

North West & North Wales Coastal Group

North West England and North Wales Shoreline Management Plan SMP2

Appendix H – Economic Appraisal and Sensitivity Testing

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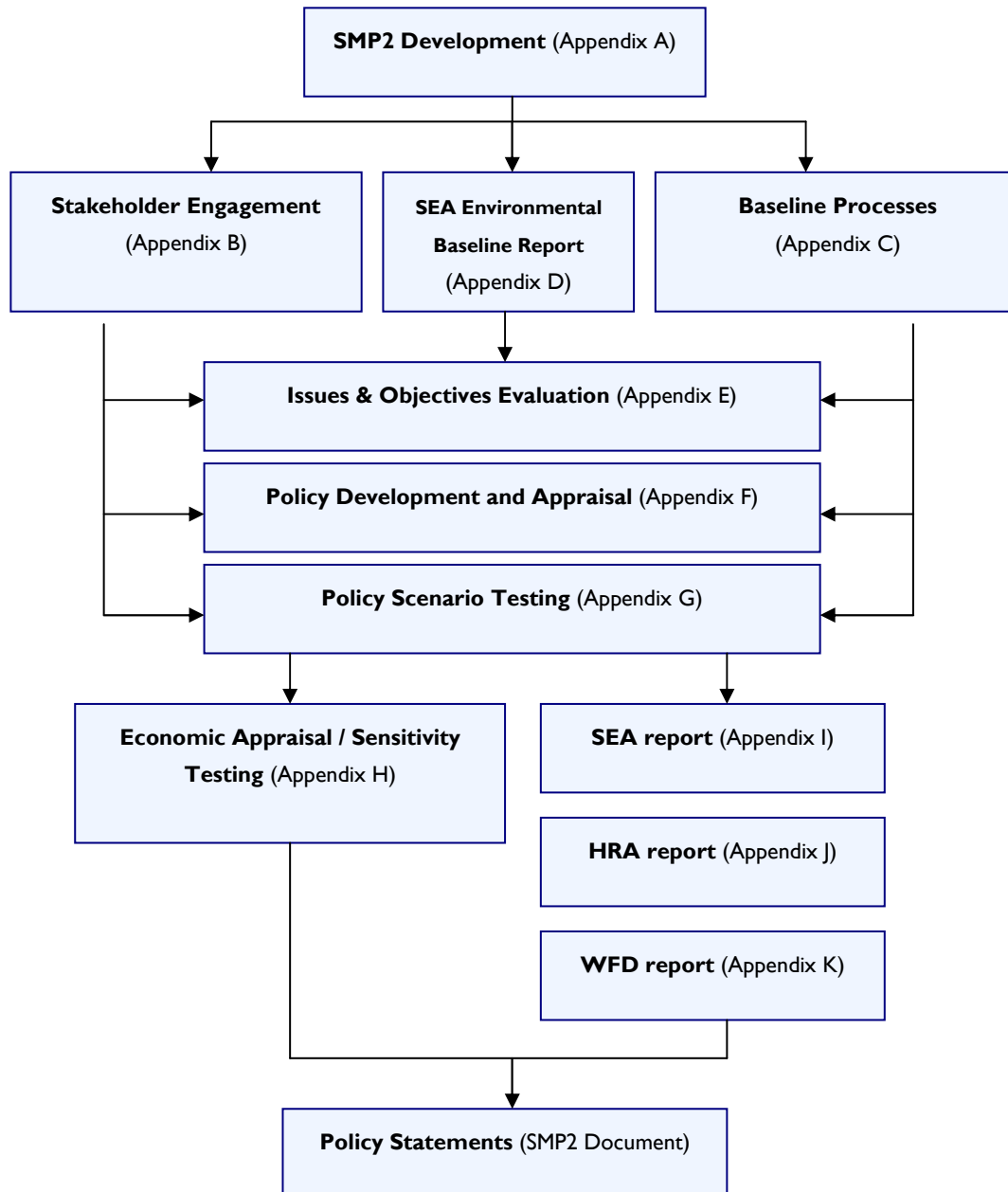
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The Supporting Appendices

These appendices and the accompanying documents provide all of the information required to support the Shoreline Management Plan. This is 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. The appendices are:

A: SMP2 Development	This reports the history of development of the SMP, describing more fully the plan and policy decision-making process.
B: Stakeholder Engagement	All communications from the stakeholder process are provided here, together with information arising from the consultation process.
C: Baseline Process Understanding	Includes baseline process report, defence assessment, NAI and WPM assessments and summarises data used in assessments.
D: SEA Environmental Baseline Report (Theme Review)	This report identifies and evaluates the environmental features (human, natural, historical and landscape).
E: Issues & Objectives Evaluation	Provides information on the issues and objectives identified as part of the Plan development, including appraisal of their importance.
F: Policy Development and Appraisal	Presents the consideration of generic policy options for each frontage, identifying possible acceptable policies, and their combination into 'scenarios' for testing. Also presents the appraisal of impacts upon shoreline evolution and the appraisal of objective achievement.
G: Policy Scenario Testing	Presents the policy assessment and appraisal of objective achievement towards definition of the Preferred Plan (as presented in the Shoreline Management Plan document).
H: Economic Appraisal and Sensitivity Testing	Presents the economic analysis undertaken in support of the Preferred Plan.
I: Strategic Environmental Assessment (SEA) Report	Presents an overview of the environmental assessment process and shows how the requirements of the EU Council Directive 2001/42/EC (the Strategic Environmental Assessment Directive) are met.
J: Habitat Regulations Assessment	Presents an assessment of the effect the plan will have on European sites.
K: Water Framework Directive Assessment	Presents the Water Framework Directive assessment of the potential hydromorphological changes and consequent ecological impact of the preferred SMP2 policies.
L: Metadatabase and Bibliographic database	All supporting information used to develop the SMP2 is referenced for future examination and retrieval.

Within each appendix cross-referencing highlights the documents where related appraisals are presented. The broad relationships between the appendices are illustrated below.



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H.1 Introduction

A review of economic viability has been carried out for the Preferred Plan and its associated policies.

It should be noted that this review is not to establish the economic justification for a scheme as defined by Defra's Flood and Coastal Defence Project Appraisal Guidance Note 3: Economic Appraisal (FCDPAG3). The review instead makes a broad assessment of the economic robustness of the preferred policies. The economic review therefore determines whether or not each policy is:

- Clearly economically viable;
- Clearly not economically viable; or,
- Potentially economically viable (and therefore may be in need of more detailed assessment at a later date, e.g. as part of a strategic plan, although some commentary on this is provided within this report).

It must be recognised that the justification for a particular policy is not necessarily dependant on economic viability based on the benefit-cost ratio alone; as impacts on other benefits may be considered more important (e.g. holding existing defences to sustain a designated habitat) and at the broad scale level of analysis undertaken at the SMP2 stage not all benefits are able to be evaluated in monetary terms. Although these other benefits have not been valued in monetary terms, they are taken into account during decision-making by considering whether they are likely to be sufficient to increase the benefits such that the benefit-cost ratio would be greater than one.

The following sections detail how the economic assessment has been undertaken. This is followed by a series of economic statements for each policy unit, and spreadsheets providing the numerical analysis performed as part of the SMP2.

H.2 Use of existing information

The following datasets were consulted to obtain information for the economic review:

- National Property Dataset – for property locations;
- www.findaproerty.com – for average property prices;
- Smiths Gore Chartered Surveyors Agricultural Land Valuation (Q4-2008) – for agricultural land values;
- Flood Risk Estimating Guide (2007 – updated using price index to 2009)– for defence costs;
- Appendix C (Baseline Process Understanding – for details on erosion rates; and,
- Environment Agency Indicative Floodplain 2008 – for indicative flood mapping.

A number of strategy plans and scheme assessments have been developed for this coast over recent years. These contain detailed information on assets, benefits, and management costs. Where this is directly applicable, such information has been considered and included as appropriate.

However, the justifications in these previous studies are only applicable if all other aspects are the same, i.e.

- the timeframe: many strategies have looked at economics over only 50 years and use different discount factors to those now required by Treasury;
- the area determined to be at risk: the SMP2 may have a modified assessment of the area that could be affected by erosion or flooding, For example the SMP2 uses the 1 in 1000 still water levels to determine flood risk, rather than a 1 in 200 year event as is commonly used for strategy level studies; and,
- the preferred option matches that from the strategy: the SMP2 may be advocating a change from previous policy or management practice.

Where the above conditions are not realised, some of the raw data from the strategy plans has still been used, where it is readily available, such as for costing defences for various policies, as it is useful in validating or modifying information from the broad-scale SMP2 assessment.

H.3 Generation of new data

As there is limited existing information that can be used directly to confirm robustness of the SMP2 policy, new economic data has been derived through application of a GIS (ESRI ArcView) and Defra FCDPAG economic calculation sheets. This 'Broad-scale Economic Review', described below, uses nationally available information on property locations and values, and the risk maps developed through the assessment of coastal processes ([Appendix C](#)).

H3.1 Determining damages and benefits

The benefits are the damages averted or delayed by the Preferred Plan, i.e. the difference in losses between implementing the Preferred Plan and the No Active Intervention (NAI) scenario. These have been calculated for each epoch.

Although policy appraisal has determined a 'zone' of likely future erosion, for the purposes of estimating possible benefits, only the most landward extent of the likely erosion (for each period: 0-20, 20-50 and 50-100 years) has been used in the present analysis. These lines have been mapped and overlain with the property location/value data to calculate potential economic losses and economic benefits for the NAI scenario and the Preferred Plan scenario. It should be noted that average erosion rates for each epoch are used in this analysis and as such, erosion losses calculated within the GIS are indicative and should be viewed accordingly.

In areas where there is a flooding risk, no attempt has been made to undertake detailed flood risk modelling; rather areas identified as at flooding risk by the Environment Agency's flood mapping have been used to identify assets potentially at risk (Flood Cells). The potential damages in these flood cells are simply taken as the summed value of all the 'at risk' assets. This is based on the assumption that under a NAI scenario flood defences would fail and all 'at risk' assets would be inundated and become uninhabitable. This is taken as an indicative figure for the assets potentially protected by defence structures. Flood damages have been calculated on a Policy Unit by Policy Unit basis, based on damages within Flood Cells. It should be noted that along a number of frontages, one or more Flood Cells cover multiple policy units, in these cases, damages may be shown to be the same in adjacent Policy Units which extend over the same flood cell, as failure of defences in either Unit will lead to inundation of the whole Flood Cell.

In calculating damages and benefits for the preferred scenario, no account has been taken of the potential for short-term accelerated or delayed losses compared to NAI, other than the total adjustment in shoreline position at the end of each epoch.

The SMP2 does not take account of standards of protection as it is only defence management policy that is being determined. Standards of protection relate to implementation of these policies, which is usually undertaken within more detailed 'strategy' level studies.

H3.1.1 Benefit values

For properties, losses and benefits have been calculated mainly on the basis of residential and commercial property values. In some instances, however, other assets, such as utilities, highways and railway lines have also had estimated values assigned to them based on the cost of reconstructing or re-routing the asset. Intangibles, such as recreation, and other impacts upon the local economy or environment, have not been valued, but the benefits that could be generated are taken into consideration when identifying if the preferred plan is likely to be economically viable (or not). Losses and benefits have been calculated using data from GIS. This was populated with data from the National Property and Critical Infrastructure datasets. The National

Property dataset is built from the Ordnance Survey Address Point dataset and the Valuation Office Focus database. Address Point identifies the location of all existing properties. The Focus database then identifies which are non-residential (i.e. commercial/industrial) and provides a rateable value from which an approximate capital value is obtained, by applying a conversion factor. A conversion factor of 13 is used to convert rateable values to capital values, based on the types of commercial property affected and the typical yield they provide (around 7.6% to 7.7%). The remaining properties are assumed to be residential and property valuations included in the National Property Dataset were used in the analysis.

Using the 20, 50 and 100 year erosion contours, GIS has been used to identify assets at risk in each epoch, and this data has been used with Defra FCDPAG calculation sheets to calculate the Capital Value (CV) and discounted Present Value (PV).

For the flood risk areas, GIS has been used to simply sum the CV for all built assets within the flood area, using the property database.

H3.1.2 Generation of new defence cost information

Future coastal defence management approaches for each Policy Unit have been developed as part of the Preferred Plan. From this, the broad replacement and maintenance requirements for each epoch have been determined.

Where there is no existing information relating to future defence costs for an area, e.g. from a strategy plan or scheme design, costs have been generated using other nationally available information.

(a) Cost Rates

Replacement costs for general defence types have been taken from Environment Agency's Unit Cost Database (Environment Agency, 2007). This suggests average replacement costs for linear structures (e.g. revetments, seawalls) beach management schemes, groynes and embankments based on costs incurred on recent Environment Agency projects. Additional costs included within recent strategies and completed works from within the SMP2 area were also included to help strengthen and validate the average cost rates used in the SMP.

Maintenance costs have been taken from the Defra 'National Appraisal of Defence Needs And Costs' (NADNAC) study (Defra 2004). Updated to current values using the Public Works Non Road (PWNR) index, this suggested annual maintenance costs for linear structures and for groyne fields at £12,000/km, and for beach schemes £23,000/km.

(b) Cost Calculations

It has been assumed that the timing of full scheme reconstruction required (i.e. design life) is at least once every 100 years for linear defences, such as seawalls, revetments and embankments; every 50 years for beach schemes; and timber groynes. However, these periods may become more frequent for areas where erosion potential is high. Maintenance has been assumed to occur to the same level in every year throughout the life of the scheme. In reality, this will be less in the early years and will increase in later years of the scheme's life. However, for the broad brush appraisal undertaken for the SMP2 this will make negligible differences to decisions as the majority of costs are associated with capital works.

Allowance has also been made for the increase in costs due to climate change and sea level rise, based upon factors developed for the NADNAC study. This takes account of the need to make structures higher, deeper, and more resilient to increased exposure. The assumptions were: no cost increase for the 0-20 year epoch;

costs factored up by 1.5 times present day rates for the 20-50 year epoch; and costs factored up by 2.0 times the present day rates for the 50-100 year epoch.

In accordance with the latest Defra and HM Treasury guidance, Optimism Bias (OB) was applied to all costs (at 60%) to reflect uncertainty in broad level analysis at the SMP2 scale.

As the SMP2 does not go into the detail of defining extents of potential managed realignment, cost allowances for set back embankments make broad scale allowances for defence lengths required from map based assessments. In some locations it is assumed that the realignment would be to high ground and no defence would be required. No allowances have been made in the costs for land purchase or compensation as it is not clear at SMP development stage what approach to managed realignment would be taken, the existing defences may for example be handed over to the land owners and under withdrawal of maintenance policy and no compensation is due.

(c) Summary of overall costs by Sub-Cell

Although the cost estimates are based on very broad assumptions, following a request by the Environment Agency we have included below in Table 1 a summary of the total costs for delivering the proposed policies over the SMP2 100 year planning period. The costs have been split by Sub Cell, with distinction between England and Wales in Sub-Cell 11a. They are presented in discounted present value format, taking account of the Treasury test discount rate, i.e. 3.5% for years 0-30, 3.0% for years 31-75, and 2.5% for years 76-100.

It should be noted that the estimates in Table 1 only include capital and maintenance costs related to defences and, as this is not a full economics review, they do not specifically include allowances for costs such as management, land purchase, compensation, legal costs, consultation, monitoring, flood warnings etc.

Sub Cell	Whole Life Present Value Defence costs £m
11a Wales	£250
11a England	£240
11a total	£490
11b	£270
11c	£240
11d	£20
11e	£120
England total	£870

Table 1 Summary of present value defence costs for preferred SMP2 policies.

H3.1.3 Methodology for calculating agricultural land prices

Agricultural land values are highly variable depending on grade, location and size of lot and have been extremely volatile through 2008 and 2009. A top end estimation of £5500 per acre (£13669 per ha) has been assumed for grade 1 and 2 farmland. The tremendous growth in leisure and lifestyle purchases of farmland has seen prices significantly higher in recent years. This type of sale is more commonly grade 3 land which accounts for the difference in valuation between grades 1 and 3. Based on previous SMP2 valuations, a grade 3 valuation 6% higher than grade 1 was chosen.

Average Grade 1/2 Land Price (£/Ha)	Average Grade 3 Land Price (£/Ha)	Overall Average Grade 4 & 5 Land Price (£/Ha)
£13669	£14488	£13128

Table 2 Average farmland prices in England paid for bare land in £ per Hectare in Q4 2008.

In accordance with the guidance in the Defra (2008), in following Scenario 1 (*land is abandoned or no longer fit for agricultural use for the foreseeable future*), the values of land were reduced by £600/ha to remove the cost of subsidies. For example, grade 1 farmland was reduced in value as follows:

$$\text{£13669 per ha} - \text{£600 per ha} = \text{£13069 per ha}$$

H3.2 Comparison of costs and benefits

As this review is not a full economic assessment, a formal benefit-cost assessment has not been conducted, however a benefit-cost ratio (BCR) has been included to help clarify and review the ‘robustness’ of the preferred plan.

In comparing likely benefits and likely costs for the policies for an individual location, over the full 100 year period, it is however still useful to consider these in terms of Present Value (PV).

Present Value is the value of a stream of benefits or costs when discounted back to the present day. For this SMP, the discount factors used are the latest provided by Defra for assessment of schemes, i.e. 3.5% for years 0-30, 3.0% for years 31-75, and 2.5% for years 76-100.

For calculation of PV damages, the approximate timing of property losses has been taken as the mid point of the epoch in which the damage is expected to occur, and corresponding discount factors applied accordingly. For the calculation of PV costs for defence replacement, the discount factor for the mid point of each epoch has been used, the actual timing of works being uncertain at present. The year-on-year maintenance PV costs have also been calculated using the discount rate for the mid point of each epoch.

The figures generated for this SMP2 are presented only in PV in Section H.4, reflecting the ‘broad-scale’ nature of the assessments undertaken. However, for further information, the CV of these the No Active intervention damages are presented in Annex H.1 and Annex H.2 gives CV & PV costs.

H3.3 Coastal defence funding in England and Wales

Defra has national policy responsibility for flood and coastal erosion risk management and provides funding through grant in aid to the Environment Agency which also administers grant for capital projects to Operating Authorities.

In 2009-2010, the Environment Agency will spend £700 million managing flood and coastal erosion risk across the UK. This budget has more than doubled from 10 years ago, and is set to increase by an estimated £100 million in 2010- 2011. In Wales, the Welsh Assembly Government is responsible for developing flood and coastal risk management policy and largely funds flood and coastal activities undertaken by operating authorities across Wales.

Despite this large commitment, the scale of coastal erosion and flood risks means we must prioritise projects to ensure we achieve the best possible results. Realistically, it is not possible to justify defending all locations to the same standard or in some cases at all.

Coastal defences often protect against both coastal flooding and erosion. Inland flooding is also affected by how we manage coastal defences. Funding for coastal and flood defence is therefore linked. In each case, in England, the Environment Agency employ a set of agreed indicators called 'outcome measures' to measure how effectively economic, social and environmental needs are met.

Public money is used as effectively as possible to reduce the risk to coastal communities, their property, infrastructure and the natural environment. Decisions on where to defend are based on risk assessment using a transparent, auditable and understandable process.

Factors considered include:

- Number of households at risk.
- Number of deprived households at risk.
- Impact of our actions on agricultural land and the farming community.
- Impact of our actions on the environment and wildlife.
- Whether erosion affects local community infrastructure and transport.
- Cost of building and maintenance.

Source: <http://www.environment-agency.gov.uk/homeandleisure/107641.aspx>

In Wales, coastal erosion and flood risk management schemes no longer need to attain a benefit cost ratio of at least unity in order to justify public investment. In 2007 a project led by WAG made three recommendations with respect to future priorities for flood risk management investment:

- the basis for assessing priority to be given to schemes should be primarily the numbers of people affected and the degree of that impact;
- the present rule that schemes must meet a cost benefit ratio of one to one or better should be relaxed to allow for other qualitative factors to be taken into consideration where appropriate; and
- future schemes should be prioritised using a new multi-criteria analysis that reflects both monetarised and non-monetarised impacts.

The WAG Minister for Environment, Planning and Countryside accepted the recommendations and asked Flood Risk Management Wales and Environment Agency Wales to implement the first two recommendations with immediate effect. WAG propose to commission work to develop an appropriate multi-criteria approach to flood and coastal risk management investment decision making in Wales, informed by the emerging flood and coastal risk policy framework being developed by Defra in England.

H3.4 Economic Uncertainties

The economic appraisal has estimated the damages for the no active intervention options and range of management options. Benefits were then calculated for each option (with NAI as the baseline) and compared with the costs of managing the 'at risk' assets in the particular cell. This results in a benefit-cost ratio which is reported in Economics Tables (**Section H.4**) and uncertainties addressed in the Uncertainties Tables (**Section H.5**). As discussed in **Section H.3.1**, the monetary damages primarily include residential and commercial property, critical infrastructure and agricultural land erosion / flood losses. The benefit-cost ratio

therefore is not truly representative of the economic ‘worth’ of any particular option as it does not include those impacts that are more difficult to monetise (such as recreation, health effects, etc.). Some of these are described in the Preferred Policy Economic Tables (**Section H.4**) and addressed in more detail for the marginal units in the Uncertainties Tables (**Section H.5**). These are then brought together in the Preferred Policy Statements (**Section 5, Main SMP2 Document**).

The SMP2 looks over a timescale of 100 years and predictions are therefore inherently uncertain. As such, there are a number of uncertainties associated with economic ‘worth’ of the preferred plan policies in the future. Key economic uncertainties are recognised here, however, many of these uncertainties should be addressed through regular updates of the SMP2 or when significant changes to input data become available:

Agricultural land

The area of land is measured from GIS and the value per acre is adjusted according to Defra guidance. Therefore, the uncertainty associated with damages to agricultural land should be LOW. Other uncertainties will be associated with GIS, erosion rates, flood risk maps, etc. used to determine when and which land will be written off, as well as changes in regional agricultural importance and associated land values in the future.

Residential properties

Data on properties at risk is based on GIS/property databases. Write-off values for properties from the National Property Database have been verified against average values. Therefore, uncertainty related to write-off damages for residential properties should be LOW. Other uncertainties will be associated with GIS, erosion rates, flood risk maps, etc. used to determine when and which residential properties will be written-off.

Commercial properties

Data on commercial properties has also been based on GIS/property datasets. It is known that the National Property Dataset (NPD) can introduce significant uncertainties for non-residential properties, with many properties not given a valuation and/or floor area. The economic appraisal does calculate valuations based on floor area where the NPD does not include specific valuations. This is based on a multiplier of 13 based on the yield of most properties. This helps to reduce the uncertainties although there are some 16% of commercial properties that still have no valuation (the majority of these have an X classification, which are often found to have low value). The overall level of uncertainty will vary by unit, but is likely to be LOW-MEDIUM. If there is a large number of X classified properties in any one unit, or other impacts that could not be valued in monetary terms then the uncertainty could be HIGH. Other uncertainties will be associated with GIS, erosion rates, flood risk maps, etc. used to determine when and which residential properties will be written-off.

Transport impacts

Costs of relocating/rebuilding roads and railways affected have been included in the economic damages where possible. There are uncertainties with the values used, with the impact on the economic damages likely to be MEDIUM-HIGH. Further investigation may be needed to more accurately estimate the costs, where these impacts are significant to the overall damages.

Environmental impacts

The economic analysis has not valued in monetary terms any impacts on environmental sites (designated or non-designated). The economic appraisal therefore excludes environmental issues such as impacts on habitats, water quality (or quantity, through loss of abstractions), historic environment (although impacts on buildings may be partly captured under properties), landscape impacts, etc. Environmental issues have been considered

(in qualitative terms) as part of the approach to determining the preferred plan. Overall, therefore, the uncertainty should be LOW-MEDIUM (depending upon the extent of issues covered in the qualitative discussion).

Recreational/tourism impacts

Within some policy units there may be impacts on recreation and tourism, but these are not quantified and have not been included in the economic damages. The impact of exclusion of recreational / tourism damages will vary by policy unit but could be HIGH in areas of regional importance for recreation and tourism.

Tourism impacts may relate to heritage features and sites, paths, tourist towns, National Parks, tourist accommodation (e.g. hotels, bed and breakfasts, and caravan parks) and infrastructure (e.g. Cumbrian Coastal Railway). Further investigation of the likely damages under NAI needs to be investigated in those units with recreational and tourism assets that could attract visitors/users from outside the immediate area (i.e. recreation assets that are used for more than short-cuts and/or dog walking).

Community/social impacts

Community impacts are likely to be greatest where there is write-off of residential and/or commercial properties. However, smaller settlements could have important social impacts reflecting the interactions between different community groups as well as between individuals. These cannot be valued in monetary terms but are taken into account during identification of the preferred plan. Some of the descriptions of the impacts refer to the integrity of settlements. The implications of lost integrity (including impacts on transport infrastructure as well as loss of properties and businesses) are included during assessment of whether the benefit-cost ratio of the preferred plan is likely to exceed one. In units where the integrity of the community could be affected, the uncertainty introduced in terms of the benefit-cost ratio could be MEDIUM-HIGH (depending on the actual impacts on the community and the proportion of the community affected). For erosion units, consideration needs to be given to blight affecting more than just those properties that are directly affected. Loss of other assets (e.g. the beach, access to the beach, recreational assets) could have significant effects on the whole community (even a whole parish) and could introduce MEDIUM-HIGH uncertainty.

H.4 Economic appraisal summary tables

The table below provides a summary of the economic review of the preferred plan for each Policy Unit. It outlines any information used in this review, including benefits and costs, together with a statement on economic viability. The table highlights where the preferred policy differs from the draft consultation policy. Indicative managed realignment costs are based on the capital value and maintenance costs of potential set back embankments, but are subject to uncertainty because detailed studies would be required to confirm precise alignments. Preferred plan damages relate to erosion losses avoided and property write off losses due to flooding, but not residual damages due to flood risk for a given standard of protection as this data is not available (refer also to **Annex H.1.2**). Note: An allowance should be made for errors of approximately +/- £1m in each epoch, due to an error allowance of +/- 250m in the measurement of defence lengths for each unit. It should be noted that where a Benefit-Cost Ratio is not robust (e.g. <5), policy delivery may be compromised by funding prioritisation and therefore needs to be examined in more detail in a strategy and opportunities for co-funding will also need to be investigated.

