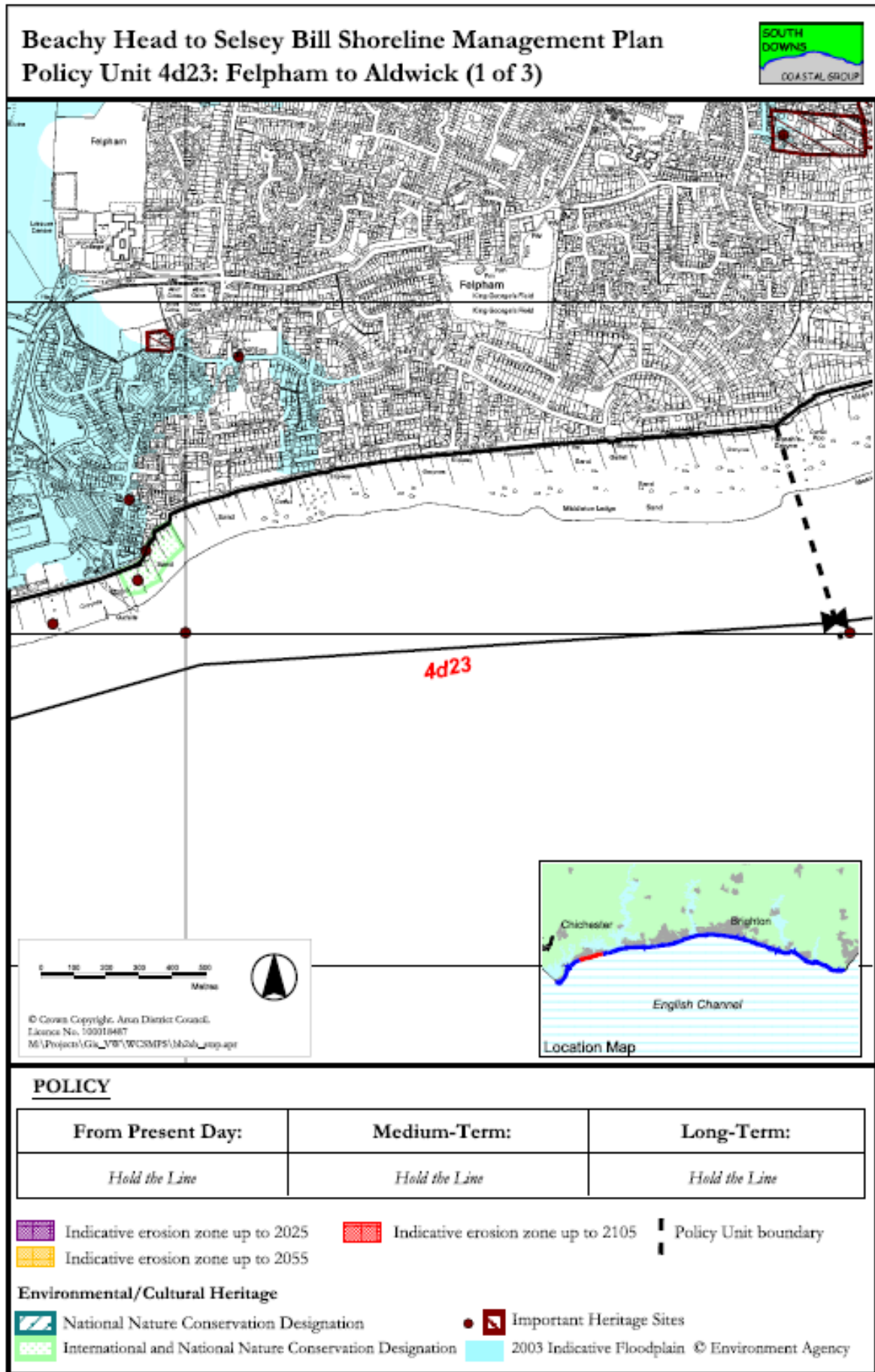
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

Time Period	Management Activities	Property, Built Assets & Land Use	Landscape	Nature Conservation	Historic Environment	Amenity & Recreational Use
2005 – 2025	Continue with current management practices.	No loss of property behind the existing defences.	No change to landscape character or seafront.	No nature conservation gains or losses- biological and geological value of habitat maintained. Potential smothering of Felpham SSSI.	No loss of heritage sites landward of the defences.	No loss of community or recreational facilities landward of the defences. Little overall change to the beach.
2025 – 2055	Increase engineering and management practices by maintaining and upgrading existing structures.	No loss of property behind the existing defences.	No change to landscape character or seafront.	Potential loss of vegetated shingle that forms part of the BAP priority habitat and part of the SSSI interest through coastal squeeze. Potential for habitat restoration elsewhere as restoration. Otherwise no nature conservation gains or losses- biological and geological value of habitat maintained.	No loss of heritage sites landward of the defences.	No loss of community or recreational facilities landward of the defences. Beach narrowing would reduce the value of the beach for the purpose of amenity and recreational use.
2055 – 2105	Significantly increase engineering and management practices, by constructing new defences and increasing beach	No loss of property behind the existing defences.	No change to landscape character, although a change to existing engineering practices would alter the existing character of the	Potential loss of vegetated shingle that forms part of the BAP priority habitat and part of the SSSI interest through coastal	No loss of heritage sites landward of the defences.	No loss of community or recreational facilities landward of the defences. Beach quality may

