Medway Estuary and Swale Shoreline Management Plan SMP

Appendix H – Economic Appraisal and Sensitivity Testing

Contents Amendment Record

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Appendix H: Economic Appraisal and Sensitivity Testing

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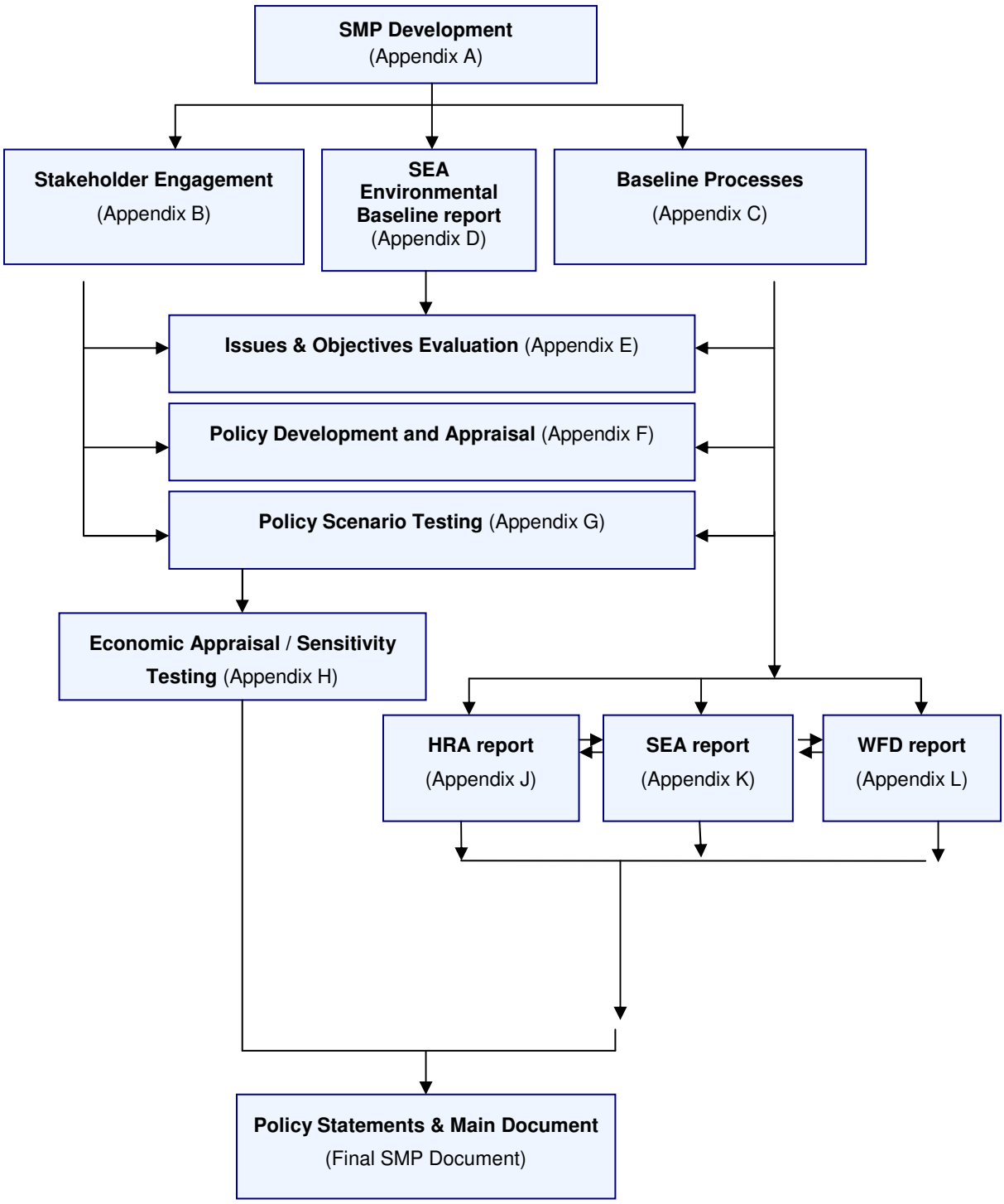
The Supporting Appendices

This appendix 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: SMP 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 (natural environment, landscape character, historic environment, land use, infrastructure and material assets, and population and human health).
E: Issues & Objective Evaluation	Provides information on the issues and objectives identified as part of the Plan development, including appraisal of their importance.
F: Initial Policy Appraisal & Scenario Development	Presents the consideration of generic policy options for each frontage, identifying possible acceptable policies, and their combination into 'scenarios' for testing.
G: 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: Metadatabase and Bibliographic database	All supporting information used to develop the SMP is referenced for future examination and retrieval.
J: Habitat Regulations Assessment	Presents an assessment of the effect the plan will have on European sites.
K: Strategic Environmental Assessment	Presents the Strategic Environmental Assessment of the Plan.
L: Water Framework Compliance	Presents a retrospective Water Framework Directive Assessment.

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



H1 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 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,
- Of marginal viability (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 alone; as impacts on other benefits may be considered more important (e.g. Holding existing defences to sustain a designated habitat). Any policies where this is the case may not be considered economically efficient under current Treasury guidance.

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 SMP.

H2 Use of existing information

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

- National Property Dataset – for property locations;
- http://www.upmystreet.co.uk/ - for property prices;
- Defra Agricultural Land Values (2006) – for agricultural land values;
- SMP Guidance – for defence costs;
- Futurecoast (Defra 2002) – for guidance on erosion rates; and,
- Environment Agency Indicative Floodplain – for indicative flood mapping.

H3 Generation of new data

As there is very limited existing information that can be used directly to confirm robustness of the SMP policy, new economic data has been derived through application of the Modelling and Decision Support Framework (MDSF) tool (which consists of a customised GIS (ESRI ArcView) and a data management toolkit). 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 shoreline interactions and responses (**Appendix C**).

H3.1 DETERMINING DAMAGES AND BENEFITS

The benefits are the damages averted or deferred by the Preferred Plan, i.e. the difference in losses between implementing this 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 used for this SMP are estimates (see **Appendix C**) as no site specific erosion data is available for either the Medway or Swale estuaries. As such, erosion losses calculated by MDSF are indicative and therefore should be used 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 areas 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 only, based on damages within Flood Cells. It should be noted that along a number of frontages, one Flood Cell covers multiple policy units. For plan wide cost benefit analysis. benefits for these flood cells have been shared and the costs aggregated across Policy Units to avoid double counting.

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 SMP 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 only on the basis of residential and commercial property values. Other assets, such as utilities, highways, and intangibles, such as recreation, and other impacts upon the local economy or environment, have not been valued or included. Exclusion of these factors will robustly confirm economic viability, as these would provide

added value. Losses and Benefits have been calculated using MDSF. This was populated with data from a national property database. The database 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. The remaining properties are assumed to be residential and current average residential property prices are obtained from www.upmystreet.co.uk, which provides property price statistics by postcode.

Using the 20, 50 and 100 year erosion contours, MDSF has been used 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 the revised Shoreline Management Plan Guidance[1]. This suggests average replacement costs for linear structures (e.g. revetments, seawalls) as £2.7million/km and costs for beach management schemes at £5.1million/km. Replacement costs for Groynes, embankments and other ''low cost'' defence types are taken as £0.6million/km.

Maintenance costs have been taken from the Defra National Appraisal of Defence Needs And Costs (NADNAC) study[2]. This used annual maintenance costs for linear structures and for groyne fields at £10,000/km, and for beach schemes £20,000/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 and revetments; every 50 years for beach schemes; and every 30 years for groynes and embankments. However, these periods may become more frequent for areas where erosion potential is high, e.g. on the outside of meanders and in confined channel locations. Maintenance has been assumed to be the same rate every year throughout the life of the scheme. In reality, this will be less in the early years and will increase in later

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

[2] Defra (2004) NADNAC National Appraisal of Defence Needs and Costs Study.

years of the scheme's life. However, for the broad brush appraisal undertaken for the SMP this will make no difference to decisions.

Allowance has also been made for the increase in costs due to climate change, 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.

Optimism bias in accordance with most recent Defra guidelines was finally applied to all costs (at 60%) to reflect uncertainty in broad level analysis at the SMP scale.

H3.1.3 Methodology for calculating agricultural land prices

Agricultural land values were calculated from land prices obtained from Defra (2006a)[3] Agricultural land sales and prices in England, Quarter End 31st December, 2006. For each agricultural grade a unique value (£ per ha) has been assigned according to Table 1 below.

[3] Defra 2006a National Statistics: Agricultural Land Sales and Prices in England. http://statistics.defra.gov.uk/esg/statnot/alp.xls

Table H1: Agricultural Land Sales in England, by Class (Defra, 2006a)

Year	Predominant Grade of Land														
	1 and 2			3			4 and 5			Not graded			All Grades		
	Number of sales	Area Sold (Ha)	Average Price (£ per Ha)	Number of sales	Area Sold (Ha)	Average Price (£ per)	Number of sales	Area Sold (Ha)	Average Price (£ per)	Number of sales	Area sold (Ha)	Average Price (£ per)	Number of sales	Area sold (Ha)	Average Price (£ per Ha)
1993	399	14,470	3,617	1,723	51,517	3,927	747	10,146	3,654	93	2,475	2,539	2,689	78,607	3,791
1994	370	13,104	4,614	7,850	57,954	4,429	506	13,333	3,211	85	2,185	2,832	2,811	86,576	4,229
1995	425	16,778	5,144	1,862	53,329	5,473	462	17,930	2,677	113	3,335	3,397	2,862	91,371	4,788
1996	585	21,679	6,798	2,236	66,742	6,396	485	14,410	3,700	119	2,912	4,474	3,425	105,743	6,058
1997	552	19,131	7,348	2,881	80,883	7,217	592	20,160	3,135	162	4,666	3,738	4,187	124,840	6,448
1998	488	15,016	6,974	2,340	69,356	6,569	545	15,653	4,066	125	3,777	3,384	3,498	103,802	6,134
1999	489	16,319	7,354	2,384	58,566	7,313	483	13,384	4,043	81	3,266	2,576	3,437	91,534	6,673
2000	462	12,365	6,948	2,189	52,587	7,589	489	11,854	5,266	87	1,696	5,029	3,227	78,502	7,082
2001	391	13,313	7,072	1,794	43,832	7,904	354	7,132	5,297	64	1,105	5,271	2,603	65,383	7,406
2002†	397	12,524	6,696	2,067	50,444	7,610	477	11,642	4,848	88	2,877	4,158	3,029	77,487	6,915
2003†	315	11,036	7,043	1,700	40,346	7,659	375	11,093	6,143	69	2,387	4,325	2,459	64,861	7,172
2004†	205	6,275	7,256	1,077	23,713	8,289	244	5,973	6,572	44	1,674	4,016	1,570	37,634	7,654

Defra, 2006a also assigns a unique value (£ per Ha) for agricultural land in the south-east of England as shown in Table 2.

Table H2: Agricultural Land Sales in England, by Government Office Region (Defra, 2006a).

	South East			South West			England		
Year	Number of Sales	Area Sold (Ha)	Average Price (£ per Ha)	Number of sales	Area Sold (Ha)	Average Price (£ per Ha)	Number of Sales	Area Sold (Ha)	Average Price (£ per Ha)
1993	*383*	*10,399*	*4,576*	*627*	*14,662*	*3,689*	*2,689*	*78,607*	*3,791*
1994	*457*	*13,843*	*4,908*	*559*	*13,196*	*4,115*	*2,811*	*86,576*	*4,229*
1995	*391*	*10,803*	*5,947*	*621*	*14,791*	*4,889*	*2,862*	*91,371*	*4,788*
1996	*506*	*13,412*	*6,845*	*693*	*16,089*	*6,.067*	*3,425*	*105,743*	*6,058*
1997	*524*	*13,973*	*7,866*	*1,019*	*24,102*	*7,158*	*4,158*	*124,840*	*6,448*
1998	*426*	*10,031*	*8,277*	*856*	*18,927*	*6,775*	*3,498*	*103,802*	*6,134*
1999	*382*	*9,899*	*7,880*	*890*	*20,817*	*6,912*	*3,437*	*91,534*	*6,673*
2000	*321*	*8,183*	*8,584*	*922*	*18,930*	*7,870*	*3,227*	*78,502*	*7,082*
2001	*298*	*7,370*	*8,190*	*695*	*14,422*	*9,241*	*2,603*	*65,383*	*7,406*
2002†	*301*	*7,469*	*9,082*	*738*	*14,897*	*7,954*	*3,029*	*77,487*	*6,915*
2003†	*289*	*7,482*	*9,285*	*669*	*13,889*	*8,944*	*2,459*	*64,861*	*7,172*
2004†	*123*	*3,469*	*9,999*	*454*	*9,757*	*8,605*	*1,570*	*37,634*	*7,654*

Therefore a combination of these two values was used to determine the average value of land, Grades 1, 2, 3, 4 and no grade, in the south-east of England. For example:

Average cost of land in England = £7654 / ha

Average cost of land in south-east England = £9999 / ha

Therefore land in south-east England is 31% more expensive than average England prices.

In accordance with the guidance in the Multi-Coloured Manual (2005)[4], the values of land are multiplied by a factor of 0.65 to remove the cost of subsidies. As these figures are 2004 figures, inflation was added to bring the figures up to date (2007). The Bank of England inflation rates were checked and 3% per year was added for 2005, 2006 and 2007. Table 3 below illustrates the results.