H4.1 Table 3: Economic summary table for Sub-Cell 11a Great Orme to Southport

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
POLICY AREA: Great Orme to Little Orme (11a1)									
I:1	Great Ormes Head	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI would result in naturally functioning coastline with benefits for geological SSSI 	<ul style="list-style-type: none"> None identified 	Natural frontage. SMP2 policy is economically viable as there are few assets at risk
I:2	Llandudno	HTL	HTL	HTL	£232,853	£10,385	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of settlement Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability Costs of defending western shoreline in Conwy Bay not included (outside SMP2 area) 	BCR = 22.42 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust

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SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
1:3	Little Ormes Head	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI would result in naturally functioning coastline with benefits to SSSI and internationally designated site 	<ul style="list-style-type: none"> None identified 	Natural frontage. SMP2 policy is economically viable as there are few assets at risk
POLICY AREA: Little Orme to the Clwyd Estuary (1 la2)									
2:1	Little Orme to Rhos on Sea (Penrhyn Bay)	HTL	HTL	HTL	£39,082	£4,135	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of settlement Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	BCR = 9.45 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
2:2	Rhos on Sea to Llanddulas (Colwyn Bay)	HTL	HTL	HTL	£395	£24,781	<ul style="list-style-type: none"> Recreation benefits from protection of cycle path and coastal properties Knock-on community and economic benefits from maintaining railway line in current position 	<ul style="list-style-type: none"> Costs of relocating railway could be significantly greater than estimated in economic damages (potentially >£20 million) 	BCR = 0.02 The economic viability of the policy may depend on estimated costs for relocating the railway and road which would be at long term risk. (which needs further investigation)

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SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
2:3	Llanddulas to Clwyd Estuary	HTL	HTL	HTL	Linked to 3.1 and 3.2 £286,030	£19,541	<ul style="list-style-type: none"> • Social benefits associated with protection of homes • Benefits to the community by protecting integrity of settlement • Protection of jobs due to protection of businesses • Negative impacts on the SSSI would reduce the benefits 	<ul style="list-style-type: none"> • No specific uncertainties that would affect economic viability 	Linked BCR = 12.21 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust. Negative impacts (on environment) unlikely to outweigh social and economic benefits but mitigation works likely to be required
POLICY AREA: Clwyd Estuary (11a3)									
3:1	Hortons Nose to Foryd Railway Bridge	HTL	HTL	HTL	Linked to 2.3 and 3.2 £286,030	£1,088	<ul style="list-style-type: none"> • Social benefits associated with protection of homes • Benefits to the community by protecting integrity of settlement • Protection of jobs due to protection of businesses • Negative impacts on the SSSI would reduce the benefits 	<ul style="list-style-type: none"> • No specific uncertainties that would affect economic viability 	Linked BCR = 12.21 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust. Negative impacts (on environment) unlikely to outweigh social and economic benefits but mitigation works likely to be required

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SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
3:2	Foryd Railway Bridge to Rhuddlan Road Bridge Clwyd Estuary west (left) bank	HTL	MR	MR	Linked to 2.3 and 3.1 £286,030	£2,804	<ul style="list-style-type: none"> • Social benefits associated with protection of homes • Benefits to the community by protecting integrity of settlement • Protection of jobs due to protection of businesses • Negative impacts on the SSSI would reduce the benefits 	<ul style="list-style-type: none"> • No specific uncertainties that would affect economic viability 	Linked BCR = 12.21 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust. Negative impacts (on environment) unlikely to outweigh social and economic benefits but mitigation works likely to be required
3:3	Rhuddlan Road Bridge to Foryd Railway Bridge Clwyd estuary East (right) bank	HTL	MR	MR	£163,822	£2,060	<ul style="list-style-type: none"> • Social benefits associated with protection of homes • Benefits to the community by protecting integrity of settlement • Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> • No specific uncertainties that would affect economic viability 	BCR = 79.52 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
3:4	Foryd Railway Bridge to Foryd Road Bridge	HTL	HTL	HTL	Unit linked with 4.1 £226,346	£575	<ul style="list-style-type: none"> • Social benefits associated with protection of homes • Benefits to the community by protecting integrity of settlement • Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> • No specific uncertainties that would affect economic viability 	Linked BCR = 9.94 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust

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		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
POLICY AREA: Clwyd Estuary to Point of Ayr (1 a4)									
4:1	Clwyd Estuary to Rhyl Golf Links	HTL	HTL	HTL	Unit linked with 3.4 £226,346	£22,188	<ul style="list-style-type: none"> • Social benefits associated with protection of homes • Benefits to the community by protecting integrity of settlement • Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> • No specific uncertainties that would affect economic viability 	Linked BCR = 9.94 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
4:2	Rhyl Golf Links	HTL	HTL	HTL	Unit linked with 4.3, 4.4 and 5.1 £684,672	£2,091	<ul style="list-style-type: none"> • Social benefits associated with protection of homes • Benefits to the community by protecting integrity of settlement • Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> • No specific uncertainties that would affect economic viability 	Linked BCR = 21.05 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
4:3	Rhyl Golf Links to Barkby Beach (Prestatyn)	HTL	HTL	HTL	Linked to 4.2, 4.4 and 5.1 £684,672	£14,637	<ul style="list-style-type: none"> • Social benefits associated with protection of homes • Benefits to the community by protecting integrity of settlement • Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> • No specific uncertainties that would affect economic viability 	Linked BCR = 21.05 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust

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		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
4:4	Barkby Beach to Point of Ayr	MR	MR	MR	Linked to 4.2, 4.3 and 5.1 £684,672	£Inc above	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of settlement Protection of jobs due to protection of businesses Allows natural roll-back with benefits for dune system 	<ul style="list-style-type: none"> MR proposed for unit 4.4 is management of natural dune roll-back and possible construction of secondary defence line in medium/long term (not costed for at this stage) 	Linked BCR = 21.05 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
POLICY AREA: Dee Estuary (11a5)									
5:1	Point of Ayr to Mostyn, south of Mostyn Dock	HTL	HTL	HTL	Linked to 4.2, 4.3 and 4.4 £684,672	£15,793	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of settlement Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	Linked BCR = 21.05 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
5:2	Mostyn to Flint Marsh	HTL	MR	MR	£50,491	£3,287	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of settlement Protection of jobs due to protection of 	<ul style="list-style-type: none"> MR in epochs 2 and 3 of Units 5.2 and 5.4 assumes the railway embankment forms the defence 	BCR = 15.36 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust

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		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							businesses		
5:3	Flint Marsh to Chester Weir to Sealand Rifle Range (Inner Dee estuary, both banks)	HTL	HTL (Possible MR)	HTL (Possible MR)	£414,851	£30,076	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of settlement Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	BCR = 13.79 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
5:4	Sealand Rifle Range to Burton Point	HTL	MR	MR	£195	£94	<ul style="list-style-type: none"> Loss of promontory fort Scheduled Monument at Burton Point when MR is implemented Loss of rifle range when MR is implemented (used by MoD and shooting clubs) Benefits of habitat creation when MR is implemented May be knock-on impacts due to loss of farm businesses (as land is written-off) 	<ul style="list-style-type: none"> Impact of loss of rifle range (especially for MoD) The promontory fort at Burton Point is considered to be of national importance (current trend is that its condition is declining and it is on the Heritage at Risk register) MR in epochs 2 and 3 assumes the railway embankment forms the defence 	BCR = 2.09 SMP2 policy is economically viable . Loss of rifle range and scheduled monument could increase damages under MR. These additional damages would need further investigation to assess best approach to staged MR
5:5	Burton Point to Thurstaston Cliffs	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> Loss of golf club land could lead to recreation impacts Allows continuation of 	<ul style="list-style-type: none"> There are some private defences in several locations, which subject to 	SMP2 policy is economically viable . Not formally defended at present. Further

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SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							natural processes	consent can continue and large areas of saltmarsh which may limit losses (at least in epoch 1)	investigation may be needed to assess impact on golf club
5:6	Thurstaston Cliffs	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> Continuation of erosion in line with SSSI designation Potential short/medium term impacts on residential properties Potential long-term impacts on caravan park 	<ul style="list-style-type: none"> Residential properties and caravan park may be able to maintain private defences (providing this does not compromise the SSSI) 	Natural Frontage. SMP2 policy is economically viable . There may be a need for further investigation on the implications of private defences (with impacts on SSSI needing to be compared with impacts on residents and businesses)
5:7	Thurstaston Slipway to Croft Drive, Caldy	Consultation draft policies			£4	£205	<ul style="list-style-type: none"> Potential impacts on golf club land from erosion under NAI (following failure of defences) May be impacts from erosion of contaminated land under NAI Allows natural processes to resume in long-term 	<ul style="list-style-type: none"> Extent of negative impacts from release of contaminants not known 	BCR = 0.02 The economic viability of the policy may depend on impacts from contaminated land and golf clubs. These need to be valued at £200k (at least) to give a BCR > 1. These impacts need to be investigated further.
		HTL	NAI	NAI					
		Final policies							

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
		HTL (private funding agreement)	HTL (private funding agreement)	HTL (private funding agreement)		funding			
5:8	Croft Drive Caldy to West Kirby Marine Lake	Consultation draft policies			£297	£351	<ul style="list-style-type: none"> Potential community impacts from loss of cliff top properties and gardens 	<ul style="list-style-type: none"> Localised protection of cliff top properties may be possible in long-term Loss of outfall structure and impact on tidal/fluvial flooding needs to be investigated in the short-term Impact of road loss on adjacent properties not known 	<p align="center">BCR = 0.85</p> <p>The economic viability of the policy may depend on additional social impacts (these need to be valued at £54k to make the BCR>1)</p>
		HTL	HTL	NAI					
		Final policies			£297	£351	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> As above 	<p>Economic justification for public funding of defences in the long term is marginal. However, Shore Road Residents Association have put in place measures to contribute to a private</p>
		HTL	HTL	HTL (private funding agreement)					

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	Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
								fund to maintain defences as part of a private / public funding agreement.
5:9 West Kirby Marine Lake to Royal Liverpool Golf Club	HTL	HTL	HTL	£1,521	£6,146	<ul style="list-style-type: none"> Recreational benefits from protection of marine lake (includes a public marina used for sailing, windsurfing and canoeing recognised as a national watersports venue, and is popular for walkers) 	<ul style="list-style-type: none"> Number of visitors/users of the Lake is not known Costs of SMP2 policy may be high (a recent scheme has been implemented and the costs given here do not reflect the additional works that have been undertaken) 	<p>BCR = 0.25</p> <p>The economic viability of the policy may depend on the recreational benefits at the Marine Lake. The recreational benefits of the SMP2 policy need to be valued at £4.6 million to make the BCR>1. The site is recognised as a national watersports venue suggesting that these benefits could be accrued. Further investigation on visitor numbers is needed to confirm this. Recent scheme appraisal showed proposed policy is economically viable.</p>
5:10 Royal Liverpool Golf Club to Hilbre Point	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> Minimal risk to golf club, unlikely to be significant additional damages Allows continuation of natural processes 	<ul style="list-style-type: none"> Accretion of foreshore suggests minimal risk. The risks could change if accretion slows or stops 	SMP2 policy is economically viable as there are few assets at risk
5:11 Hilbre Island	HTL	HTL	HTL	£0	£0	<ul style="list-style-type: none"> Stabilisation of estuary channel and protection of West Kirby area and 	<ul style="list-style-type: none"> Costs and benefits of limited intervention to HTL 	The economic viability of the policy may depend on the strategic importance of the island (lying at the

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		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							<ul style="list-style-type: none"> designated tidal flats Preserves heritage assets on island Preserves Local Nature Reserve 		mouth of the River Dee). There is limited erosion risk to properties and assets on the island, but damage to assets at risk along the West Kirby frontage if the island disappears is likely to economically justify limited intervention.
POLICY AREA: North Wirral (11a6)									
6:1	Hilbre Point (Stanley Road) to Wallasey Embankment (Meols)	HTL	HTL	HTL	£300	£7,892	<ul style="list-style-type: none"> Maintains protection to Hoylake and Leasowe with associated social and community benefits Protects lifeboat station and access with associated safety benefits Protects recreation infrastructure and facilities 	<ul style="list-style-type: none"> Road diversion has been included in the damages SMP2 level risk flood and erosion mapping may not capture all of the damages Costs of policy may be over-estimated as area apparently accreting 	BCR = 0.04 The economic viability of the policy may depend on the importance of the seafront and lifeboat station and the social, economic and recreation benefits that would be protected, particularly if the costs of the policy are over-estimated and damages under-estimated
6:2	Wallasey Embankment (Meols to Leasowe)	HTL	HTL	HTL	£283,487	£8,911	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of settlement Protection of jobs due to protection of businesses Protection to railway 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	BCR = 31.81 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust

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		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							<ul style="list-style-type: none"> • Benefits to Meols Meadows SSSI 		
6:3	Wallasey Embankment to (Leasowe) to Harrison Groyne (New Brighton)	HTL	HTL	MR	£0	£1,349	<ul style="list-style-type: none"> • Benefits of protecting golf course land for up to 50 years. Based on rateable value of £61,000 x 13 (as used for non-residential property damages), the annual 'value' per hectare (assuming 65-70ha for an 18-hole golf course) is £11,000 to £12,000 per hectare per year • MR would encourage return to naturally functioning dune system • Potential negative impacts on Old Gun Site under MR (picnic area with wildlife/habitat value) • Loss of coastal fringe land at golf course under MR • Negative impacts on North Wirral Country Park (attracts 250,000 visitors per year) • May be impacts from erosion of historic 	<ul style="list-style-type: none"> • Extent of negative impacts from release of contaminants not known • Impacts on golf course, picnic site and Country Park will depend on area of land that is eroded • Estimated damages to golf course will include rateable value of clubhouse (no details on given on VOA web-site that allow clubhouse to be separated from land). As an alternative, the cost of rebuilding an 18 hole course (excludes purchase of land, machinery and construction of buildings) is estimated at £42,000 to £47,000 per hectare (one-off costs which in annual terms would be £1,500 to £1,700 per hectare per year over 100 years) 	<p align="center">BCR = 0</p> <p>Existing defences have good residual life, hence MR recommended at end of residual life.</p> <p>There is unlikely to be sufficient economic justification for national funding for new defences on present alignment, so alternative approaches need to be investigated. However, the economic viability of the policy may depend on whether, maintenance costs of £1,349k are outweighed by impacts on the golf course, Old Gun Site picnic site and Country Park, and potential contamination from the historic landfill site. These benefits would have to be weighed against damages to dune system under HTL</p>

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							landfill site under NAI		
6:4	Harrison Groyne to Perch rock (New Brighton)	HTL	HTL	HTL	£492	£5,372	<ul style="list-style-type: none"> Recreational benefits from protection of frontage HTL would maintain benefits associated with regeneration (New Brighton is centre of a £70 million regeneration project for Wirral Waterfront) Community benefits from maintaining integrity of New Brighton Additional benefits due to avoiding erosion of potentially contaminated reclamation fill Negative benefits of HTL from coastal squeeze impacts on internationally designated site 	<ul style="list-style-type: none"> Number of visitors to New Brighton is not known such that recreation benefits cannot be estimated in monetary terms Extent of negative impacts from release of contaminants not known 	<p>BCR = 0.09</p> <p>The economic viability of the policy may depend on whether flood risk area is re-assessed and amenity and community benefits are included. Recreation, community and contamination impacts would have to be valued at £4.9 million to make BCR > 1. Investigation of recreation and community impacts needed and will have to be weighed up against environmental damages</p>
POLICY AREA: Mersey Estuary (11a7)									
7:1	Perch Rock to Riverwood Road / Eastham Park (South / left bank)	HTL	HTL	HTL	£3,393	£28,430	<ul style="list-style-type: none"> Negative benefits of HTL from coastal squeeze impacts on internationally designated site (uncertainty over 	<ul style="list-style-type: none"> Defences are too complex to cost accurately. Uncertainty over future sediment supply makes it 	<p>BCR = 0.12</p> <p>Flood risks and erosion</p>

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		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							<ul style="list-style-type: none"> sediment supply) HTL protects integrity of Wallasey, Bebington, other conurbations, industry, docks, ports and infrastructure with associated community impacts Knock-on benefits of HTL on wider economy and on jobs (especially from protection of docks and ports) Benefits of avoiding flooding of historical landfill site under NAI 	difficult to determine likely environmental impacts	risk area limited, but intensively developed. Therefore the economic viability of the policy may depend on community, industry, ports and infrastructure and knock-on benefits. These need to be valued at £25 million to make BCR>1, which seems unlikely but importance of community impacts and uncertainty over costs means further investigation is likely to be merited
7:2	Riverwood Road / Eastham Park to Eastham Ferry	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> Allows natural erosion of cliffs to continue 		Natural frontage SMP2 policy is economically viable as there are few assets at risk
7:3	Eastham Ferry to Runcorn Bridge (south bank)	HTL	HTL	HTL	£8,280	£35,538	<ul style="list-style-type: none"> HTL has social and community benefits by maintaining the integrity of Ellesmere Port, Runcorn, other conurbations, industry, docks, ports Recreation benefits from protection of infrastructure Heritage benefits from protection of 	<ul style="list-style-type: none"> The Manchester Ship Canal forms the defence along this length The Manchester Ship Canal provides fluvial protection to much of Warrington including areas outside the study area and these benefits and costs are not included in the 	BCR = 0.23 The economic viability of the policy may depend on knock-on benefits from flood defence function of the Manchester Ship Canal, which lies between the estuary and a large flood risk area at Stanlow and Ince Marshes, protecting the industrialised hinterland and avoiding

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							<ul style="list-style-type: none"> Manchester Ship Canal Knock-on benefits to economy and jobs May be knock-on impacts due to loss of farm businesses (as land is written-off) 	benefit-cost ratio	potential contamination. These need to be valued at £27.2 million to make BCR>1, which is possible, and importance of community impacts means further investigation is likely to be merited
7:4	Runcorn Bridge to Arpley landfill Site (Upper Mersey Estuary south bank)	HTL	MR	MR	£821	£3,229	<ul style="list-style-type: none"> Opportunities for habitat creation through MR in epochs 2 and 3 to offset coastal squeeze elsewhere Flood risk reduction to urban areas upstream Recreation and community impacts of MR on integrity of industry, infrastructure, Warrington, and Runcorn Heritage impacts from MR affecting Manchester Ship Canal Potential impacts from contaminated land and landfill May be knock-on impacts due to loss of farm businesses (as land is written-off) 	<ul style="list-style-type: none"> Extent of impacts on integrity of industry and settlements not fully known with opportunities to provide flood reduction benefits with set back defence line in the medium/long-term making this more adaptable option Extent of negative impacts from release of contaminants not known 	<p style="text-align: center;">BCR = 0.25</p> <p>The economic viability of this policy may depend on additional benefits such as avoiding pollution from flooding of contaminated land and community, recreation benefits. These need to be valued at £2.4 million to make BCR>1, which could be possible and needs to be investigated</p>

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		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
7:5	Arpley Landfill site (south bank) to SMP2 boundary to west of Sewage works (north bank)	HTL	HTL	HTL	£67,919	£4,596	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of settlement Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	BCR = 14.78 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
7:6	Sewage works to Terrace Road Widnes (Upper Mersey Estuary north bank)	HTL	MR	MR	£93,521	£2,300	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of settlement Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> In units 7.6, 7.7 and 7.8, existing defences are to be maintained whilst effects are investigated 	BCR = 40.67 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
7:7	Terrace Road Widnes to Pickerings Pasture	HTL	HTL	HTL	£8,202	£2,300	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of settlement Recreation benefits associated with protecting pedestrian and cycle paths along the river Protection of jobs due to protection of 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	BCR = 3.57 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust

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		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							businesses		
7:8	Pickerings Pasture to Garston Industrial Estate	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> Allowing cliffs (which are an SSSI) to erode will maintain natural processes and notified interest area in cliffs near to airport May be knock-on impacts due to loss of farm businesses (as land is written-off) Potential damage to Lovel's Hall and Hale Duck Decoy scheduled monuments has not been included in the benefits. Hale Duck Decoy is a nature reserve (restored at a cost of £45,000) 	<ul style="list-style-type: none"> Value of sediment eroded from cliffs to benefit the estuary processes and designated habitats Benefits and costs of local protection to scheduled monuments 	Natural frontage NAI only economically viable option due to limited value of assets at risk
7:9	Garston Industrial Estate to Seaforth	HTL	HTL	HTL	£15,572	£28,868	<ul style="list-style-type: none"> HTL protects integrity of Bootle, Liverpool, other conurbations, industry, docks, ports and infrastructure HTL will protect recreation infrastructure in the area HTL will prevent release of 	<ul style="list-style-type: none"> Defences are too complex to cost accurately Likely that flood zone mapping used does not account for potential breaches in defences and promenades such that impacts under NAI may be under- 	BCR = 0.54 The economic viability of the policy may depend on social, recreation, contamination and heritage benefits. These benefits would need to be £13.3 million to make BCR>1, which may not be unreasonable especially given uncertainties over

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		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							contaminants	estimated	NAI damages and costs
POLICY AREA: Seaforth to the River Alt (11a8)									
8:1	Seaforth to MEPAS pumping Station	HTL	HTL	HTL	£2,370k	£6,297k	<ul style="list-style-type: none"> HTL could result in negative environmental impacts by stopping or slowing erosion (SPA and SSSI currently in favourable condition) HTL protects integrity of Crosby and Blundelsands HTL maintains protection to buried infrastructure HTL protects golf club land and avoids release of contaminants 	<ul style="list-style-type: none"> Monetised costs and benefits verified with strategy Extent of negative impacts from release of contaminants not known Buried infrastructure could be relocated (costs unknown) 	<p>BCR = 0.38</p> <p>The economic viability of the policy may depend on benefits that could accrue from avoiding pollution from erosion of landfill and on costs of relocation of buried infrastructure, recreation and social benefits. Additional benefits need to be £3.9 million to make BCR>1. These need to be weighed up against negative impacts on Mersey SPA and SSSI</p>
8:2	MEPAS pumping Station to Hightown	MR	MR	MR	£58	£0	<ul style="list-style-type: none"> May be impacts on integrity of Hightown 	<ul style="list-style-type: none"> Social impacts unknown and may be limited due to MR resulting in erosion of sand dunes MR assumes natural processes will continue, with minimal intervention to maintain outfalls deflecting the Alt 	<p>Natural frontage SMP2 policy is economically viable resulting in development of more natural dune system</p>

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SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
								channel away from the shore (costs not included) and assumes that set back defences will only be constructed when assets at risk at Hightown.	
8:3	Hightown to mouth of the River Alt (east bank)	HTL	HTL	HTL	£652k	£663	<ul style="list-style-type: none"> HTL helps to protect Hightown with associated social benefits Limited intervention and dune management under HTL provides environmental benefits 	<ul style="list-style-type: none"> Costs and benefits verified with strategy 	<p align="center">BCR=0.98</p> <p>The economic viability of the policy may depend on the inclusion of social benefits to Hightown and environmental benefits to the Sefton Coast SAC are included</p>
8:4	River Alt mouth (east and west banks) to the Alt pumping station	HTL	HTL	HTL	£0	£0	<ul style="list-style-type: none"> Costs of maintaining walls not included Benefits of channel to the drainage of the vast inland area not quantified 	<ul style="list-style-type: none"> Training works to river channel needed to maintain discharge from the very large pumping station. Too complicated to assess at SMP2 level 	<p>The economic viability of the policy relates to the Altmouth pumping station managing flood risk to a large inland area.</p>

SMP2 Policy Unit	SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy	
	Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy				
POLICY AREA: Formby Dunes (11a9)									
9:1	Mouth of the River Alt (west bank) to Weld Road, Southport (Formby dune system)	MR	MR	MR	£2,076	£0	<ul style="list-style-type: none"> MR provides environmental impacts to an internationally designated SAC by allowing the shoreline and dunes to roll back Erosion risk to a small number of isolated properties Long-term impacts on caravan park and holiday centre Long-term impacts on car parks and footpaths 	<ul style="list-style-type: none"> MR assumes allowing the dune system to evolve naturally with limited intervention to manage dunes, and manage adaptation in the erosion risk zone (no costs included at this stage). Medium to long-term losses to properties, caravan park and holiday centre need to be investigated Economic impacts mainly to Grade 5 agricultural land Costs of limited intervention to relocate assets and manage dunes not quantifiable at this stage 	<p>Natural frontage SMP2 policy is economically viable. Not feasible to defend the eroding dunes as their environmental and recreation value would be lost</p>

H4.2 Table 4: Economic summary table for Sub-Cell 11b Southport to Rossall Point

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
POLICY AREA: Ribble Estuary (11b1)									
I:1	Weld Road to Fairways (Southport)	HTL	HTL	HTL	Linked to 1.2 £305,908	£5,186	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of settlement Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	Linked BCR = 27.56 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
I:2	Fairways to Crossens Pumping Station	HTL	HTL	HTL	Linked to 1.1 £305,908	£5,913	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of settlement Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	Linked BCR = 27.56 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
I:3	Crossens Pumping Station to Hesketh Out Marsh West (Hundred End Gutter)	HTL	HTL	MR	Linked to 1.4 and 1.5 £116,724	£4,558	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of settlement 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability Damages and costs have been assessed on the basis of retreating 	Linked BCR = 7.54 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust

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SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							<ul style="list-style-type: none"> Protection of jobs due to protection of businesses 	to higher ground while protecting the most valuable assets in the frontage, hence could be highly variable depending on the exact details of the MR	
I:4	Hesketh Outmarsh West	HTL	HTL	MR	Linked to I.3, I.5 and I.6 £116,724	£1,412	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of settlement Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	Linked BCR = 7.54 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
I:5	Hesketh Outmarsh East	MR	HTL	HTL	Linked to I.3, I.4 and I.6 £116,724	£2,219	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of settlement Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	Linked BCR = 7.54 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
I:6	Hesketh Outmarsh East to White Bridge, Rufford (River Douglas left bank)	HTL	HTL	MR	Linked to I.3, I.4 and I.5 £116,724	£7,278	<ul style="list-style-type: none"> HTL protects settlements and canals from flood risk Social benefits associated with protection of homes 	<ul style="list-style-type: none"> Impacts on canals not captured in economic damages 	Linked BCR = 7.54 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust

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SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							<ul style="list-style-type: none"> and business Protects several main roads Maintains current stability of estuary 		more robust
I:7	White Bridge, Rufford, to Old Railway Embankment, Much Hoole Marsh House (River Douglas right bank)	HTL	HTL	MR	£32,925	£7,278	<ul style="list-style-type: none"> Potential for significant social impacts on MR in epoch 3 	Potential for significant residential damages (and associated social impacts) will need to inform the alignment of MR	BCR = 4.52 SMP2 policy is economically viable but potential for significant residential damages (and associated social impacts) will need to inform the alignment of MR
I:8	Old Railway Embankment, Much Hoole Marsh House to Hutton Marsh (Pilots Cottage)	HTL	HTL	MR	Linked to I.9 £50,841	£638	<ul style="list-style-type: none"> HTL would protect landfill site, avoiding contamination impacts HTL would provide significant social benefits associated with protection of homes Benefits to the community by protecting integrity of settlement 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	BCR = 33.83 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
I:9	Hutton Marsh	MR	HTL	MR	Linked to I.8 £50,841	£865	<ul style="list-style-type: none"> SPA is in unfavourable condition and needs to be brought back under tidal influence through MR 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	BCR = 33.83 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust

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SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
I: 10	Hutton Marsh to Penwortham Golf Course	HTL	MR	HTL	£3,355	£592	<ul style="list-style-type: none"> MR provides opportunity to reduce surge tides upstream Potential for environmental benefits and more sustainable coastline May be knock-on impacts due to loss of farm businesses (as land is written-off) 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	BCR = 5.67 SMP2 policy is economically viable based on monetised benefits alone. Additional environmental and knock-on benefits for other units make SMP2 policy more robust
I: 11	Penwortham Golf Course to Penwortham Bridge	HTL	HTL	HTL	£0	£1,527	<ul style="list-style-type: none"> HTL protects sports grounds and large area of allotments HTL protects main roads 	<ul style="list-style-type: none"> No damages calculated in monetary terms Value of amenity damages related to allotments Traffic disruption benefits Uncertain flood link to Lower Penwortham, adjacent to SMP2 boundary 	The economic viability of the policy may depend on on the amenity value of the allotments, recreational, and transport benefits
I: 12	Penwortham Bridge to Freckleton Marsh (W end of sewage works)	HTL	HTL	HTL	Unit linked to I.13 £15,203	£6,377	<ul style="list-style-type: none"> HTL maintains integrity of Preston HTL provides protection to landfill site and waste water treatment plant 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	Linked BCR = 1.56 SMP2 policy is economically viable based on monetised benefits plus additional social benefits to Preston and from avoiding contamination
I: 13	Freckleton Marsh (W end of sewage works) to Naze	HTL	HTL	MR	Linked to I.12 £15,203	£3,366	<ul style="list-style-type: none"> Potential for environmental benefits from MR 	<ul style="list-style-type: none"> HTL provides shortest defence length, which may be 	Linked BCR = 1.56 Economic viability of the policy may be improved by

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SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
	Point							most cost-effective	the value of potential habitat creation to mitigate for potential losses elsewhere.
I: 14	Naze Point to Warton Bank	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> May be knock-on impacts due to loss of farm businesses (as land is written-off) 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	No existing defences. SMP2 policy is economically viable
I: 15	Warton Bank to Lytham Dock	HTL	HTL	HTL	Linked to I.16 and I.17 £372,144	£1,707	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of settlement Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	Linked BCR = 40.16 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
I: 16	Lytham Dock to Land Registry	HTL	HTL	HTL	Linked to I.15 and I.17 £372,144	£2,253	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of settlement Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	Linked BCR = 40.16 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
I: 17	Lytham Land Registry to Fairhaven Lake	HTL	HTL	HTL	Linked to I.15 and I.16 £372,144	£5,307	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	Linked BCR = 40.16 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy

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SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							<ul style="list-style-type: none"> settlement Protection of jobs due to protection of businesses 		more robust
I: 18	Fairhaven Lake	HTL	HTL	HTL	£387	£2,180	<ul style="list-style-type: none"> HTL protects Fairhaven Lake and provides recreation benefits (including boating and canoeing, bowling, tennis, basketball, Skate Park and RSPB Discovery Centre) 	<ul style="list-style-type: none"> Flooding damages may be under-estimated by national mapping Strategy study (just starting) should be able to confirm recreational benefits 	BCR = 0.18 Economic viability of the policy may depend on the regional importance of Fairhaven Lake. Recreation benefits and additional flooding related benefits need to be £1.8 million to make BCR>1.
I: 19	Fairhaven Lake to Miniature Golf Course	HTL	HTL	HTL	£0	£0	<ul style="list-style-type: none"> HTL maintains important recreation asset (seafront) Habitat benefits from management of dune system 	<ul style="list-style-type: none"> Costs minimised through use of dune management Flooding damages not estimated as dune breaches are not covered 	Dune management should provide most cost effective means of defence. Economic viability of this policy may require further assessment of tourism and social benefits at strategy level.
I: 20	Miniature Golf Course to St Anne's Pier	HTL	HTL	HTL	£1,069	£5,795	<ul style="list-style-type: none"> HTL maintains important recreation asset (seafront) 	<ul style="list-style-type: none"> Flooding damages under-estimated as dune breaches are not covered 	BCR = 0.18 Economic viability of the policy may depend on benefits to seafront and tourism. These benefits (or additional damages averted) need to be £4.7 million to make BCR>1
I: 21	St Annes's Pier to St Annes' Northern Boundary	HTL	HTL	HTL	Linked to 2.1 £32,097	£460	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	Linked BCR = 6.73 SMP2 policy is economically viable based on monetised benefits alone. Additional

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SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							<ul style="list-style-type: none"> protecting integrity of settlement Protection of jobs due to protection of businesses 		benefits make SMP2 policy more robust
POLICY AREA: St Annes to Rossall Point (1 b2)									
2:1	St Annes (northern boundary) to Squires Gate	MR	HTL	HTL	Linked to 1.21 £32,097	£4,313	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of settlement Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> Costs include natural dune roll-back 	Linked BCR = 6.73 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
2:2	Squires Gate to Blackpool Tower	HTL	HTL	HTL	£76,921	£7,558	<ul style="list-style-type: none"> Tourism benefits and amenity value of the beach Social benefits associated with protection of homes Benefits to the community by protecting integrity of settlement Protection of jobs due to protection of businesses HTL will protect tram and coastal road (traffic disruption costs are not included in the monetised 	<ul style="list-style-type: none"> Uncertainty over extent of road and tram disruption damages (Shared with PU2.3) 	Linked BCR = 10.18 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust

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SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							damages)		
2:3	Blackpool Tower to Anchorsholme Park	HTL	HTL	HTL	£2,212	£18,476	<ul style="list-style-type: none"> HTL protects promenade and seafront with associated tourism and recreation benefits Amenity value of the beach Knock-on benefits for the local/regional economy including protection of jobs HTL will protect tram and coastal road (traffic disruption costs are not included in the monetised damages) 	<ul style="list-style-type: none"> Uncertainty over extent of road and tram disruption damages (Shared with PU2.2) 	<p align="center">BCR = 0.12</p> <p>Economic viability of the policy may depend on recreation/amenity benefits and transport disruption costs. These benefits need to be £16.3 million to make BCR>1. Given the regional/national significance of this unit, this appears likely to be the case</p>
2:4	Anchorsholme Park	HTL	HTL	HTL	£0	£25,048	<ul style="list-style-type: none"> HTL protects important greenspace in urban area (with associated health, recreation, wellbeing, etc. benefits) HTL protects significant buried waste water infrastructure, including pumping station serving a large area of Blackpool 	<ul style="list-style-type: none"> Longer term erosion link to flood cell in 2.5 to 3.3 not included in broad scale assessment 	<p align="center">BCR = 0</p> <p>Policy provides the shortest and probably cheapest defence alignment. However, the economic viability of the policy may depend on the avoided costs of relocating the pumping station and social/amenity benefits of the park as a greenspace (with associated green</p>

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SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
									infrastructure benefits). These benefits need to be £25 million to make BCR>1
2:5	Anchorsholme Park to Jubilee Gardens	HTL	HTL	HTL	Linked to 2.6, 2.7, 2.8, 2.9, 3.1, 3.2 and 3.3 £2,811,293	£2,203	<ul style="list-style-type: none"> • Social benefits associated with protection of homes • Benefits to the community by protecting integrity of settlement • Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> • No specific uncertainties that would affect economic viability 	Linked BCR = 63.27 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
2:6	Jubilee Gardens to Five Bar Gate	HTL	HTL	HTL	Linked unit	£4,792	<ul style="list-style-type: none"> • Social benefits associated with protection of homes • Benefits to the community by protecting integrity of settlement • Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> • No specific uncertainties that would affect economic viability 	Linked BCR = 63.27 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
2:7	Five Bar Gate to Rossall Hospital (Rossall School)	HTL	HTL	HTL	Linked unit	£3,893	<ul style="list-style-type: none"> • Social benefits associated with protection of homes • Benefits to the community by protecting integrity of settlement • Protection of jobs due to protection of 	<ul style="list-style-type: none"> • No specific uncertainties that would affect economic viability 	Linked BCR = 63.27 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust

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SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							businesses		
2:8	Rossall Hospital to Chatsworth Avenue	HTL	HTL	HTL	Linked unit	£8,985	<ul style="list-style-type: none"> • Social benefits associated with protection of homes • Benefits to the community by protecting integrity of settlement • Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> • No specific uncertainties that would affect economic viability 	Linked BCR = 63.27 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
2:9	Chatsworth Avenue to Rossall Point	HTL	HTL	HTL	Linked unit	£8,386	<ul style="list-style-type: none"> • Social benefits associated with protection of homes • Benefits to the community by protecting integrity of settlement • Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> • No specific uncertainties that would affect economic viability 	Linked BCR = 63.27 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust

H4.3 Table 5: Economic summary table for Sub-Cell 11c Rossall Point to Hodbarrow Point

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
POLICY AREA: Fleetwood and Wyre Estuary (11c1)									
I:1	Rossall Point to Marine Lake (east)	HTL	HTL	HTL	Linked unit	£7,188	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of settlement Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	Linked BCR = 63.27 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
I:2	Marine Lake to Fleetwood Pier	HTL	HTL	HTL	Linked unit	£6,589	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of settlement Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	Linked BCR = 63.27 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
I:3	Fleetwood Pier to Fleetwood Ferry	HTL	HTL	HTL	Linked unit	£2,396	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	Linked BCR = 63.27 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy

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SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							<ul style="list-style-type: none"> settlement Protection of jobs due to protection of businesses 		more robust
I:4	Fleetwood to Stanah	HTL	HTL	HTL	Linked Unit	£7,752	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of Fleetwood Protection of jobs due to protection of businesses Protection of landfill, reducing risk of contamination Protection to nature reserve 	<ul style="list-style-type: none"> Damages are shared with flood cell B (units 2.5 to 3.3) 	<p>Linked BCR >50</p> <p>SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust</p>
I:5	Stanah to Cartford Bridge (south bank) and Cartford Bridge to Shard Bridge (north bank)	Draft consultation policies			£676	£1,469	<ul style="list-style-type: none"> NAI would result in benefits to internationally designated site May be knock-on impacts due to loss of farm businesses (as land is written-off) 	<ul style="list-style-type: none"> Privately funded defence maintenance can continue, subject to consent 	<p>BCR = 0.46</p> <p>SMP2 is unlikely to be economically viable. Benefits to internationally designated site from NAI may not be outweighed by damages to agricultural land</p>
		HTL	NAI	NAI					
		Final policies							

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SMP2 Policy Unit	SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy	
	Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy				
	HTL	MR	MR			<ul style="list-style-type: none"> internationally designated site May be knock-on impacts due to loss of farm businesses (if land is required to be written-off) 	<ul style="list-style-type: none"> investigations, where practicable, to withdraw from maintenance and retreat back to high land (no costs included at this stage) Privately funded defence maintenance can continue, subject to consent. 	<p>Hold The Line in the future due to lack of assets at risk. Managed realignment will allow for adaptation to change.</p>	
I:6	Shard Road (A588) to Golf Course	HTL	HTL	HTL	£1,745	£2,863	<ul style="list-style-type: none"> HTL protects communities at Hambleton 	<ul style="list-style-type: none"> Flood cells potentially linked to a very wide area, such that damages may be under-estimated 	<p>BCR = 0.61</p> <p>The economic viability of the policy may depend on community benefits and other damages that may be incurred due to flooding of a very wide area under NAI. The additional benefits would need to be £793k to make BCR>1</p>
I:7	Knott End Golf course	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI would result in naturally functioning coastline 	<ul style="list-style-type: none"> Privately funded defences could be constructed (as required), subject to consent 	<p>Natural frontage, no formal defences currently present. SMP2 policy is economically viable as there are very few assets at risk</p>
I:8	Golf course to Knott End on Sea	HTL	HTL	HTL	Linked to 2.1, 2.2 and 2.3 £156,735	£1,296	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	<p>Linked BCR = 7.30</p> <p>SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy</p>

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SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							<ul style="list-style-type: none"> Knott End on Sea Protection of jobs due to protection of businesses 		more robust
POLICY AREA: Knott End to Plover Scar (1 c2)									
2:1	Knott End on Sea	HTL	HTL	HTL	Linked to 2.1, 2.2 and 2.3 £156,735	£4,961	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of Knott End on Sea Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	Linked BCR = 7.30 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
2:2	Knott End to Fluke Hall	HTL	HTL	HTL	Linked to 2.1, 2.2 and 2.3 £156,735	£9,350	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of Knott End on Sea Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	Linked BCR = 7.30 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
2:3	Fluke Hall to Cocker Bridge	Draft consultation policies			Linked to 2.1, 2.2 and 2.3 £156,735	£5,854	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of Knott End on Sea Protection of jobs due 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	Linked BCR = 7.30 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
		HTL	MR	HTL					

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							to protection of businesses		
		Final policies							
		HTL	HTL or MR	HTL	As above	As above	<ul style="list-style-type: none"> As above 	<ul style="list-style-type: none"> As above 	<p>Policy is economically viable due to value of assets protected in the flood cell, which links Policy Units 1.8, 2.1, 2.2 and 2.3</p> <p>Set back defence or secondary defence line could be more cost effective than improving current primary defences</p>
2:4 Cocker Bridge to Glasson Dock		Draft consultation policies			Linked to 3.1 £20,820	£3,352	<ul style="list-style-type: none"> MR offers potential for creation of intertidal habitat with environmental benefits and will allow saltmarsh to roll-back as sea levels rise Social impacts from loss of isolated properties MR has potential impacts on Cockersands Abbey, especially for visitors 	<ul style="list-style-type: none"> Heritage impacts on Cockersands Abbey uncertain – could be beneficial if MR improves context and setting Extent of environmental benefits depends on realignment 	<p>Linked BCR = 3.84</p> <p>SMP2 policy is economically viable based on monetised benefits and potential environmental benefits. Location of realignment needs to be designed to provide best balance between social and economic impacts and environmental benefits</p>
		HTL	MR	MR					
		Final policies			As above	As above	<ul style="list-style-type: none"> As above 	<ul style="list-style-type: none"> As above 	<p>Policy is economically viable due to value of assets protected in the flood cell, which links to Policy Unit 3.1.</p> <p>Set back defence could be</p>
		HTL	HTL or MR	HTL or MR					

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		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
									a smaller structure on a shorter alignment requiring less maintenance and be more cost effective than current defences.
POLICY AREA: Lune Estuary (11c3)									
3:1	Glasson Dock to Conder Green Farm	HTL	HTL	HTL	Linked to 2.4 £20,820	£2,069	<ul style="list-style-type: none"> Benefits linked to Policy Unit 2.6, same comments apply for MR in overall flood cell See above PU 2.6 	<ul style="list-style-type: none"> See above PU 2.6 	Linked BCR = 3.84 SMP2 policy is economically viable based on monetised benefits and potential environmental benefits. Location of realignment needs to be designed to provide best balance between social and economic impacts and environmental benefits
3:2	Conder Green Farm to Aldcliffe	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> Recreational impacts from loss of footpaths and cycleways on old railway embankment Potential impacts on Registered Park and Garden 	<ul style="list-style-type: none"> Extent of impact on Registered Park and Garden not fully known 	SMP2 policy is economically viable due to limited impacts
3:3	Aldcliffe to Freemans Wood (Aldcliffe Marsh)	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> Potential for NAI to act as flood storage area in times of surge, reducing costs elsewhere Potential for replacement habitat to mitigate coastal 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	SMP2 policy is economically viable due to potential environmental benefits and protection offered by cross-bank constructed at Freeman's Wood

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SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							squeeze in other units		
3:4	Freemans Wood to Skerton Weir (east bank) and Skerton Weir to Lythe Bridge (west bank)	HTL	HTL	HTL	£293,409	£8,646	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of Knott End on Sea Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> Defences are too complex to cost accurately 	BCR = 33.94 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
3:5	Lythe Bridge to Riverside Farm	HTL	MR	HTL	£285,926	£553	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of settlement Protection of jobs due to protection of businesses Potential habitat benefits from realignment (without impacts on properties) 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	BCR = 516.82 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
3:6	Riverside Farm to Overton cattle grid	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI would result in naturally functioning coast with potential to create intertidal habitat Potential for 	<ul style="list-style-type: none"> May be potential to manage retreat to higher ground 	SMP2 policy is economically viable due to potential environmental benefits and limited damages (no damages to properties)

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							<ul style="list-style-type: none"> replacement habitat to mitigate coastal squeeze in other units • May be knock-on impacts due to loss of farm businesses (as land is written-off) 		
3:7	Overton Cattle Grid to Sunderland Village	Draft consultation policies			£654	£1,102	<ul style="list-style-type: none"> • Road access to Sunderland village already cut-off on large tide, MR will reduce social impacts associated with lack of access to village • Relocation of road will allow saltmarsh to roll-back more naturally (benefits not quantified) 	<ul style="list-style-type: none"> • HTL in epoch 1 provides opportunity to investigate potential for realignment • Longer term, more sustainable location for road and village needs to be considered 	<p>BCR = 0.59 SMP2 policy is economically viable due to potential environmental benefits and as set back defence protects Overton and Middleton</p>
		HTL	MR	MR					
		Final policies			As above	As above	As above	As above	<p>The economic viability of the policy may depend on social benefits of maintaining access and environmental benefits of realigning the road away from the marsh. Inadequate economic case to hold existing line, so alternative approaches necessary. Defence alignment could be optimised to be more cost effective,</p>
		HTL	HTL	MR					

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
POLICY AREA: Sunderland Village to Potts Corner (11c4)									
4.1	Sunderland Village	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> Social impacts on Sunderland village May be knock-on impacts due to loss of farm businesses (as land is written-off) 	<ul style="list-style-type: none"> Longer term, more sustainable location for road and village needs to be considered Potential for private defences (subject to consent) or resistance/resilience measures in short and medium-term 	Hold the line with new shoreline defences is unlikely to be viable for National funding but limited intervention to manage change could be pursued. Potential opportunities for co-funding could be explored.
4.2	Sunderland Point	MR	MR	MR	£0	£0	<ul style="list-style-type: none"> Benefits of Sunderland Point providing protection to wider estuary 	<ul style="list-style-type: none"> MR assumes limited intervention if required by private property owners and monitoring to manage coastal change at the Point (no costs included at this stage) There is uncertainty over the impact of erosion at the point on the wider Lune estuary. 	Limited intervention may be economically justified when wider estuary benefits are included.
4.3	Sunderland Point to the Secondary Embankment	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> Social impacts on Sunderland village May be knock-on impacts due to loss of farm businesses (as land is written-off) 	<ul style="list-style-type: none"> Potential for private defences set back from coast (subject to consent) or resistance/resilience measures in short and medium-term 	Limited assets at risk so defences can not be economically justified.

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		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
4.4	Secondary Embankment to Potts Corner	HTL	HTL	HTL	£0	£369	<ul style="list-style-type: none"> Benefits of protecting Overton & Middleton by maintaining tie in to secondary embankment not available from SMP2 scale analysis. 	<ul style="list-style-type: none"> Potential to realign secondary embankment tie in away from coast. 	Policy is economically viable. In the long term Setting defences back from open coast would allow less substantial structures to be used.
POLICY AREA: Potts Corner to Heysham Dock (1 c5)									
5:1	Potts Corner to Heysham Power Station	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> May be some knock-on impacts on jobs and economy due to erosion of commercial properties/land NAI will result in naturally functioning coastline 	<ul style="list-style-type: none"> Potential for private defences (subject to consent) 	Natural frontage SMP2 policy is economically viable due to potential environmental benefits
5:2	Heysham Power Station and Heysham Dock	HTL	HTL	HTL	£1,322	£9,352	<ul style="list-style-type: none"> Protection of Heysham Nuclear Power Station and dock would provide significant social and economic benefits HTL will reduce risk of contamination from power stations 	<ul style="list-style-type: none"> Extent of potential impacts from release of contaminants not known 	BCR = 0.14 SMP2 policy is economically viable due to presence of power station and importance of electricity generated to regional/national economy
POLICY AREA: Heysham Dock to Hest Bank (1 c6)									
6:1	South End of Halfmoon Bay to Chapel Hill (Lower Heysham)	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI will result in naturally functioning coastline Potential impacts from flooding of Sealink landfill site 	<ul style="list-style-type: none"> Extent of potential impacts from release of contaminants from landfill site not known 	Natural frontage SMP2 policy is economically viable due to potential environmental benefits. Further investigation of impacts from release of

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		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
									contaminants is needed
6:2	Chapel Hill to Hest Bank (Morecambe)	HTL	HTL	HTL	£286,886	£4,084	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of settlement Protection of jobs due to protection of businesses Potential habitat benefits from realignment (without impacts on properties) 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	BCR = 70.25 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
POLICY AREA: Hest Bank to Heald Brow (11c7)									
7:1	Hest Bank to West Cain House	HTL	MR	HTL	£97	£345	<ul style="list-style-type: none"> Benefits to railway line from HTL Potential to provide more sustainable defence line through realignment 	<ul style="list-style-type: none"> Realignment could still provide benefits to railway line but new line needs to be investigated Costs and benefits of future relocation of STW 	BCR = 0.28 Insufficient viability to continue to defend the current alignment therefore other options need to be investigated. Economic viability of the policy may depend on impacts to railway line which needs to be £248k to make BCR>1
7:2	West Cain House to Red Bank Farm	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI will result in naturally functioning coastline 	<ul style="list-style-type: none"> Potential for private defences (subject to consent) 	No formal defences present. SMP2 policy is economically viable

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		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
7:3	Red Bank Farm to Bolton-le-Sands Caravan Park	HTL	MR	HTL	£568	£1,346	<ul style="list-style-type: none"> Benefits from protection of mainline railway and local road Benefits from protection of landfill site (reduced risk of release of contaminants) Amenity/tourism benefits from protection of camp-site/caravan park Potential for habitat benefits from realignment 	<ul style="list-style-type: none"> Potential for environmental benefits through MR not known 	<p>BCR = 0.42</p> <p>The economic viability of the policy depends on risks to the railway and amenity/recreation benefits. MR could also deliver environmental benefits</p>
7:4	Bolton-le-Sands Caravan Park to River Keer	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI will result in naturally functioning coastline Negative impacts on isolated properties along the natural coast 	<ul style="list-style-type: none"> Potential for private defences (subject to consent) 	<p>SMP2 policy is economically viable due to limited damages and potential for private defences (to further minimise damages)</p>
7:5	River Keer to Heald Brow	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> Impacts on railway will be monitored and may necessitate change in policy No impacts on Leighton Moss SPA, Ramsar site and SSSI 	<ul style="list-style-type: none"> Future impacts on railway and SPA/Ramsar/SSSI not fully known Potential impacts on contaminated land not known 	<p>SMP2 policy is economically viable due to limited damages and allowance for further investigations to better understand potential impacts on railway, SPA and contaminated land</p>
POLICY AREA: Heald Brow to Humphrey Head (1 c8)									

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		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
8:1	Heald Brow to Frith Wood	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI will result in naturally functioning coastline 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	No formal defences present. SMP2 policy is economically viable as there are very few assets at risk
8:2	New Barns	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> Impacts on access track 	<ul style="list-style-type: none"> Potential for private defences (subject to consent) Access track already inaccessible on certain tides, with impacts predicted to increase due to sea level rise 	SMP2 policy is economically viable as there are very few assets at risk (and opportunities for private defences)
8:3	Grubbins Wood (New Barns to Ash Meadow)	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI will result in naturally functioning coastline 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	Natural frontage. SMP2 policy is economically viable as there are very few assets at risk
8:4	Ash Meadow to the Kent Viaduct (Arnside)	HTL	HTL	HTL	£0	£2,666	<ul style="list-style-type: none"> Social benefits from protection of promenade and local road (B5282) in Arnside Recreation benefits from protection of promenade Tourism benefits from protection of promenade with knock-on benefits to businesses and jobs 	<ul style="list-style-type: none"> Costs uncertain for this unit 	BCR = 0 Economic viability of the policy relates to the importance of promenade and local road to Arnside
8:5	Kent Viaduct to Holme Island	HTL	HTL	HTL	Linked to 8.6 £9,693	£6,358	<ul style="list-style-type: none"> Protection of railway line around Lake District Knock-on social and 	<ul style="list-style-type: none"> Damages to railway line could be underestimated Potential for habitat 	Linked BCR = 0.87 Economic viability of the policy may depend on the value of the railway line to

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							economic benefits from protection of railway line	creation under MR	the region.
8:6	Holme Island to Humphrey Head	HTL	HTL	HTL	Linked to 8.5 £9,693	£4,795	<ul style="list-style-type: none"> Social benefits from protection to Grange-over-Sands Protection of railway line around Lake District Knock-on social and economic benefits from protection of railway line Possible negative impacts as HTL could further increase siltation, slow water draining into Morecambe Bay and possibly lead to fluvial flooding 	<ul style="list-style-type: none"> Impacts from fluvial flooding not estimated 	<p>Linked BCR = 0.87</p> <p>Economic viability of the policy may depend on the value of the railway line and social benefits to Grange-over-Sands. Damages from additional fluvial flooding need to be investigated</p>
POLICY AREA: Kent Estuary (1 c9)									
9:1	Kent Viaduct to Dick Fell Road (Sandside)	HTL	MR	MR	£451	£246	<ul style="list-style-type: none"> HTL (and MR) will protect important access routes HTL protects agricultural land of strategic value HTL could increase coastal squeeze (MR should help reduce this negative environmental impact) 	<ul style="list-style-type: none"> MR needs to maintain access routes Impact of allowing loss of the access road could have wider ranging impacts which have not been costed 	<p>BCR = 1.83</p> <p>SMP2 policy is economically viable.</p> <p>Investigations required to identify appropriate realignment (balancing social and economic impacts with environmental benefits)</p>