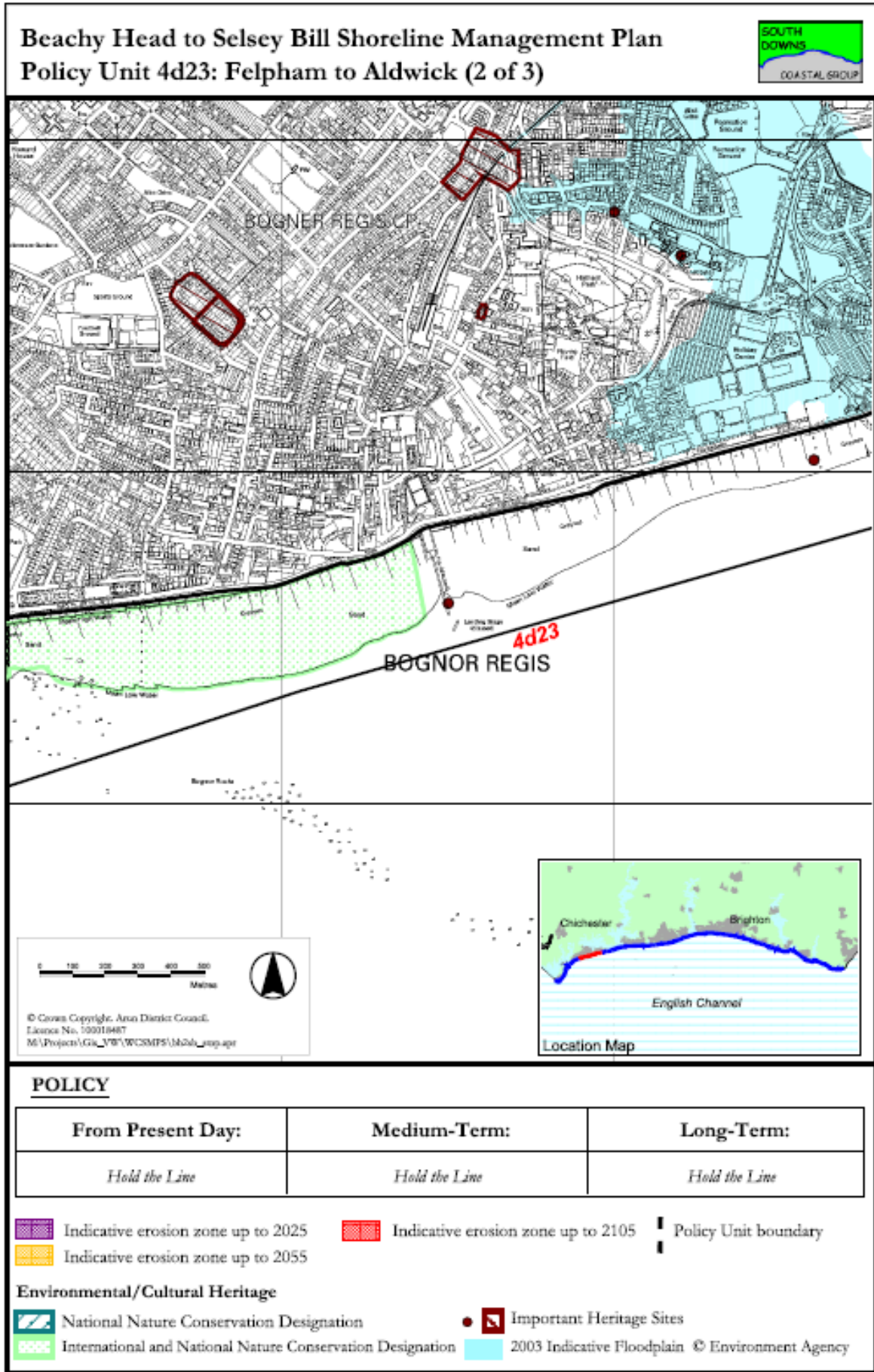
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	renourishment.		seafront	squeeze. Potential for habitat restoration elsewhere as restoration. Otherwise no nature conservation gains or losses- biological and geological value of habitat maintained.		reduce further/be lost as the beach continues to narrow.
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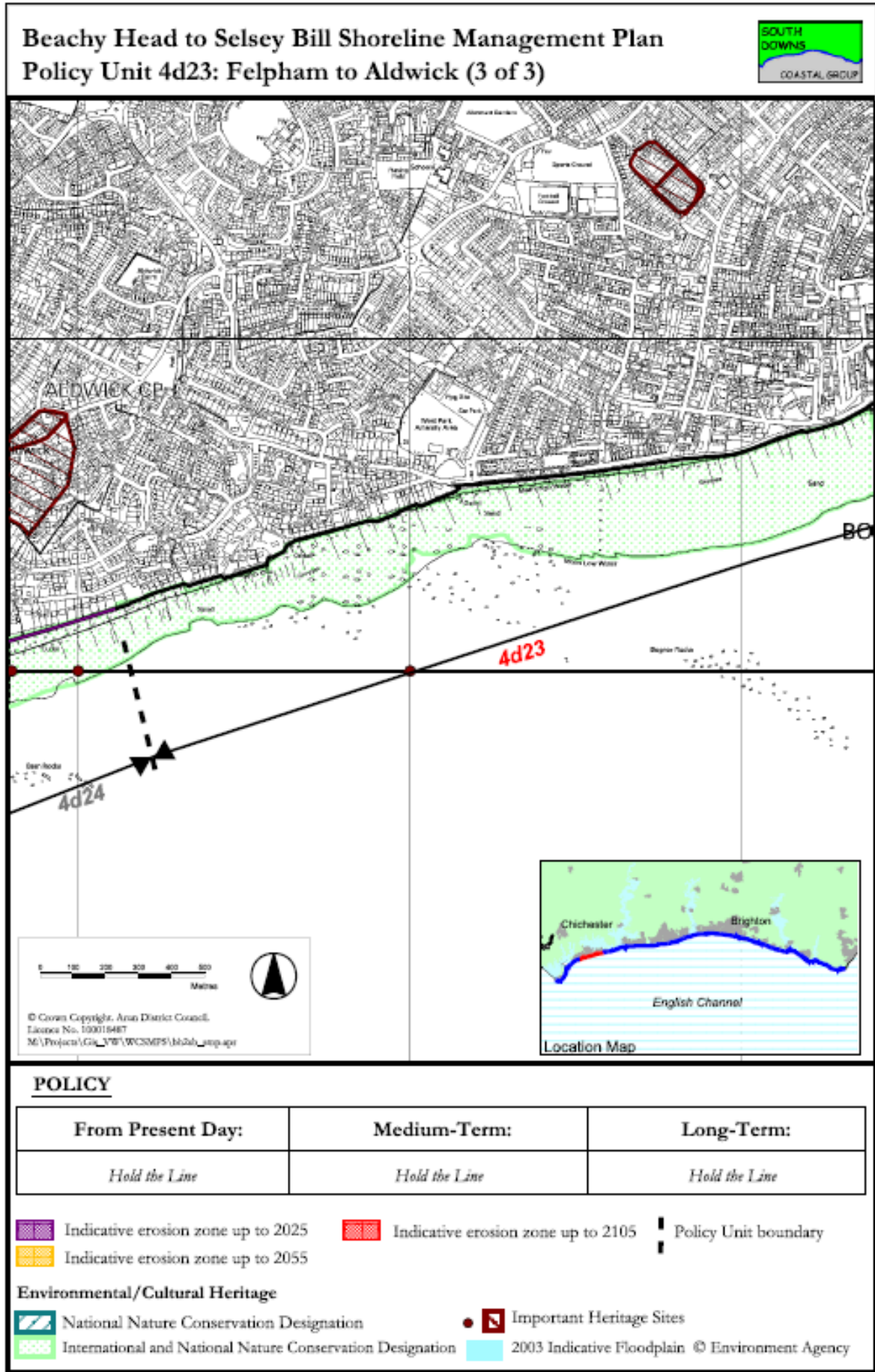
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Location reference: Aldwick to Pagham