[4] Flood Hazard Research Centre (2005) Multi-Coloured Manual. University of Middlesex.

Table H3: land values used to calculate 'financial loss' (Note: The figures in the end column were used to assign values in the economic assessment, to agricultural land losses due to flooding and erosion and to Managed Realignment.)

Grade	Ave price per hectare (£ per ha) 2004	Average price (£ per ha) for south east England 2004	Price (£ per ha) multiplied by 0.65 to remove the cost of subsidies	Price (£ per ha) updated to 2007 base date (3% pa) (3 pa ha)
1 & 2	7256	9479	6161	6733
3	8289	10829	7039	7691
4&5	6572	8586	5581	6098
no grade	4016	5246	3410	3726

H3.2 Comparison of costs and benefits

As this review is not a full economic assessment, a formal benefit-cost assessment using benefit-cost ratios (BCR) has not been conducted; rather, the information available has been used to 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 in some instances to be able 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% thereafter.

For calculation of PV damages/damages, the approximate timing of property losses has been determined using MDSF and corresponding discount factors applied accordingly. For calculation of PV costs for defence replacement, the average discount factor for each epoch has been used, the actual timing of works being uncertain at present. The year-on-year maintenance PV costs have been calculated using the total of the discount rates for that epoch.

The figures generated for this SMP are presented only in CV in **Section H4**, reflecting the 'broad-scale' nature of the assessments undertaken. However, for further information, the PV of these figures are presented in **Annex H1** (for benefits/damages) and **Annex H2** (for costs).

H3.3 Sensitivity assessments

At selected locations, the economic viability of alternative defence policies has been assessed as a sensitivity case, where the alternative is potentially economically viable (see **Section H4** and **Annex H2**).

H4 Economic appraisal summary tables

The Tables 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. Example Managed Realignment costs are based on the capital value and maintenance costs of a set back embankment (the example extents used in these calculations are mapped in **Annex H4** and costs for realigned revetments are included in **Annex H2**). 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.

Table H4.A summarises the cost benefit of each policy and the plan as a whole. Table H4.B provides more detailed information and discussion on the cost and benefit build up for each policy.

Table H4.A High Level Economic Appraisal Summary: Cost Benefit for Each Policy & Whole SMP

	Policy	**Policy**	**Policy**	**Cost (£M)**	**Cost (£M)**	**Cost (£M)**	**Cost (£M)**	**Benefits (£M)**	**Benefits (£M)**	**Benefits (£M)**	**Benefits (£M)**	**CBR**
Policy Unit	Epoch 1	Epoch 2	Epoch 3	Epoch 1	Epoch 2	Epoch 3	**Total**	Property (F&E)	Agri	Undefended	**Total**	
E401	HTL	HTL	HTL	2.08	35.16	16.8	**54.04**	132	0.7	0	**132.7**	**2.5**
E402	MR&HTL	MR&HTL	MR&HTL	3.04	8.64	21.6	**33.28**	134	0.7	0.03	**134.67**	**4.0**
E403	HTL	HTL	HTL	1.92	21.6	22.4	**45.92**					
E404	MR&HTL	MR&HTL	MR&HTL	1.95	10.99	12.64	**25.58**	149	0.1	0	**149.1**	**2.1**
E405	NAI	NAI	NAI	0	0	0	**0**	0	0	0	**0**	**0.0**
E406	HTL	HTL	HTL	12	40.08	19.2	**71.28**	237.4	0.06	0	**237.46**	**3.3**
E407	HTL	HTL	HTL	4.5	4.2	10.4	**19.1**	29.2	0.05	0	**29.25**	**1.5**
E408	MR&HTL	MR&HTL	MR&HTL	4.6	14.3	19.8	**38.7**	302.5	0.2	0.02	**302.68**	**7.8**
E409	HTL	MR&HTL	MR&HTL	7.8	10.03	24.9	**42.73**	293.2	0.16	0.01	**293.35**	**6.9**
E410	HTL	MR&HTL	MR&HTL	16.2	16	33	**65.2**	103.2	0.08	0.02	**103.26**	**1.6**

Policy Unit	Policy	Policy	Policy	Cost (£M)	Cost (£M)	Cost (£M)	Cost (£M)	Benefits (£M)	Benefits (£M)	Benefits (£M)	Benefits (£M)	CBR
	Epoch 1	Epoch 2	Epoch 3	Epoch 1	Epoch 2	Epoch 3	**Total**	Property (F&E)	Agri	Undefended	**Total**	
E411	MR	MR	MR	3.6	6.1	13.3	**23**	1.05	0.07	0.03	**1.09**	**0.0**
E412	HTL	HTL	HTL	2.2	48.7	11.2	**62.1**	414.55	0.02	0	**414.57**	**6.7**
E413	HTL	HTL	HTL	1.4	29.6	6.8	**37.8**	336.1	0.07	0	**336.17**	**8.9**
E414	MR&HTL	MR&HTL	MR&HTL	1.1	18.7	5.6	**25.4**	96.6	0.07	0.003	**96.667**	**3.8**
E415	HTL	HTL	HTL	3.8	55.3	18.2	**77.3**	97.4	0.17	0.02	**97.55**	**1.3**
E416	NAI	NAI	NAI	0	0	0	**0**	0	0	0	**0**	**0.0**
E417	MR&HTL	MR&HTL	MR&HTL	2.1	13.8	9.3	**25.2**	15.9	0.09	0.005	**15.985**	**0.6**
E418	MR	NAI	NAI	0.22	0	0	**0.22**	0.2	0.012	0.004	**0.208**	**0.9**
E419	NAI	NAI	NAI	0	0	0	**0**	0	0	0	**0**	**0.0**
E420	MR	MR	MR	39.2	9	20.8	**69**	17.3	0.4	0.05	**17.65**	**0.3**
E421	HTL	HTL	HTL	1.2	26.1	6	**33.3**	21.4	0.16	0	**21.56**	**0.6**
E422	HTL	HTL	HTL	1.9	41.8	9.6	**53.3**	567.5	0.5	0	**568**	**10.7**
E423	HTL	MR&HTL	MR&HTL	5.8	64.3	42.2	**112.3**	177.1	1	0.2	**177.9**	**1.6**
E424	HTL	HTL	HTL	1.3	27.8	6.4	**35.5**	32	0.98	0	**32.98**	**0.9**
E425	MR	MR	MR	1.8	3.1	7.7	**12.6**	1.6	0.9	0.17	**2.33**	**0.2**
E426	MR	MR	MR	14.6	25	50.4	**90**	2	2.1	0.15	**3.95**	**0.0**
E427	HTL	MR	MR	0.7	8.5	5.4	**14.6**	0.44	1.2	0.01	**1.63**	**0.1**
E428	HTL	MR	MR	5.6	7.1	13	**25.7**	1340.6	0.26	0.004	**1340.856**	**20.9**
E429	HTL	HTL	HTL	22.4	5.3	10.8	**38.5**					
E430	NAI	NAI	NAI	0	0	0	**0**	0	0.02	0	**0.02**	**0.0**

Policy Unit	Policy	Policy	Policy	Cost (£M)	Cost (£M)	Cost (£M)	Cost (£M)	Benefits (£M)	Benefits (£M)	Benefits (£M)	Benefits (£M)	CBR
	Epoch 1	Epoch 2	Epoch 3	Epoch 1	Epoch 2	Epoch 3	Total	Property (F&E)	Agri	Undefended	Total	
Plan Wide							**1131.65**				**4511.586**	**4.0**

Table H4.B Economic Appraisal Summary

Location	Epoch 1	Epoch 2	Epoch 3	Broad-scale Review (this SMP)		Conclusion
				Damages and Benefits[5] Capital Value (CV)	Assumed Defence Works & Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)						
E4 01 Grain Tower to Colemouth Creek	HTL	HTL	HTL	***NAI Damages:*** NAI could result in the inundation of the Isle of Grain flood risk area (including Grain Power Station, Thamesport Container Terminal and over 130 properties in the villages of Lower Stoke and Middle Stoke) with a capital value of c. **£132m.** **Agricultural land loss**: Grade 1: 5.5ha Grade 2: 5.5ha Grade 4: 103.1ha Non-agricultural: 39.1ha	The maintenance and replacement of existing defences under the Hold policy have been costed as: ***Preferred Plan (Hold the Line) CV Costs:*** Years 0-20: £2.08m Years 20-50: £35.16m Years 50-100: £16.8m (These include Optimum Bias and Climate Change allowance)	The value of assets at risk indicates that a policy of Hold the Line is economically viable.

[5] The maximum extents of the indicative erosion zones were used in MDSF calculations

Location	Epoch 1	Epoch 2	Epoch 3	Broad-scale Review (this SMP)		Conclusion
				Damages and Benefits[5] Capital Value (CV)	Assumed Defence Works & Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)						
				= Capital value of agricultural land loss is c. **£0.7m.** Additionally, nationally important infrastructure, e.g. the A228 road, railway line and pylons could also be inundated (however the value of these has not been included in the present assessment). ***Preferred Plan (Hold the Line) Damages:*** Years 0-20: none Years 20-50: none Years 50-100: none		
E4 02 Colemouth Creek to Bee Ness Jetty	MR with localised HTL	MR with localised HTL	MR with localised HTL	***NAI Damages:*** NAI could result in the inundation of the Isle of Grain and Stoke Marshes flood risk area (including Grain Power Station, Thamesport Container Terminal and over 130 properties in the villages of Lower Stoke and Middle Stoke) with a capital value of c. **£134m.** **Agricultural land loss**: Grade 1: 10.5ha Grade 2: 5.5ha Grade 3: 0.2ha Grade 4: 103.1ha	***Preferred Plan (Managed Realignment with localised Hold the Line) CV Costs:*** Years 0-20: £3.04m Years 20-50: £8.64m Years 50-100: £21.6m (This includes Optimum Bias and Climate Change allowance) The cost of providing set back defences would depend upon the alignment chosen. Estimated capital values were generated for possible	The value of assets at risk indicates that a policy of Hold the Line is economically viable. It appears that there may be economic advantages to provide a set-back defence in discrete locations along this frontage.

Location	Epoch 1	Epoch 2	Epoch 3	Broad-scale Review (this SMP)		Conclusion
				Damages and Benefits[5] Capital Value (CV)	Assumed Defence Works & Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)						
				Non-agricultural: 41.9ha = Capital value of agricultural land loss is c. **£0.7m.** Additionally, nationally important infrastructure, e.g. the A228 road, railway line and pylons could also be inundated (however the value of these has not been included in the present assessment). ***Preferred Plan (Managed Realignment with localised Hold the Line) Damages:*** Indicative MR extent agricultural loss: Grade 1: 0.5ha Grade 4: 4.4ha = **c. £0.03m**	inundation of two example areas seaward of infrastructure along this frontage, with the remaining defence line held in the present position (see Annex H4). These costs assume the natural raised topography is used as part of the defence in discrete areas. Compared to the estimated Hold the Line costs along this frontage of £42.2m in total for the 100 year period, this indicates that a retired defence in localised areas would be economically preferable in the long term.	
E4 03 Kingsnorth Power Station	HTL	HTL	HTL	***NAI Damages:*** NAI could result in the inundation of the Kingsnorth and Hoo St Werburg flood risk area (including the loss of Kingsnorth Power Station and over 100 residential and 50 commercial properties at Hoo St Werburg and Kingsnorth) with a capital value of c. **£149m.** **Agricultural land loss**:	The maintenance and replacement of existing defences under the Hold the line policy have been costed as: ***Preferred Plan (Hold the Line) CV Costs:*** Years 0-20: £1.92m Years 20-50: £21.6m Years 50-100: £22.4m (This includes Optimum Bias and Climate Change allowance)	The value of assets at risk indicates that a policy of Hold the Line is economically viable.

Location	Epoch 1	Epoch 2	Epoch 3	Broad-scale Review (this SMP)		Conclusion
				Damages and Benefits[5] Capital Value (CV)	Assumed Defence Works & Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)						
				Grade 1: 11.7ha Grade 3: 0.4ha Grade 4: 5.7ha Non-agricultural: 18.4ha = Capital value of agricultural land loss is c. **£0.1m.** ***Preferred Plan (Hold the Line) Damages:*** Years 0-20: none Years 20-50: none Years 50-100: none		
E4 04 Kingsnorth Power Station to Cockham Wood	MR with localised HTL	MR with localised HTL	MR with localised HTL	***NAI Damages:*** NAI could result in the inundation of the Kingsnorth and Hoo St Werburg flood risk area (including the loss of Kingsnorth Power Station and over 100 residential and 50 commercial properties at Hoo St Werburg and Kingsnorth) with a capital value of c. **£149m.** **Agricultural land loss**: Grade 1: 11.7ha Grade 3: 0.4ha Grade 4: 5.7ha Non-agricultural: 17.3ha	***Preferred Plan (Managed Realignment with localised Hold the Line) CV Costs:*** Years 0-20: £1.95m Years 20-50: £10.99m Years 50-100: £12.64m (This includes Optimum Bias and Climate Change allowance) The cost of providing set back defences would depend upon the alignment chosen. Estimated capital values were generated for possible inundation of two example areas along this frontage, one to the	The value of assets at risk indicates that a policy of Hold the Line is economically viable. It appears that there may be slight economic advantages to provide a set-back defence in discrete locations along this frontage.