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		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
9:2	Sandside (Dick Fell Road to Hollins Well Road)	HTL	HTL	HTL	£0	£2,070	<ul style="list-style-type: none"> HTL will protect community and infrastructure at Sandside HTL will protect local road (B5282), which provides access to/ from Sandside quarry 	<ul style="list-style-type: none"> No damages to properties estimated 	<p>BCR = 0</p> <p>Economic viability of the policy relates to the value of avoiding flooding and erosion to the main coastal road through Sandside to the community. Benefits need to be £2.1 million to make BCR>1</p>
9:3	Hollins Well Road north to Levens Bridge (east bank) & Levens Bridge to Kent Viaduct (west bank)	HTL	MR	MR	£0	£14,476	<ul style="list-style-type: none"> HTL protects agricultural land of strategic value May be knock-on impacts due to loss of farm businesses (as land is written-off) HTL would protect railway viaduct Potential to provide significant environmental benefits from realignment 	<ul style="list-style-type: none"> Investigations needed to identify appropriate realignments (Regulated Tidal Exchange may be more appropriate) 	<p>A Hold the Line policy is unlikely to be economically viable across whole unit. Realignment or abandoning sections of defence would provide a more cost effective solution. However, investigations need to be carried out to assess potential for MR and identify appropriate alignments, and economic evaluation of impacts of potential changes to the estuary processes not quantifiable at this stage.</p>
POLICY AREA: Humphrey Head to Cark (11c10)									
10:1	Humphrey Head	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI will result in naturally functioning coastline 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	<p>Natural frontage. SMP2 policy is economically viable as there are very few assets at risk</p>

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy					
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy								
10: 2	Humphrey Head to Cowpren Point	Draft consultation policies			£5,613	£2,943	<ul style="list-style-type: none"> Negative environmental impacts due to coastal squeeze (this unit has some of the most significant negative impacts) Protection of Cark Airfield Scheduled Monument Loss of commercial properties may have knock-on effects for local economy and jobs Policy will provide continued protection to railway line 	<ul style="list-style-type: none"> HTL likely to result in costs for compensatory habitat Costs associated with set back embankments uncertain 	<p>BCR = 1.91 SMP2 policy is economically viable as it avoids significant negative environmental impacts and offers opportunities for a more sustainable coast, including relocation of caravans</p>					
		HTL	MR	MR										
		Final policies								As above	As above	<ul style="list-style-type: none"> As above 	<ul style="list-style-type: none"> As above 	<p>Long term phased Managed Realignment is economically viable. Allowing for habitat creation and private contributions will significantly increase the viability of delivery of the overall policy for this frontage.</p>
		HTL	MR and HTL	MR										
10: 3	Cowpren Point to Cark	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI will result in naturally functioning coastline 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	<p>Natural frontage. SMP2 policy is economically viable as there are very few assets at risk</p>					

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		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
POLICY AREA: Outer Leven Estuary (11c11)									
11: 1	Cark to Leven Viaduct	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> Protects railway line Knock-on social and economic benefits from protection of railway line 	<ul style="list-style-type: none"> Costs of protecting railway line (as and when necessary) not included 	SMP2 policy is economically viable , with works only to be carried out if railway is at risk
11: 2	Leven Viaduct to Canal Foot cottages	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI will result in naturally functioning coastline 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	Natural frontage. SMP2 policy is economically viable as there are very few assets at risk
11: 3	Canal Foot	HTL	HTL	HTL	Linked to 11.5 £17,631	£1,211	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of Canal Foot Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	Linked BCR = 12.93 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
11: 4	Glaxo Factory Site (south)	NAI	NAI	NAI	Linked to 11.5 £0	£0	<ul style="list-style-type: none"> NAI will result in naturally functioning coastline Impacts on eroding slag heap (potential for release of contaminants) 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	SMP2 policy is economically viable , depending on potential for release of contaminants
11: 5	Sandhall to Conishead Priory	HTL	MR	MR	Linked to 11.3 £17,631	£152	<ul style="list-style-type: none"> HTL protects Glaxo and Lower Ulverston with associated social and community benefits Knock-on benefits to 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	Linked BCR = 12.93 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy

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		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							local economy and jobs from protection of factory		more robust
11: 6	Conishead Priory to Bardsea	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI will result in naturally functioning coastline and avoid coastal squeeze 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	Natural frontage with only limited defences. SMP2 policy is economically viable as there are very few assets at risk
POLICY AREA: Leven Estuary (11c12)									
12: 1	Leven Viaduct to Haverthwaite (left bank) and Haverthwaite to Greenodd (right bank)	HTL	MR	NAI	£1,550	£1,149	<ul style="list-style-type: none"> May be knock-on impacts due to loss of farm businesses (as land is written-off) Retreating defence will maintain geological SSSI and provide additional natural habitat 	<ul style="list-style-type: none"> Potential for private defences (subject to consent) Costs of rail diversion may be underestimated 	BCR = 1.35 Current extensive defences are not economically justifiable in the long term due to a density of assets within the flood cell. Therefore, SMP2 policy is economically viable as allowing for realigning or withdrawing from sections of defence will provide the most cost effective solution.
12: 2	Greenodd to Barrow End Rocks (A590)	HTL	HTL	HTL	<£1	£1,983	<ul style="list-style-type: none"> HTL will protect main road (A590) with knock-on social and economic benefits Some negative environmental impacts due to coastal squeeze 	<ul style="list-style-type: none"> Damages to the main road have not been estimated in monetary terms 	BCR = 0 SMP2 policy is economically viable as the costs of diverting the road would be significantly more expensive than the costs of protection

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
12: 3	Barrow End Rocks (A590) to Leven Viaduct	HTL	MR	NAI	£1,043	£0	<ul style="list-style-type: none"> NAI will result in naturally functioning coastline and avoid coastal squeeze 	<ul style="list-style-type: none"> As a mostly natural frontage, HTL in epoch 1 allows time for investigations to identify impacts on rest of estuary and adjacent bay through maintenance of small lengths of defence (costs likely to be minimal). MR assumes a more sustainable defence alignment by retreating to higher land, or constructing set back defence where necessary, depending on investigations into approach (no costs included at this stage). Potential for private defences (subject to consent) 	Natural frontage with only limited defences. SMP2 policy is economically viable as there are few assets at risk
POLICY AREA: Bardsea to Piel Island (11c13)									
13: 1	Bardsea to Newbiggin	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI will result in naturally functioning coastline and avoid coastal squeeze 	<ul style="list-style-type: none"> Potential for private defences (subject to consent) 	Natural frontage with only limited defences. SMP2 policy is economically viable as there are few assets at risk

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SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
13: 2	Newbiggin to Rampside	HTL	MR	HTL	£5,035	£1,378	<ul style="list-style-type: none"> HTL provides social and economic benefits by protecting road (MR relocates road and provides additional benefits as the road is currently occasionally closed due to storm damage) Opportunities for environmental benefits from MR 	<ul style="list-style-type: none"> Road diversion damages may be under-estimated 	BCR = 3.65 Economic viability of the policy may depend on risks to the A5087 coast road and cost effectiveness of sustaining the current alignment.
13: 3	Rampside	NAI	HTL	HTL	£1,570	£738	<ul style="list-style-type: none"> Social benefits from protection of communities at Rampside Coastline remains natural until defences are required Environmental benefits from protection of freshwater grazing marsh 	<ul style="list-style-type: none"> Apparently natural frontage, time to requirement of defences may be uncertain 	BCR = 2.13 SMP2 policy is economically viable
13: 4	Roa Island	HTL	HTL	HTL	£3,225	£4,317	<ul style="list-style-type: none"> HTL protects saltmarsh and mudflat Social benefits from protection of community at Roa Island Safety benefits from protection of lifeboat station Economic and 	<ul style="list-style-type: none"> Potential for private defences (subject to consent) to be maintained 	BCR = 0.75 Economic viability of the policy may depend on additional social, safety (life boat and access), economic and recreation benefits. Additional benefits need to be £1.1 million to make BCR>1. The lifeboat station cost

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		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							recreation benefits from protection of navigation channel		£2.6 million (in 2000) and could cost more to relocate
13: 5	Piel Island	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI will result in naturally functioning coastline and avoid coastal squeeze 	<ul style="list-style-type: none"> Potential for private defences (subject to consent) to Piel Castle 	Natural frontage with only limited defences. SMP2 policy is economically viable as there are few assets at risk and Piel Castle can be defended as necessary
POLICY AREA: Walney Island (11c14)									
14: 1	South End Hawes to Biggar (east side)	NAI	NAI	NAI	Linked to 14.3 £0	£0	<ul style="list-style-type: none"> NAI will result in naturally functioning coastline with benefits to geological SSSI 	<ul style="list-style-type: none"> Potential for private defences (subject to consent) 	SMP2 policy is economically viable as there are few assets at risk, with environmental benefits
14: 2	Biggar to Lenny Hill (east side)	HTL	HTL	HTL	Linked to 14.5 £5,999	£2,012	<ul style="list-style-type: none"> HTL would protect Biggar, Trummer Hill and Vickerstown with associated social and community benefits Protection of jobs due to protection of businesses Potential negative environmental impacts from coastal squeeze 	<ul style="list-style-type: none"> Damages are shared with 14.5 frontage on the open coast Costs assume that the defences are sheltered such that reconstruction is not required 	Linked BCR = 2.45 SMP2 policy is economically viable due to social benefits, although the negative environmental impacts need to be taken into account
14: 3	South End Hawes to Hare Hill (open coast)	NAI	NAI	NAI	Linked to 14.1 £0	£0	<ul style="list-style-type: none"> NAI will result in naturally functioning coastline with benefits to geological SSSI 	<ul style="list-style-type: none"> Potential for private defences (subject to consent) 	SMP2 policy is economically viable as there are few assets at risk, with environmental benefits

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SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
14: 4	Hare Hill to Hillock Whins	HTL	HTL	HTL	£182	£6,574	<ul style="list-style-type: none"> HTL protects landfill site and reduces risk of contamination Social and community benefits from protection of Walney Island Benefits to flood risk management on mainland by maintaining integrity of Walney 	<ul style="list-style-type: none"> Extent of potential impacts from release of contaminants not known 	<p>BCR = 0.03</p> <p>Economic viability of the policy may depend on wider benefits to Barrow and avoidance of pollution or relocation of landfill costs. Social and community benefits will increase benefits further</p>
14: 5	Hillock Whins to Nanny point Scar	NAI	MR	MR	Linked to 14.2 £5,999	£0	<ul style="list-style-type: none"> NAI and MR will result in naturally functioning coastline 	<ul style="list-style-type: none"> Damages are shared with 14.2 frontage on the open coast Limited defences present, therefore in the short term, investigate possibility of withdrawing from maintenance and re-instate natural processes. MR assumes provision of set back flood defences if / when flood risk justifies (no costs included at this stage). 	<p>Linked BCR = 0.29</p> <p>It is not economically viable to defend the whole of this section. SMP2 policy is likely to be economically viable as allowing for realigning or withdrawing from sections of defence will provide the most cost effective solution.</p>
14: 6	Nanny Point Scar to Mill Scar	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI will result in naturally functioning coastline May be some negative environmental impacts 	<ul style="list-style-type: none"> Extent of potential impacts from release of contaminants not known 	<p>Natural frontage. SMP2 policy is economically viable as there are few assets at risk. Investigations may be</p>

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SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							from flooding or erosion		needed to ensure landfills do not cause pollution
14: 7	Mill Scar to north of West Shore Park	MR	MR	MR	£0	£437	<ul style="list-style-type: none"> Potential to restore natural functioning of coast, with benefits to beach levels (with recreation benefits) Negative impacts associated with relocation of static homes Recreation impacts from erosion of golf course land in longer-term Loss of access road (emergency access to airfield) 	<ul style="list-style-type: none"> Emergency access road to airfield would need to be replaced Cost of relocation of static homes 	Long term Hold the Line to the whole of the golf course and West Shore Park frontage is not economically viable. However, economic viability of policy may depend on environmental benefits and recreation benefits from improved beach levels. Investigations will be needed to address relocation issues
14: 8	North Walney - from north of West Shore Park to Lenny Hill (both coasts)	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI will result in naturally functioning coastline 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	Natural frontage. SMP2 policy is economically viable as there are few assets at risk
POLICY AREA: Walney Channel (Mainland) (11c15)									
15: 1	Rampside to Westfield Point	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI will result in naturally functioning coastline 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	Natural frontage. SMP2 policy is economically viable as there are few assets at risk
15: 2	Westfield Point to Hindpool (Barrow in Furness)	HTL	HTL	HTL	£130,609	£12,440	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	BCR = 10.50 SMP2 policy is economically viable based on monetised benefits alone. Additional

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SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							<ul style="list-style-type: none"> protecting integrity of Barrow in Furness • Protection of jobs due to protection of businesses, gas terminal, dockyards and power station • Avoids negative impacts from release of contaminants from industrial areas 		benefits make SMP2 policy more robust
15: 3	Hindpool to Lowsy Point	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> • NAI will result in naturally functioning coastline 	<ul style="list-style-type: none"> • No specific uncertainties that would affect economic viability 	Natural frontage. SMP2 policy is economically viable as there are few assets at risk
POLICY AREA: Duddon Estuary (11c16)									
16: 1	Lowsy Point to Askam Pier	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> • NAI will result in naturally functioning coastline 	<ul style="list-style-type: none"> • No specific uncertainties that would affect economic viability 	Natural frontage. SMP2 policy is economically viable as there are few assets at risk
16: 2	Askam-in-Furness (including Askam Pier)	HTL	HTL	HTL	£112	£172	<ul style="list-style-type: none"> • HTL maintains integrity of Askam with social and community benefits • Protects boat moorings behind pier • Protects open land used for recreation • Stabilises low water channel and intertidal habitats to north and south 	<ul style="list-style-type: none"> • Costs of policy may be over-estimated 	BCR = 0.65 Economic viability of the policy will depend on the inclusion of a more detailed assessment of wider benefits from environmental, recreation, social and community impacts. These need to be £60k to make BCR>1 (or less if the costs are over-estimated)

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SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
16:3	Askam to Dunnerholme	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI will result in naturally functioning coastline Opportunities for wetland habitat creation through MR or regulated tidal exchange 	<ul style="list-style-type: none"> Negative impacts on Natterjack toads from MR not known 	Natural frontage. SMP2 policy is economically viable as there are few assets at risk. Impacts on Natterjack toads will require further investigation
16:4	Dunnerholme to Sand Side	HTL	HTL	HTL	£4,099	£1,590	<ul style="list-style-type: none"> Knock-on social, recreation/tourism and economic benefits from protection of railway (railway line around the Lake District) 	<ul style="list-style-type: none"> Railway diversion damages may be under-estimated 	BCR = 2.58 SMP2 policy is economically viable but justification is based almost solely on railway
16:5	Kirkby-in-Furness	HTL	HTL	HTL	£4,609	£2,522	<ul style="list-style-type: none"> Knock-on social, recreation/tourism and economic benefits from protection of railway (railway line around the Lake District) 	<ul style="list-style-type: none"> Railway diversion damages may be under-estimated 	BCR = 1.83 SMP2 policy is economically viable but justification is based almost solely on railway (erosion protection would be required to properties in absence of railway)
16:6	Herdhouse Moss	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI will result in naturally functioning coastline 	<ul style="list-style-type: none"> Potential for private defences (subject to consent) 	Natural frontage, no formal defences present. SMP2 policy is economically viable as there are few assets at risk
16:7	Galloper Pool to Viaduct	HTL	HTL	HTL	£615	£1,076	<ul style="list-style-type: none"> Knock-on social, recreation/tourism and economic benefits from protection of railway (railway line around the Lake 	<ul style="list-style-type: none"> Railway diversion damages may be under-estimated 	BCR = 0.57 Economic viability of the policy may depend on the inclusion of benefits relating to the railway line and road. (erosion

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							<ul style="list-style-type: none"> District) May also be impacts on the A595 main coast road (not included in economic damages) 		protection would be required to properties in absence of railway)
16: 8	Duddon Estuary (Both banks upstream of Viaduct and right bank south to Green Rd Station)	Draft consultation policies			£0	£636	<ul style="list-style-type: none"> May be knock-on impacts due to loss of farm businesses (as land is written-off) Policy helps to protect landscape and wildlife value of National Park 	<ul style="list-style-type: none"> Economic damages assume that action is taken to reduce flood risk to A595 	BCR = 0 Economic viability of the policy may depend on potential disruption from flooding of the main road (this needs further investigation to show it is economically worthwhile) and tourism/recreation benefits
		MR	MR	MR					
		Final policies			As above	As above	<ul style="list-style-type: none"> As above 	<ul style="list-style-type: none"> As above 	There is insufficient economic justification to maintain existing shoreline defences due to a lack of assets at flood risk. Importance of road indicates that managed realignment or raising of road is potentially economically viable
		HTL	MR	MR					
16: 9	Millom Marshes	HTL	MR	MR	£2,281	£3,042	<ul style="list-style-type: none"> Knock-on social, recreation/tourism and economic benefits from protection of railway (railway line around the Lake District) 	<ul style="list-style-type: none"> Railway diversion damages may be under-estimated 	BCR = 0.75 Economic viability of the policy depends largely on benefits provided by the railway. Impacts of MR on wider estuary need to be investigated, positive and

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SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							<ul style="list-style-type: none"> MR results in shorter defence line and helps to result in naturally functioning coast HTL constrains natural habitat creation and may have negative environmental impacts (reduced by MR) 		negative environmental benefits not assessed at this stage.
16:10	Red Hills (Industrial area)	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI will result in naturally functioning coastline Value of disused quay and derelict site 	<ul style="list-style-type: none"> Potential for private defences (subject to consent) 	Natural frontage, no formal defences present. SMP2 policy is economically viable as there are no assets at risk
16:11	Hodbarrow Mains	NAI	MR	HTL	Linked to 16.12 £16,187	£209	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of Millom Protection of jobs due to protection of businesses Avoids negative impacts from release of contaminants from industrial areas 	<ul style="list-style-type: none"> Assumes construction of defences would not be justified until medium term when risks increase due to sea level rise 	Linked BCR = 63.50 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust

H4.4 Table 6: Economic summary table for Sub-Cell 11d Hodbarrow Point to St Bees Head

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
POLICY AREA: Haverigg to Selker (11d1)									
I:1	Hodbarrow Nature Reserve & Lagoon	HTL	MR	HTL	Linked to 16.11 £16,187	£46	<ul style="list-style-type: none"> Protects properties in Haverigg with associated social and community benefits 	<ul style="list-style-type: none"> Potential for private defences (subject to consent) HTL in epoch 1 allows time for investigations to assess amenity and environmental value of lagoon 	Linked BCR = 63.50 SMP2 policy is economically viable but investigations are required to determine best way of managing the defences
I:2	Haverigg	HTL	HTL	HTL	£12,432	£578	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of Haverigg Protection of jobs due to protection of businesses Protection of landfill, reducing risk of contamination Protection to nature 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	Linked BCR = 21.50 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust

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SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							reserve		
I:3	Haverigg to Hartrees Hill	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI would result in naturally functioning coastline 	<ul style="list-style-type: none"> Privately funded defences could be constructed (as required), subject to consent 	Natural frontage, no formal defences currently present SMP2 policy is economically viable as there are very few assets at risk
I:4	Silecroft (Hartrees Hill)	Draft consultation policies			£0	£0	<ul style="list-style-type: none"> Need to relocate car parks and beach accesses to avoid negative impacts on recreation NAI would result in naturally functioning coastline 	<ul style="list-style-type: none"> Privately funded defences could be maintained and/or constructed (as required), subject to consent Existing defences unsustainable as they would become outflanked 	SMP2 policy is economically viable . Damages under NAI are £23,700 PV, and HTL policy would have a BCR of 0.05 so not viable. Costs of relocation of car parks and beach accesses would need to be justified by recreation benefits
		NAI	NAI	NAI					
		Final policies					<ul style="list-style-type: none"> As above 	<ul style="list-style-type: none"> As above 	Insufficient economic justification for public funding of defences. However, provision of private funding of defences is expected to continue.
		HTL (private funding agreement)	HTL (private funding agreement)	HTL (private funding agreement)	As above	As above			
I:5	Hartrees Hill to Selker	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI supports geological SSSI 	<ul style="list-style-type: none"> Relocation of road accesses/tracks needed to avoid negative social and community impacts 	SMP2 policy is economically viable but costs of relocation of access tracks would need to be compared with social

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SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
									impacts
POLICY AREA: Selker to Eskmeals (1 d2)									
2:1	Selker to Stubb Place	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI would result in naturally functioning coastline 	<ul style="list-style-type: none"> Road may need to be relocated to avoid negative social and community impacts Privately funded defences could be constructed (as required), subject to consent 	SMP2 policy is economically viable but costs of relocation of road would need to be compared with social impacts
2:2	Stubb Place and Eskmeals Dunes	Draft consultation policies			£0	£0	<ul style="list-style-type: none"> NAI would result in naturally functioning coastline 	<ul style="list-style-type: none"> Road and Eskmeals range may need to be relocated to avoid negative impacts for MoD 	Natural frontage, no formal defences currently present. SMP2 policy is economically viable but costs of relocating range need to be investigated
		NAI	NAI	NAI					
		Final policies			As above	As above	<ul style="list-style-type: none"> MR would result in a more naturally functioning coastline 	<ul style="list-style-type: none"> MR assumes a continuation of natural coastal evolution and roll-back of dunes with localised limited intervention to manage risk to assets and beach management (costs minimal). Road and Eskmeals range may need to be relocated to avoid negative impacts for 	Insufficient economic justification for public funding of defences at Stubb Place. However, provision to private funding of defences / management practices is expected to continue. Dunes not formally defended at present; and not considered economically viable to construct new defences in dune system.
		MR	MR	MR					

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SMP2 Policy Unit	SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy	
	Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy				
POLICY AREA: Ravenglass Estuary Complex (I Id3)									
3:1	Eskmeals Dunes to Ravenglass including River Esk to Muncaster Bridge SMP2 boundary	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> • NAI supports internationally and nationally designated sites 	<ul style="list-style-type: none"> • There will be a need for maintenance of railway viaduct and mainline railway • There may be a future need to raise the road bridge at Muncaster 	SMP2 policy is economically viable but maintenance costs for railway and costs of raising road need to be investigated
3:2	Ravenglass	HTL	HTL	HTL	£1,626	£862	<ul style="list-style-type: none"> • HTL maintains integrity of Ravenglass with associated social and community benefits, plus tourism and recreation benefits 	<ul style="list-style-type: none"> • No specific uncertainties that would affect economic viability 	BCR = 1.89 SMP2 policy is economically viable and additional social, community, recreation and tourism benefits will increase the BCR
3:3	Ravenglass to Drigg Point including River Mite to Muncaster Mill and River Irt to Drigg Holme	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> • Knock-on impacts to farm businesses due to loss of agricultural land • Environmental benefits to be gained through NAI allowing a naturally functioning coastline 	<ul style="list-style-type: none"> • Local defences may be needed for the Ravenglass and Eskdale railway line in the long-term • Extent of protection needed for mainline railway and viaduct 	SMP2 policy is economically viable . but anticipated damages of £1.2 million under NAI, as well as need for work on railway, suggest that further investigation is needed
POLICY AREA: Drigg Point to Seascale (I Id4)									
4:1	Drigg Point to Seascale	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> • Benefits of NAI for Drigg Dunes and Gullery Nature Reserve 	<ul style="list-style-type: none"> • None identified 	Natural frontage. SMP2 policy is economically viable as there are very few assets at risk

**North West England and North Wales SMP2
Appendix H – Economics and Sensitivity Testing**

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
POLICY AREA: Seascale to St Bees (11d5)									
5:1	Seascale	HTL	HTL	HTL	£2,661	£1,140	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting the integrity of Seascale Protection of jobs due to protection of businesses Protection of railway line has knock-on impacts for functionality of Sellafield to the north 	<ul style="list-style-type: none"> Extent to which impacts on Seascale could affect viability of Sellafield 	<p>BCR = 2.33 SMP2 policy is economically viable. With the addition of social and community benefits, as well as knock-on impacts relating to the rail link to Sellafield, the BCR would likely increase</p>
5:2	Seascale to Sellafield	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> Costs of maintaining or relocating railway Knock-on impacts of damages of £200k to relocate railway 	<ul style="list-style-type: none"> Costs of relocating railway may be underestimated 	<p>SMP2 policy is economically viable, but further investigation may be required to determine the potential costs of relocating the railway (since this may be affected by NAI)</p>
5:3	Sellafield	HTL	HTL	HTL	£0	£1,323	<ul style="list-style-type: none"> HTL protects Sellafield nuclear site 	<ul style="list-style-type: none"> Benefits from protection of Sellafield likely to be significant given that site reprocesses nuclear waste from around the world 	<p>BCR = 0 SMP2 Policy likely to be economically viable since damages to nuclear power station need to be £1.3 million to make BCR = 1. Impacts are likely to be significantly greater than this</p>
5:4	Sellafield to Braystones	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> Impacts on railway Potential impacts on 	<ul style="list-style-type: none"> Cost of rebuilding/ rerouting the railway 	<p>SMP2 policy is economically viable.</p>

**North West England and North Wales SMP2
Appendix H – Economics and Sensitivity Testing**

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							sewage works	<ul style="list-style-type: none"> Potential for impacts to sewage works – may require relocation 	There are considerable damages under NAI of £1.18 million. In addition, damages to railway are likely to increase this figure. Therefore policy allows for works to be undertaken if the railway becomes at risk, but costs and benefits are not calculated at this stage
5:5	Braystones, Nethertown and Coulderton	Draft consultation policies			£0	£0	<ul style="list-style-type: none"> Importance of railway for functionality of Sellafield nuclear site 	<ul style="list-style-type: none"> Cost and benefits of relocating railway Epoch when property is at risk 	SMP2 policy is economically viable but assumes that the railway would be relocated should it be affected
		NAI	NAI	NAI					
		Final policies			As above	As above	<ul style="list-style-type: none"> As above 	<ul style="list-style-type: none"> MR in the short term assumes monitoring of flood and erosion risk to railway, and only carry out works if the railway is at risk (no costs included) Cost and benefits of relocating railway Epoch when property is at risk 	Insufficient justification for intervention until railway is at risk, when viability would depend on overall case for railway. Insufficient economic justification to defend properties built on the beach.
		MR	NAI	NAI					
5:6	Coulderton to Seamill	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> HTL protects the railway with knock-on social and economic benefits 	<ul style="list-style-type: none"> Cost of relocating railway Epoch when property is at risk 	SMP2 policy is economically viable but assumes that the railway would be relocated should it be affected
5:7	Seamill to Pow Beck	HTL	HTL	HTL	£37	£2,747	<ul style="list-style-type: none"> HTL protects the railway with knock-on social and economic 	<ul style="list-style-type: none"> Costs of relocating railway may be underestimated 	BCR = 0.01 Economic viability of policy may depend on overall case

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Appendix H – Economics and Sensitivity Testing**