Policy Unit reference: 4d24

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

The recommended long-term plan for Aldwick to Pagham is to continue to protect assets within the area through holding the present position. The urban area between Pagham and Aldwick is populated with a large number of residential and some commercial properties, and is fronted by an amenity beach, which provides access for local fishing industry, residents, tourists, maintenance contractors & emergency services. The area is a key tourist resort and service centre for the sub region, providing a range of facilities that support surrounding communities. The long term policy is considered sustainable in socio-economic terms and technical terms as it will not interrupt with the local sediment transport regime or linkages to shorelines downdrift.

Preferred policies to implement Plan:

Immediate:

The present-day policy for this area is to continue to maintain the coastline in its present position. There are currently no defences along this coastline with the exception of four rock groynes in the west since the beaches are naturally accreting over much of the frontage, but in order to prepare for implementation of the medium and long-term policies, beach monitoring will be carried out.

Beach monitoring will be used to assess the standard of protection, and provide a warning mechanism for coastal managers to assess when the impacts of sea level rise are greater than that standard of protection. This policy is consistent with the long-term plan for this section of shoreline.

Medium-term:

The medium-term policy is to defend the frontage in order to maintain the present position of the coastline. It is expected that during the next 20-50 years, the beaches will begin to stabilise, even retreating as sea levels rise. New defence practices may be required to maintain the shoreline in its current position and protect the hinterland from flooding either through new defences or beach recycling.

Longer-term:

The long-term policy is to continue defending the frontage. Defence of this frontage would most likely be provided through maintaining, replacing and upgrading the defences constructed during the medium-term.

Although this should continue to protect assets within the town, the character of the frontage may however be changed from the present day, with defence structures and low beaches present along the frontage.

Location reference:	Aldwick to Pagham
Policy Unit reference:	<i>4d24</i>

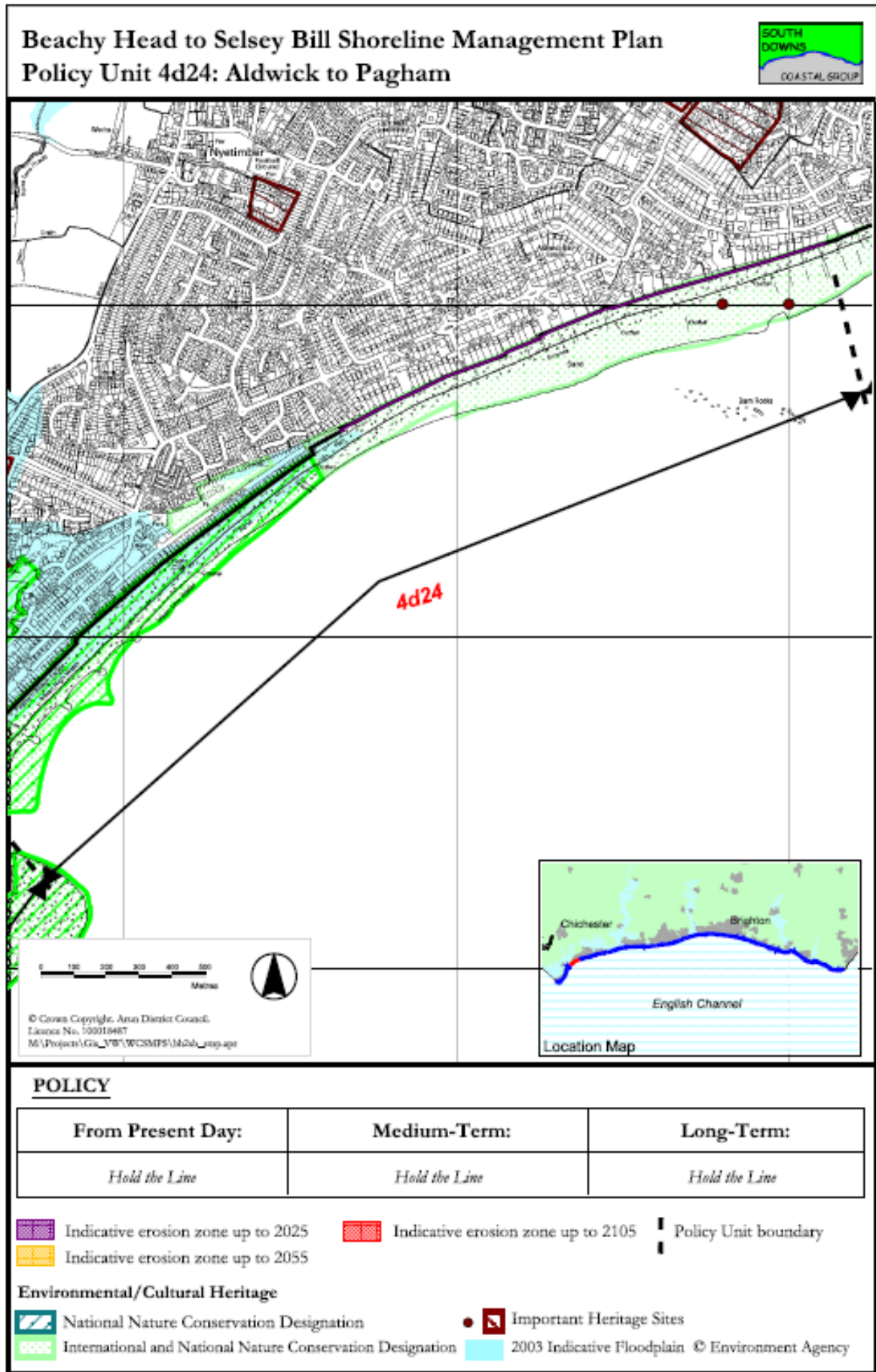
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