Location	Epoch 1	Epoch 2	Epoch 3	Broad-scale Review (this SMP)		Conclusion
				Damages and Benefits[5] Capital Value (CV)	Assumed Defence Works & Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)						
				= Capital value of agricultural land loss is c. **£0.1m.** ***Preferred Plan (Managed Realignment with localised Hold the Line) Damages:*** Indicative MR extent agricultural loss: Grade 4: 1ha = **c. £0.06m**	immediate west of the power station and one to the east of Hoo Marina, with the remaining defence line held in the present position (see Annex H4). Both realignment sites were chosen to avoid the location of the proposed mineral extraction and habitat restoration site. Compared to estimated Hold the Line costs of £26.5m along this frontage, this indicates that a retired defence line would have similar CV costs to Hold the Line in this location, but with the added opportunity for habitat creation in realigned areas.	
E4 05 Hoo Marina to Lower Uponr	NAI	NAI	NAI	***NAI Damages:*** Loss of a Scheduled Monument in the long term.	No defence intervention.	NAI policy is appropriate as no other option would be economically viable. Loss of SM in the long term.
E4 06 Lower Upnor to Medway Bridge	HTL	HTL	HTL	***NAI Damages:*** NAI could result in the inundation of the Upnor, Strood and Frindsbury flood risk area (including the loss of over 350 residential and 1,050 commercial properties) with a capital value of c. **£222.6m.** **Agricultural land loss**: Grade 1: 1.8ha Grade 2: 0.3ha	The maintenance and replacement of existing defences under the Hold policy have been costed as: ***Preferred Plan (Hold the Line) CV Costs:*** Years 0-20: £12m Years 20-50: £40.08m Years 50-100: £19.2m (This includes Optimum Bias and Climate Change allowance)	The value of assets at risk indicates that a policy of Hold the Line is economically viable.

Location	Epoch 1	Epoch 2	Epoch 3	Broad-scale Review (this SMP)		Conclusion
				Damages and Benefits[5] Capital Value (CV)	Assumed Defence Works & Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)						
				Grade 3: 2.6ha Grade 5: 3.4ha Non-agricultural: 6.3ha = Capital value of agricultural land loss is c. **£0.06m.** ***NAI Erosion damages*** Years 0-20: none Years 20-50: none Years 50-100: £14.8m Total NAI Erosion Damages: £ 14.8m ***Preferred Plan (Hold the Line) Damages:*** Years 0-20: none Years 20-50: none Years 50-100: none		
E4 07 Medway Bridge to North Halling	HTL	HTL	HTL	***NAI Damages:*** NAI could result in the inundation of the Cuxton flood risk area (including the loss of over 130 residential and 10 commercial properties) with a capital value of c. **£26.9m.** **Agricultural land loss**: Grade 2: 1ha Grade 3: 6ha = Capital value of agricultural land loss	The maintenance and replacement of existing defences under the Hold policy have been costed as: ***Preferred Plan (Hold the Line) CV Costs:*** Years 0-20: £4.5m Years 20-50: £4.2m Years 50-100: £10.4m (This includes Optimum Bias and Climate Change allowance)	The value of assets at risk indicates that a policy of Hold the Line is economically viable.

Location	Epoch 1	Epoch 2	Epoch 3	Broad-scale Review (this SMP)		Conclusion
				Damages and Benefits[5] Capital Value (CV)	Assumed Defence Works & Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)						
				is c. **£0.05m.** Additionally, nationally important infrastructure, e.g. the A228 road and railway line could also be inundated (however the value of these has not been included in the present assessment). ***NAI Erosion Damages:*** Years 0-20: none Years 20-50: £0.15m Years 50-100: £2.2m Total NAI Erosion Damages: £2.3m ***Preferred Plan (Hold the Line) Damages:*** Years 0-20: none Years 20-50: none Years 50-100: none		
E4 08 North Halling to Snodland	MR with localised HTL	MR with localised HTL	MR with localised HTL	***NAI Damages:*** NAI could result in the inundation of the Halling and Snodland flood risk area (including the loss of over 800 residential and 145 commercial properties) with a capital value of c. **£295m.** **Agricultural land loss**: Grade 2: 4.2ha	***Preferred Plan (Managed Realignment with localised Hold the Line) CV Costs:*** Years 0-20: £4.6m Years 20-50: £14.3m Years 50-100: £19.8m (This includes Optimum Bias and Climate Change allowance)	The value of assets at risk indicates that a policy of Hold the Line is economically viable along sections of frontage. It appears that there may be economic advantages to provide a set-back defence in discrete locations along this frontage.

Location	Epoch 1	Epoch 2	Epoch 3	Broad-scale Review (this SMP)		Conclusion
				Damages and Benefits[5] Capital Value (CV)	Assumed Defence Works & Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)						
				Grade 3: 1.4ha Grade 4: 25.7 ha Non-agricultural: 15ha = Capital value of agricultural land loss is c. **£0.2m.** Additionally, nationally important infrastructure, e.g. the A228 road and railway line could also be inundated (however the value of these has not been included in the present assessment). ***NAI Erosion Damages:*** Years 0-20: none Years 20-50: £3.4m Years 50-100: £4.1m Total NAI Erosion Damages: £7.5m ***Preferred Plan (Managed Realignment with localised Hold the Line) Damages:*** Indicative MR extent agricultural loss: Grade 4: 2.7ha = **c. £0.02m**	The cost of providing set back defences would depend upon the alignment chosen. Estimated capital values were generated for possible inundation of three example areas along this frontage, one at Halling, one at Holborough Marshes and the third at Snodland, with the remaining defence line held in the present position (see Annex H4). Compared to estimated Hold the Line costs along this frontage of £48.1m in total for the 100 year period, this indicates that a retired defence in localised areas would be economically preferable in the long term.	
E4 09 Snodland to Allington Lock	HTL	MR with localised HTL	MR with localised HTL	***NAI Damages:*** NAI could result in the inundation of the Snodland to Allington Lock flood risk area (including the loss of	***Preferred Plan (Hold the Line & Managed Realignment with localised Hold the Line) CV Costs:***	The value of assets at risk indicates that a policy of Hold the Line is economically viable in the short term and for a Hold policy along sections

Location	Epoch 1	Epoch 2	Epoch 3	Broad-scale Review (this SMP)		Conclusion
				Damages and Benefits[5] Capital Value (CV)	Assumed Defence Works & Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)						
				approximately 800 residential and 145 commercial properties) with a capital value of c. **£293.2m.** **Agricultural land loss**: Grade 2: 4.1ha Grade 3: 1.3ha Grade 4: 19.8ha Non-agricultural: 15ha = Capital value of agricultural land loss is c. **£0.16m.** Additionally, nationally important infrastructure, e.g. the railway line, and important freshwater lakes at Leybourne could also be inundated (however the value of these has not been included in the present assessment). ***Preferred Plan (Hold the Line & Managed Realignment with localised Hold the Line) Damages:*** Indicative MR extent agricultural loss: Grade 2: 0.8ha Grade 3: 0.2ha Grade 4: 0.2ha Urban: 0.4ha = **c. £0.01m**	Years 0-20: £7.8m Years 20-50: £10.03m Years 50-100: £24.9m (This includes Optimum Bias and Climate Change allowance) The cost of providing set back defences would depend upon the alignment chosen. Estimated capital values were generated for possible inundation of an example area towards the south of the frontage at Forstal, with the remaining defence line held in the present position (see Annex H4). Compared to estimated Hold the Line costs along this frontage of £47.12m in total for the 100 year period, this indicates that a retired defence in localised areas would be economically preferable in the long term.	of frontage in the medium and long term. It appears that there may be economic advantages to provide a set-back defence in discrete locations along this frontage.

Location	Epoch 1	Epoch 2	Epoch 3	Broad-scale Review (this SMP)		Conclusion
				Damages and Benefits[5] Capital Value (CV)	Assumed Defence Works & Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)						
E4 10 Allington Lock to North Wouldham	HTL	MR with localised HTL	MR with localised HTL	***NAI Damages:*** NAI could result in the inundation of the Allington Lock to Wouldham flood risk area (including the loss of over 110 residential and 125 commercial properties) with a capital value of c. **£95m.** **Agricultural land loss**: Grade 2: 5.3ha Grade 3: 0.3ha Grade 4: 6.4ha Non-agricultural: 3.5ha = Capital value of agricultural land loss is c. **£0.08m.** ***NAI Erosion Damages:*** Years 0-20: £0.15m Years 20-50: £5.3m Years 50-100: £2.8m Total NAI Erosion Damages: £8.2m ***Preferred Plan (Hold the Line & Managed Realignment with localised Hold the Line) Damages:*** Indicative MR extent agricultural loss: Grade 2: 0.4ha Grade 4: 2.25ha	***Preferred Plan (Hold the Line & Managed Realignment with localised Hold the Line) CV Costs:*** Years 0-20: £16.2m Years 20-50: £16m Years 50-100: £33m (This includes Optimum Bias and Climate Change allowance) The cost of providing set back defences would depend upon the alignment chosen. Estimated capital values were generated for possible inundation of three example areas, one at Millhall, one at Burham Court and the third at Wouldham, with the remaining defence line held in the present position (see Annex H4). Compared to estimated Hold the Line costs along this frontage of £72.58m in total for the 100 year period, this indicates that a retired defence in localised areas would be economically preferable in the long term.	The value of assets at risk indicates that a policy of Hold the Line is economically viable in the short term and for a Hold policy along sections of frontage in the medium and long term. It appears that there may be economic advantages to provide a set-back defence in discrete locations along this frontage.

Location	Epoch 1	Epoch 2	Epoch 3	Broad-scale Review (this SMP)		Conclusion
				Damages and Benefits[5] Capital Value (CV)	Assumed Defence Works & Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)						
				= **c. £0.02m**		
E4 11 Wouldham Marshes	MR	MR	MR	***NAI Damages:*** NAI could result in the inundation of the Wouldham Marshes flood risk area (including the loss of 7 residential properties) with a capital value of c. **£1.05m.** **Agricultural land loss**: Grade 2: 2.2ha Grade 3: 0.6ha Grade 4: 7.8ha = Capital value of agricultural land loss is c. **£0.07m.** ***Preferred Plan (Managed Realignment) Damages:*** Indicative MR extent agricultural loss: Grade 4: 4.5ha = **c. £0.03m**	***Preferred Plan (Managed Realignment) CV Costs:*** Years 0-20: £3.6m Years 20-50: £6.1m Years 50-100: £13.3m (This includes Optimum Bias and Climate Change allowance) The cost of providing set back defences would depend upon the alignment chosen. Estimated capital values were generated for an example realigned extent on Wouldham Marshes (see Annex H4). Compared to estimated Hold the Line costs along this frontage of £21.8m in total for the 100 year period, the cost of providing set back defences is similar, but with the added opportunity for habitat creation in realigned areas.	There are insufficient assets to justify intervention of any significance along this frontage. However, no active intervention would not be recommended on process grounds as a no active intervention policy along this section may cause destabilisation along the Medway Towns frontages. However, as only indicative realignment extents are shown in the SMP, there is potential to position the realignment so it incorporates higher land, which will be more cost effective. More detailed assessment will therefore be required before this policy is implemented. Managed Realignment would provide opportunity for habitat creation and allow natural meandering of the channel to recommence.
E4 12 Medway Bridge to West St Mary's Island	HTL	HTL	HTL	***NAI Damages:*** NAI could result in the inundation of the Rochester and Chatham flood risk area (including the loss of essential infrastructure and over 1890 residential and 370 commercial properties) with a capital value of c. **£414.4m.**	The maintenance and replacement of existing defences under the Hold the line policy have been costed as: ***Preferred Plan (Hold the Line) CV Costs:*** Years 0-20: £2.2m	The value of assets at risk indicates that a policy of Hold the Line is economically viable.

Location	Epoch 1	Epoch 2	Epoch 3	Broad-scale Review (this SMP)		Conclusion
				Damages and Benefits[5] Capital Value (CV)	Assumed Defence Works & Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)						
				Agricultural land loss: Grade 3: 2.4ha Non-agricultural: 32.4ha = Capital value of agricultural land loss is c. **£0.02m.** ***NAI Erosion Damages:*** Years 0-20: none Years 20-50: none Years 50-100: £0.15m Total NAI Erosion Damages: £0.15m ***Preferred Plan (Hold the Line) Damages:*** Years 0-20: none Years 20-50: none Years 50-100: none	Years 20-50: £48.7m Years 50-100: £11.2m (This includes Optimum Bias and Climate Change allowance)	
E4 13 St Mary's Island to The Strand	HTL	HTL	HTL	***NAI Damages:*** NAI could result in the inundation of the Chatham, Gillingham and Lower Twydall flood risk area (including the loss of essential infrastructure and over 1500 residential and 170 commercial properties) with a capital value of c. **£336.1m.** **Agricultural land loss**:	The maintenance and replacement of existing defences under the Hold the line policy have been costed as: ***Preferred Plan (Hold the Line) CV Costs:*** Years 0-20: £1.4m Years 20-50: £29.6m Years 50-100: £6.8m (This includes Optimum Bias and	The value of assets at risk indicates that a policy of Hold the Line is economically viable.