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							<ul style="list-style-type: none"> benefits Properties at Seamill, seaward of railway 		for the railway. Knock-on benefits of retaining railway need to be at least £2.7 million to make BCR>1. SMP2 policy approach is therefore: Maintain / upgrade railway defences as required (no active intervention if railway no longer operational)
POLICY AREA: St Bees (11d6)									
6:1	Pow Beck to St Bees Promenade	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI would result in naturally functioning coastline 	<ul style="list-style-type: none"> None identified 	Natural frontage. SMP2 policy is economically viable as there are very few assets at risk
6:2	St Bees Promenade	HTL	HTL	MR	£8	£249	<ul style="list-style-type: none"> Potential negative environmental impacts on geological SSSI at St Bees promenade Changes in tourism/ recreation as a result of negative impacts on beach 	<ul style="list-style-type: none"> Extent of tourism impacts (could be significant since St Bees has at least two camping/caravan sites near to the coast, so beach is likely to be a significant attraction. Also have the Cumbria Coastal Way). Beach recharge could be used to minimise tourism impacts 	BCR = 0.04 Economic viability of the policy may depend on benefits from tourism, amenity value of the beach and recreation. Benefits would need to be £250k to make BCR > 1, but dis-benefits to environmental site would also need to be included
POLICY AREA: St Bees Head (11d7)									
7:1	St Bees Head	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> Extent of knock-on impacts to farm businesses which have 	<ul style="list-style-type: none"> None identified 	Natural frontage. SMP2 policy is economically viable since NAI damages

**North West England and North Wales SMP2
Appendix H – Economics and Sensitivity Testing**

SMP2 Policy Unit	SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
	Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
						lost land		are just £9k, which supports policy of 'no justification for intervention'

H4.5 Table 7: Economic summary table for Sub-Cell 11e St Bees Head to the Scottish Border

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
POLICY AREA: St Bees to Whitehaven (11e1)									
1:1	St Bees Head to Saltom Pit	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> Benefits to geological SSSI from continued erosion 	<ul style="list-style-type: none"> None identified 	Natural frontage. SMP2 policy is economically viable as there are few assets at risk
1:2	Saltom Pit	HTL	HTL	NAI	£3	£39	<ul style="list-style-type: none"> HTL protects Saltom Pit (Scheduled Monument) which has been restored with English Heritage and European Union funding. There was considerable community support and involvement in the project which forms part of a scheme to regenerate the coast of Whitehaven at a cost of £175,000 Recreation benefits from protection of Cumbria Coastal Way (but could be relocated) 	<ul style="list-style-type: none"> Economic damages from loss of Saltom Pit not known, but likely to be significant 	BCR = 0.08 Economic viability of the policy in the short and medium terms may depend on amenity / heritage benefits of the Scheduled Monument. Damages from loss of Saltom Pit need to be at least £36k to make the BCR>1. Given the interest in the site, community action following the Local Authority's decision to abandon the site and the funds spent on restoring the site, the benefits may be considerably greater
1:3	Saltom Pit to Whitehaven	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI maintains naturally functioning coastline 	<ul style="list-style-type: none"> None identified 	Natural frontage. SMP2 policy is economically viable as there are few

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
									assets at risk
1: 4	Whitehaven South Beach	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> • NAI would result in naturally functioning coastline • Negative impacts in terms of loss of recreational space 	<ul style="list-style-type: none"> • None identified 	Natural frontage. SMP2 policy is economically viable as there are few assets at risk
POLICY AREA: Whitehaven to Workington (1 e2)									
2: 1	Whitehaven Harbour and north beach	HTL	HTL	HTL	£6,215	£6,055	<ul style="list-style-type: none"> • HTL maintains integrity of town and port, and protects Scheduled Monuments • Knock-on benefits of HTL for tourism industry due to protection afforded to marina and its surroundings 	<ul style="list-style-type: none"> • Value attached to social, tourism/ recreation and heritage benefits 	<p>BCR = 1.03</p> <p>Economic viability of the policy may depend on additional social, tourism/recreation and heritage benefits to make BCR more robust >1</p>
2: 2	Bransty to Parton	HTL	HTL	HTL	£586	£4,630	<ul style="list-style-type: none"> • Importance of railway (although diversion costs are included in the economic damages) • Potential impacts on tourism and recreation due to temporary loss of Cumbria Coastal Way (since path will require rerouting) 	<ul style="list-style-type: none"> • Cost of realigning the railway may be underestimated • Costs of relocating Cumbria Coastal Way (likely to be small) 	<p>BCR = 0.13</p> <p>Rail diversion is included in the damages; however, economic viability of the policy may depend on more detailed assessments of costs of rerouting or defending the railway on the current alignment. Damages would have to be £4.2 million to make BCR>1</p>

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
2: 3	Parton	HTL	HTL	HTL	£1,063	£1,305	<ul style="list-style-type: none"> • Damages to railway line and station – likely to have knock-on impacts for Whitehaven and Workington, as well as local effects in Parton • Potential impacts on heritage assets, e.g. Roman Fort 	<ul style="list-style-type: none"> • Value of damages to actual railway line in addition to knock-on impacts • Extent of damage to heritage asset. 	<p style="text-align: center;">BCR = 0.81</p> <p>Economic viability of the policy may depend on benefits from the railway and heritage assets. These benefits need to be at least £250k to make the BCR>1</p>
2: 4	Parton to Harrington Parks	HTL	HTL	HTL	£1,617	£9,509	<ul style="list-style-type: none"> • HTL protects railway and railway line, providing knock-on social and economic benefits • Protects access to wind turbines 	<ul style="list-style-type: none"> • Cost of realigning the railway may be underestimated • Cost of providing alternative access to windfarms (note: Lowca windfarm generates 4.62MW) 	<p style="text-align: center;">BCR = 0.17</p> <p>Economic viability of the policy may depend on more detailed assessments of costs of rerouting or defending railway on its current alignment. Damages and access arrangements to the windfarm need to be £7.9 million to make BCR>1. This requires further investigation</p>
2: 5	Harrington Parks to Harrington Harbour	HTL	NAI	NAI	£3.5	£131	<ul style="list-style-type: none"> • Social and community benefits associated with protecting integrity of settlement • Amenity benefits of marina not included • Impact of outfall loss needs to be investigated in short-term 	<ul style="list-style-type: none"> • No specific uncertainties that would affect economic viability 	<p style="text-align: center;">BCR = 0.03</p> <p>Economic viability of the policy may depend on Harrington Harbour and local amenity benefits. Insufficient justification for long term defences unless land is contaminated.</p>

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
2: 6	Harrington Harbour	HTL	HTL	HTL	£2,851	£2,541	<ul style="list-style-type: none"> Benefits associated with recreational value of harbour 	<ul style="list-style-type: none"> Extent of benefits associated with recreational (and tourism) use of harbour 	<p>BCR = 1.12</p> <p>Economic viability of policy may depend on additional non-quantified commercial / amenity benefits of harbour use.</p>
2: 7	Harrington to Steel Works Site	HTL	HTL	HTL	£661	£838	<ul style="list-style-type: none"> Knock-on benefits to economy, investment and employment associated with the railway 	<ul style="list-style-type: none"> Extent of knock-on impacts from railway 	<p>BCR = 0.79</p> <p>Economic viability of policy may depend on more detailed assessments of costs of rerouting or defending the railway on its current alignment. Knock-on benefits to economy, investment and employment associated with railway may also increase the BCR.</p>
2: 8	Steel Works Site	HTL	HTL	HTL	£0	£829	<ul style="list-style-type: none"> HTL protects integrity of settlement with associated social and community benefits Reduces risk of damages from release of contaminants from old steel works site 	<ul style="list-style-type: none"> Costs of remediating contamination not included in NAI damages 	<p>BCR = 0</p> <p>Economic viability of the policy depends on the redevelopment of the site and likely extent of remediation costs for contaminated land. Benefits need to be at least £829k to make BCR>1. Policy assumes developer contributions / private funding.</p>
2: 9	Steel Works to The Howe	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI would result in naturally functioning coastline 	<ul style="list-style-type: none"> None identified 	<p>Natural frontage. SMP2 policy is economically viable as there are few assets at risk</p>

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
2: 10	The Howe to Workington Harbour south breakwater	MR	MR	MR	£0	£269	<ul style="list-style-type: none"> Allows erosion to occur (but intervention would be required to protect town and/or prevent erosion of contaminated land) 	<ul style="list-style-type: none"> Extent of contamination unknown Potential for future damages to town not known 	<p>BCR = 0</p> <p>Insufficient economic justification for maintaining defences on current shoreline position. Economic viability of policy may depend on benefits due to contamination and/or flooding of town. Benefits would need to be greater than £269k</p>
2: 11	Workington Harbour	HTL	HTL	HTL	£33,149	£6,488	<ul style="list-style-type: none"> Benefits to the community by protecting integrity of settlement (with knock-on benefits for the tourism industry) Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	<p>BCR = 5.11</p> <p>SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust</p>
POLICY AREA: Workington to Maryport (11e3)									
3: 1	Workington Harbour to Siddick	HTL	MR	MR	£0	£1,195	<ul style="list-style-type: none"> Cost of remediation of contaminated land (but could be protected if required under realignment) Loss of windfarm (with generation capacity of 4.2MW) 	<ul style="list-style-type: none"> Extent of costs of remediating contaminated land Impacts resulting from loss of windfarm (most turbines are within the 100 year erosion line or the floodzone) 	<p>BCR = 0</p> <p>Economic viability of the policy may depend on benefits from the railway and wind farm. HTL proposed to give time to investigate contamination issues and protect residual life of windfarms. Potential contamination and wind farm damages need to be at</p>

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
									least £1.2 million for BCR>1
3: 2	Siddick to Risehow	HTL	HTL	HTL	£15,264	£1,587	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the community by protecting integrity of settlement, including coast road (A596) Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	BCR = 9.62 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust
3: 3	Risehow to Maryport Marina	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI would result in naturally functioning coastline 	<ul style="list-style-type: none"> None identified 	SMP2 policy is economically viable as there are few assets at risk
3: 4	Maryport Harbour / Marina	HTL	HTL	HTL	£6,496	£8,986	<ul style="list-style-type: none"> Social benefits of maintaining integrity of Maryport Benefits associated with protecting Scheduled Monuments/ heritage assets in the harbour area 	<ul style="list-style-type: none"> Extent of benefits to the town, its harbour and economy are not known 	BCR = 0.72 Economic viability of the policy may depend on the commercial and amenity use of the harbour and surrounding area and heritage benefits. Additional social, heritage and commercial benefits need to be at least £2.5 million to make the BCR>1
POLICY AREA: Maryport to Dubmill Point (1 e4)									

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
4: 1	Maryport Harbour to Roman Fort	HTL	HTL	HTL	£36	£1,671	<ul style="list-style-type: none"> Heritage and tourism benefits from protection of Roman Fort and Hadrian's Wall World Heritage Site Social/recreation and tourism benefits from protecting Cumbria Coastal Way and Allerdale Ramble (but these could be relocated) 	<ul style="list-style-type: none"> Heritage and recreation benefits resulting from World Heritage Site to this unit not known 	<p>BCR = 0.02</p> <p>Economic viability of the policy may depend on the inclusion of environmental / heritage / amenity / tourism benefits. Justification based on protection of Hadrian's Wall World Heritage Site (WHS) and Scheduled Monuments (heritage and recreation benefits). These need to be at least £1.6 million to make BCR>1. World Heritage Site should provide sufficient benefits to justify for this unit (over 100 years need £57,000 benefits per year)</p>
4: 2	Roman Fort to bank End (Maryport Promenade)	HTL	NAI	NAI	£181	£259	<ul style="list-style-type: none"> Heritage and tourism benefits from protection of Roman Fort and Hadrian's Wall World Heritage Site 	<ul style="list-style-type: none"> Heritage and recreation benefits resulting from World Heritage Site to this unit not known 	<p>BCR = 0.70 for HTL in epoch 1. Economic viability of short term policy may depend on environmental / heritage / amenity benefits. Benefits need to be at least £78k to make BCR>1. These are very small additional benefits so should be appropriate (benefits of Hadrian's Wall WHS may need to be estimated and applied to individual cells)</p>

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
4: 3	Maryport Golf Course to Allonby	Draft consultation policies			£0	£0	<ul style="list-style-type: none"> • NAI would result in naturally functioning coastline • Local impacts on coast road (B5300) • Loss of saltpans and associated heritage • Loss of footpaths (but these could be relocated) 	<ul style="list-style-type: none"> • Extent of impacts on golf course • Heritage value of saltpans • Local impacts on coast road (but unlikely to be felt at national level) 	<p>SMP2 policy of NAI is economically viable. Other (non-monetised damages) need to be at least £2.7 million to make BCR of alternative policy > 1. This may merit further investigation</p>
		NAI	NAI	NAI					
4: 3	Maryport Golf Course to Allonby	Final policies			As above	As above	<ul style="list-style-type: none"> • MR would result in a more naturally functioning coastline • Local impacts on coast road (B5300) • Loss of saltpans and associated heritage • Loss of footpaths (but these could be relocated) 	<ul style="list-style-type: none"> • MR assumes a return to a more natural shoreline where practicable. MR would allow for local limited intervention at Heritage assets if required (no costs included at this stage) • Extent of impacts on golf course • Heritage value of saltpans • Local impacts on coast road (but unlikely to be felt at national level) 	<p>The economic viability of the policy may depend on heritage / amenity and infrastructure benefits.</p>
		MR	MR	MR					
4: 4	Allonby	HTL	HTL	HTL	£120	£1,078	<ul style="list-style-type: none"> • Social benefits from maintaining integrity of Allonby 	<ul style="list-style-type: none"> • Defences may not be required under medium-term (costs may be over-estimated) 	<p>BCR = 0.11</p> <p>Intervention with defences not anticipated until medium term epoch, small scale scheme difficult to assess at this stage, Economic viability of the policy may depend on local</p>

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
									Allonby properties and infrastructure benefits. These benefits need to be at least £960k to make BCR>1
4: 5	Allonby to Seacroft Farm	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI would result in naturally functioning coastline 	<ul style="list-style-type: none"> None identified 	Natural frontage. SMP2 policy is economically viable . Damages of just £12k (all from erosion of agricultural land) under NAI support policy of ‘no justification for intervention’
4: 6	Seacroft Farm to Dubmill Point	HTL	NAI	NAI	£2	£6,228	<ul style="list-style-type: none"> Social and potential economic impacts on coast road linking Silloth to Allonby under NAI (road would need to be diverted to avoid impacts) 	<ul style="list-style-type: none"> Extent of impacts on coast road (but local/regional rather than national) 	SMP2 policy is economically viable as there are few assets at risk. However, MR could be better than NAI since this would allow road to be diverted. Costs of relocating the road need to be investigated
POLICY AREA: Dubmill Point to Silloth (1 to 5)									
5: 1	Dubmill Point to Silloth	Draft consultation policies			£0	£0	<ul style="list-style-type: none"> NAI would result in naturally functioning coastline 	<ul style="list-style-type: none"> Risk that NAI could cause damages to properties – private defences may be required 	SMP2 policy is economically viable as there are few assets at risk. Risk to properties in longer term needs to be investigated
		NAI	NAI	NAI					

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
		Final policies			As above	As above	<ul style="list-style-type: none"> MR would result in a more naturally functioning coastline 	<ul style="list-style-type: none"> MR assumed to allow continued natural coastal evolution with localised limited intervention to manage risk to assets whilst adaptation is considered (no costs included at this stage). Risk that MR could cause damages to properties dependent on alignment 	<p>Limited assets at risk of flooding or erosion, so likely to be insufficient economic justification for National expenditure on defences. However, policy allows for provision to private funding of defences if required.</p>
		MR	MR	MR					
POLICY AREA: Silloth to The Grune (1 e6)									
6: 1	Silloth Harbour	HTL	HTL	HTL	£226	£3,441	<ul style="list-style-type: none"> Social benefits – maintaining the integrity of Silloth Protects Silloth Harbour with associated economic benefits Negative impacts on environmental sites likely to result from HTL 	<ul style="list-style-type: none"> Impact on environment – HTL has a potential detrimental effect on SPA/Ramsar site Extent of social benefits 	<p>BCR = 0.07</p> <p>Economic viability of the policy depends on social and commercial harbour benefits. Social and harbour benefits need to be at least £3.2 million to give BCR = 1. Environmental dis-benefits mean social/harbour benefits will need to be greater</p>
6: 2	Silloth to Skinburness (open coast)	HTL	HTL	HTL	£1,107	£11,612	<ul style="list-style-type: none"> HTL maintains integrity of coastal settlements with associated social and economic benefits Protects caravan parks and amenities with recreation and tourism 	<ul style="list-style-type: none"> Extent of social impacts – social interactions between/within settlements are not known Extent that HTL would impact on internationally 	<p>BCR = 0.10</p> <p>Economic viability of the policy may depend on social and recreation benefits compared to environmental dis-benefits related to coastal processes and / or a potential breach. Additional</p>

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							<ul style="list-style-type: none"> benefits Positive impacts of avoiding breach through to inland flood area and related changes to intertidal habitats Negative impacts of HTL on internationally designated site 	<ul style="list-style-type: none"> designated site not known Links to Moricambe Bay flood area behind Grune – needs to be considered with PUIIe 7.1 & 7.2 	benefits would need to be at least £10.5 million to make BCR>1
6: 3	The Grune	NAI	NAI	NAI	£0	£0	<ul style="list-style-type: none"> NAI would result in naturally functioning coastline May be knock-on impacts due to loss of farm businesses (as land is written-off) 	<ul style="list-style-type: none"> Linkages between The Grune and adjacent internationally designated site not known 	SMP2 policy is economically viable . Investigations needed to ensure NAI does not result in negative environmental impacts
POLICY AREA: Morricambe Bay (Ile7)									
7: 1	Skinburness (east)	HTL	HTL	HTL	£495	£219	<ul style="list-style-type: none"> Social benefits associated with protection of residential and commercial properties 	<ul style="list-style-type: none"> Extent of social benefits resulting from protection of residential and commercial properties 	BCR = 2.26 Economic viability of policy may depend on the inclusion of additional benefits assessed as part of the strategy study for the wider area. Knock-on benefits from protection of residential and commercial properties are likely to increase BCR
7: 2	Skinburness to Wath Farm	HTL	MR	HTL	£7,976	£1,686	<ul style="list-style-type: none"> Social benefits associated with protection of homes Benefits to the 	<ul style="list-style-type: none"> No specific uncertainties that would affect economic viability 	BCR = 4.73 SMP2 policy is economically viable based on monetised benefits

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							<ul style="list-style-type: none"> community by protecting integrity of settlement Protection of jobs due to protection of businesses, e.g. camping and caravan sites 		alone. Additional benefits make SMP2 policy more robust
7: 3	Wath Farm to Saltcoates including Waver to Brownrigg	Draft consultation policies			£0	£0	<ul style="list-style-type: none"> NAI would result in naturally functioning coastline and allows roll-back of saltmarsh with benefits for internationally designated site May be knock-on impacts due to loss of farm businesses (as land is written-off) 	<ul style="list-style-type: none"> None identified 	<p>SMP2 policy is economically viable. Under NAI, damages of just £234k (mainly from agricultural land) supports policy of ‘no justification for intervention’</p>
		NAI	NAI	NAI					
		Final policies			As above	As above	<ul style="list-style-type: none"> MR would result in a more naturally functioning coastline and allows roll-back of saltmarsh with benefits for internationally designated site May be knock-on impacts due to loss of farm businesses (as land is written-off) 	<ul style="list-style-type: none"> Saltmarsh will continue to provide natural flood defence. MR allows measures to proactively adapt to future coastal changes (no costs included at this stage). 	<p>Insufficient economic justification for public funding of defences. However, policy allows for provision for private funding of defences if required.</p>
		MR	MR	MR					
		Draft consultation policies			£0	£0	<ul style="list-style-type: none"> NAI would result in naturally functioning coastline and allows roll-back of saltmarsh 	<ul style="list-style-type: none"> Whether villages are at risk – extent of any economic damages including potential for 	Natural frontage. SMP2 policy is economically viable , but there may be impacts on the villages

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
7: 4	Newton Marsh	NAI	NAI	NAI			<ul style="list-style-type: none"> with benefits for internationally designated site Potential flooding of the villages with associated negative social impacts 	realignment (local defences) in medium to long-term	which require consideration
		Final policies			As above	As above	<ul style="list-style-type: none"> MR would result in naturally functioning coastline and allows roll-back of saltmarsh with benefits for internationally designated site Potential flooding of the villages with associated negative social impacts 	<ul style="list-style-type: none"> Saltmarsh will continue to provide natural flood defence. MR allows measures to proactively adapt to future coastal changes (no costs included at this stage). Also potential for local private managed realignment of flood defences. Whether villages are at risk – extent of any economic damages including potential for realignment (local defences) 	Insufficient economic justification for public funding of defences. However, policy allows for provision for private funding of defences if required.
7: 5	Newton Marsh to Anthorn including Wampool to NTL	Draft consultation policies					£0	£0	<ul style="list-style-type: none"> NAI would result in naturally functioning coastline and allows roll-back of saltmarsh with benefits for internationally designated site
		NAI	NAI	NAI					

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
								impacts may extent to other units, e.g. if access road is affected	
		Final policies			As above	As above	<ul style="list-style-type: none"> MR would result in naturally functioning coastline and allows roll-back of saltmarsh with benefits for internationally designated site 	<ul style="list-style-type: none"> Saltmarsh will continue to provide natural flood defence. MR allows measures to proactively adapt to future coastal changes (no costs included at this stage). Whether villages are at risk – extent of any economic damages including potential for realignment (local defences) Extent of impacts at local level – these impacts may extent to other units, e.g. if access road is affected 	<p>Insufficient economic justification for public funding of defences. However, policy allows for provision for private funding of defences if required.</p>
		MR	MR	MR					
7:6	Anthorn	HTL	HTL	HTL	£134	£345	<ul style="list-style-type: none"> HTL protects integrity of Anthorn with associated social, recreation and amenity benefits Protects access to transmitting station (used to transmit the 'time' signal since 2007) Potential negative impacts on 	<ul style="list-style-type: none"> Extent of impact on Anthorn as a community Impacts on designated site Extent of any recreational benefits Potential impacts on access to Anthorn Transmitting Station 	<p>BCR = 0.39</p> <p>Economic viability of policy may depend on inclusion of social and infrastructure benefits not included in this assessment. Benefits would have to be worth £211k (or more if damages to habitats are taken into account). Recreation and amenity benefits could also increase</p>

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							internationally designated site		the BCR
7: 7	Anthorn to Cardurnock	Draft consultation policies			£0	£0	<ul style="list-style-type: none"> NAI would result in naturally functioning coastline with benefits for internationally designated site 	<ul style="list-style-type: none"> May be need for intervention in future if Solway Moss SAC is at risk 	Natural frontage. SMP2 policy is economically viable as there are few assets at risk
		NAI	NAI	NAI					
		Final policies			As above	As above	<ul style="list-style-type: none"> MR would result in a more naturally functioning coastline with benefits for internationally designated site 	<ul style="list-style-type: none"> MR allows measures to proactively adapt to future coastal changes (no costs included at this stage) May be need for intervention in future if Solway Moss SAC is at risk 	Insufficient economic justification for public funding of defences. However, policy allows for provision for private funding of defences if required.
		MR	MR	MR					
POLICY AREA: Cardurnock to Scottish Border (1 e8)									
8: 1	Cardurnock to Bowness-on-Solway	Draft consultation policies			£0	£0	<ul style="list-style-type: none"> Knock-on impacts to farm businesses 	<ul style="list-style-type: none"> Extent of knock-on impacts to farm businesses 	SMP2 policy is economically viable . NAI with damages of just £51k (mainly from agricultural land) supports policy of 'no justification for intervention' (MR could help to reduce damages)
		NAI	NAI	NAI					

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SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
		Final policies			As above	As above	<ul style="list-style-type: none"> Knock-on impacts to farm businesses 	<ul style="list-style-type: none"> MR allows measures to proactively adapt to future coastal changes (no costs included at this stage) Extent of knock-on impacts to farm businesses 	Insufficient economic justification for public funding of defences. However, policy allows for provision for private funding of defences if required.
		MR	MR	MR					
8: Bowness-on-Solway		Draft consultation policies			£0	£0	<ul style="list-style-type: none"> Heritage impacts (World Heritage Site and Scheduled Monuments) Tourism impacts 	<ul style="list-style-type: none"> Extent to which heritage impacts may occur within 100 years Extent to which tourism in the area would be affected 	SMP2 policy is economically viable , but NAI has damages of £382k. Heritage and tourism impacts may add to the damages – Bowness on Solway is the start (or end) of Hadrian's Wall National Trail
		NAI	NAI	NAI					
		Final policies			As above	As above	<ul style="list-style-type: none"> Heritage impacts (World Heritage Site and Scheduled Monuments) Tourism impacts 	<ul style="list-style-type: none"> Saltmarsh accretion provides natural defence MR allows measures to proactively adapt to future coastal changes (no costs included at this stage) Extent to which heritage impacts may occur within 100 years Extent to which tourism in the area would be affected 	Unlikely to be sufficient economic justification for public funding of maintenance or improvement of defences in medium to longer term. However, policy allows for provision for private funding of defences if required.
		MR	MR	MR					

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
8: 3	Bowness-on-Solway to Drumburgh	Draft consultation policies			£0	£0	<ul style="list-style-type: none"> • NAI would result in naturally functioning coastline with benefits for internationally designated site • Risk to coastal road during epoch 1 with associated social and economic impacts • May be knock-on impacts due to loss of farm businesses (as land is written-off) 	<ul style="list-style-type: none"> • Extent of risk to coastal road in epoch 1- with associated knock-on impacts 	<p>SMP2 policy is economically viable. Damages of just £100k (from agricultural land) supports policy description of 'no justification for intervention' (MR could help to reduce damages)</p>
		NAI	NAI	NAI					
MR	MR	MR	As above	As above	<ul style="list-style-type: none"> • May be knock-on impacts due to loss of farm businesses (as land is written-off) 	<ul style="list-style-type: none"> • Extent to which coastal road will be increasingly affected 	<p>SMP2 policy is economically viable. Damages of just £243k (mainly from agricultural</p>		
8: 4	Drumburgh to	Draft consultation policies						£0	£0