Time Period	Management Activities	Property, Built Assets & Land Use	Landscape	Nature Conservation	Historic Environment	Amenity & Recreational Use
2005 – 2025	No existing defences.	No loss of property.	No change to landscape character or seafront.	No nature conservation gains or losses- biological and geological value of habitat maintained.	No loss of heritage sites landward of the defences.	No loss of community or recreational facilities landward of the defences. No change to existing beach condition.
2025 – 2055	New coastal and flood defence management practices.	Risk to property reduced, no loss expected behind new defences.	No change to landscape character, although construction of flood and coastal defences will affect the existing character of the seafront. Potential loss of vegetated shingle that forms part of the BAP priority habitat and part of the SSSI interest through coastal squeeze. Potential for habitat restoration elsewhere as restoration.	Beaches and associated habitats at risk of erosion by coastal squeeze.	No loss of heritage sites landward of the defences.	No loss of community or recreational facilities landward of the defences. Beach narrowing and construction of defences would reduce the value of the beach for the purpose of amenity and recreational use.
2055 – 2105	Continue with new coastal and flood defence management practices	No loss of property behind the new defences.	No change to landscape character, although construction of flood and coastal defences will affect the existing	Beaches and associated habitats at risk of erosion by coastal squeeze.	No loss of heritage sites landward of the defences.	No loss of community or recreational facilities landward of the defences. Beach quality may

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			character of the seafront. Potential loss of vegetated shingle that forms part of the BAP priority habitat and part of the SSSI interest through coastal squeeze. Potential for habitat restoration elsewhere as restoration.			reduce further/be lost as the beach continues to narrow.
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Location reference: Pagham to Church Norton

Policy Unit reference: 4d25

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

The recommended long-term plan for Pagham (Pagham Harbour, south and north spit inclusive) to Selsey East Beach is to achieve a more naturally functioning coastline. The harbour is an area of national and international conservation importance and some lengths of this coastline are currently protected by management practices. Therefore any future management policy will need to incorporate the objective to move towards a more naturally functioning coastal frontage, whilst also considering the way in which the coastline is currently managed. In order to meet these objectives without detrimental impact on the designated habitats careful management of any policy change is critical to the long term plan of a more naturally free functioning process.

Preferred policies to implement Plan:

Immediate:

The present day policy is to manage the realignment of the coastal frontage through a series of management practices that will help to achieve the medium-term/long-term policy of creating a more naturally functioning system. In order to do this, it is expected that the training wall will be maintained, thus holding the northern spit in its present alignment. Along the southern spit, the groynes could be allowed to fail, thus promoting natural rollback of the spit. This may be further encouraged through removing material from the front of the beach (and the surrounding shingle banks) and placing it to the rear of the spit if appropriate.

Throughout this period, constant habitat and coastal process monitoring should take place (perhaps as part of a strategic monitoring program). The existing inner harbour flood defences could need to be maintained and possibly upgraded based on the impacts of sea level rise.

Medium-term:

The medium-term policy is to begin to realign this frontage, in order to achieve a more naturally/dynamic functioning system. It is unsure as yet on how this could be achieved, suffice it to comment that it will involve a change to the configuration of defences in the harbour, The impact different harbour entrance locations may have (based on spit movements and future breaches) is unknown and can only be determined through detailed study using robust analysis of past experience, data sets and research. Another issue is the resulting additional reworking of sediment fed from updrift sources that may now be trapped within the Pagham system that has until recently bypassed the harbour and sustained the existing beaches along the Aldwick frontage. Any implementation here must be technically sustainable and have limited and manageable impact on the beaches downdrift.

The existing flood defences are likely to become inadequate and an opportunity to relocate flood embankments to mitigate for the impact of sea level rise is preferable, using existing land forms such as the

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embankment upon which the B2145 is sited.

As part of the policy at Church Norton, secondary flood defences may need to be constructed, to avoid any danger of breaching or inundation to the properties or historical monuments here as a result of managed realignment at Pagham Harbour.

Longer-term:

The long-term policy is to continue to realign this frontage, in order to achieve a more naturally functioning system. The way in which this is completed depends on the outcome of future studies