Location	Epoch 1	Epoch 2	Epoch 3	Broad-scale Review (this SMP)		Conclusion
				Damages and Benefits[5] Capital Value (CV)	Assumed Defence Works & Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)						
				Grade 1: 5.9ha Grade 2: 0.5ha Grade 4: 5.1ha Non-agricultural: 18.1ha = Capital value of agricultural land loss is c. **£0.07m.** ***Preferred Plan (Hold the Line) Damages:*** Years 0-20: none Years 20-50: none Years 50-100: none	Climate Change allowance)	
E4 14 The Strand to West Motney Hill	HTL	MR	MR	***NAI Damages:*** NAI could result in the inundation of the Lower Twydall flood risk area (including the loss of over 530 residential and 15 commercial properties) with a capital value of c. **£96.6m.** **Agricultural land loss**: Grade 1: 5.9ha Grade 2: 0.5ha Grade 4: 5.1ha Non-agricultural: 1.6ha = Capital value of agricultural land loss is c. **£0.07m.**	***Preferred Plan (Hold the Line followed by Managed Realignment) CV Costs:*** Years 0-20: £1.1m Years 20-50: £18.7m Years 50-100: £5.6m (This includes Optimum Bias and Climate Change allowance) The cost of providing set back defences would depend upon the alignment chosen. Estimated capital values were generated for possible inundation of two example areas, one at Lower Twydall and one at Horrid Hill, with the remaining defence line	The value of assets at risk indicates that a policy of Hold the Line is economically viable in the short term. It appears that there may be economic advantages to provide a set-back defence along this frontage in the medium and long term.

Location	Epoch 1	Epoch 2	Epoch 3	Broad-scale Review (this SMP)		Conclusion
				Damages and Benefits[5] Capital Value (CV)	Assumed Defence Works & Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)						
				Preferred Plan (Hold the Line & Managed Realignment) Damages: Indicative MR extent agricultural loss: Grade 1: 0.4ha = **c. £0.003m**	held in the present position (see Annex H4). Compared to estimated Hold the Line costs along this frontage of £31.2m in total for the 100 year period, this indicates that a retired defence in localised areas would be economically preferable in the long term.	
E4 15 Motney Hill to Ham Green	MR with localised HTL	MR with localised HTL	MR with localised HTL	***NAI Damages:*** NAI could result in the inundation of the Lower Twydall, Lower Rainham, Otterham and Upchurch flood risk area (including the loss of over 530 residential and 19 commercial properties) with a capital value of c. **£97.4m.** **Agricultural land loss**: Grade 1: 10.6ha Grade 2: 0.5ha Grade 4: 14.9ha Non-agricultural: 1.6 ha = Capital value of agricultural land loss is c. **£0.17m.** ***Preferred Plan (Managed Realignment with localised Hold the Line) Damages:***	***Preferred Plan (Managed Realignment with localised Hold the Line) CV Costs:*** Years 0-20: £3.8m Years 20-50: £55.3m Years 50-100: £18.2m (This includes Optimum Bias and Climate Change allowance) The cost of providing set back defences would depend upon the alignment chosen. Estimated capital values were generated for possible inundation of one example area at Horsham Marsh, with the remaining defence line held in the present position (see Annex H4). Compared to estimated Hold the Line costs along this frontage of £71m in total for the 100 year period, the cost of providing set back defences is	The value of assets at risk indicates that a policy of Hold the Line is economically viable along parts of the frontage. However, Managed Realignment with localised Hold the Line along this frontage appears to be only marginally viable in economic terms compared to Hold the Line costs. There would however, be added value in creating new habitat in realigned areas. As only indicative realignment extents are shown in the SMP, there is potential to position the realignment so that the length of defence is shorter that the indicative realignment extent shown in the SMP, which will reduce costs. More detailed assessment will therefore be required

Location	Epoch 1	Epoch 2	Epoch 3	Broad-scale Review (this SMP)		Conclusion
				Damages and Benefits[5] Capital Value (CV)	Assumed Defence Works & Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)						
				Indicative MR extent agricultural loss: Grade 4: 3.6ha = **c. £0.02m**	more costly, but with the added opportunity for habitat creation in realigned areas.	before this policy is implemented.
E4 16 Ham Green to East of Upchurch	NAI	NAI	NAI	***NAI Damages (erosion):*** Potential damage / loss of one residential property and some greenhouses. Land lost due to erosion is uncertain, but is likely to be minimal.	No defence intervention.	NAI policy is appropriate as no other option would be economically viable. Limited loss of built assets in the long term.
E4 17 East of Upchurch to East Lower Halstow	MR with localised HTL	MR with localised HTL	MR with localised HTL	***NAI Damages:*** NAI could result in the inundation of the Lower Halstow flood risk area (including the loss of over 70 residential and 14 commercial properties) with a capital value of c. **£15.9m.** **Agricultural land loss**: Grade 1: 6.7ha Grade 2: 4.2ha Grade 3: 1.1ha Grade 4: 0.7ha Non-agricultural: 0.1ha = Capital value of agricultural land loss is c. **£0.09m.** ***Preferred Plan (Managed Realignment with localised Hold the Line) Damages:***	***Preferred Plan (Managed Realignment with localised Hold the Line) CV Costs:*** Years 0-20: £2.1m Years 20-50: £13.8m Years 50-100: £9.3m (This includes Optimum Bias and Climate Change allowance) The cost of providing set back defences would depend upon the alignment chosen. Estimated capital values were generated for possible inundation of two example areas west of Lower Halstow, with the remaining defence line held in the present position (see Annex H4). Compared to estimated Hold the Line costs along this frontage of £15.5m in	Managed Realignment with localised HTL along this frontage does not appear to be economically preferable compared to Hold the Line costs. There would however, be added value in creating new habitat in realigned areas. As only indicative realignment extents are shown in the SMP, there is potential to position the realignments so that the lengths of defence are shorter than the indicative realignment extents shown in the SMP, which will reduce costs. More detailed assessment will therefore be required before this policy is implemented.

Location	Epoch 1	Epoch 2	Epoch 3	Broad-scale Review (this SMP)		Conclusion
				Damages and Benefits[5] Capital Value (CV)	Assumed Defence Works & Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)						
				Indicative MR extent agricultural loss: Grade 1: 0.7ha = **c. £0.005m**	total for the 100 year period, the cost of providing set back defences is more expensive, however there will be added opportunity for habitat creation in realigned areas.	
E4 18 Barksore Marshes	MR	NAI	NAI	***NAI Damages:*** NAI could result in the inundation of the Barksore Marshes and one property with a capital value of c. **£0.2m.** **Agricultural land loss**: Grade 2: 0.9ha Grade 3: 0.3ha Non-agricultural: 0.8ha = Capital value of agricultural land loss is c. **£0.012m.** ***Preferred Plan (Managed Realignment) Damages:*** Indicative MR extent agricultural loss: Grade 2: 0.3ha Grade 3: 0.2ha = **c. £0.004m**	***Preferred Plan (Managed Realignment) CV Costs:*** Years 0-20: £0.22m (This includes Optimum Bias and Climate Change allowance) The cost of providing set back defences would depend upon the alignment chosen. Estimated capital values were generated for realigned defences in the south east of the marshes only, as the remaining marshes rise to higher land (see Annex H4). These defences have been costed for maintenance in epoch one only. Compared to estimated Hold the Line costs along this frontage of £34m in total for the 100 year period, this indicates that a retired defence in a small localised area, followed by no active intervention, would be economically preferable in the long term.	It appears that there may be economic advantages to provide a set-back defence along this frontage in the short term. NAI policy in the medium and long term is appropriate as no other option would be economically viable.
E4 19	NAI	NAI	NAI	***NAI Damages (erosion):***	No defence intervention.	NAI policy is appropriate as no other

Location	Epoch 1	Epoch 2	Epoch 3	Broad-scale Review (this SMP)		Conclusion
				Damages and Benefits[5] Capital Value (CV)	Assumed Defence Works & Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)						
Funton to Raspberry Hill				Loss of the local road in the long term		option would be economically viable. Loss of a local road in the long term.
E4 20 Chetney Marshes	MR	MR	MR	***NAI Damages:*** NAI could result in the inundation of the Chetney Marshes and Ferry Marshes flood risk area (including the loss of over 80 residential and 5 commercial properties) with a capital value of c. **£17.3m.** **Agricultural land loss**: Grade 1: 0.9ha Grade 2: 0.6ha Grade 3: 0.3ha Grade 4: 62.8ha = Capital value of agricultural land loss is c. **£0.4m.** Additionally, the primary assets here are the A249 road and railway line to the south of Chetney Marshes and power lines on the marshes which would effectively be lost once defence management ceased. No attempt has been made to value these assets. ***Preferred Plan (Managed Realignment) Damages:***	***Preferred Plan (Managed Realignment) CV Costs:*** Years 0-20: £39.2m Years 20-50: £9m Years 50-100: £20.8m (These include Optimum Bias and Climate Change allowance) The cost of providing set back defences would depend upon the alignment chosen. Estimated capital values were generated for possible inundation of two example areas on Chetney Marshes with the remaining defence line held in the present position (see Annex H4). Compared to estimated Hold the Line costs along this frontage of £74.8m in total for the 100 year period, this indicates that a retired defence line would be economically preferable in the long term.	There are insufficient assets to justify intervention of any significance along this frontage. However, no active intervention would not be recommended due to potential adverse affects on coastal processes downstream. The figures presented do not include for losses associated with the road, railway line and power lines, which are important built assets along this frontage. It is considered that a fuller economic evaluation of these potential benefits would provide a clear economic justification for defending the line in a retreated position over the next 100 years (if that remains appropriate). It appears that there may be economic advantages to provide a set-back defence along this frontage.

Location	Epoch 1	Epoch 2	Epoch 3	Broad-scale Review (this SMP)		Conclusion
				Damages and Benefits[5] Capital Value (CV)	Assumed Defence Works & Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)						
				Indicative MR extent agricultural loss: Grade 4: 8.4ha = **c. £0.05m**		
E4 21 Kingsferry Bridge to Milton Creek	HTL	HTL	HTL	***NAI Damages:*** NAI could result in the inundation of the Coldharbour Marshes and Kemsley flood risk area (including the loss of over 20 commercial properties) with a capital value of c. **£21.4m.** **Agricultural land loss**: Grade 1: 0.1ha Grade 3: 0.7ha Grade 4: 25.3ha = Capital value of agricultural land loss is c. **£0.16m.** Additionally, the primary assets here are the A249 road, railway line, power substation and associated infrastructure which would also effectively be lost once defence management ceased. No attempt has been made to value these assets. ***Preferred Plan (Hold the Line) Damages:*** Years 0-20: none	The maintenance and replacement of existing defences under the Hold policy have been costed as: ***Preferred Plan (Hold the Line) CV Costs:*** Years 0-20: £1.2m Years 20-50: £26.1m Years 50-100: £6m (These include Optimum Bias and Climate Change allowance)	The figures presented do not include for losses associated with the road, railway line and other infrastructure, which are important along this frontage. It is considered that a fuller economic evaluation of these potential benefits would provide a clear economic justification for Hold the Line over 100 years (if that remains appropriate).

Location	Epoch 1	Epoch 2	Epoch 3	Broad-scale Review (this SMP)		Conclusion
				Damages and Benefits[5] Capital Value (CV)	Assumed Defence Works & Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)						
				Years 20-50: none Years 50-100: none		
E4 22 Milton Creek	HTL	HTL	HTL	***NAI Damages:*** NAI could result in the inundation of the Sittingbourne and Kemsley flood risk area (including the loss of over 3000 residential and 340 commercial properties) with a capital value of c. **£567.5m.** **Agricultural land loss**: Grade 1: 28.5ha Grade 2: 1.5ha Grade 3: 4.7ha Grade 4: 25.6ha Non-agricultural: 28.4ha = Capital value of agricultural land loss is c. **£0.5m.** ***Preferred Plan (Hold the Line) Damages:*** Years 0-20: none Years 20-50: none Years 50-100: none	The maintenance and replacement of existing defences under the Hold policy have been costed as: ***Preferred Plan (Hold the Line) CV Costs:*** Years 0-20: £1.9m Years 20-50: £41.8m Years 50-100: £9.6m (These include Optimum Bias and Climate Change allowance)	The value of assets at risk indicates that a policy of Hold the Line is economically viable for the next 100 years.
E4 23 Murston Pits to Faversham	HTL	MR with localised HTL	MR with localised HTL	***NAI Damages:*** NAI could result in the inundation of the flood risk area between Sittingbourne	***Preferred Plan (Hold the Line & Managed Realignment with localised Hold the Line) CV Costs:***	The value of assets at risk indicates that a policy of Hold the Line is economically viable in the short term