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
	Dykesfield	NAI	NAI	NAI					land) support policy of 'no justification for intervention'. Impacts resulting from disruption to coastal road may not be sufficient to alter policy but MR could help to reduce damages
		Final policies			As above	As above	<ul style="list-style-type: none"> May be knock-on impacts due to loss of farm businesses (as land is written-off) 	<ul style="list-style-type: none"> MR allows for measures to proactively adapt to future coastal changes (no costs included at this stage). Extent to which coastal road will be increasingly affected 	Insufficient economic justification for public funding of defences. However, policy allows for provision for private funding of defences if required.
		MR	MR	MR					
8: 5	Dykesfield to NTL Kingsmoor (Eden)	Draft consultation policies			£0	£0	<ul style="list-style-type: none"> NAI would result in naturally functioning coastline with benefits for internationally designated site May be knock-on impacts due to loss of farm businesses (as land is written-off) 	<ul style="list-style-type: none"> Extent to which farm businesses experience knock-on impacts 	SMP2 policy is economically viable . Damages of just £266k (from agricultural land) support policy of 'no justification for intervention'
		NAI	NAI	NAI					
		Final policies			As above	As above	<ul style="list-style-type: none"> MR would result in a more naturally functioning coastline with benefits for internationally designated site May be knock-on impacts due to loss of farm businesses (as 	<ul style="list-style-type: none"> MR allows for measures to proactively adapt to future coastal changes (no costs included at this stage). Extent to which farm businesses experience knock-on impacts 	Insufficient economic justification for public funding of defences. However, policy allows for provision for private funding of defences if required.
		MR	MR	MR					

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
							land is written-off)		
8: 6	NTL Kingsmoor (Eden) to Rockliffe	Draft consultation policies			£0	£0	<ul style="list-style-type: none"> • NAI would result in naturally functioning coastline with benefits for internationally designated site • May be knock-on impacts due to loss of farm businesses (as land is written-off) 	<ul style="list-style-type: none"> • Extent to which farm businesses experience knock-on impacts 	SMP2 policy is economically viable . Damages of just £131k (from agricultural land) support policy of 'no justification for intervention
		NAI	NAI	NAI					
		Final policies			As above	As above	<ul style="list-style-type: none"> • MR would result in naturally functioning coastline with benefits for internationally designated site • May be knock-on impacts due to loss of farm businesses (as land is written-off) 	<ul style="list-style-type: none"> • MR allows for measures to proactively adapt to future coastal changes (no costs included at this stage). • Extent to which farm businesses experience knock-on impacts 	Insufficient economic justification for public funding of defences. However, policy allows for provision for private funding of defences if required.
		MR	MR	MR					
8: 7	Rockliffe	HTL	HTL	HTL	£6,681	£379	<ul style="list-style-type: none"> • Social benefits associated with protection of homes • Benefits to the community by protecting integrity of settlement • Protection of jobs due to protection of businesses 	<ul style="list-style-type: none"> • No specific uncertainties that would affect economic viability 	BCR = 17.64 SMP2 policy is economically viable based on monetised benefits alone. Additional benefits make SMP2 policy more robust

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
8: 8	Rockcliffe to Demesne Farm	Draft consultation policies			£0	£0	<ul style="list-style-type: none"> NAI would result in naturally functioning coastline with benefits for internationally designated site 	<ul style="list-style-type: none"> None identified 	Natural frontage. SMP2 policy is economically viable as there are few assets at risk
		NAI	NAI	NAI					
		Final policies			As above	As above	<ul style="list-style-type: none"> MR would result in a more naturally functioning coastline with benefits for internationally designated site 	<ul style="list-style-type: none"> MR allows for measures to proactively adapt to future coastal changes (no costs included at this stage). 	Insufficient economic justification for public funding of defences. However, policy allows for provision for private funding of defences if required.
		MR	MR	MR					
8: 9	Demesne Farm to Metal Bridge (Esk)	Draft consultation policies			£0	£760	<ul style="list-style-type: none"> Potential habitat creation benefits to manage impacts of coastal squeeze in other locations 	<ul style="list-style-type: none"> Extent of habitat creation benefits 	SMP2 policy is economically viable . Additional benefits from habitat creation would have to be at least £760k to make BCR>1 (or justified by damages avoided in other locations under HTL that result in coastal squeeze elsewhere)
		MR	NAI	NAI					
		Final policies			As above	As above	<ul style="list-style-type: none"> Potential habitat creation benefits to manage impacts of coastal squeeze in 	<ul style="list-style-type: none"> Rockcliffe Marsh provides natural flood defence. MR provides 	Insufficient economic justification for public funding of defences. However, public allows for

SMP2 Policy Unit		SMP2 Policy			Broad-scale SMP2 Review (PV, £k)		Benefits and Negative Impacts not Included in Benefit-Cost Ratio	Key Uncertainties	Benefit-Cost Ratio & Justification for SMP2 Policy
		Epoch 1	Epoch 2	Epoch 3	Benefits of Policy	Costs of Policy			
		MR	MR	MR			other locations	opportunity to realign defences to high ground and allows for measures to proactively adapt to future coastal changes (no costs included at this stage). <ul style="list-style-type: none"> Extent of habitat creation benefits 	provision for private funding of defences if required.
8: 10	Metal Bridge (Esk) to the River Sark	MR	MR	HTL	£0	£619	<ul style="list-style-type: none"> Potential habitat creation benefits to manage impacts of coastal squeeze in other locations 	<ul style="list-style-type: none"> In long-term, defences may be needed for motorway and railway (saltmarsh created under MR may help to reduce costs) 	Economic viability of the policy may depend on the inclusion of infrastructure (A74/M74) benefits. In short-term, there are unlikely to be additional damages which would provide the £619k benefits needed to make BCR = 1. With time, potential impacts on M74/A74(M) may mean that protection can be justified

H.5 Sensitivity Testing

Sensitivity testing was undertaken to highlight uncertainty or risks that may affect policy decisions and identifies the consequences for the preferred scenario. This information helps understand how robust the policy decision is, helps identify where changes in future circumstances may affect the policy, helps understand where further knowledge is needed to reduce uncertainty and importantly provides a link to policy and option development within subsequent flood and erosion risk management strategies. The conclusion of this assessment is described as part of presenting the concluding policy decisions in the **Main Document (Section 5)**.

It is important to note that development of the Preferred Policies have recognised uncertainty is present and have therefore sought where needed to be adaptive and able to be refined through further understanding and evidence as gathered as part of the Action Plans going forward.

A staged approach has been applied involving the following:

- Understanding the ability for generic uncertainties to influence the policy decision (**Table H.5.1**);
- Understanding the ability for specific uncertainties to influence the policy decision. Specific uncertainties were assessed during policy scenario assessment (**Appendix G**). Along the Morecambe Bay and Cumbria coast a number of different policy scenarios were assessed with and without the presence of the railway line to help inform the policy decision;
- Recording of those uncertainties potentially affecting the economic assessment (**Section H.3.3**);
- Concluding on the influence of uncertainties as part of the presentation of the policy decision and determining the robustness of the policy decision (**Table H.5.1 and Main Document - Section 5**). Where the longer term policy choice is dependent on the outcome of further studies, for example in areas where MR is recommended, it is noted that due to the uncertainty regarding the outcome of these studies, the medium / long term preferred policy may change; and,
- Detailing in the Action Plans for each Policy Statement (**Main Document – Section 5**) where further information is needed to help manage the policy going forwards to implementation stages.

SMP2 Procedural Guidance states that it is not appropriate to speculate regarding uncertainties in changes in social attitudes or socio-economic policy. As such, the following uncertainties are acknowledged here, but are not included in the main analysis:

- A change in social preferences in relation to an increased acceptance to flood and erosion and / or adaptive methods and changes in environmental legislation;
- A change in funding priorities leading to increased / decreased funding;
- Availability of compensation for those affected by flooding and / or erosion; and,
- An increasing prioritisation of agricultural land within flood and erosion risk management policy.

Supporting information regarding contemporary climate change predictions (**Appendix C**) and corresponding implications for the SMP2 area are found in **Annex H.3**.

H.5.1 Uncertainty Identification Table

This table indicates those management policies that may be vulnerable to typical uncertainties.

Uncertainty	Exposure to Uncertainty			
	HTL	ATL	MR	NAI
Increased development	Increased development will increase hinterland assets making Holding or Advancing the defence line more attractive.		An increase in development will reduce space for MR and increase hinterland assets thereby reducing the potential for MR and NAI. MR and NAI policy exposed to this uncertainty	
Decreased development	Holding or Advancing the line may not be economically justifiable if future development decreases or if policy choices have been made based on an assumption of increased future development. HTL and ATL policy exposed to this uncertainty		Reduced development will increase space for MR (enhancing the ability to retreat defences) and making a decision not to intervene more robust. Ultimately decreased development could bring forward any longer-term MR and NAI policies.	
Knowledge on climate change forecasts (sea level rise and storminess)	Enhanced rates of SLR and storminess may result in coastal squeeze and increased wave energy at defences making defences more expensive and technically difficult to maintain. This may reduce the potential for long-term Maintaining or Advancing the line and increase the attractiveness of other alternatives. HTL and ATL policy exposed to this uncertainty		Enhanced rates of SLR and storminess may be accommodated naturally by MR and NAI. However, in the longer term defended and undefended hinterland may be under threat resulting in additional investment or need to relocate and/or lose assets. Particularly relevant in areas of low lying hinterland. MR and NAI policy exposed to this uncertainty	
Reductions in sediment supply	A reduced sediment supply may increase the exposure of defences to wave energy, defences will become more expensive and technically difficult to maintain. This may reduce the potential for long-term Holding or Advancing the line and increase the attractiveness of other alternatives. HTL and ATL policy exposed to this uncertainty		Reduced sediment supplies will potentially limit the ability for MR sites to be self-maintaining but would not be a primary driver for selection of MR or NAI.	
Degree of land contaminated	The presence of contamination would increase the attractiveness of Holding or Advancing the line.		The presence of contaminated land would require expensive remediation to facilitate MR or NAI, making them less attractive as a policy. MR and NAI policy exposed to this uncertainty	
Accuracy of economic & defence data	The accuracy of economic information in terms of costs and benefits could potentially affect policy choice in cases where the decision is driven by economic viability and is marginal. This uncertainty arises from the level of detail within the economic analysis and the availability of supporting evidence (such as numerical modelling results and the condition of defences). All policies are exposed to this uncertainty			
Presence of protected habitats and species	The presence of protected habitats will increase the potential need for offsetting habitats, increasing cost and difficulty in deliverability. This is unlikely to result in a change in HTL policy but makes ATL less attractive. ATL policy exposed to this uncertainty		The presence of protected habitats (freshwater or saline) will result in the need to develop integrated solutions that maintain and improve existing habitats This is unlikely to result in a change to a MR policy but makes a NAI policy less attractive. NAI policy exposed to this uncertainty	

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Appendix H – Economic and Sensitivity Testing

ANNEX I - Supporting Economic Appraisal Data – Damages / Benefits

Annex H.1 Supporting Economic Appraisal Data – Damages/Benefits

Summary Of No Active Intervention Flooding And Erosion Losses

Table I – Sub Cell A: No Active Intervention Erosion and Flood Losses (note, only those policy units in which losses occur are presented in this table)

Policy Unit	Residential		Commercial		Agriculture	
	Properties	CV (£k)	Properties	CV (£k)	Land (Ha)	CV (£k)
Llandudno	4,153	£526,343	1,099	£235,769	4	£48
Penrhyn Bay (Little Orme to Rhos Point)	858	£110,996	159	£16,840	180	£2,400
Rhos Point to Llandulas (Colwyn Bay)	7	£1,041	6	£17,452	0	£0
Llandulas to Clwyd Estuary Hortons Nose to Foryd Railway Bridge	4,994	£831,890	529	£70,921	2,038	£28,073
Foryd Railway Bridge to Rhuddlan Road Bridge (west bank)						
Rhuddlan Bridge to Foryd Railway Bridge (East Bank)	1,621	£186,918	228	£46,185	37	£513
Foryd Railway Bridge to Foryd Road Bridge	2,107	£207,302	887	£114,605	149	£2,054
Clwyd Estuary to Rhyl Golf Links Rhyl Golf Links	6,478	£884,995	490	£68,934	884	£11,868
Rhyl Golf Links to Barkby Beach (Prestatyn)						
Barkby Beach to Point of Ayr Point of Ayr to south of Mostyn Dock						
Mostyn to Flint Marsh	196	£25,989	233	£41,328	422	£5,578
Flint Marsh to Chester Weir to Sealand Rifle Range	5,228	£683,660	1,406	£624,866	3,169	£41,335
Sealand Rifle Range to Burton Point	0	£0	0	£0	71	£916
Burton Point to Thurstaston Cliffs	38	£7,891	10	£2,057	20	£267
Thurstaston Cliffs	0	£0	0	£0	1	£14
Thurstaston Slipway to Croft Drive, Caldy	0	£0	0	£0	1	£21
Croft Drive Caldy to West Kirby Marine Lake	16	£2,660	2	£177	0	£0
West Kirby Marine lake to Royal Liverpool Golf Club	45	£4,676	4	£273	0	£0
Red Rocks to Wallasey Embankment	13	£2,207	0	£0	2	£33
Wallasey Embankment	5,818	£808,206	201	£110,814	265	£3,403
Harrison Groyne to Perch Rock	0	£0	4	£4,665	0	£0
Perch Rock to Riverwood Road/ Eastham (South / Left Bank)	1	£85	66	£10,956	0	£0
Eastham Ferry to Runcorn Bridge	0	£0	24	£21,842	391	£5,100
Runcorn Bridge to Arpley Landfill site (Upper Mersey Estuary South bank)	6	£1,377	0	£0	185	£2,478

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Policy Unit	Residential		Commercial		Agriculture	
	Properties	CV (£k)	Properties	CV (£k)	Land (Ha)	CV (£k)
Arpley LandFill site (South bank) to SMP2 boundary to west of sewage works (North Bank)	1,025	£146,311	117	£73,077	117	£1,612
Sewage works to Runcorn Bridge (Upper Mersey Estuary north bank)	1,593	£296,515	79	£7,231	95	£1,251
Runcorn Bridge to Pickerings Pasture	108	£14,186	56	£10,876	119	£1,625
Pickerings Pasture to Garston Industrial Estate	0	£0	0	£0	87	£1,194
Garston Industrial Estate to Seaforth	267	£33,900	26	£16,770	0	£0
Seaforth to MEPAS pumping station	0	£0	0	£0	2	£27
MEPAS pumping station to Hightown)	0	£0	0	£0	7	£82
Hightown to River Alt mouth	56	£9,909	1	£0	13	£164
Alt mouth to Weld Road, Southport	0	£0	2	£263	274	£3,432

Table 2 – Sub Cell B: No Active Intervention Erosion and Flood Losses (note, only those policy units in which losses occur are presented in this table)

Policy Unit	Residential		Commercial		Agriculture	
	Properties	CV (£k)	Properties	CV (£k)	Land (Ha)	CV (£k)
Weld Road to Fairways	5,744	£852,352	219	£131,173	912	£11,852
Fairways to Crossens Pumping Station						
Crossens Pumping Station to Hesketh Out Marsh West (Hundred End Gutter)						
4. Hesketh Outmarsh West	1,770	£278,529	179	£34,921	5,760	£75,027
Hesketh Outmarsh East						
Hesketh Outmarsh East to White Bridge, Rufford (River Douglas Left Bank)						
White Bridge, Rufford, to Old Railway Embankment, Much Hoole Marsh House	650	£90,532	41	£9,892	1,173	£15,718
Old Railway Embankment, Much Hoole Marsh House to Hutton Marsh	377	£67,956	8	£176	410	£5,436
Hutton Marsh						
Hutton Marsh to Penwortham Golf Course	1	£240	0	£0	492	£6,524
Penwortham Bridge to Freckleton Marsh (W end of sewage works)	115	£13,770	46	£23,996	924	£12,619
Freckleton Marsh (W end of sewage works) to Naze Point						
Naze Point to Warton Bank	0	£0	1	£55	9	£118

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Policy Unit	Residential		Commercial		Agriculture	
	Properties	CV (£k)	Properties	CV (£k)	Land (Ha)	CV (£k)
Warton Bank to Lytham Dock						
Lytham Dock to Land Registry	3,308	£449,066	205	£67,244	657	£8,636
Lytham Land Registry to Fairhaven Lake						
Fairhaven Lake	0	£0	4	£1,259	0	£0
Miniature Golf Course to St Anne's Pier	0	£0	5	£1,508	0	£0
St Annes's Pier to St Annes' Northern Boundary						
St Annes (northern boundary) to Squires Gate	228	£35,607	6	£9,669	0	£0
Squires Gate to Blackpool Tower	5,499	£639,450	896	£175,601	104	£1,397
Blackpool Tower to Anchorsholme	0	£0	0	£3,120	0	£0
Anchorsholme Park to Jubilee Gardens						
Jubilee Gardens to Five Bar Gate						
Five Bar Gate to Rossall Hospital (Rossall School)						
Rossall Hospital to Chatsworth Avenue						
Chatsworth Avenue to Rossall Point	26,733	£3,554,932	1,673	£406,928	270	£3,747
Rossall Point to Marine Lake (east)						
Marine Lake to Fleetwood Pier						
Fleetwood Pier to Fleetwood Ferry						
Fleetwood to Stanah						

Table 3 – Sub Cell C: No Active Intervention Erosion and Flood Losses (note, only those policy units in which losses occur are presented in this table)

Policy Unit	Residential		Commercial		Agriculture	
	Properties	CV (£k)	Properties	CV (£k)	Land (Ha)	CV (£k)
Fleetwood Pier to Fleetwood Ferry	26,733	£3,554,932	1,673	£406,928	270	£20,578
Fleetwood to Stanah						
Stannah to Cartford Bridge (South Bank) and Cartford Bridge to Shard Bridge (North Bank)	0	£0	0	£0	232	£3,172
3. Shard Road (A588) to GolfCourse	20	£3,609	0	£0	149	£2,069
GolfCourse to Knott End						
Knott End-on-Sea	2,848	£429,011	232	£34,727	3491	£46,254
Knott End to Fluke Hall						
Fluke Hall to Cocker Bridge						
Cocker Bridge to Glasson Dock	105	£11,995	36	£5,268	1084	£15,031
Glasson Dock to Condor Green						

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Policy Unit	Residential		Commercial		Agriculture	
	Properties	CV (£k)	Properties	CV (£k)	Land (Ha)	CV (£k)
Farm						
River Conder to Aldcliffe	4	£320	0	£0	38	£525
Aldcliffe Marsh to Freemans Wood	0	£0	0	£0	31	£410
Freemans Wood to Skerton Weir (east bank) and Skerton Weir to Lythe Bridge (west bank)	3,003	£306,684	430	£106,177	75	£1,022
Lythe Bridge to Riverside Farm	5,653	£733,839	500	£191,496	383	£5,315
Riverside Farm to Overton Cattle Grid	1	£240	0	£0	70	£947
Overton Cattle Grid to Sunderland Village	65	£10,353	0	£0	84	£1,167
Sunderland Village to Potts Corner	29	£2,771	1	£12	98	£1,361
Potts Corner to Heysham Power Station	2	£379	23	£16,647	10	£129
Heysham Power Station to Heysham Dock	0	£0	10	£14,037	0	£0
Chapel Hill to Hest Bank (Morecambe)	5,733	£742,485	502	£191,509	388	£5,382
Hest Bank to West Cain House	0	£0	0	£431	23	£317
West Cain House to Red Bank Farm	1	£80	0	£0	4	£44
Red Bank Farm to Bolton-le-Sands Caravan Park	13	£1,254	6	£19	43	£589
Bolton-le-Sands Caravan Park to River Keer	7	£1,319	0	£2,000	87	£1,182
River Keer to Heald Brow	0	£0	0	£0	223	£2,894
New Barns	1	£247	0	£0	12	£145
Kent Viaduct to Dick Fell Road (Sandside)	9	£1,344	8	£122	195	£2,444
Hollins Well Road north to Levens Bridge (East bank) & Levens Bridge to kent Viaduct (West bank)	38	£5,242	22	£4,726	2060	£28,561
Kent Viaduct to Holme Island	44	£6,520	5	£6,742	1358	£18,277
Holme Island to Humphrey Head	24	£3,215	29	£17,945	473	£6,523
Humphrey Head to Cowpren Point	2	£247	0	£3,684	122	£1,683
Cark to Leven Viaduct	3	£370	0	£0	517	£6,903
Leven Viaduct to Haverthwaite (left bank) and Haverthwaite to Greenodd (right bank)	0	£0	0	£0	0	£2
Greenodd to Barrow End Rocks (A590)	11	£1,814	3	£88	219	£2,991
Barrow End Rocks (A590) to Leven Viaduct	0	£0	0	£0	6	£81
Leven Viaduct to Canal Foot Cottages	235	£27,024	83	£26,295	298	£4,050
Canal Foot	0	£0	0	£0	4	£51
Glaxo Factory Site	6	£700	8	£1,974	57	£780
Conishead Priory to Bardsea	3	£518	1	£2,004	24	£329
Bardsea to Newbiggin	59	£10,098	4	£10,092	285	£3,864
Newbiggin to Rampside	100	£15,341	8	£717	42	£569

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Policy Unit	Residential		Commercial		Agriculture	
	Properties	CV (£k)	Properties	CV (£k)	Land (Ha)	CV (£k)
Roa Island	39	£3,927	5	£494	10	£128
South End Hawes to Biggar (east side)	13	£1,556	2	£583	166	£2,085
South End Hawes to Hare Hill (open coast)						
Biggar to Lenny Hill (east side)	133	£18,878	16	£393	197	£2,468
Hillock Whins to Nanny point Scar						
Hare Hill to Hillock Whins	0	£0	0	£0	21	£266
Nanny Point Scar to Mill Scar	0	£0	0	£0	2	£24
North Walney Westshore Park to Lenny Hill (both Coasts)	0	£0	0	£0	57	£719
Rampside to Westfield Point	0	£0	0	£0	1	£9
Westfield Point to Hindpool	2,595	£275,756	348	£149,174	4	£53
Hindpool to Lowsy Point	0	£0	0	£0	40	£507
Lowsy Point to Askham Pier	0	£0	0	£0	2	£24
Askham-in-Furness	8	£938	0	£0	4	£47
Askham to Dunnerholme	0	£0	0	£0	13	£163
Dunnerholme to Sandside	3	£296	1	£4,372	84	£1,114
Kirkby-in-Furness	35	£4,091	0	£2,105	22	£306
Herdhouse Moss	11	£1,752	0	£4,342	304	£3,969
Galloper Pool to Viaduct	2	£345	1	£102	17	£224
Duddon Estuary(Both banks upstream of Viaduct and west bank south to green road station)	2	£231	0	£0	208	£2,852
Millom Marshes	11	£2,195	1	£3,559	277	£3,789
Red Hills (Industrial area)						
Hodbarrow Mains	471	£51,577	16	£1,094	1	£9
Hodbarrow Nature Reserve & Lagoon						

Table 4 – Sub Cell D: No Active Intervention Erosion and Flood Losses (note, only those policy units in which losses occur are presented in this table)

Policy Unit	Residential		Commercial		Agriculture	
	Properties	CV (£k)	Properties	CV (£k)	Land (Ha)	CV (£k)
Haverigg	251	£65,817	17	£6,844	309	£8,246
Silecroft (Hartrees Hill)	1	£247	1	£6	0	£0
Silecroft to Selker	1	£99	0	£0	150	£2,090
Selker to Eskmeals Range	7	£762	0	£0	26	£366
Eskmeals Dunes to Ravenglass inc River Esk to Muncaster Bridge	5	£863	1	£52	297	£3,809
SMP2 boundary						
Ravenglass	49	£4,891	9	£400	0	£0
Ravenglass to Drigg Point inc River Mite to Muncaster Mill & River lrt to Drigg Holme	9	£1,440	0	£0	185	£2,552
Seascale	88	£11,593	0	£1,974	24	£335
Seascale to Sellafield	0	£0	19	£970	0	£0

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Policy Unit	Residential		Commercial		Agriculture	
	Properties	CV (£k)	Properties	CV (£k)	Land (Ha)	CV (£k)
Sellafield Station to Braystones	54	£7,383	5	£647	192	£2,624
Braystones/ Nethertown/Coulderton	29	£6,264	0	£0	10	£132
Coulderton to Pow Beck	0	£0	0	£1,842	11	£135
St Bees Promenade to Gutter Foot	0	£0	0	£0	3	£41
Gutter Foot (St Bees) to St Bees Head	0	£0	0	£0	2	£28
Haverigg	251	£65,817	17	£6,844	309	£8,246
Silecroft (Hartrees Hill)	1	£247	1	£6	0	£0
Silecroft to Selker	1	£99	0	£0	150	£2,090
Selker to Eskmeals Range	7	£762	0	£0	26	£366

Table 5 – Sub Cell E: No Active Intervention Erosion and Flood Losses (note, only those policy units in which losses occur are presented in this table)

Policy Unit	Residential		Commercial		Agriculture	
	Properties	CV (£k)	Properties	CV (£k)	Land (Ha)	CV (£k)
St Bees Head to Saltom Pit	0	0	0	0	4	49
Saltom Pit	0	0	0	0	0	4
Whitehaven Harbour and north beach	93	10,536	73	9,686	0	0
Bransty to Parton	0	0	2	1,981	1	10
Parton	31	3149	9	309	0	0
Parton to Harrington Parks	0	0	0	0	0	1
Harrington Parks to Harrington Harbour	0	0	0	5,263	7	94
Harrington Harbour	86	8,885	15	392	0	0
Harrington to Steel Works Site	0	0	0	2,150	0	0
Workington Harbour	688	71384	120	36,388	6	89
Siddick to Risehow	163	17,706	43	31,804	11	157
Maryport Harbour / Marina	162	17,518	33	3,620	0	0
Maryport Harbour to Roman Fort	3	296	0	0	6	81
Maryport Roman Fort to Bank End (Maryport Promenade)	3	0	0	260	6	239
Maryport Golf Course to Allonby	0	0	0	0	2	32
Allonby	4	330	1	16	3	44
Allonby to Seacroft Farm	0	0	0	0	10	130
Seacroft Farm to Dubmill Point	0	0	0	0	4	49
Silloth Harbour	0	0	5	737	0	0
Silloth to Skinburness (open coast)	46	8,863	7	281	12	160
The Grune	20	2,247	0	0	19	235
Skinburness (east)	10	1,579	0	0	2	31
Skinburness to Wath Farm	93	14,163	14	9,560	268	3718
Wath Farm to Saltcoates inc Waver to Brownrigg	0	0	0	0	179	2478
Newton Marsh	3	330	0	0	94	1304
Newton Marsh to Anthorn inc Wampool to NTL	49	6,535	4	162	825	11,408

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Policy Unit	Residential		Commercial		Agriculture	
	Properties	CV (£k)	Properties	CV (£k)	Land (Ha)	CV (£k)
Anthorn	2	345	0	0	0	90
Cardurnock to Bowness-on-Solway	0	0	0	0	0	541
Bowness-on-Solway	7	1,061	1	20	0	161
Bowness-on-Solway to Drumburgh	0	0	0	0	0	1,040
Drumburgh to Dykesfield	2	345	1	41	0	2,192
Dykesfield to NTL Kingsmoor (Eden)	4	412	1	0	0	2,410
NTL Kingsmoor (Eden) to Rockcliffe	0	0	0	0	0	1,393
Rockcliffe	131	14,673	8	4,715	0	2,349
Demesne Farm to Metal Bridge (Esk)	2	198	0	0	0	2,004
Metal Bridge (Esk) to the River Sark	0	0	0	0	0	2,582

North West & North Wales Coastal Group

North West England and North Wales Shoreline Management Plan SMP2

Appendix H – Economic and Sensitivity Testing

ANNEX 2 - Supporting Economic Appraisal Data - Costs

Annex H.2 – Supporting Economic Appraisal Data for SMP2 Costs

This annex presents the full preferred scenario costs developed for the SMP2. As outlined in the assumptions below, these are generated from national generic costs and do not reflect local conditions. These figures should not be considered out of context. The costs presented in section H4 have been taken from available strategy and/or scheme documents where available, as these represent a more accurate and site specific consideration of implementation costs. The figures presented in this Annex have only been used where other, more detailed, cost information is not available. As such the costs presented here differ from those in section H4 for frontages where more detailed costs are available.