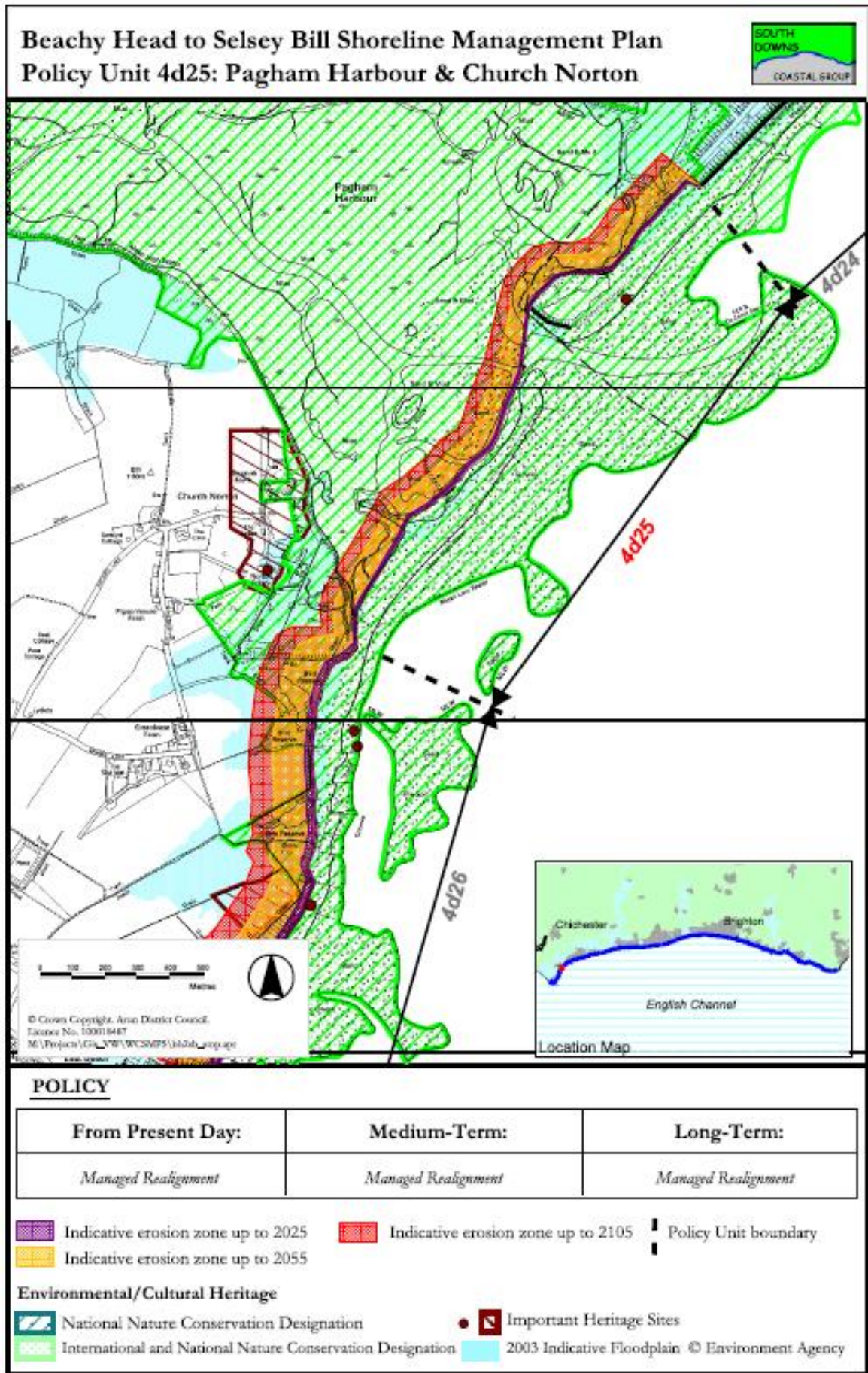
This policy is considered to be sustainable in the long-term, as it reduces the amount of engineering and management intervention required, but does raise questions about the sustainability of the designated habitats. It's not necessarily a loss of habitat, rather a change and increase in differing habitats in the areas that could occur. Pagham harbour and its environs do provide a prime location for habitat recreation in terms of compensatory habitat from other locations within the area. However further assessment will be needed.

Location reference:	Pagham to Church Norton
Policy Unit reference:	<i>4d25</i>

IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

Time Period	Management Activities	Property, Built Assets & Land Use	Landscape	Nature Conservation	Historic Environment	Amenity & Recreational Use
2005 – 2025	Maintain existing practices along the northern spit. Alterations to management practices along southern spit.	Shingle rollback may result in some loss of the beach along the southern spit, although there will be no loss of residential or commercial property.	No change to landscape. Some change to seafront along southern spit as groynes fail and the shingle beach is made wider on its landward side.	Increased conservation gain along southern spit, as defences are removed and the shingle is free to roll back. No conservation gains or losses along the northern spit.	No loss of heritage sites landwards of the defences, although impacts on sub tidal foreshore and wetland archaeological sites should be investigated and provisions made for mitigation.	Some change to the existing beach width along the southern spit. Beach along northern spit retained.
2025 – 2055	Prepare the coastline and defences to achieve a more naturally functioning system.	No loss of property or land behind the existing defences.	Change to landscape, although quality maintained.	Increased biological and conservation gain, with removal of defences.	No loss of heritage sites landwards of the defences, although impacts on sub tidal foreshore and wetland archaeological sites should be investigated and provisions made for mitigation.	Some loss of community /recreational facilities as the coastline is realigned and sea levels rise.
2055 – 2105	This is dependent on the outcome of future studies.	No loss of property or land behind the existing defences. Up to 10ha of agricultural land could however, be lost by year 2105.	Change to landscape, although quality maintained.	Increased biological and conservation gain, with removal of defences.	No loss of heritage sites landwards of the defences, although impacts on sub tidal foreshore and wetland archaeological sites should be investigated and provisions made for mitigation.	Some loss of community /recreational facilities as the coastline is realigned and sea levels rise.

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Location reference: Church Norton to Selsey East Beach

Policy Unit reference: 4d26

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

The recommended long-term plan for Church Norton to East Beach is to realign this section of coastline by not replacing the existing groynes, but providing secondary defences to protect assets at Church Norton from coastal flooding in order to achieve a more naturally functioning coastline.

Preferred policies to implement Plan:

Immediate:

The present-day policy for this area is to continue to protect the properties at Church Norton, by maintaining the timber groynes and sheet piling. In order to implement managed realignment, the timber groynes and sheet piling will no longer be maintained (although their residual life means that they will continue to function throughout the majority of the immediate term).

The groynes will continue to trap material on the beach, which will protect the maximum number of assets in the short term. As the groynes fail towards the end of the period, the beaches will start to retreat and roll back.