Location	Epoch 1	Epoch 2	Epoch 3	Broad-scale Review (this SMP)		Conclusion
				Damages and Benefits[5] Capital Value (CV)	Assumed Defence Works & Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)						
				and Faversham (including the loss of over 620 residential and 225 commercial properties) with a capital value of c. **£177.1m.** **Agricultural land loss**: Grade 1: 34.2ha Grade 2: 1.6ha Grade 3: 6ha Grade 4: 106.6ha Non-agricultural: 23.5ha = Capital value of agricultural land loss is c. **£1m.** ***Preferred Plan (Hold the Line & Managed Realignment with localised Hold the Line) Damages:*** Indicative MR extent agricultural loss: Grade 1: 1.3ha Grade 3: 1.3ha Grade 4: 36ha = **c. £0.2m**	Years 0-20: £5.8m Years 20-50: £64.3m Years 50-100: £42.2m (These include Optimum Bias and Climate Change allowance) The cost of providing set back defences would depend upon the alignment chosen. Estimated capital values were generated for possible inundation of four example areas, one between Little Murston and Conyer, two between Conyer and Oare and the fourth at Ham Marshes with the remaining defence line held in the present position (see Annex H4). Compared to estimated Hold the Line costs along this frontage of £159.8m in total for the 100 year period, this indicates that a retired defence line would be economically preferable in the long term.	and a Hold policy along discrete sections of frontage in the medium and long term. It appears that there may be economic advantages to provide a set-back defence in discrete locations along this frontage in the medium and long term, with added opportunity for habitat creation in realigned areas.
E4 24 Faversham to Nagden	HTL	HTL	HTL	***NAI Damages:*** NAI could result in the inundation of the Faversham flood risk area (including the loss of approximately 150 residential and 15 commercial properties) with a	The maintenance and replacement of existing defences under the Hold policy have been costed as: ***Preferred Plan (Hold the Line) CV Costs:***	The figures presented do not include for losses associated with the railway line and heritage assets along this frontage. It is considered that a fuller economic evaluation of these potential benefits would provide a

Location	Epoch 1	Epoch 2	Epoch 3	Broad-scale Review (this SMP)		Conclusion
				Damages and Benefits[5] Capital Value (CV)	Assumed Defence Works & Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)						
				capital value of c. **£32m.** **Agricultural land loss**: Grade 1: 7.9ha Grade 2: 5.1ha Grade 3: 115.2ha Grade 4: 0.9ha Non-agricultural: 4.8ha = Capital value of agricultural land loss is c. **£0.98m.** Additionally, the primary infrastructure, i.e. the railway line, and important heritage built assets would effectively be lost once defence management ceased. No attempt has been made to value these assets. ***Preferred Plan (Hold the Line) Damages:*** Years 0-20: none Years 20-50: none Years 50-100: none	Years 0-20: £1.3m Years 20-50: £27.8m Years 50-100: £6.4m (These include Optimum Bias and Climate Change allowance)	clear economic justification for Hold the Line over 100 years (if that remains appropriate).
E4 25 Shell Ness to Sayes Court	MR	MR	MR	***NAI Damages:*** NAI could result in large scale inundation of the south Sheppey flood risk area (including the loss of approximately 7 residential and 6	***Preferred Plan (Managed Realignment) CV Costs:*** Years 0-20: £1.8m Years 20-50: £3.1m	There are insufficient assets to justify intervention of any significance along this frontage. However, no active intervention would not be recommended due to the adverse

Location	Epoch 1	Epoch 2	Epoch 3	Broad-scale Review (this SMP)		Conclusion
				Damages and Benefits[5] Capital Value (CV)	Assumed Defence Works & Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)						
				commercial properties) with a capital value of c. **£1.6m.** **Agricultural land loss**: Grade 3: 7ha Grade 4: 125.4ha Grade 5: 14.5ha = Capital value of agricultural land loss is c. **£0.9m.** ***Preferred Plan (Managed Realignment) Damages:*** Indicative MR extent agricultural loss: Grade 3: 0.1ha Grade 4: 24ha Grade 5: 3.2ha = **c. £0.17m**	Years 50-100: £7.7m (These include Optimum Bias and Climate Change allowance) The cost of providing set back defences would depend upon the alignment chosen. Estimated capital values were generated for an example realignment at Harty Marshes, incorporating higher land where possible (see Annex H4). Compared to estimated Hold the Line costs along this frontage of £18.7m in total for the 100 year period, this indicates that a retired defence line would be economically preferable in the long term.	affects on downstream processes which would result following inundation of the extensive floodplain on the Isle of Sheppey. It appears that there may be economic advantages to provide a set-back defence along this frontage instead of HTL, with added opportunity for habitat creation in realigned areas. As only indicative realignment extents are shown in the SMP, there is potential to position the realignment with shorter defence lengths, which may be more cost effective. More detailed assessment will therefore be required before this policy is implemented.
E4 26 Sayes Court to North Elmley Island	MR	MR	MR	***NAI Damages:*** NAI could result in large scale inundation of the south Sheppey flood risk area (including the loss of approximately 10 residential and 6 commercial properties) with a capital value of c. **£2m.** **Agricultural land loss**: Grade 3: 15.8ha Grade 4: 285.2ha	***Preferred Plan (Managed Realignment) CV Costs:*** Years 0-20: £14.6m Years 20-50: £25m Years 50-100: £50.4m (These include Optimum Bias and Climate Change allowance) The cost of providing set back defences would depend upon the	There are insufficient assets to justify intervention of any significance along this frontage. However, no active intervention would not be recommended due to the adverse affects on downstream processes which would result following inundation of the extensive floodplain on the Isle of Sheppey. Managed Realignment along this frontage does not appear to be

Location	Epoch 1	Epoch 2	Epoch 3	Broad-scale Review (this SMP)		Conclusion
				Damages and Benefits[5] Capital Value (CV)	Assumed Defence Works & Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)						
				Grade 5: 31.8ha = Capital value of agricultural land loss is c. **£2.1m.** ***Preferred Plan (Managed Realignment) Damages:*** Indicative MR extent agricultural loss: Grade 3: 2.6ha Grade 4: 20.1ha Grade 5: 1.6ha = **c. £0.15m**	alignment chosen. Estimated capital values were generated for possible inundation of four example areas between Elmley Island and the Isle of Harty, incorporating higher land where possible (see Annex H4). Compared to estimated Hold the Line costs along this frontage of £75m in total for the 100 year period, the cost of providing set back defences is more expensive, however there will be added opportunity for habitat creation in realigned areas.	economically preferable compared to Hold the Line costs. There would however, be added value in creating new habitat in realigned areas and, as only indicative realignment extents are shown in the SMP, there is potential to position the realignments so that the lengths of defence are shorter than the example realignment extents shown in the SMP, which will reduce costs. More detailed assessment will therefore be required before this policy is implemented.
E4 27 North Elmley Island to Kingsferry Bridge	HTL	MR	MR	***NAI Damages:*** NAI could result in the inundation of the south Sheppey flood risk area (including the loss of approximately 3 residential properties) with a capital value of c. **£0.44m.** **Agricultural land loss**: Grade 3: 8.8 ha Grade 4: 159.8 ha Grade 5: 17.3ha = Capital value of agricultural land loss is c. **£1.2m.** Additionally, the primary assets here are the A249 road, railway line, and	***Preferred Plan (Hold the Line followed by Managed Realignment) CV Costs:*** Years 0-20: £0.7m Years 20-50: £8.5m Years 50-100: £5.4m (These include Optimum Bias and Climate Change allowance) The cost of providing set back defences would depend upon the alignment chosen. Estimated capital values were generated for possible inundation of a small example area between Elmley Island and the	The figures presented do not include for losses associated with the road, railway line and other infrastructure, which are the main built assets along this frontage. It is considered that a fuller economic evaluation of these potential benefits would provide a clear economic justification for Hold the Line in the short term (if that remains appropriate). It appears that there may be economic advantages to provide set-back defences along this frontage in the medium and long term with the added opportunity for habitat creation in realigned areas.

Location	Epoch 1	Epoch 2	Epoch 3	Broad-scale Review (this SMP)		Conclusion
				Damages and Benefits[5] Capital Value (CV)	Assumed Defence Works & Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)						
				pylons which would effectively be lost once defence management ceased. No attempt has been made to value these assets. ***Preferred Plan (Hold the Line & Managed Realignment) Damages:*** Indicative MR extent agricultural loss: Grade 3: 0.3ha Grade 4: 1.3ha = **c. £0.01m**	Kingsferry Bridge, incorporating higher land where practible (see Annex H4). Compared to estimated Hold the Line costs along this frontage of £20m in total for the 100 year period, this indicates that a retired defence line would be economically preferable in the long term, with the added opportunity for habitat creation in realigned areas.	
E4 28 Kingsferry Bridge to Rushenden	HTL	MR	MR	***NAI Damages:*** NAI could result in the inundation of the Rushenden, Queenborough and Sheerness flood risk area (including the loss of approximately 7335 residential and 879 commercial properties) with a capital value of c. **£1,340.6m.** **Agricultural land loss**: Grade 3: 5.4ha Grade 4: 30.5ha Grade 5: 5.6ha Non-agricultural: 63.2ha = Capital value of agricultural land loss is c. **£0.26m.** Additionally, other primary assets here are the A249 road and railway line	***Preferred Plan (Hold the Line followed by Managed Realignment) CV Costs:*** Years 0-20: £5.6m Years 20-50: £7.1m Years 50-100: £13m (These include Optimum Bias and Climate Change allowance) The cost of providing set back defences would depend upon the alignment chosen. Estimated capital values were generated for the possible inundation of a small example area north of Kingsferry Bridge (see Annex H4).	The value of assets at risk indicates that a policy of Hold the Line is economically viable along the frontage for the short and longer term. However HTL followed by MR would be less expensive and would also provide environmental benefits through habitat creation.

Location	Epoch 1	Epoch 2	Epoch 3	Broad-scale Review (this SMP)		Conclusion
				Damages and Benefits[5] Capital Value (CV)	Assumed Defence Works & Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)						
				which would effectively be lost once defence management ceased. No attempt has been made to value these assets. ***Preferred Plan (Hold the Line & Managed Realignment) Damages:*** Indicative MR extent agricultural loss: Grade 4: 0.7ha = **c. £0.004m**	Compared to estimated Hold the Line costs along this frontage of £31.2m in total for the 100 year period, this indicates that a retired defence line would be economically preferable in the long term.	
E4 29 Rushenden to Sheerness	HTL	HTL	HTL	***NAI Damages:*** NAI could result in the inundation of the Rushenden, Queenborough and Sheerness flood risk area (including the loss of approximately 7,335 residential and 879 commercial properties) with a capital value of c. **£1,340.6m.** **Agricultural land loss**: Grade 3: 5.4ha Grade 4: 30.5 ha Grade 5: 5.6ha Non-agricultural: 63.2ha = Capital value of agricultural land loss is c. **£0.26m.** Additionally, other primary assets here are the A249 road and railway line	The maintenance and replacement of existing defences under the Hold policy have been costed as: ***Preferred Plan (Hold the Line) CV Costs:*** Years 0-20: £22.4m Years 20-50: £5.3m Years 50-100: £10.8m (These include Optimum Bias and Climate Change allowance)	The value of assets at risk indicates that a policy of Hold the Line is economically viable along the frontage for the next 100 years.

Location	Epoch 1	Epoch 2	Epoch 3	Broad-scale Review (this SMP)		Conclusion
				Damages and Benefits[5] Capital Value (CV)	Assumed Defence Works & Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)						
				which would effectively be lost once defence management ceased. No attempt has been made to value these assets. ***Preferred Plan (Hold the Line) Damages:*** Years 0-20: none Years 20-50: none Years 50-100: none		
E4 30 Medway Islands	NAI	NAI	NAI	***NAI Damages:*** Loss of two Scheduled Monuments in the long term. **Agricultural land loss**: Non-agricultural: 5.5ha = Capital value of agricultural land loss is c. **£0.02m.**	No intervention planned.	NAI policy is appropriate as no other option would be economically viable. However in the long term this policy will lead to the loss of two Scheduled Monuments.

H5 Economic sensitivity assessment summary tables

Table H5.1 below provides a summary of the economic reviews undertaken for selected locations that required a sensitivity assessment. The table summarises the calculated benefits and costs, together with a statement on economic viability when assessing the alternative policy of hold the line as a sensitivity test, along policy units where managed realignment is proposed. Also, in response to stakeholder concerns that the original economic assessment given in **Section H4** of the present appendix undervalued agricultural land, the sensitivity analysis presented here has increased agricultural land values by a factor of 2. The conclusions show that this did not change the economic viabilities of the preferred policy option. Corresponding HTL defence tables are found in **Annex H2**. 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.

Table H5.1 Sensitivity Assessment of a Hold the Line policy, where Managed Realignment is the proposed policy.

Location	Policy			Description of Alternative tested	Broad-scale Review (this SMP)		Conclusions
					Alternative Damages and Benefits Capital Value (CV)	Alternative Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)							
E4 02 Colemouth Creek to Bee Ness Jetty	MR with localised HTL	MR with localised HTL	MR with localised HTL	Hold the Line along the whole frontage.	Protection of environmental assets (not evaluated).	To maintain and replace an embankment over the 6km frontage would cost: £1.9m CV in years 0-20 £11.5m CV in years 20-50 £28.8m CV in years 50-100 (Total £42.2m CV) These figures allow for maintenance and replacement, optimum bias and climate change.	This alternative is not considered economically preferable. The provision of defences to HTL is more costly compared to potential costs for MR along sections of this frontage. MR with localised HTL would cost: £3.0m CV in years 0-20 £8.6m CV in years 20-50 £21.6m CV in years 50-100 (Total £33.3m CV) These figures allow for maintenance and replacement, optimum bias and climate change.