Basis for cost assumptions:

- Replacement costs taken from the Unit Cost Database (Environment Agency, 2007). and costs included within recent strategies and completed works from within the SMP2 area;
- Maintenance costs taken from NADNAC study prepared for Defra (2004). This sets annual maintenance cost for linear structures and for groyne fields at £12k/km and for beach schemes £23k/km;
- Assumed design life (and thus full scheme reconstruction will be required) as 100 years for linear defences, 50 years for beach schemes and groynes;
- Allow for maintenance as a linear cost, although realistically less in early years and increasing in latter years of scheme life;
- Allowance for increase in costs due to climate change: Period 20-50 years - costs factored up by 1.5 x present day rates; Period 50-100 years - costs factored up by 2.0x present day rates; and,
- Optimism bias (at 60%) to be applied to all costs when examining BCR, to reflect uncertainty in broad level analysis at SMP2 scale.

Defence Type	Defence Type	Cost per m	
		Replacement	Maintenance
Standard piling	Urban/Rural Average	£3,820	£12
Earth Embankment	2.5m High	£797	£12
	3.5m High	£1,407	£12
Groynes		£987	£12
Revetment		£5,031	£12
Small scale rock armour		£1,566	£12
Beach Recharge		£1,569	£23
Sand Dune Works		£41	£0
Seawall	Shoreline (Stand alone structure)	£4,326	£12
	Shoreline (With Revetment)	£6,246	£12
	Setback (Stand alone structure)	£1,762	£12
	Setback (With Revetment)	£3,520	£12
Breakwater		£3,513	£12

Defence Costs for Preferred policies

The following tables presents the cost estimates only for those policy units where the preferred policies involve intervention during the 100 year time-frame of the SMP2 (i.e. managed realignment or hold the line are proposed), as those areas where no active intervention is proposed would not incur any cost of intervention.

Sub Cell 11A Policy Units	Whole Life Capital CV (£k)	Whole Life Maintenance CV (£k)	Total Whole Life PV (£k)	Total Whole Life Cost PV+60% Optimism Bias (£k)
Llandudno	£22,315	£16,140	£10,385	£16,615
Penrhyn Bay (Little Orme to Rhos Point)	£7,592	£8,113	£4,135	£6,616
Rhos Point to Llandulas (Colwyn Bay)	£54,204	£36,356	£24,781	£39,649
Llandulas to Clwyd Estuary	£43,735	£26,979	£19,541	£31,266
Hortons Nose to Foryd Railway Bridge	£2,123	£1,925	£1,088	£1,740
Foryd Railway Bridge to Rhuddlan Road Bridge (west bank)	£4,213	£6,674	£2,804	£4,486
Rhuddlan Bridge to Foryd Railway Bridge (East Bank)	£3,096	£4,904	£2,060	£3,296
Foryd Railway Bridge to Foryd Road Bridge	£1,174	£947	£575	£920
Clwyd Estuary to Rhyl Golf Links	£33,268	£12,829	£22,188	£35,501
Rhyl Golf Links	£18,113	£1,998	£2,091	£3,345
Rhyl Golf Links to Barkby Beach (Prestatyn)	£37,971	£13,212	£14,637	£23,420
Point of Ayr to south of Mostyn Dock	£41,435	£13,708	£15,793	£25,269
Mostyn to Flint Marsh	£9,056	£2,258	£3,287	£5,259
Flint Marsh to Chester Weir to Sealand Rifle Range	£57,412	£55,536	£30,076	£48,122
Sealand Rifle Range to Burton Point	£0	£132	£94	£150
Thurstaton Slipway to Croft Drive, Caldy	Private funding agreement (no costs included)			
Croft Drive Caldy to West Kirby Marine Lake	£0	£809	£351	£561
West Kirby Marine lake to Royal Liverpool Golf Club	£15,365	£6,295	£6,146	£9,833
Red Rocks to Wallasey Embankment	£61,220	£9,296	£7,892	£12,627
Wallasey Embankment	£23,448	£9,433	£8,911	£14,258
Wallasey Embankment to Harrison Groyne	£0	£3,128	£1,349	£2,158
Harrison Groyne to Perch Rock	£14,946	£3,425	£5,372	£8,595
Perch Rock to Riverwood Road Eastham (South/Left Bank)	£74,492	£24,311	£28,430	£45,488
Eastham Ferry to Runcorn Bridge	£93,115	£30,389	£35,538	£56,861
Runcorn Bridge to Arpley Landfill site (Upper Mersey Estuary South bank)	£7,579	£3,953	£3,229	£5,167
Arpley LandFill site (South bank) to SMP2 boundary to west of sewage works (North Bank)	£7,154	£10,602	£4,596	£7,354

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Sub Cell 11A Policy Units	Whole Life Capital CV (£k)	Whole Life Maintenance CV (£k)	Total Whole Life PV (£k)	Total Whole Life Cost PV+60% Optimism Bias (£k)
Sewage works to Runcorn Bridge (Upper Mersey Estuary north bank)	£4,697	£3,787	£2,300	£3,679
Runcorn Bridge to Pickerings Pasture	£4,697	£3,787	£2,300	£3,679
Garston Industrial Estate to Seaforth	£75,638	£24,685	£28,868	£46,188
Seaforth to MEPAS pumping station	£36,722	£9,466	£13,426	£21,482

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Appendix H – Economics and Sensitivity Testing

Sub Cell IIB Policy Units	Whole Life Capital CV (£k)	Whole Life Maintenance CV (£k)	Total Whole Life PV (£k)	Total Whole Life Cost PV+60% Optimism Bias (£k)
Weld Road to Fairways	£40,287	£6,087	£5,186	£8,298
Fairways to Crossens Pumping Station	£13,008	£8,472	£5,913	£9,461
Crossens Pumping Station to Hesketh Out Marsh West (Hundred End Gutter)	£6,849	£10,848	£4,558	£7,292
Hesketh Outmarsh West	£2,121	£3,361	£1,412	£2,259
Hesketh Outmarsh East	£4,661	£3,658	£2,219	£3,551
Hesketh Outmarsh East to White Bridge, Rufford (River Douglas Left Bank)	£10,936	£17,323	£7,278	£11,645
White Bridge, Rufford, to Old Railway Embankment, Much Hoole Marsh House	£10,936	£17,323	£7,278	£11,645
Old Railway Embankment, Much Hoole Marsh House to Hutton Marsh	£0	£1,471	£638	£1,021
Hutton Marsh	£1,817	£1,426	£865	£1,384
Hutton Marsh to Penwortham Golf Course	£1,243	£975	£592	£947
Penwortham Golf Course to Penwortham Bridge	£2,295	£3,635	£1,527	£2,443
Penwortham Bridge to Freckleton Marsh (W end of sewage works)	£11,779	£12,193	£6,377	£10,203
Freckleton Marsh (W end of sewage works) to Naze Point	£7,071	£5,549	£3,366	£5,386
Warton Bank to Lytham Dock	£3,586	£2,814	£1,707	£2,731
Lytham Dock to Land Registry	£4,733	£3,714	£2,253	£3,605
Lytham Land Registry to Fairhaven Lake	£12,778	£6,312	£5,307	£8,491
Fairhaven Lake	£5,840	£1,704	£2,180	£3,488
Miniature Golf Course to St Anne's Pier	£7,683	£1,557	£5,795	£9,272
St Annes's Pier to St Annes' Northern Boundary	£529	£380	£460	£736
St Annes (northern boundary) to Squires Gate	£4,970	£3,538	£4,313	£6,900
Squires Gate to Blackpool Tower	£58,713	£8,871	£7,558	£12,093
Blackpool Tower to Anchorsholme	£52,467	£10,537	£18,476	£29,561
Anchorsholme Park	£34,978	£1,129	£25,048	£40,077
Anchorsholme Park to Jubilee Gardens	£17,114	£2,586	£2,203	£3,525
Jubilee Gardens to Five Bar Gate	£5,786	£3,020	£4,792	£7,667
Five Bar Gate to Rossall Hospital (Rossall School)	£4,701	£2,454	£3,893	£6,229
Rossall Hospital to Chatsworth Avenue	£10,849	£5,662	£8,985	£14,376
Chatsworth Avenue to Rossall Point	£10,126	£5,285	£8,386	£13,417

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Sub Cell IIB Policy Units	Whole Life Capital CV (£k)	Whole Life Maintenance CV (£k)	Total Whole Life PV (£k)	Total Whole Life Cost PV+60% Optimism Bias (£k)
Rossall Point to Marine Lake (east)	£8,679	£4,530	£7,188	£11,500
Marine Lake to Fleetwood Pier	£7,956	£4,152	£6,589	£10,542
Fleetwood Pier to Fleetwood Ferry	£2,893	£1,510	£2,396	£3,833

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Sub Cell IIC Policy Units	Whole Life Capital CV (£k)	Whole Life Maintenance CV (£k)	Total Whole Life PV (£k)	Total Whole Life Cost PV+60% Optimism Bias (£k)
Fleetwood to Stanah	£12,181	£11,360	£7,752	£12,403
Stannah to Cartford Bridge (South Bank) and Cartford Bridge to Shard Bridge (North Bank)	£0	£2,073	£1,469	£2,351
Shard Road (A588) to GolfCourse	£4,303	£6,816	£2,863	£4,582
GolfCourse to Knott End	£4,216	£0	£1,296	£2,073
Knott End-on-Sea	£14,054	£2,840	£4,961	£7,938
Knott End to Fluke Hall	£18,724	£15,903	£9,350	£14,961
Fluke Hall to Cocker Bridge	£8,797	£13,934	£5,854	£9,367
Cocker Bridge to Glasson Dock	£8,478	£3,620	£3,352	£5,364
Glasson Dock to Condor Green Farm	£4,085	£3,597	£2,069	£3,310
Freemans Wood to Skerton Weir (east bank) and Skerton Weir to Lythe Bridge (west bank)	£20,679	£10,129	£8,646	£13,833
Lythe Bridge to Riverside Farm	£837	£1,313	£553	£885
Overton Cattle Grid to Sunderland Village	£1,673	£2,634	£1,102	£1,763
Heysham Power Station to Heysham Dock	£24,078	£8,633	£9,352	£14,963
Chapel Hill to Hest Bank (Morecambe)	£2,450	£17,039	£4,084	£6,534
Hest Bank to West Cain House	£705	£568	£345	£552
Red Bank Farm to Bolton-le-Sands Caravan Park	£3,398	£1,463	£1,346	£2,154
Ash Meadow to Kent Viaduct (Arneside)	£6,864	£2,461	£2,666	£4,266
Kent Viaduct to Dick Fell Road (Sandside)	£0	£347	£246	£394
Sandside (Dick Fell Road to Hollins Well Road)	£4,227	£3,408	£2,070	£3,311
Hollins Well Road north to Levens Bridge (East bank) & Levens Bridge to kent Viaduct (West bank)	£21,753	£34,457	£14,476	£23,162
Kent Viaduct to Holme Island	£16,369	£5,869	£6,358	£10,172
Holme Island to Humphrey Head	£10,218	£7,317	£4,795	£7,672
Humphrey Head to Cowpren Point	£4,422	£7,005	£2,943	£4,709
Greenodd to Barrow End Rocks (A590)	£4,051	£3,266	£1,983	£3,173
Canal Foot	£3,245	£947	£1,211	£1,938
Sandhall to Conishead Priory	£0	£214	£152	£243
Newbiggin to Rampside	£23,053	£5,935	£8,427	£13,483
Rampside	£1,759	£1,225	£738	£1,181
Roa Island	£12,282	£2,851	£4,317	£6,907
Biggar to Lenny Hill (east side)	£14,843	£8,898	£6,574	£10,518

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Appendix H – Economics and Sensitivity Testing

Sub Cell IIC Policy Units	Whole Life Capital CV (£k)	Whole Life Maintenance CV (£k)	Total Whole Life PV (£k)	Total Whole Life Cost PV+60% Optimism Bias (£k)
Hare Hill to Hillock Whins	£3,006	£2,423	£1,472	£2,355
Hillock Whins to Nanny point Scar	£657	£1,041	£437	£700
Mill Scar to West Shore Park	£0	£238	£168	£270
Westfield Point to Hindpool	£28,303	£16,547	£12,440	£19,903
Askham-in-Furness	£352	£284	£172	£276
Dunnerholme to Sandside	£4,086	£1,632	£1,590	£2,544
Kirkby-in-Furness	£6,481	£2,589	£2,522	£4,036
Galloper Pool to Viaduct	£2,110	£1,893	£1,076	£1,722
Duddon Estuary(Both banks upstream of Viaduct and west bank south to green road station)	£0	£897	£636	£1,018
Millom Marshes	£4,572	£7,242	£3,042	£4,868
Red Hills (Industrial area)	£3,523	£1,407	£1,371	£2,193

Sub Cell IID Policy Units	Whole Life Capital CV (£k)	Whole Life Maintenance CV (£k)	Total Whole Life PV (£k)	Total Whole Life Cost PV+60% Optimism Bias (£k)
Hodbarrow Mains	£1,494	£724	£209	£334
Hodbarrow Nature Reserve & Lagoon	£329	£159	£46	£74
Haverigg	£2,099	£1,046	£578	£925
Ravenglass	£1,545	£1,713	£862	£1,380
Seascale	£3,139	£776	£1,140	£1,824
Sellafield Nuclear Site	£3,317	£1,344	£1,323	£2,117
Coulderton to Pow Beck	£7,547	£1,893	£2,747	£4,396
St Bees Promenade to Gutter Foot	£0	£574	£249	£398

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Appendix H – Economics and Sensitivity Testing

Sub Cell IIE Policy Units	Whole Life Capital CV (£m)	Whole Life Maintenance CV (£m)	Total Whole Life PV (£m)	Total Whole Life Cost PV+60% Optimism Bias (£m)
Saltom Pit	£0	£112	£39	£63
Whitehaven Harbour and north beach	£16,079	£4,922	£6,055	£9,687
Bransty to Parton	£13,117	£2,651	£4,630	£7,409
Parton	£3,585	£899	£1,305	£2,088
Parton to Harrington Parks	£26,652	£5,831	£9,509	£15,215
Harrington Parks to Harrington Harbour	£0	£185	£131	£210
Harrington Harbour	£6,764	£2,045	£2,541	£4,066
Harrington to Steel Works Site	£1,996	£1,412	£838	£1,340
Steel Works Site	£2,002	£947	£829	£1,327
The Howe to Workington Harbour South Breakwater	£2,082	£770	£269	£430
Workington Harbour	£16,967	£5,632	£6,488	£10,381
Workington Harbour to Siddick	£2,290	£1,950	£1,195	£1,912
Siddick to Risehow	£3,241	£2,613	£1,587	£2,539
Maryport Harbour / Marina	£23,390	£7,952	£8,986	£14,378
Maryport Harbour to Roman Fort	£4,478	£1,306	£1,671	£2,674
Maryport Roman Fort to Bank End (Maryport Promenade)	£0	£365	£259	£414
Allonby	£2,220	£2,493	£1,078	£1,725
Seacroft Farm to Dubmill Point	£8,281	£504	£6,228	£9,965
Silloth Harbour	£9,008	£2,976	£3,441	£5,506
Silloth to Skinburness (open coast)	£31,403	£8,671	£11,612	£18,579
Skinburness (east)	£329	£521	£219	£350
Skinburness to Wath Farm	£2,534	£4,014	£1,686	£2,698
Anthorn	£822	£582	£345	£552
Rockcliffe	£717	£997	£379	£606
Demesne Farm to Metal Bridge (Esk)	£0	£1,072	£760	£1,216
Metal Bridge (Esk) to the River Sark	£0	£873	£619	£990

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Appendix H – Economic and Sensitivity Testing

ANNEX 3 - Supporting information for Sensitivity Testing

Annex H.3 – Supporting information for Sensitivity Testing

Climate Change Scenarios

Proposed climate change scenarios (Defra, 2006)¹:

Area	Assumed Vertical Land Movement (mm/yr)	Net Sea level Rise (mm/yr)			
		1990-2025	2025-2055	2055-2085	2085-2115
NW England, NE England, Scotland (north of Flamborough Head)	+0.8	2.5 (88)	7.0 (298)	10.0 (598)	13.0 (988)
SW and Wales	-0.5	3.5 (123)	8.0 (363)	11.5 (708)	14.5 (1143)

The number in brackets is the net rise by the end of that period, determined by multiplying the rate by the number of years and summing the cumulative amounts for each period.

¹ Defra (2006) Flood and Coastal Defence Appraisal Guidance, FCDPAG3 Economic Appraisal, Supplementary Note to Operating Authorities – Climate Change Impacts, October 2006.

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Appendix H – Economic and Sensitivity Testing

ANNEX 4 - Supporting information for economic assessment

Annex H.4 – Supporting information for economic assessment

Coastal paths and trails

Introduction

There are several long distance routes which run along the North West coast, as well as numerous other public rights of way. This section presents information on the coastal footpaths and cycle ways which are found within the North West SMP2 area.

Units with Coastal Paths and Trails

Table H4.1 provides a breakdown of the coastal paths and cycle ways within the North West SMP2 area. Information on the location and type of path (i.e. footpath, bridleway etc.) has been taken from Ordnance Survey maps.

Unit Code	Unit Name	Footpath	Description
A	Great Orme to Little Orme	North Wales Path	This follows the road around Great Orme, before running along the seafront in Llandudno and branching inland on reaching Little Orme.
B	Little Orme to Point of Ayr	North Wales Path	This runs along the coast from the disused quarry on the east of Little Orme to Old Colwyn. It then goes inland, before returning to the coast at Llanddulas. It follows the seafront until it reaches Foryd, where it crosses the River Clwyd on the Foryd Bridge.
B	Little Orme to Point of Ayr	Traffic-free Cycle Route	This runs along the coast from Penrhyn Bay to Foryd. It then restarts north of the Clwyd estuary in Rhyl and goes along the coast until it reaches the northern most carpark in Prestatyn.
B	Little Orme to Point of Ayr	Public Footpath	Public footpath runs across sand/dunes from Talacre to lighthouse at Point of Ayr.
C	Dee Estuary	Public Footpath	Public footpath from Mostyn runs along estuary bank and then across the marsh to Whelston. Another section runs across the marsh in Bagillt. Near Little Neston, around 1.5km of footpath runs along the edge of the marsh. About 0.75km public footpath is on the edge of the marsh in Moorside.
C	Dee Estuary	Traffic-free Cycle Route	This runs from West Kirby to Hilbre Point (<1.5km).
D	Hilbre Point to Perch Rock (North Wirral)	Bridleway	A short section (around 0.25km) of bridleway runs along the coast at Wallasey Embankment.
D	Hilbre Point to Perch Rock (North Wirral)	Traffic-free Cycle Route	This runs from the lighthouse on Leasowe Common by Wallasey Embankment through to the slipway at the north end of Wallasey golfcourse (>4km).
E	Mersey Estuary	Traffic-free Cycle Route	Two sections of cycle route on south bank of River Mersey: around 0.75km in Wallasey and >1 km in Egremont.
E	Mersey Estuary	Public Footpath	Several km of footpath along bank of River Weaver, south of Runcorn.

Table H4.1: Coastal Paths and Trails			
Unit Code	Unit Name	Footpath	Description
E	Mersey Estuary	Trans Pennine Trail	Trans Pennine Trail runs along bank of St Helens Canal (from Sankey Bridges), then along the north bank of the River Mersey until Hale Bank, where it moves inland. For some of this length, the trail is joined with the Mersey Way.
E	Mersey Estuary	Public Footpath	Several sections of public footpath run along the edge of the Manchester Ship Canal.
E	Mersey Estuary	Mersey Way	This runs along the north bank of the River Mersey from south east of Hale to the industrial estate south of Garston.
E	Mersey Estuary	Trans Pennine Trail	This runs along the north bank of the River Mersey from Dingle to just west of James St Station.
F	Sefton Coast (Seaforth to Crossens)	Traffic-free Cycle Route	This runs from the marine lake in Seaforth along the shore to just west of Hall Road Station.
F	Sefton Coast (Seaforth to Crossens)	Sefton Coastal Footpath	This runs from the marine lake in Seaforth along the shore to Hightown where it moves inland before returning to the coast west of Formby Station. It runs across the dunes for <3km and then goes inland again.
F	Sefton Coast (Seaforth to Crossens)	Sefton Coastal Footpath/ Trans Pennine Trail	The Trans Pennine Trail joins the Sefton Coastal Path at Big Ball's Hill. They both run alongside the road to Ainsdale-on-Sea. About 1km north of Ainsdale-on-Sea, the Sefton Coastal Path branches off, moving inland. The Trans Pennine Trail continues along the coast until it reaches Pleasureland at Southport.
F	Sefton Coast (Seaforth to Crossens)	Public Footpaths	Several public footpaths run from Formby to the shore. These are mostly perpendicular to the coast, and include the Fisherman's Path. This runs from North Formby across the Formby Hills to the sea, cutting across the Sefton Coastal Path.
G	Ribble Estuary	Sefton Coastal Footpath/ Trans Pennine Trail	Both footpaths run along the coast for about 0.5km adjacent to Southport Municipal Golf Course.
G	Ribble Estuary	Public Footpath	A footpath runs along the landwards edge of the marsh from Fiddler's Ferry to Marsh Farm, where it goes inland. There is another section of path which runs across Hesketh Out Marsh, before running along the bank of the River Asland or Douglas.
G	Ribble Estuary	Ribble Way	The Ribble Way crosses the marshes on the north side of the River Asland or Douglas, before running along the banks of the River Ribble through Preston.
G	Ribble Estuary	Lancashire Coastal Way	The Lancashire Coastal Way runs from Freckleton along a tidal inlet on the north bank of the River Ribble. It then goes along the landwards edge of Warton Bank marsh.
H	Lytham Jetty to River Wyre	Lancashire Coastal Way	The Lancashire Coastal Way runs directly along the coast for the whole unit (Lytham to Fleetwood).

Table H4.1: Coastal Paths and Trails			
Unit Code	Unit Name	Footpath	Description
H	Lytham Jetty to River Wyre	National Cycle Network	A cycle path runs along the seafront from Blackpool North Pier to Cleveleys.
I	Wyre Estuary	Public Footpath	A footpath runs along the bank of the Wyre Estuary in several places: Fleetwood, Thornton to Little Singleton, Little Eccleston to Great Eccleston, Out Rawcliffe to Holme Nook, Moors Farm to Hambleton (mid section marked only as 'path' rather than public right of way), Barnaby's Sands to Knott End-on-Sea.
J	Knott End-on-Sea to Heysham	Lancashire Coastal Way	Lancashire Coastal Way runs along the coast from Knott End-on-Sea to Fluke Hall, where it moves inland. It returns to the coast near Cockerham before heading inland at Crook Farm at the mouth of the Lune Estuary.
K	Lune Estuary	Lancashire Coastal Way	Lancashire Coastal Way runs along the bank of the River Lune estuary or across marsh bordering the estuary from Glasson to Carlisle Bridge in Lancaster.
K	Lune Estuary	Traffic-free Cycle Route	The cycle route runs along the bank of the River Lune estuary from Glasson to Aldcliffe.
K	Lune Estuary	Lune Valley Ramble	This path runs along the river bank from the A589 bridge up to Skerton Weir (where it moves away from the bank to pass through the Riverside Park) and beyond.
K	Lune Estuary	Bridleway/ Traffic-free Cycle Route	This runs from the Roman Fort in Lancaster, along the bank of the River Lune, to Skerton Weir and beyond.
J	Knott End-on-Sea to Heysham	Public Footpath	Footpaths run along the bank of the River Lune at Bazil and Sunderland.
L	Heysham to Roa Island	Lancashire Coastal Way	Lancashire Coastal Way runs along the coast from Morecambe to Carnforth. It later runs along the coast at Jenny Brown's Point, and along the landwards edge of the marsh near Bank House Farm.
L	Heysham to Roa Island	Byway Open to All Traffic	Byway runs from the sewage works north of Hest Bank across the sands and the Kent Channel to Kents Bank.
L	Heysham to Roa Island	Public Footpath	A footpath runs along the bank of the River Kent estuary by Arnside Park, Frith Wood and Grubbins Wood.
M	Kent Estuary	Cumbria Coastal Way	This runs along the landwards edge of the marsh on the south side of the estuary for about 1km, before moving inland. It later crosses the River Kent at Levens Bridge and then Sampool Bridge, before returning to the marsh/estuary bank on the north side of the estuary. It moves inland again at Crag Wood, before returning to the coast where the River Winster joins the estuary. It continues along the coast until it reaches the southern end of Kents Bank.
L	Heysham to Roa Island	Cumbria Coastal Way	This runs along the coast for a very short distance (0.25km) at Wyke Farm. It then goes inland, before running along the coast from Cowpren Point to Sand Gate.