This is consistent with the long-term plan for this section of shoreline.

Medium-term:

The medium-term policy is to continue to realign the coastline landwards.

During the next 20 to 50 years, it is likely the beach will continue to rollback, exposing the sheet piling and backshore to erosion; and releasing a supply of sediment. The timber groynes and sheet piling would completely fail in the medium term. The narrow beach will be subject to increased overtopping as sea levels rise, and the likelihood and frequency of tidal flooding will increase, such that freshwater Habitat could be lost. Flood defences will be constructed to control the extent of tidal flooding around Church Norton. This is consistent with the long-term plan for this section of shoreline.

Longer-term:

The long-term policy is to allow this coastline to function more naturally, by removing defences, but managing the extent of inland flooding. There would be no defences along this frontage and the realigned coast could be permanently inundated.

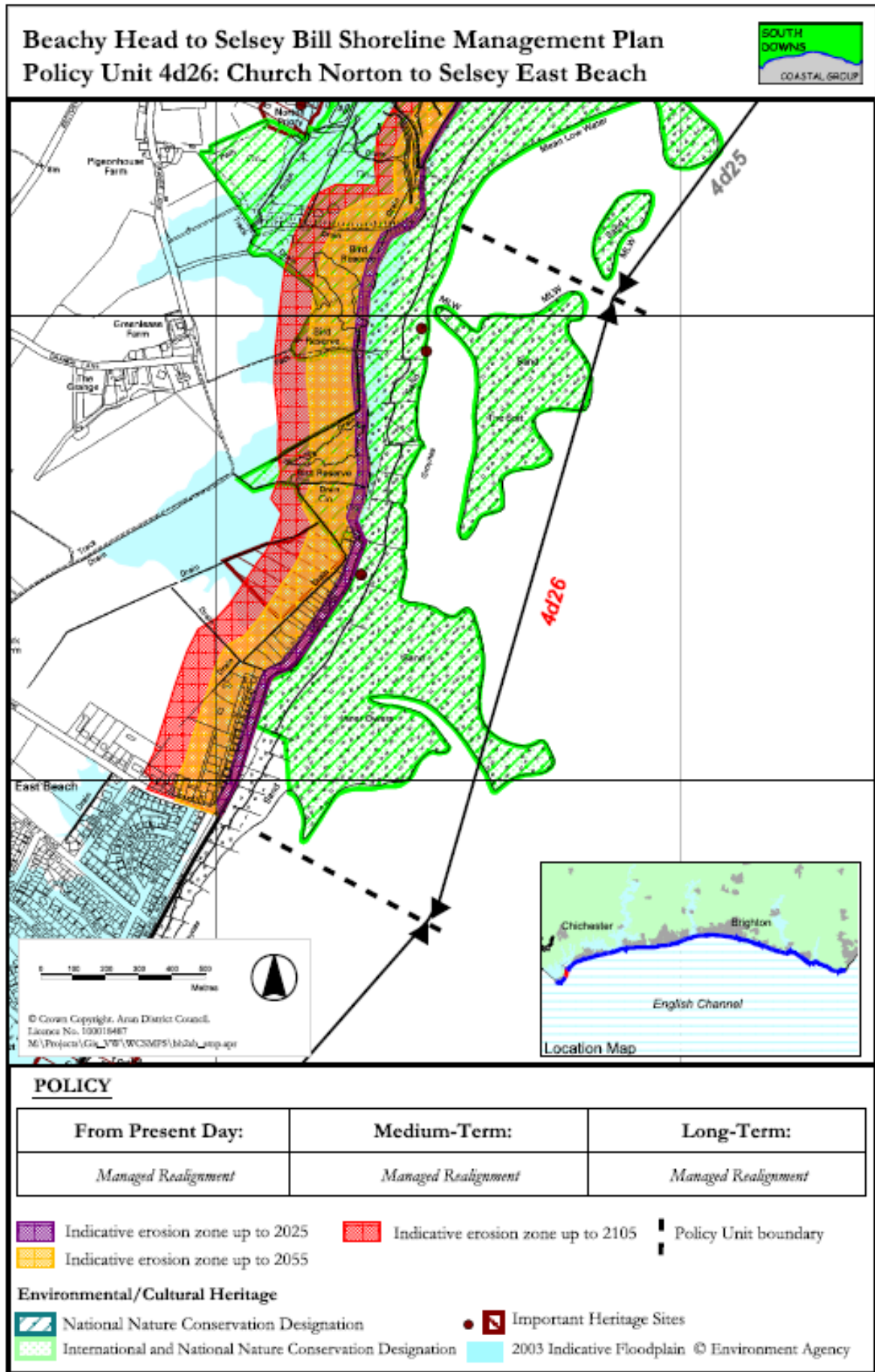
The character of the frontage will change, forming an embayment against the adjacent coastline. There would be high potential for intertidal habitat formation, such as mudflats and saltmarsh. Flood defences would determine the extent of habitat area.

Location reference:	Church Norton to Selsey East Beach
Policy Unit reference:	4d26

IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

Time Period	Management Activities	Property, Built Assets & Land Use	Landscape	Nature Conservation	Historic Environment	Amenity & Recreational Use
2005 – 2025	The policy for this period is to realign, although the defences are likely to remain during this period.	It is expected that up to 15 residential properties, and one commercial property may be under threat near the end of this period	No change to landscape character of seafront.	No conservation gains or losses.	No loss of heritage sites landward of defences.	No loss of community or recreational facilities landward of defences. Narrow beach retained.
2025 – 2055	Allow the defences to fail. Construct new secondary defences to reduce the risk of flooding at Church Norton.	No threat to commercial properties, but it is expected that residential losses of up to 20 properties by the end of this epoch.	Change to landscape, although it will retain a high quality. The seafront will also change as the defences fail.	Increased biological and habitat value as natural processes resume following defence failure. Loss of SPA freshwater habitat could require compensatory habitat creation.	Some historical assets may be at risk.	Some loss of seafront community or recreational facilities, as the shoreline erodes and sea levels rise. Beach narrowing.
2055 – 2105	Maintain and upgrade the flood defences at Church Norton.	Further loss of residential properties is anticipated. Other properties may become more exposed and subject to overtopping and flood damage. Expected loss of 20ha agricultural land by year 2105.	Switch of terrestrial landscape to intertidal habitat at some locations. The seafront and beaches will continually change as it adjusts following the failure of defences.	Increased biological and habitat value as natural processes resume following defence failure, although there will be a loss of freshwater habitat.	Some historical assets may be at risk. Some potential loss of conservation areas.	Some loss of seafront community or recreational facilities, as the shoreline erodes and sea levels rise. Change to beach (potentially some widening) as an embayment forms.