Location	Policy			Description of Alternative tested	Broad-scale Review (this SMP)		Conclusions
					Alternative Damages and Benefits Capital Value (CV)	Alternative Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)							
				Agricultural land values doubled	***NAI Damages:*** NAI could result in the inundation of the Isle of Grain and Stoke Marshes flood risk area (including Grain Power Station, Thamesport Container Terminal and over 130 properties in the villages of Lower Stoke and Middle Stoke) with a capital value of c. **£134m.** **Agricultural land loss**: Grade 1: 10.5ha Grade 2: 5.5ha Grade 3: 0.2ha Grade 4: 103.1ha Non-agricultural: 41.9ha = Capital value of agricultural land loss is c. **£1.4m.** Additionally, nationally important infrastructure, e.g. the A228 road, railway line and pylons could also be inundated (however the value of these has not been included in the present assessment).	***Preferred Plan (Managed Realignment with localised Hold the Line) CV Costs:*** Years 0-20: £3.04m Years 20-50: £8.64m Years 50-100: £21.6m (Total £33.3m CV) (This includes Optimum Bias and Climate Change allowance) The cost of providing set back defences would depend upon the alignment chosen. Estimated capital values were generated for possible inundation of two discrete areas seaward of infrastructure along this frontage, with the remaining defence line held in the present position. These costs assume the natural raised topography is used as part of the defence in discrete areas. Compared to the estimated Hold the Line costs along this frontage of £42.2m in total for the 100 year period, this indicates that a retired defence in localised areas	The value of assets at risk indicates that a policy of Hold the Line is economically viable. It appears that there may be economic advantages to provide a set-back defence in discrete locations along this frontage. No change to the original economic appraisal given in Section H4.

Location	Policy			Description of Alternative tested	Broad-scale Review (this SMP)		Conclusions
					Alternative Damages and Benefits Capital Value (CV)	Alternative Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)							
					Preferred Plan (Managed Realignment with localised Hold the Line) Damages: Indicative MR extent agricultural loss: Grade 1: 0.5ha Grade 4: 4.4ha = **c. £0.06m**	would be economically preferable in the long term.	
E4 04 Power Station to Cockham Wood	MR with localised HTL	MR with localised HTL	MR with localised HTL	Hold the Line along the whole frontage.	Protection of agricultural land (not evaluated).	To maintain and replace a line of defence over the 3.5km frontage (i.e. 1km seawall; 2.5km embankment) would cost: £1.1m CV in years 0-20 £11.8m CV in years 20-50 £13.6m CV in years 50-100 (Total £26.5m CV) These figures allow for maintenance and replacement, optimum bias and climate change.	This alternative is not considered economically preferable. The provision of defences to HTL is more costly compared to potential costs for MR along sections of this frontage. The provision of defences to MR with localised HTL would cost: £2m CV in years 0-20 £11 m CV in years 20-50 £12.6m CV in years 50-100 (Total £25.6m CV) These figures allow for maintenance and replacement, optimum bias and climate change.
				Agricultural land values doubled	***NAI Damages:*** NAI could result in the inundation of the Kingsnorth and Hoo St Werburg flood risk	***Preferred Plan (Managed Realignment with localised Hold the Line) CV Costs:*** Years 0-20: £1.95m	The value of assets at risk indicates that a policy of Hold the Line is economically viable. It appears that there may be slight

Location	Policy			Description of Alternative tested	Broad-scale Review (this SMP)		Conclusions
					Alternative Damages and Benefits Capital Value (CV)	Alternative Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)							
					area (including the loss of Kingsnorth Power Station and over 100 residential and 50 commercial properties at Hoo St Werburg and Kingsnorth) with a capital value of c. **£149m.** **Agricultural land loss**: Grade 1: 11.7ha Grade 3: 0.4ha Grade 4: 5.7ha Non-agricultural: 17.3ha = Capital value of agricultural land loss is c. **£0.2m.** ***Preferred Plan (Managed Realignment with localised Hold the Line) Damages:*** Indicative MR extent agricultural loss: Grade 4: 1ha = **c. £0.12m**	Years 20-50: £10.99m Years 50-100: £12.64m (Total £25.6m CV) (This includes Optimum Bias and Climate Change allowance) The cost of providing set back defences would depend upon the alignment chosen. Estimated capital values were generated for possible inundation of two discrete areas along this frontage, one to the immediate west of the power station and one to the east of Hoo Marina, with the remaining defence line held in the present position. Both realignment sites were chosen to avoid the location of the proposed mineral extraction and habitat restoration site. Compared to estimated Hold the Line costs of £26.5m along this frontage, this indicates that a retired defence line would have similar CV costs to Hold the Line in this location, but with the added opportunity for habitat	economic advantages to provide a set-back defence in discrete locations along this frontage. No change to the original economic appraisal given in Section H4.

Location	Policy			Description of Alternative tested	Broad-scale Review (this SMP)		Conclusions
					Alternative Damages and Benefits Capital Value (CV)	Alternative Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)							
						creation in realigned areas.	
E4 08 North Halling to Snodland	MR with localised HTL	MR with localised HTL	MR with localised HTL	Hold the Line along the whole frontage.	Protection of environmental assets (not evaluated).	To maintain and replace a line of defence over the 6km frontage (i.e. 1km seawall; 5km embankment) would cost: £5.9m CV in years 0-20 £16.6m CV in years 20-50 £25.6m CV in years 50-100 (Total £48.1m CV) These figures allow for maintenance and replacement, optimum bias and climate change.	This alternative is not considered economically preferable. The provision of defences to HTL is more costly compared to potential costs for MR along sections of this frontage. The provision of defences to MR with localised HTL would cost: £4.6m CV in years 0-20 £14.3m CV in years 20-50 £19.8m CV in years 50-100 (Total £38.7m CV) These figures allow for maintenance and replacement, optimum bias and climate change.
				Agricultural land values doubled	***NAI Damages:*** NAI could result in the inundation of the Halling and Snodland flood risk area (including the loss of over 800 residential and 145 commercial properties) with a capital value of c. **£295m.** **Agricultural land loss**: Grade 2: 4.2ha Grade 3: 1.4ha	***Preferred Plan (Managed Realignment with localised Hold the Line) CV Costs:*** Years 0-20: £4.6m Years 20-50: £14.3m Years 50-100: £19.8m (Total £38.7m CV) (This includes Optimum Bias and Climate Change allowance) The cost of providing set back defences would depend upon the	The value of assets at risk indicates that a policy of Hold the Line is economically viable along sections of frontage. It appears that there may be economic advantages to provide a set-back defence in discrete locations along this frontage. No change to the original economic appraisal given in Section H4.

Location	Policy			Description of Alternative tested	Broad-scale Review (this SMP)		Conclusions
					Alternative Damages and Benefits Capital Value (CV)	Alternative Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)							
					Grade 4: 25.7 ha Non-agricultural: 15ha = Capital value of agricultural land loss is c. **£0.4m.** Additionally, nationally important infrastructure, e.g. the A228 road and railway line could also be inundated (however the value of these has not been included in the present assessment). ***NAI Erosion Damages:*** Years 0-20: none Years 20-50: £3.4m Years 50-100: £4.1m Total NAI Erosion Damages: £7.5m ***Preferred Plan (Managed Realignment with localised Hold the Line) Damages:*** Indicative MR extent agricultural loss: Grade 4: 2.7ha = **c. £0.04m**	alignment chosen. Estimated capital values were generated for possible inundation of three discrete areas along this frontage, one at Halling, one at Holborough Marshes and the third at Snodland, with the remaining defence line held in the present position. Compared to estimated Hold the Line costs along this frontage of £48.1m in total for the 100 year period, this indicates that a retired defence in localised areas would be economically preferable in the long term.	
E4 11	MR	MR	MR	Hold the Line	Protection of environmental	To maintain and replace an	The provision of defences to HTL is

Location	Policy			Description of Alternative tested	Broad-scale Review (this SMP)		Conclusions
					Alternative Damages and Benefits Capital Value (CV)	Alternative Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)							
Wouldham Marshes				along the whole frontage.	assets and agricultural land (not evaluated).	embankment over the 3.5km frontage would cost: £3.9m CV in years 0-20 £6.7m CV in years 20-50 £11.2m CV in years 50-100 (Total £21.8m CV) These figures allow for maintenance and replacement, optimum bias and climate change.	similar to potential costs for MR along this frontage. However MR would provide an added opportunity for habitat creation in realigned areas. MR would cost: £3.6m CV in years 0-20 £6.1m CV in years 20-50 £13.3m CV in years 50-100 (Total £23m CV) These figures allow for maintenance and replacement, optimum bias and climate change.
				Agricultural land values doubled	***NAI Damages:*** NAI could result in the inundation of the Wouldham Marshes flood risk area (including the loss of 7 residential properties) with a capital value of c. **£1.05m.** **Agricultural land loss**: Grade 2: 2.2ha Grade 3: 0.6ha Grade 4: 7.8ha = Capital value of agricultural land loss is c. **£0.14m.**	***Preferred Plan (Managed Realignment) CV Costs:*** Years 0-20: £3.6m Years 20-50: £6.1m Years 50-100: £13.3m (Total £23m CV) (This includes Optimum Bias and Climate Change allowance) The cost of providing set back defences would depend upon the alignment chosen. Estimated capital values were generated for the possible inundation of part of Wouldham Marshes.	There are insufficient assets to justify intervention of any significance along this frontage. However, as only indicative realignment extents are shown in the SMP, there is potential to position the realignment so it incorporates higher land, which will be more cost effective. More detailed assessment will therefore be required before this policy is implemented. Managed Realignment would provide opportunity for habitat creation and allow natural meandering of the channel to recommence. No change to the original economic

Location	Policy			Description of Alternative tested	Broad-scale Review (this SMP)		Conclusions
					Alternative Damages and Benefits Capital Value (CV)	Alternative Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)							
					Preferred Plan (Managed Realignment) Damages: Indicative MR extent agricultural loss: Grade 4: 4.5ha = **c. £0.06m**	Compared to estimated Hold the Line costs along this frontage of £21.8m in total for the 100 year period, the cost of providing set back defences is similar, but with the added opportunity for habitat creation in realigned areas.	appraisal given in Section H4.
E4 15 Motney Hill to Ham Green	MR with localised HTL	MR with localised HTL	MR with localised HTL	Hold the Line along the whole frontage.	Protection of environmental assets and agricultural land (not evaluated).	To maintain and replace a line of defence over the 8km frontage would cost: £2.6m CV in years 0-20 £55.7m CV in years 20-50 £12.8m CV in years 50-100 (Total £71m CV) These figures allow for maintenance and replacement, optimum bias and climate change.	The provision of defences for MR with localised HTL is more expensive compared to potential costs for MR along this frontage. However, MR with localised HTL would provide an added opportunity for habitat creation in realigned areas. The provision of realigned embankments to MR with localised HTL would cost: £3.8m CV in years 0-20 £55.3m CV in years 20-50 £18.2m CV in years 50-100 (Total £77.3m CV) These figures allow for maintenance and replacement, optimum bias and climate change. It should also be noted that the MR with localised HTL costs are only for indicative MR extents and therefore there is potential to position the realignment so that the lengths of defence are shorter that the indicative realignment extents

Location	Policy	Description of Alternative tested	Broad-scale Review (this SMP)		Conclusions
			Alternative Damages and Benefits Capital Value (CV)	Alternative Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)					
					shown in the SMP, which will reduce costs. More detailed assessment will therefore be required before this policy is implemented.
		Agricultural land values doubled	***NAI Damages:*** NAI could result in the inundation of the Lower Twydall, Lower Rainham, Otterham and Upchurch flood risk area (including the loss of over 530 residential and 19 commercial properties) with a capital value of c. **£97.4m.** **Agricultural land loss**: Grade 1: 10.6ha Grade 2: 0.5ha Grade 4: 14.9ha Non-agricultural: 1.6 ha = Capital value of agricultural land loss is c. **£0.34m.** ***Preferred Plan (Managed Realignment with localised Hold the Line) Damages:*** Indicative MR extent agricultural loss:	***Preferred Plan (Managed Realignment with localised Hold the Line) CV Costs:*** Years 0-20: £3.8m Years 20-50: £55.3m Years 50-100: £18.2m (Total £77.3m CV) (This includes Optimum Bias and Climate Change allowance) The cost of providing set back defences would depend upon the alignment chosen. Estimated capital values were generated for possible inundation of one discrete area at Horsham Marsh, with the remaining defence line held in the present position. Compared to estimated Hold the Line costs along this frontage of £71m in total for the 100 year period, the cost of providing set back defences is more costly, but with the added opportunity for habitat creation in realigned	The value of assets at risk indicates that a policy of Hold the Line is economically viable along parts of the frontage. However, Managed Realignment with localised Hold the Line along this frontage appears to be only marginally viable in economic terms compared to Hold the Line costs. There would however, be added value in creating new habitat in realigned areas. As only indicative realignment extents are shown in the SMP, there is potential to position the realignment so that the length of defence is shorter that the indicative realignment extent shown in the SMP, which will reduce costs. More detailed assessment will therefore be required before this policy is implemented. No change to the original economic appraisal given in Section H4.