Table H4.1: Coastal Paths and Trails			
Unit Code	Unit Name	Footpath	Description
N	Leven Estuary	Byway Open to All Traffic	Byway runs from Crook Wheel over the sand at the mouth of the Leven Estuary, then along Ulverston Canal into Ulverston.
N	Leven Estuary	Cumbria Coastal Way	Cumbria Coastal Way runs along River Leven from Low Wood to Roudsea Wood. It later crosses the estuary at Greenodd, running along the bank of the estuary until it reaches Barrow End Rocks, where it moves inland. It returns to the coast at Plumpton Hall, following the shore until it reaches Canal Foot. It moves inland for a short distance, then goes along the coast from just north of the pumping station near Bardsea to Bardsea itself.
N	Leven Estuary	Public Footpath	Footpaths along Rusland Pool from the normal tidal limit at Crooks Bridge to Pool Foot where the channel joins the Leven estuary.
L	Heysham to Roa Island	Cumbria Coastal Way	This runs along the coast from Bardsea to Roa Island.
O	Walney Island	Cumbria Coastal Way	This runs from Roa Island, around the coast to Salthouse Junction in Barrow. It then moves inland, before returning to the coast at Sowerby Lodge, and running round the seawards edge of Sandscale Haws National Nature Reserve.
O	Walney Island	Cistercian Way	This crosses Walney Channel on the Jubilee Bridge, before running down the east coast of Walney Island to South End Bungalow.
O	Walney Island	Public Footpath	A footpath runs along the west coast of Walney Island from Sandy Gap to Earnse Point. Another footpath crosses Walney Channel north of the Jubilee Bridge.
O	Walney Island	Bridleway	A bridleway crosses Walney Channel north of Jubilee Bridge.
P	Duddon Estuary (Lowsy Point to Hodbarrow Point)	Cumbria Coastal Way	This runs along the coast from the edge of the unit in the south, up to Sand Side. There is also a very short coastal section at Skellow Crag End. On the west side of the Duddon Estuary, there is marsh between the path and the estuary channel, apart from most of the section running from Millom to the edge of the unit.
P	Duddon Estuary (Lowsy Point to Hodbarrow Point)	Bridleway	There are six bridleways which cross Duddon Sands. There is also a byway which runs from just north of Askam in Furness to the carpark south of Roanhead Farm.
Q	Hodbarrow Point to St Bees Head (including Rivers Calder and Ehen)	Cumbria Coastal Way	Cumbria Coastal Way runs along the coast from Hodbarrow Point to Skelda Hill (south of Eskmeals Range) where it moves inland. It crosses the
R	Ravenglass Estuary Complex (Irt,	Bridleways	Bridleways cross the River Esk by the Esk viaduct and further upstream close to the Beacon Plantation.

Table H4.1: Coastal Paths and Trails			
Unit Code	Unit Name	Footpath	Description
	Mite and Esk)		
R	Ravenglass Estuary Complex (Irt, Mite and Esk)	Cumbria Coastal Way	This crosses the River Esk on Muncaster Bridge. It later runs along the river, before running along the coast up to Ravenglass. It crosses the Mite, then moves inland and crosses the Irt at Holme Bridge.
Q	Hodbarrow Point to St Bees Head (including Rivers Calder and Ehen)	Cumbria Coastal Way	This runs along the coast from the carpark west of Drigg station up to St Bees Head.
S	St Bees Head to Grune Point	Cumbria Coastal Way	This follows the coast from St Bees Head to just north of Parton. (However, the footpath is not right on the coast for the whole way-it is landwards of the quarries north of Sandwith and the disused mine by Arrowthwaite. It also goes around the marina and docks in Whitehaven.) The path returns to follow the coast at Harrington for just over 1km, and there are also coastal sections in Workington, south and north of the River Derwent. The path continues along the seafront from just north of Workington, up to Maryport, where it goes inland of the docks. It then returns to the coast until it reaches Silloth, where it goes inland of the docks. The path returns to the coast on the north side of Silloth docks up to Skiburness.
S	St Bees Head to Grune Point	Allerdale Ramble	This runs parallel to the coast from Maryport. It joins the Cumbria Coastal Way at Bank End, and subsequently runs just landwards of mean high water. It then moves inland of the docks at Silloth, before returning to run along the coast up to and around Grune Point.
T	Moricambe Bay	Cumbria Coastal Way	This runs from Skinburness, across Calvo Marsh to Brownrigg, where it moves inland. It later crosses the River Wampool on Whitrigg Bridge.
U	Cardurnock to the Scottish Border (Inner Solway Firth)	Hadrian's Wall Path	This starts in Bowness-on-Solway. It runs directly along the coast for just over 0.5km, before moving slightly inland and running across the edge of the marsh. It then branches inland, just before reaching Westfield Cottage.
U	Cardurnock to the Scottish Border (Inner Solway Firth)	Cumbria Coastal Way/ Hadrian's Wall Path	There run together from Drumburgh across coastal marsh to Dykesfield where they head inland. The Cumbria Coastal Way later runs along the bank of the River Eden from Beaumont to Demesne. It also goes along the bank of the River Esk for a short distance near Metal Bridge.
U	Cardurnock to the Scottish Border (Inner	Public Footpaths	There are two paths which head out onto Burgh Marsh. Another path runs along the west bank of the River Eden, from Beaumont to just past Casson Dyke Farm. There is also a path which circuits Demesne Marsh.

Table H4.1: Coastal Paths and Trails			
Unit Code	Unit Name	Footpath	Description
	Solway Firth)		

Details on Named Paths and Trails

Amongst the long distance routes which run along the coast are parts of the Trans Pennine Trail, the Cumbria Coastal Way and Hadrian's Wall Path. This section provides a few details on the named paths in Table I.1.

Starting in Wales, the North Wales Path is 60 miles (96km) long, and runs from Bangor to Prestatyn². It has sections which are directly on the coast in SMP2 units A and B.

The Trans Pennine Trail, which has coastal sections in SMP2 units E and F, runs 215 miles (346km) from Southport to Hornsea³. There are also additional sections joining Leeds and Chesterfield, as well as a route to York. The Trail is set up for walking, horse riding and cycling, and is consequently an important part of the National Cycle Network. For some of its length, the Trans Pennine Trail runs concurrently with the Mersey Way. This is a 22 mile (35km) path which runs from Rixton to Garston, along the Mersey River and Estuary⁴.

The Sefton Coastal Way runs for 21 miles (34km) from Waterloo Station to Crossens, Merseyside⁴. The route goes through dunes, marshes, nature reserves and several towns, and has sections which are directly along the coast in SMP2 units F and G. For parts of the way the route runs with the Trans Pennine Trail.

The Ribble Way, which follows the course of the River Ribble, is 70 miles (112km) long and starts at Longton⁵ in SMP2 unit G: Ribble Estuary. Within Lancashire, there is also the Lancashire Coastal Way. This has parts which are directly on the coast in SMP2 units G, H, J, K and L. The footpath is 137 miles (219km) long and runs from Freckleton to Silverdale⁵. Also starting in Lancashire is the Lune Valley Ramble, which runs for 16.5 miles (26.5km) from Lancaster to Kirby Lonsdale⁴. This features in SMP2 unit K: Lune Estuary, where it runs along the bank of the River Lune in central Lancaster.

Moving north, the Cumbria Coastal Way runs from the Lancashire/Cumbria boundary up to the Scottish border⁶. It is 182 miles (298km) long and runs directly along the coast for much of this length, as shown by Table I.1. The Cistercian Way can also be found in Cumbria. It is on the coast in SMP2 unit O, where it starts from South End Bungalow on Walney Island, runs up the eastern coast, and then crosses Jubilee Bridge into Barrow in Furness, where it joins the Cumbria Coastal Way.

² Sourced from www.walking.visitwales.com/server.php?show=nav.00k003002008

³ Sourced from the Trans Pennine Trail website: www.TransPenninetrail.org.uk/

⁴ Sourced from The Long Distance Walkers Association website: www.ldwa.org.uk/index.php

⁵ Sources from Lancashire County Council: www.lancscc.gov.uk

⁶ Sourced from www.english-lakes.com/cumbria_coastal_way.htm

The Allerdale Ramble features in SMP2 unit S: St Bees Head to Grune Point. It is around 54 miles (87km) long, and has a coastal stretch from Maryport up to Grune Point in the Solway Firth⁴. For part of this distance, it runs with the Cumbria Coastal Way.

In SMP2 unit U: Cardurnock to the Scottish Border, part of Hadrian's Wall Path runs along the coast. This is an 84 mile (135km) route which follows the course of Hadrian's Wall through Cumbria and Northumberland⁷. Using a people counter and data from other trails, it is estimated that over 7,000 long distance walkers used the Hadrian's Wall Path in 2007⁸.

Railways

Introduction

Along parts of the North West coast, the railway line runs parallel to the shore. Consequently, it is vulnerable to coastal change. This section presents information on the location and usage of coastal railway line within the North West SMP2 area.

Units with Coastal Railway

Table H4.2 starts in the south of the NW SMP2 area and moves north, detailing the sections of railway line which are on the coast. Although there are a few isolated lengths of coastal railway in SMP2 units C, L, M, P and R, and viaducts in SMP2 units N, P and R, the main sections of interest can be found in units Q (Hodbarrow Point to St Bees Head) and S (St Bees Head to Grune Point). These units include part of the Cumbrian Coast Line, which runs from Barrow-in-Furness to Carlisle.

Location of Line (Station to Station)	Description	Unit Code	Unit Name
Prestatyn to Flint	About 3km of railway is directly along the coast, between Tan-ian and Mostyn Quay.	C	Dee Estuary
Morecambe to Carnforth	Railway is inland except for around 0.5km where the line runs along the coast, adjacent to Hest Bank. The Lancashire Coastal Way (footpath) is seawards of the line, but this is along the marsh and sand/shingle.	L	Heysham to Roa Island
Arnside to Grange-over-sands	Railway goes over Kent viaduct then follows coast, inland of marsh, except for around 1km where line runs directly along the coast.	M	Kent Estuary
Grange-over-sands to Kents Bank	Railway follows the coast round. A footpath (Cumbria Coastal Way) is seawards of the line for part of the distance.	L	Heysham to Roa Island
Kents Bank to Cark and Cartmel	Railway is inland except for about 0.75km where line is directly on coast, just outside of Kents Bank station.	L	Heysham to Roa Island

⁷ Sourced from Visit Cumbria: www.visitcumbria.com/car/hadwall.htm

⁸ Sourced from Economic Impact Study and Trail User Analysis 2003-2007, downloaded from National Trails Internet Site, www.nationaltrail.co.uk

Table H4.2: Location of Coastal Railway Line			
Location of Line (Station to Station)	Description	Unit Code	Unit Name
Cark and Cartmel to Ulverston	Railway is inland of marshes, before going over Leven Viaduct then heading inland to Ulverston.	N	Leven Estuary
Roose via Barrow-in-Furness to Askam	Railway is inland except where it borders Cavendish Dock.	O	Walney Island (also part of P: Duddon Estuary)
Askam to Kirkby-in-Furness	Railway is along coast for about 1.5km. Cumbria Coastal Way is seawards of line but runs along marsh.	P	Duddon Estuary (Lowsey Point to Hodbarrow Point)
Kirkby-in-Furness to Foxfield	Railway is mostly inland (partly across marsh) except for less than 0.5km near Foxfield.	P	Duddon Estuary (Lowsey Point to Hodbarrow Point)
Foxfield to Millom	Railway is inland apart from viaduct over Duddon Estuary.	P	Duddon Estuary (Lowsey Point to Hodbarrow Point)
Bootle Station (Hycemoor) to Ravenglass	Railway is inland except for viaduct over River Esk and 0.5km near Ravenglass where line is directly along coast.	R	Ravenglass Estuary Complex (Irt, Mite and Esk)
Ravenglass to Drigg	Railway is inland apart from viaduct over River Mite. Section also includes Irt Viaduct.	R	Ravenglass Estuary Complex (Irt, Mite and Esk)
Seascale to St Bees	The railway is directly along the coast. However, there is a spit between the line and the sea at Sellafield. The Cumbria Coastal Way is seawards of the line but is along the sand/sand and shingle. Section includes River Ehen and River Calder viaducts.	Q	Hodbarrow Point to St Bees Head (including Rivers Calder and Ehen)
Whitehaven to Workington	The railway is directly along the coast except when nearing Workington. Sand, shingle, rocky outcrops and loose rock are between the railway line and sea.	S	St Bees Head to Grune Point
Workington to Maryport	The railway is along the coast except for around 2.5km on leaving Workington and about 1.5km when nearing Maryport Station. The Cumbria Coastal Way is along the shore, seawards of the line.	S	St Bees Head to Grune Point

Travel on Coastal Railway Line

Coastal change is already an issue for railway lines in the NW SMP2 area. For example, the Lancashire and Cumbria Route Utilisation Strategy (Network Rail, 2008a) reports that rail infrastructure in the region is relatively expensive, partly due to the viaducts and sea defences required. The next two sections provide further details on the freight and passenger traffic on the affected routes.

Passenger Travel

The Lancashire and Cumbria network has about 10.2 million passengers per year, with the Cumbrian Coast line having 18% of these journeys (Cumbria County Council, ND). The Cumbrian Coast line is 85 miles long, with 25 intermediate stations (Department for Transport, 2007). There is single track north of Sellafield (towards Whitehaven) and double track to the south (towards Ravenglass and Barrow). Considering passenger usage for 2005/06, there were 5,800 daily passenger trips on the Cumbrian Coast line, of which 2,100 were entirely within the section and did not extend into other parts of the railway network (Network Rail, 2008a). Passenger sampling carried out between Barrow and Carlisle discovered that out of those travelling (Department for Transport, 2007):

- 52% were in full time employment;
- 13% were in part time employment;
- 9% were students;
- 10% were unemployed;
- 15% were retired; and
- 1% were classified as 'other'.

Most passengers are commuters travelling to Barrow-in-Furness, Carlisle and Sellafield (Department for Transport, 2007). Indeed, the top 15 used stations in the Lancashire and Cumbria area include Barrow-in-Furness, Sellafield, Millom, Whitehaven and Ulverston (Cumbria County Council, ND). The area's top 20 flows include Workington to Carlisle, Millom to Barrow and Barrow to Sellafield (Cumbria County Council, ND).

Freight Travel

Several of the sections of coastal railway line named in the Table 1.1 are used for freight transport. Of particular importance is the Cumbrian Coast Line, which incorporates Sellafield station, and serves the nuclear site. BNFL Sellafield supports over 12,000 direct jobs, and has 36% of the UK's civil nuclear industry (Britain's energy coast™/ a Masterplan for West Cumbria). The West Cumbria area as a whole has the world's single largest concentration of nuclear facilities, with the result that the nuclear industry provides around 40% of the area's GVA (Northwest Regional Development Agency, ND). The Cumbrian Coast Line is used for freight traffic from Sellafield (Lumley, 2007), as well as petroleum and other cargoes (Cumbria County Council, ND). For example, Direct Rail Services Ltd carries nuclear material to and from Sellafield and Drigg, including freight from Heysham Power Station in SMP2 unit J: Knott End-on-Sea to Heysham (Network Rail, 2008a). Freight movement between Carlisle, Workington Docks and Dalston is also important (Network Rail, 2008b).

Development of the Line: Investment

There has been recent investment in coastal railway covered by the North West SMP. For example, a new freight connection is being developed in Workington (SMP2 unit S: St Bees Head to Grune Point) for a paper plant company (Network Rail., 2008a). There is also the potential for the construction of a new connection to serve quarrying in Millom (ibid). In addition, a £14 million refurbishment was carried out on the Leven Viaduct (SMP2 unit N: Leven Estuary) in 2006 (Lumley, 2007). The viaduct joins the section of line between Cark and Cartmel station and Ulverston. The repairs were carried out because the line was seen as a "vital link" to the local economies, carrying both passengers and freight (Lumley, 2007).

Development of the Line: Growth

The Cumbrian Coast line has experienced growth of 11% in the past 10 years (Cumbria County Council, ND). The Lancashire and Cumbria Route Utilisation Strategy (Network Rail, 2008a) reported that there was overcrowding on peak services into Sellafield. However, service changes from December 2008 were expected to partially deal with this issue (Network Rail, 2008a). The Strategy also noted that rail services would need to be reviewed if employment patterns and hence commuter requirements at Sellafield changed (Network Rail, 2008a). This highlights the relationship between the nuclear plant and the railway. The growth or decline of businesses in the areas also affects the level of freight traffic. For example, there used to be a considerable level of freight traffic from the Corus steelworks at Workington (Network Rail, 2008b).

Commuters and freight traffic are not the only drivers which lead to service alterations. Tourism is also important. An article published by Cumbria County Council⁹ reports a joint initiative between the council and Northern Rail, which involved funding for extra carriages on the Barrow-in-Furness to Carlisle route during the summer of 2007. The article also reports that 0.75 million people use the route each year, with summer being busiest with people travelling to west coast destinations and Ravenglass for L'al Ratty Line.

In North Wales, a North Wales Coast Line user group is currently being set up in Flint¹⁰. This aims to support the coastal railway in North Wales. This includes the coastal section between Prestatyn and Flint which falls within SMP2 Unit C: Dee Estuary.

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Roads

⁹ Article entitled: '16/8/2007 – Bums on seats for Cumbrian train line', available at www.cumbria.gov.uk/news/2007/august/16_08_2007-165203.asp.

¹⁰ Article entitled: North Wales Coast Line user group launched in Flint, dated 16/03/2009, available from the Daily Post at <http://www.dailypost.co.uk/news/north-wales-news/2009/03/16/north-wales-coast-line-user-group-launched-in-flint-55578-23151551/>.

Introduction

Along parts of the North West coast, main roads run parallel to the shore. Consequently, they are vulnerable to coastal change. This section presents information on the location and types of coastal road within the North West SMP2 area.

Units with Coastal Road

Table H4.3 provides a breakdown of the type and location of coastal road within the North West SMP2 area. Roads are categorized as A, B, unclassified, or track/drive, according to Ordnance Survey maps.

Table H4.3: Coastal Roads by SMP2 Unit			
Unit Code	Unit Name	Road	Description
A	Great Orme to Little Orme	Unclassified	Unclassified road (generally <4m wide) around Great Orme's Head is directly on coast for short (<1km) section by Llandudno pier.
A	Great Orme to Little Orme	A546/B5115	Around 2.5km of road is along the seafront in Llandudno Bay/Ormes Bay. There is a promenade between the road and sea for much of this length.
B	Little Orme to Point of Ayr	Unclassified	Unclassified road (generally >4m wide) follows the seafront from Penrhyn Bay to Tan-y-Lan. There is a cycle way between the road and the sea.
B	Little Orme to Point of Ayr	A55	A55 runs parallel to the sea but is landwards of a cycle route, railway or other road so is not directly on the coast.
C	Dee Estuary	A548	A548 crosses River Dee at Connah's Quay.
C	Dee Estuary	B5134	B5134 runs along the edge of the marsh in Neston for about 1 km.
D	Hilbre Point to Perch Rock (North Wirral)	Unclassified	Unclassified (generally >4m wide) road runs along the seafront in Hoylake for about 2.5km.
D	Hilbre Point to Perch Rock (North Wirral)	A554	A554 runs directly along the seafront for about 1.5km in New Brighton, Wallasey.
E	Mersey Estuary	A5036	A5036 runs along the north side of the estuary in Bootle, in-between the estuary itself and the docks.
F	Sefton Coast (Seaforth to Crossens)	Unclassified	Unclassified road (generally >4m wide) parallel to seafront for about 1 km in Blundellsands.
F	Sefton Coast (Seaforth to Crossens)	Unclassified	Unclassified road (generally >4m wide) runs along the sand dunes parallel to the sea from Ainsdale-on-Sea to Southport (about 5.5km).
G	Ribble Estuary	Unclassified	Unclassified road (generally >4m wide) runs directly along the seafront for about 3km and across marsh for about 2.5km.
G	Ribble Estuary	A59	A59 crosses River Ribble estuary in Preston.
H	Lytham Jetty to River Wyre	Unclassified	Unclassified road (generally >4m wide) runs along the seafront for about 3.5km in Lytham St Annes.
H	Lytham Jetty to River Wyre	A548	A548 runs along the seafront for most of the Blackpool frontage (about 12km).

H	Lytham Jetty to River Wyre	Unclassified	Unclassified road (generally >4m wide) runs along the shore for about 1.5km in Cleveleys.
H	Lytham Jetty to River Wyre	Track/Drive	Track/drive (promenade) with Lancashire Coastal Way runs along the seafront from Cleveleys to Fleetwood for about 6km.
I	Wyre Estuary	A588	A588 crosses River Wyre Estuary on Shard Bridge south of Hambleton.
J	Knott End-on-Sea to Heysham	B5270	B5270 runs along seafront for about 0.5km in Knott End-on-Sea.
J	Knott End-on-Sea to Heysham	Unclassified	Unclassified road (generally <4m wide) runs along the coast for about 1km at Bank Houses.
K	Lune Estuary	B5290	B5290 runs between marina/Lancaster Canal and marsh for about 1km in Glasson.
K	Lune Estuary	A589	A589 crosses River Lune in Lancaster and runs along the bank for about 1km.
K	Lune Estuary	A6	A6 crosses River Lune in Lancaster on Skerton Bridge.
K	Lune Estuary	Unclassified	Unclassified road (generally >4m wide) runs along bank of River Lune in Lancaster for <2km.
K	Lune Estuary	Unclassified	Unclassified road (generally >4m wide) runs along bank of River Lune for about 0.5km by Oxcliffe Hill.
J	Knott End-on-Sea to Heysham	Unclassified	Unclassified road (generally <4m wide) runs across Lades Marsh from Overton to Sunderland for <2km.
L	Heysham to Roa Island (also includes units M and N)	A589	A589 runs directly along the coast in Morecambe for <1.5km.
L	Heysham to Roa Island (also includes units M and N)	A5105	A5105 runs directly along the coast at the edge of Morecambe for <2km.
L	Heysham to Roa Island (also includes units M and N)	Unclassified	2 sections of unclassified road (generally <4m wide) run directly along the coast by Bolton-le-Sands.
L	Heysham to Roa Island (also includes units M and N)	Unclassified	Unclassified road (generally <4m wide) runs along bank of River Keer and across sand dunes for about 1km in Carnforth.
M	Kent Estuary	B5282	B5282 runs along the shore in Arnside by the Kent viaduct for >0.5km.
M	Kent Estuary	B5282	B5282 runs along the edge of the estuary for about 1.5km in Sandside.
M	Kent Estuary	Unclassified	Unclassified road ('Marsh Road') (generally <4m wide) runs along the edge of the marsh from Weir on River Bela for about 1km.

M	Kent Estuary	A6	A6 crosses River Kent at Levens Bridge (A590 crosses River Gilpin at Sampool Bridge).
M	Kent Estuary	A590	A590 crosses River Gilpin at Sampool Bridge.
N	Leven Estuary	B5278	B5278 crosses River Leven at Haverthwaite.
N	Leven Estuary	A590	A590 runs along the edge of River Leven estuary for about 1.5km at Greenodd.
L	Heysham to Roa Island (also includes units M and N)	A5087	A5087 runs along the edge of the coast for <1km just south of Bardsea.
L	Heysham to Roa Island (also includes units M and N)	A5087	A5987 runs directly along the coast for just over 4km from Newbiggin to the roundabout outside Rampside.
L	Heysham to Roa Island (also includes units M and N)	Unclassified	Unclassified road (generally >4m wide) runs along coast in Rampside and to Roa Island (Roa Island Road) for about 2km.
O	Walney Island	Unclassified	Unclassified road (generally <4m wide) runs along coast from Wylock Marsh to Scar End Point (about 1.5km), providing access to South End Bungalow and South End.
O	Walney Island	Unclassified	Unclassified road (generally >4m wide) (Mawflat Lane) runs along marsh on Walney Island for about 1.5km.
O	Walney Island	Unclassified	Unclassified road (generally >4m wide) (Carr Lane) runs along the landwards edge of the marsh from Biggar for about 2km until it joins the A590.
O	Walney Island	A590	A590 runs along the coast for <0.5km in Vickerstown before crossing Jubilee Bridge to Barrow Island.
O	Walney Island	Unclassified	Unclassified road (generally >4m wide) runs along coast through Vickerstown and North Walney for just over 1km.
P	Duddon Estuary (Lowsy Point to Hodbarrow Point)	N/A	No roads running along the coast.
Q	Hodbarrow Point to St Bees Head (including Rivers Calder and Ehen) (also includes unit R)	Unclassified	Unclassified road (>4m wide) runs along the coast for <0.5km at Marshside Cottages.
R	Ravenglass Estuary Complex (Irt,	Unclassified	Unclassified road (>4m wide) runs around the coast in Ravenglass for about 0.25km.

	Mite and Esk)		
R	Ravenglass Estuary Complex (lrt, Mite and Esk)	A595	A595 crosses River Esk at Muncaster Bridge.
Q	Hodbarrow Point to St Bees Head (including Rivers Calder and Ehen) (also incorporates unit R)	B5344	B5344 runs along the coast for a short distance (around 0.25km) at Seascale.
S	St Bees Head to Grune Point	A597	A597 crosses River Derwent at Cloffocks
S	St Bees Head to Grune Point	B530	B530 runs parallel to the coast from Bank End up to Cuning Hill (south of Silloth) where it moves inland. For some of this stretch, the road is directly along the coast, for example at Swarthy Hill, by Seacroft Farm and in Beckfoot.
S	St Bees Head to Grune Point	Unclassified	Unclassified road (generally >4m wide) runs directly along the coast for about 0.75km between Silloth and Skinburness.
T	Moricambe Bay	Unclassified	Around 1.5km of the unclassified road (generally >4m wide) running from Anthorn to Cardurnock is directly on the coast.
T	Moricambe Bay	Unclassified	Unclassified road from Angerton to Whitrigg crosses estuary at Whitrigg Bridge.
T	Moricambe Bay	B5307	B5307 crosses River Wampool on Howwath Bridge at Whitrigglees.
U	Cardurnock to the Scottish Border (Inner Solway Firth)	Unclassified	Unclassified road (generally >4m wide) runs along the seafront in Bowness-on-Solway for about 0.75km.
U	Cardurnock to the Scottish Border (Inner Solway Firth)	Unclassified	Unclassified road (generally >4m wide) from Drumburgh to Boustead Hill runs across Burgh Marsh for about 1km.
U	Cardurnock to the Scottish Border (Inner Solway Firth)	Unclassified	Unclassified road (generally <4m wide) runs along bank of River Eden for <0.5km near Rockcliffe.
U	Cardurnock to the Scottish Border (Inner Solway Firth)	A74(T)	A74(T) crosses River Esk at Metal Bridge.

Although the majority of coastal roads are unclassified ones, these provide access for local communities and are likely to be the only routes in some cases. For example, Roa Island Road (SMP2 unit L: Heysham to Roa Island) is the only road to the properties and lifeboat station on Roa Island. In other cases, loss of coastal roads would lead to lengthy diversions. If the Anthorn to Cardurnock road in SMP2 unit T: Moricambe Bay was lost, the diversion would be considerable.

There are several locations where classified roads run directly along the coast. For example, the A548 travels along the seafront in Blackpool, whilst the B5270 is on the coast in Knott End-on-Sea.