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Location reference: East Beach to Selsey Bill

Policy Unit reference: 4d27

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

The recommended long-term plan for East Beach to Selsey Bill is to continue to protect assets within the town through defending the present position; the town is a key tourist resort with recreational and amenity assets.

Selsey Bill is also a key geomorphological hold point for the frontage and still acts as a control on the development of the shoreline to the east and west. The clay headland of Selsey Bill shelters the coastline to the immediate east from the predominant south-westerly storms although overtopping by storm waves occurs at some locations. Kirk Arrow Spit and Mixon Reef are key nearshore geomorphological features which lie approximately 2-3km offshore of Selsey Bill and help to hold the clay headland of Selsey Bill in its present position and are a source of material. Submerged shingle deposits of the Inner Owers that exist around Selsey Bill, periodically feed the shoreline in the vicinity of Selsey Bill which supplies the whole subcell. It is important therefore that the supply of sediment is unimpeded by management policy practices.

Preferred policies to implement Plan:

Immediate:

The present-day policy for this area is to continue to protect the town frontage through maintaining existing seawalls and groynes.

This will protect the maximum number of assets, but over this period beaches will start to become narrower and defences more exposed.

This is consistent with the long-term plan for this section of shoreline.

Medium-term:

The medium-term policy is to continue defending the frontage beyond the immediate term. Defence of this frontage would most likely be provided through maintaining and upgrading the existing structures.

During the next 20 to 50 years, it is likely that a beach would continue to narrow, steepen and lower, and the effectiveness of the groynes will gradually reduce as sea levels rise. Beyond this, the groynes will eventually become redundant and there will no longer be beaches in front of the town. An increased commitment to maintaining the seawall would be required. Onshore sediment input from existing sources is likely to diminish with sea level rise, and beach management practices may be constrained.

Longer-term:

The long-term policy is to continue defending the frontage. Defence of this frontage would most likely be provided by replacing the existing seawall and groynes; maintaining and upgrading them throughout the longer term in addition to beach replenishment/ recycling of suitable sources.

Although this should continue to protect assets within the town, the

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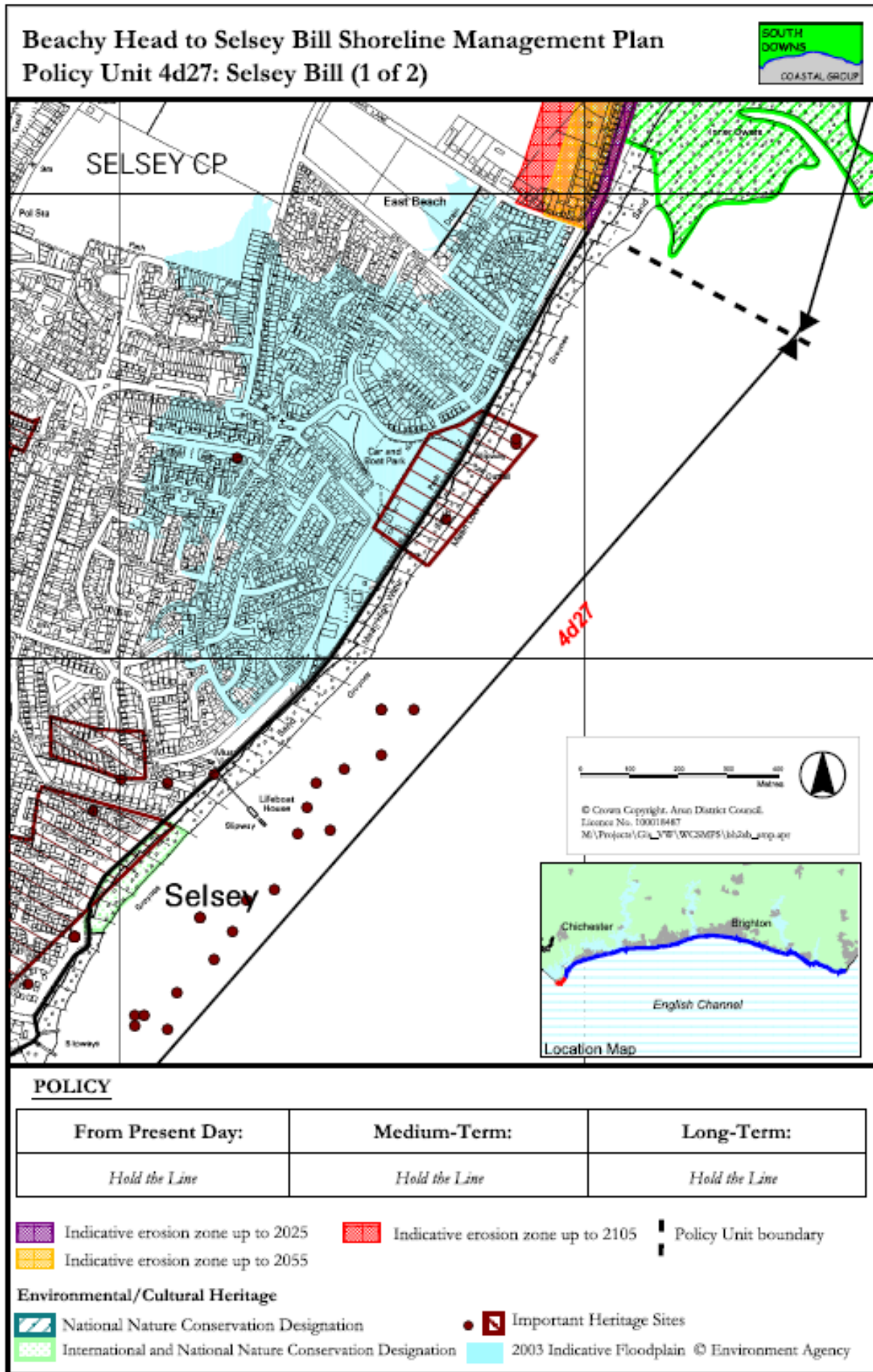
character of the frontage may however be changed from the present day, with higher seawalls and low beaches present in front of the town.