Location	Policy			Description of Alternative tested	Broad-scale Review (this SMP)		Conclusions
					Alternative Damages and Benefits Capital Value (CV)	**Alternative Costs Capital Value (CV)**	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)							
					Grade 4: 3.6ha = **c. £0.04m**	areas.	
E4 16 Ham Green to East of Upchurch	NAI	NAI	NAI	Hold the Line along the whole frontage.	***NAI Damages (erosion):*** Potential damage / loss of one residential property and some greenhouses. Land lost due to erosion is uncertain, but is likely to be minimal.	To maintain and replace a line of defence over the 1.75km frontage would cost: £0.6m CV in years 0-20 £12.2m CV in years 20-50 £2.8m CV in years 50-100 (Total £15.5m CV) These figures allow for maintenance and replacement, optimum bias and climate change.	This alternative is not considered economically viable based on the limited value of assets.
E4 17 East of Upchurch to East Lower Halstow	MR with localised HTL	MR with localised HTL	MR with localised HTL	Hold the Line along the whole frontage.	***NAI Damages:*** NAI could result in the inundation of the Lower Halstow flood risk area (including the loss of over 70 residential and 14 commercial properties) with a capital value of c. **£15.9m.** **Agricultural land loss**: Grade 1: 6.7ha Grade 2: 4.2ha Grade 3: 1.1ha Grade 4: 0.7ha	To maintain and replace a line of defence over the 1.75km frontage would cost: £0.6m CV in years 0-20 £12.2m CV in years 20-50 £2.8m CV in years 50-100 (Total £15.5m CV) These figures allow for maintenance and replacement, optimum bias and climate change.	This alternative is considered economically preferable. The provision of defences to HTL is less costly compared to potential costs for MR with localised HTL along sections of this frontage. The provision of realigned embankments to MR with localised HTL would cost: £2.1m CV in years 0-20 £13.8m CV in years 20-50 £9.2m CV in years 50-100 (Total £25.2m CV) These figures allow for maintenance and replacement, optimum bias and climate

Location	Policy	Description of Alternative tested	Broad-scale Review (this SMP)		Conclusions
			Alternative Damages and Benefits Capital Value (CV)	Alternative Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)					
			Non-agricultural: 0.1ha = Capital value of agricultural land loss is c. **£0.09m.** ***Preferred Plan (Managed Realignment with localised Hold the Line) Damages:*** Indicative MR extent agricultural loss: Grade 1: 0.7ha = **c. £0.005m**		change. There would however, be added value in creating new habitat in realigned areas under a MR with localised HTL policy. It should also be noted that the MR with localised HTL costs are only for indicative MR extents and therefore there is potential to position the realignment so that the lengths of defence are shorter that the indicative realignment extents shown in the SMP, which will reduce costs. More detailed assessment will therefore be required before this policy is implemented.
			Agricultural land values doubled	***NAI Damages:*** NAI could result in the inundation of the Lower Halstow flood risk area (including the loss of over 70 residential and 14 commercial properties) with a capital value of c. **£15.9m.** **Agricultural land loss**: Grade 1: 6.7ha Grade 2: 4.2ha Grade 3: 1.1ha Grade 4: 0.7ha	***Preferred Plan (Managed Realignment with localised Hold the Line) CV Costs:*** Years 0-20: £2.1m Years 20-50: £13.8m Years 50-100: £9.3m (Total £25.2m CV) (This includes Optimum Bias and Climate Change allowance) The cost of providing set back defences would depend upon the alignment chosen. Estimated	Managed Realignment with localised HTL along this frontage does not appear to be economically preferable compared to Hold the Line costs. There would however, be added value in creating new habitat in realigned areas. As only indicative realignment extents are shown in the SMP, there is potential to position the realignments so that the lengths of defence are shorter than the indicative realignment extents shown in the SMP, which will reduce costs. More detailed assessment will therefore be required before this policy is implemented.

Location	Policy			Description of Alternative tested	Broad-scale Review (this SMP)		Conclusions
					Alternative Damages and Benefits Capital Value (CV)	Alternative Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)							
					Non-agricultural: 0.1ha = Capital value of agricultural land loss is c. **£0.18m.** ***Preferred Plan (Managed Realignment with localised Hold the Line) Damages:*** Indicative MR extent agricultural loss: Grade 1: 0.7ha = **c. £0.01m**	capital values were generated for possible inundation of two discrete areas west of Lower Halstow, with the remaining defence line held in the present position. Compared to estimated Hold the Line costs along this frontage of £15.5m in total for the 100 year period, the cost of providing set back defences is more expensive, however there will be added opportunity for habitat creation in realigned areas.	No change to the original economic appraisal given in Section H4.
E4 18 Barksore Marshes	MR	NAI	NAI	Hold the Line along the whole frontage.	Protection of environmental assets and agricultural land (not evaluated).	To maintain and replace a line of defence over the 5km frontage would cost: £22.4m CV in years 0-20 £3.6m CV in years 20-50 £8m CV in years 50-100 (Total £34m CV) These figures allow for maintenance and replacement, optimum bias and climate change.	This alternative is not considered economically viable. The provision of defences to HTL is more costly compared to potential costs for MR in epoch 1 and NAI in epochs 2 and 3. The provision of realigned embankments to MR would cost: £224k CV in years 0-20 This figure allows for maintenance and replacement, optimum bias and climate change.
				Agricultural land values	***NAI Damages:***	***Preferred Plan (Managed***	It appears that there may be economic advantages to provide a set-back defence

Location	Policy			Description of Alternative tested	Broad-scale Review (this SMP)		Conclusions
					Alternative Damages and Benefits Capital Value (CV)	Alternative Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)							
				doubled	NAI could result in the inundation of the Barksore Marshes and one property with a capital value of c. **£0.2m.** **Agricultural land loss**: Grade 2: 0.9ha Grade 3: 0.3ha Non-agricultural: 0.8ha = Capital value of agricultural land loss is c. **£0.024m.** ***Preferred Plan (Managed Realignment) Damages:*** Indicative MR extent agricultural loss: Grade 2: 0.3ha Grade 3: 0.2ha = **c. £0.008m**	***Realignment) CV Costs:*** Years 0-20: £0.22m (This includes Optimum Bias and Climate Change allowance) The cost of providing set back defences would depend upon the alignment chosen. Estimated capital values were generated for realigned defences in the south east of the marshes only, as the remaining marshes rise to higher land. These defences have been costed for maintenance in epoch one only. Compared to estimated Hold the Line costs along this frontage of £34m in total for the 100 year period, this indicates that a retired defence in a small localised area, followed by no active intervention, would be economically preferable in the long term.	along this frontage in the short term. NAI policy in the medium and long term is appropriate as no other option would be economically viable. No change to the original economic appraisal given in Section H4.
E4 19 Funton to Raspberry Hill	NAI	NAI	NAI	Hold the Line along the whole frontage.	Protection of road and agricultural land (not evaluated).	To maintain and replace a line of defence over the 2km frontage would cost: £0.6m CV in years 0-20 £13.9m CV in years 20-50	This alternative is not considered economically viable.

Location	Policy			Description of Alternative tested	Broad-scale Review (this SMP)		Conclusions
					Alternative Damages and Benefits Capital Value (CV)	Alternative Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)							
						£3.2m CV in years 50-100 (Total £17.8m CV) These figures allow for maintenance and replacement, optimum bias and climate change.	
E4 20 Chetney Marshes	MR	MR	MR	Hold the Line along the whole frontage.	Protection of environmental assets and agricultural land (not evaluated).	To maintain and replace a line of defence over the 11km frontage would cost: £49.3m CV in years 0-20 £7.9m CV in years 20-50 £17.6m CV in years 50-100 (Total £74.8m CV) These figures allow for maintenance and replacement, optimum bias and climate change.	This alternative is not considered economically preferable. The provision of defences to HTL is more costly compared to potential costs for MR along this frontage. The provision of realigned embankments to MR would cost: £39.2m CV in years 0-20 £9m CV in years 20-50 £20.8m CV in years 50-100 (Total £69m CV) These figures allow for maintenance and replacement, optimum bias and climate change.
				Agricultural land values doubled	***NAI Damages:*** NAI could result in the inundation of the Chetney Marshes and Ferry Marshes flood risk area (including the	***Preferred Plan (Managed Realignment) CV Costs:*** Years 0-20: £39.2m Years 20-50: £9m Years 50-100: £20.8m	The figures presented do not include for losses associated with the road, railway line and power lines, which are important built assets along this frontage. It is considered that a fuller economic evaluation of these potential benefits

Location	Policy			Description of Alternative tested	Broad-scale Review (this SMP)		Conclusions
					Alternative Damages and Benefits Capital Value (CV)	Alternative Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)							
					loss of over 80 residential and 5 commercial properties) with a capital value of c. **£17.3m.** **Agricultural land loss**: Grade 1: 0.9ha Grade 2: 0.6ha Grade 3: 0.3ha Grade 4: 62.8ha = Capital value of agricultural land loss is c. **£0.8m.** Additionally, the primary assets here are the A249 road and railway line to the south of Chetney Marshes and power lines on the marshes which would effectively be lost once defence management ceased. No attempt has been made to value these assets. ***Preferred Plan (Managed Realignment) Damages:*** Indicative MR extent agricultural loss: Grade 4: 8.4ha = **c. £0.1m**	(Total £69m CV) (These include Optimum Bias and Climate Change allowance) The cost of providing set back defences would depend upon the alignment chosen. Estimated capital values were generated for possible inundation of two discrete areas on Chetney Marshes with the remaining defence line held in the present position. Compared to estimated Hold the Line costs along this frontage of £74.8m in total for the 100 year period, this indicates that a retired defence line would be economically preferable in the long term.	would provide a clear economic justification for defending the line in a retreated position over the next 100 years (if that remains appropriate). It appears that there may be economic advantages in providing a set-back defence along this frontage. No change to the original economic appraisal given in Section H4.

Location	Policy			Description of Alternative tested	Broad-scale Review (this SMP)		Conclusions
					Alternative Damages and Benefits Capital Value (CV)	Alternative Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)							
E4 23 Murston Pits to Faversham	HTL	MR with localised HTL	MR with localised HTL	Hold the Line along the whole frontage.	Protection of environmental assets and agricultural land (not evaluated).	To maintain and replace an embankment over the 18km frontage would cost: £5.8m CV in years 0-20 £125.3m CV in years 20-50 £28.8m CV in years 50-100 (Total £159.8m CV) These figures allow for maintenance and replacement, optimum bias and climate change.	This alternative is not considered economically preferable. The provision of defences to HTL is more costly compared to potential costs for MR with localised HTL along sections of this frontage. The provision of realigned embankments to MR with localised HTL would cost: £5.8m CV in years 0-20 £64.3m CV in years 20-50 £42.2m CV in years 50-100 (Total £112.3m CV) These figures allow for maintenance and replacement, optimum bias and climate change.
				Agricultural land values doubled	***NAI Damages:*** NAI could result in the inundation of the flood risk area between Sittingbourne and Faversham (including the loss of over 620 residential and 225 commercial properties) with a capital value of c. **£177.1m.** **Agricultural land loss**: Grade 1: 34.2ha	***Preferred Plan (Hold the Line & Managed Realignment with localised Hold the Line) CV Costs:*** Years 0-20: £5.8m Years 20-50: £64.3m Years 50-100: £42.2m (Total £112.3m CV) (These include Optimum Bias and Climate Change allowance)	The value of assets at risk indicates that a policy of Hold the Line is economically viable in the short term and a Hold policy along discrete sections of frontage in the medium and long term. It appears that there may be economic advantages to provide a set-back defence in discrete locations along this frontage in the medium and long term, with added opportunity for habitat creation in realigned areas. No change to the original economic

Location	Policy			Description of Alternative tested	Broad-scale Review (this SMP)		Conclusions
					Alternative Damages and Benefits Capital Value (CV)	Alternative Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)							
					Grade 2: 1.6ha Grade 3: 6ha Grade 4: 106.6ha Non-agricultural: 23.5ha = Capital value of agricultural land loss is c. **£2m.** ***Preferred Plan (Hold the Line & Managed Realignment with localised Hold the Line) Damages:*** Indicative MR extent agricultural loss: Grade 1: 1.3ha Grade 3: 1.3ha Grade 4: 36ha = **c. £0.4m**	The cost of providing set back defences would depend upon the alignment chosen. Estimated capital values were generated for possible inundation of four discrete areas, one between Little Murston and Conyer, two between Conyer and Oare and the fourth at Ham Marshes with the remaining defence line held in the present position. Compared to estimated Hold the Line costs along this frontage of £159.8m in total for the 100 year period, this indicates that a retired defence line would be economically preferable in the long term.	appraisal given in Section H4.
E4 25 Shell Ness to Sayes Court	MR	MR	MR	Hold the Line along the whole frontage.	Protection of environmental assets and agricultural land (not evaluated).	To maintain and replace an embankment over the 3km frontage would cost: £3.4m CV in years 0-20 £5.8m CV in years 20-50 £9.6m CV in years 50-100 (Total £18.7m CV) These figures allow for	This alternative is not considered economically preferable. The provision of defences to HTL is more costly compared to potential costs for MR along this frontage. The provision of realigned embankments to MR would cost: £1.8m CV in years 0-20

Location	Policy	Description of Alternative tested	Broad-scale Review (this SMP)		Conclusions
			Alternative Damages and Benefits Capital Value (CV)	Alternative Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)					
				maintenance and replacement, optimum bias and climate change.	£3.1m CV in years 20-50 £7.7m CV in years 50-100 (Total £12.5m CV) These figures allow for maintenance and replacement, optimum bias and climate change.
		Agricultural land values doubled	***NAI Damages:*** NAI could result in large scale inundation of the south Sheppey flood risk area (including the loss of approximately 7 residential and 6 commercial properties) with a capital value of c. **£1.6m.** **Agricultural land loss**: Grade 3: 7ha Grade 4: 125.4ha Grade 5: 14.5ha = Capital value of agricultural land loss is c. **£1.8m.** ***Preferred Plan (Managed Realignment) Damages:*** Indicative MR extent agricultural loss:	***Preferred Plan (Managed Realignment) CV Costs:*** Years 0-20: £1.8m Years 20-50: £3.1m Years 50-100: £7.7m (Total £12.5m CV) (These include Optimum Bias and Climate Change allowance) The cost of providing set back defences would depend upon the alignment chosen. Estimated capital values were generated for possible inundation of Harty Marshes, incorporating higher land where possible. Compared to estimated Hold the Line costs along this frontage of £18.7m in total for the 100 year period, this indicates that a retired defence line would be	There are insufficient assets to justify intervention of any significance along this frontage. However, it appears that there may be economic advantages to provide a set-back defence along this frontage instead of HTL, with added opportunity for habitat creation in realigned areas. As only indicative realignment extents are shown in the SMP, there is potential to position the realignment with shorter defence lengths, which may be more cost effective. More detailed assessment will therefore be required before this policy is implemented. No change to the original economic appraisal given in Section H4.