Location reference:	East Beach to Selsey Bill
Policy Unit reference:	<i>4d27</i>

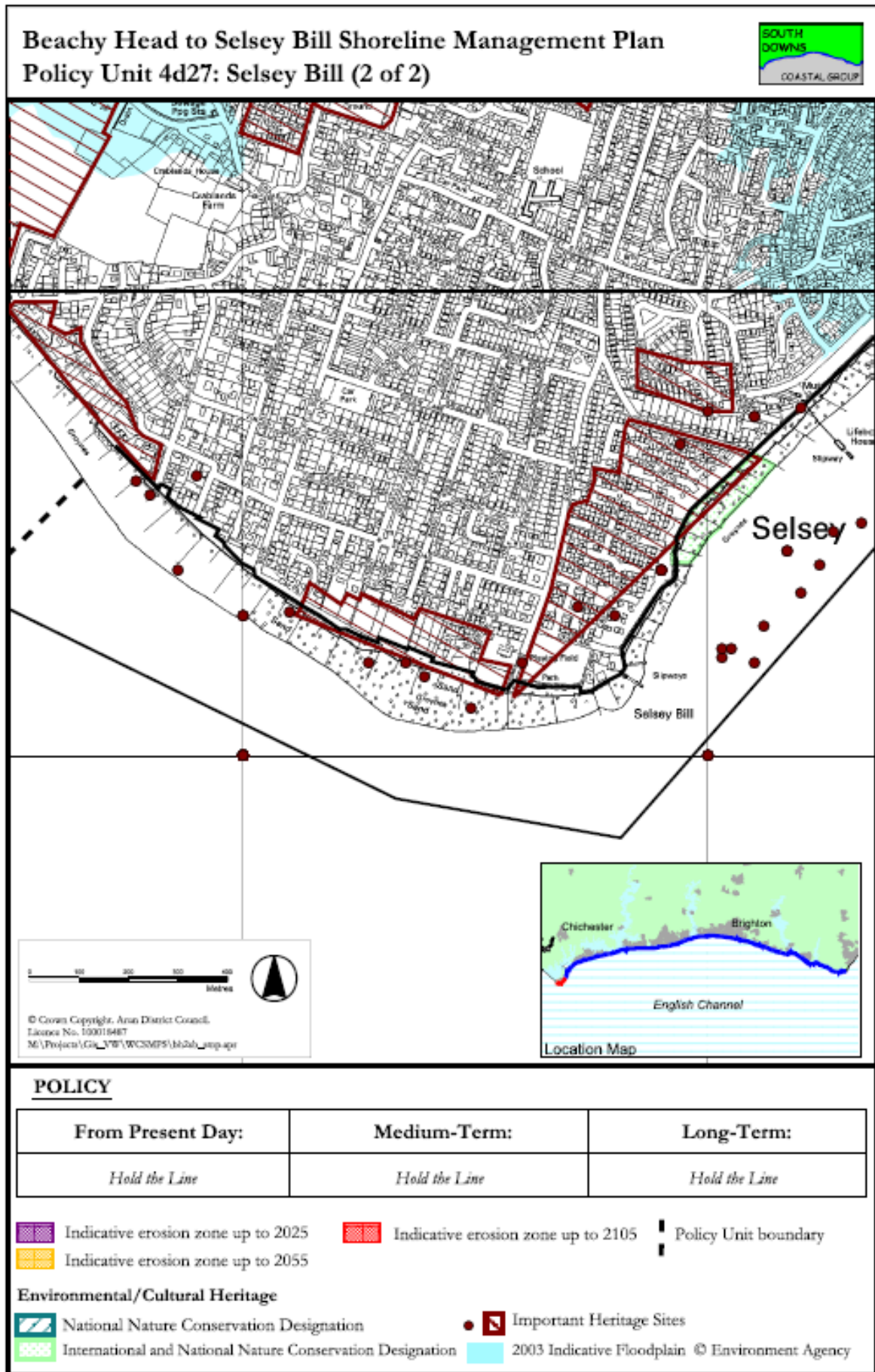
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

Time Period	Management Activities	Property, Built Assets & Land Use	Landscape	Nature Conservation	Historic Environment	Amenity & Recreational Use
2005 – 2025	Continue with present management activities.	No loss of property or land behind the existing defences.	No nature conservation gains.	No change to landscape character of seafront.	No loss of heritage sites landward of defences.	No loss of community or recreational facilities landward of defences. Narrow beach retained.
2025 – 2055	Continue with present management activities. Possible beach recycling/renourishment	No loss of property or land behind the existing defences.	No nature conservation gains.	No change to landscape character of seafront.	No loss of heritage sites landward of defences.	No loss of community or recreational facilities landward of defences. Reduction in beach.
2055 – 2105	Continue with present management activities, but increase the height of seawalls during this period. Possible beach renourishment/recycling.	No loss of property or land behind the existing defences, although some properties may become more exposed and subject to overtopping and flood damage.	No nature conservation gains. Some potential loss of conservation areas as defences are renewed.	Landscape character of seafront may change due to greater defence works. Esplanade may need to be relocated/ set back.	No loss of heritage sites landward of defences.	No loss of community or recreational facilities landward of defences. Some land may need to be sacrificed to establish new defences. Narrow beach will exist.

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