Location	Policy			Description of Alternative tested	Broad-scale Review (this SMP)		Conclusions
					Alternative Damages and Benefits Capital Value (CV)	Alternative Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)							
					Grade 3: 0.1ha Grade 4: 24ha Grade 5: 3.2ha = **c. £0.34m**	economically preferable in the long term.	
E4 26 Sayes Court to North Elmley Island	MR	MR	MR	Hold the Line along the whole frontage.	Protection of environmental assets and agricultural land (not evaluated).	To maintain and replace an embankment over the 6km frontage would cost: £13.4m CV in years 0-20 £23m CV in years 20-50 £38.4m CV in years 50-100 (Total £74.9m CV) These figures allow for maintenance and replacement, optimum bias and climate change.	This alternative is considered economically preferable. The provision of defences to HTL is less costly compared to potential costs for MR along this frontage. The provision of realigned embankments would cost: £14.6m CV in years 0-20 £25m CV in years 20-50 £50.4m CV in years 50-100 (Total £90m CV) These figures allow for maintenance and replacement, optimum bias and climate change. There would however, be added value in creating new habitat in realigned areas under a MR policy. It should also be noted that the MR costs are only for indicative MR extents and therefore there is potential to position the realignment so that the lengths of defence are shorter that the indicative realignment extents shown in the SMP, which will

Location	Policy	Description of Alternative tested	Broad-scale Review (this SMP)		Conclusions
			Alternative Damages and Benefits Capital Value (CV)	Alternative Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)					
					reduce costs. More detailed assessment will therefore be required before this policy is implemented.
		Agricultural land values doubled	***NAI Damages:*** NAI could result in large scale inundation of the south Sheppey flood risk area (including the loss of approximately 10 residential and 6 commercial properties) with a capital value of c. **£2m.** **Agricultural land loss**: Grade 3: 15.8ha Grade 4: 285.2ha Grade 5: 31.8ha = Capital value of agricultural land loss is c. **£4.2m.** ***Preferred Plan (Managed Realignment) Damages:*** Indicative MR extent agricultural loss: Grade 3: 2.6ha Grade 4: 20.1ha Grade 5: 1.6ha = **c. £0.3m**	***Preferred Plan (Managed Realignment) CV Costs:*** Years 0-20: £14.6m Years 20-50: £25m Years 50-100: £50.4m (Total £90m CV) (These include Optimum Bias and Climate Change allowance) The cost of providing set back defences would depend upon the alignment chosen. Estimated capital values were generated for possible inundation of four areas between Elmley Island and the Isle of Harty, incorporating higher land where possible. Compared to estimated Hold the Line costs along this frontage of £75m in total for the 100 year period, the cost of providing set back defences is more expensive, however there will be	There are insufficient assets to justify intervention of any significance along this frontage. Managed Realignment along this frontage does not appear to be economically preferable compared to Hold the Line costs. There would however, be added value in creating new habitat in realigned areas and, as only indicative realignment extents are shown in the SMP, there is potential to position the realignments so that the lengths of defence are shorter than the example realignment extents shown in the SMP, which will reduce costs. More detailed assessment will therefore be required before this policy is implemented. No change to the original economic appraisal given in Section H4.

Location	Policy			Description of Alternative tested	Broad-scale Review (this SMP)		Conclusions
					Alternative Damages and Benefits Capital Value (CV)	Alternative Costs Capital Value (CV)	
(HTL = Hold the Line; MR = Managed Realignment; NAI = No Active Intervention)							
						added opportunity for habitat creation in realigned areas.	

As part of the Economic Assessment, flood damages have been calculated on a policy unit by policy unit basis, based on damages within flood cells. Along a number of frontages within the SMP boundaries, flood cells extend over multiple policy units. As a sensitivity test, where a number of Policy Units extend over one or more flood cells, the No Active Intervention damages for these flood cells have been combined to give a value for 'total damages' for the flood areas affected, and defence costs for the associated Policy Units have been aggregated to provide a value for 'total costs'. The calculated 'total' damage and cost values are compared and summarised in Table H5.2. The conclusions show that this assessment did not change the economic viabilities of the preferred policy option.

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.

Table H5.2 Sensitivity Assessment using Flood Cells.

Flood management unit (FMU)	NAI Flooding Damages and Benefits (CV)		Total Damages and Benefits	Policy Unit	Preferred Policy Option Costs (CV)	Conclusions
	Residential and commercial	Agricultural land loss				
Policy Units E401 and E402 incorporating FMU 11 and 13						
11	£132.34m	£0.70m	£133.05m	E4 01	£54.04m	Economically preferable
13	£1.45m	£0.04m	£1.49m	E4 02	£33.28m	
			£134.54m		**£87.32m**	
Policy Units E403 and E404 incorporating FMU 16						

Flood management unit (FMU)	NAI Flooding Damages and Benefits (CV)		Total Damages and Benefits	Policy Unit	Preferred Policy Option Costs (CV)	Conclusions
	Residential and commercial	Agricultural land loss				
16	£149.47m	£0.17m	£149.64m	E4 03	£45.92m	Economically preferable
				E4 04	£25.58m	
			£149.64m		**£71.5m**	
Policy Units E406 and E407 incorporating FMU 22, 23, 26 and 28						
22	£4.79m	£0.03m	£4.82m	E4 06	£71.28m	Economically preferable
23	£280.69m	£0.02m	£280.71m	E4 07	£19.1m	
26	£7.12m	£0.003m	£7.12m			
28	£19.75m	£0.05m	£19.8m			
			£312.45m		**£90.38m**	
Policy Units E408 and E409 incorporating FMU 29, 31, 33 and 35						
29	£0.64m	£0.018m	£0.66m	E4 08	£38.7m	Economically preferable
31	£0.58m	£0.00008m	£0.58m	E4 09	£42.73m	
33	£0.23m	£0.019m	£0.25m			
35	£293.21m	£0.16m	£293.37m			
			£294.86m		**£81.43m**	
Policy Units E412, E413, E414 and E415 incorporating FMU 25, 24, 21, 17 and 15						
25	-	£0.00006m	£0.00006m	E4 12	£62.1m	Economically preferable
24	£174.91m	£0.02m	£174.93m	E4 13	£37.8m	
21	£239.5m	-	£239.5m	E4 14	£25.4m	
17	£96.57m	£0.074m	£96.64m	E4 15	£77.3m	

Flood management unit (FMU)	NAI Flooding Damages and Benefits (CV)		Total Damages and Benefits	Policy Unit	Preferred Policy Option Costs (CV)	Conclusions
	Residential and commercial	Agricultural land loss				
15	£0.84m	£0.091m	£0.93m			
			£512m		**£202.6m**	
Policy Units E422 and E423 incorporating FMU 6, 5 and 3						
6	£530.95m	£0.13m	£531.08m	E4 22	£53.3m	Economically preferable
5	£36.58m	£0.35m	£36.93m	E4 23	£112.3m	
3	£140.53m	£0.66m	£141.19m			
			£709.2m		**£165.6m**	
Policy Units E425, E426 and E427 incorporating FMU 2 and 4						
2	£1.6m	0.91m	£2.51m	E4 25	£12.6m	Not economically preferable
4	£0.44m	£1.15m	£1.59m	E4 26	£90m	
				E4 27	£14.6m	
			£4.1m		**£117.2m**	
Policy Units E428 and E429 incorporating FMU 9						
9	£1341m	£0.26m	£1341.26m	E4 28	£25.7m	Economically preferable
				E4 29	£38.5m	
			£1341.26m		**£64.2m**	

H6 Sensitivity Testing

Sensitivity Analysis was undertaken to highlight uncertainty or risks in key variables that may affect policy decisions and identifies the consequences for the preferred scenario. Examples of uncertainty include:

- Anticipated changes in development: regeneration/ development / decommissioning of assets;
- Contamination of land, locations which maybe at risk including: Power Stations, Historic industrial areas, Dockyards, Industrial areas, Historic landfill sites and Contemporary landfill sites;
- Change in environmental legislation, i.e. increased / decreased importance of environmental designations; and,
- Climate change / sea-level rise / increased storminess / increased fluvial flows.
- An increasing importance of agriculture linked with the issue of food security in the future.

The following tables provide a qualitative assessment of the sensitivity of proposed policies to change. Sensitivity analysis was also applied during cost benefit analysis to confirm the robustness of the policies e.g. agricultural land values were doubled to gauge the sensitivity of increased agricultural importance.

SMP 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;
- A change in funding priorities leading to increased / decreased funding;
- Availability of compensation for those affected by flooding and / or erosion; and

Supporting information regarding contemporary climate change predictions and corresponding implications for the Medway and Swale estuaries are found in **Annex H3**.

H6.1 Uncertainty Identification Table

The table below indicates the degree to which the four generic management policies are exposed to identified uncertainties.

Uncertainty	Exposure to Uncertainty			
	HTL	**ATL**	**MR**	**NAI**
Change in land use – increased development	Maintaining the defence line will provide a suitable standard of protection for increased development	Advancing the defence line will provide a suitable standard of protection for increased development	Realigning the defence line is not favourable for increased development **MR policy exposed to this uncertainty**	No Active Intervention is not favourable for increased development **NAI policy exposed to this uncertainty**
Change in land use – decreased development	Maintaining the defence line may not be economically justifiable as development decreases **HTL policy exposed to this uncertainty**	Advancing the defence line may not be economically justifiable as development decreases **ATL policy exposed to this uncertainty**	Realigning the defences is possible as development decreases	No Active Intervention will not provide protection to remaining assets **NAI policy exposed to this uncertainty**
Increased rates of SLR	Under a scenario of HTL sea level rise may result in coastal squeeze and increased wave energy at defences. Defences will become more expensive and technically difficult to maintain **HTL policy exposed to this uncertainty**	Under a scenario of ATL sea level rise may result in greater coastal squeeze and greater increased wave energy at defences. It is likely that the intertidal will be lost. Defences will become more expensive and technically difficult to maintain **ATL policy exposed to this uncertainty**	Under a scenario of MR sea level rise may be accommodated. Over time defences will become more expensive and technically difficult to maintain especially in areas of low lying hinterland **MR policy exposed to this uncertainty**	Under a scenario of NAI sea level rise will result in uncontrolled inundation of water. Erosion rates could increase and /or erosion may be reactivated where the shoreline was previously defended **NAI policy exposed to this uncertainty**
Increased fluvial flows (estuary)	Increased fluvial flows may increase channel erosion and render defences more susceptible to undermining. Defences will become more	Increased fluvial flows may increase channel erosion and render defences more susceptible to undermining, this will be exacerbated by channel	Retreated defence line may provide a flood storage area to manage the accommodation of flood inundation from increased fluvial flows, however increased	No Active intervention will result in uncontrolled inundation of flood waters from increased fluvial flows. Increased fluvial flows will increase erosion of

Uncertainty	Exposure to Uncertainty			
	HTL	ATL	MR	NAI
	expensive and technically difficult to maintain **HTL policy exposed to this uncertainty**	narrowing with advanced defences. Defences will become more expensive and technically difficult to maintain **ATL policy exposed to this uncertainty**	fluvial flows may increase channel erosion and render defences more susceptible to undermining. Over time defences will become more expensive and technically difficult to maintain **MR policy exposed to this uncertainty**	channels and potentially re-activate channel meandering **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 **HTL policy exposed to this uncertainty**	A reduced sediment supply may increase exposure of defences to wave energy, advancing the defence line will exacerbate this exposure, consequently defences will become more expensive and technically difficult to maintain. ATL may also affect longshore sediment transport processes within the estuary **ATL policy exposed to this uncertainty**	Retreated defence line will allow fines to be released into the estuary system as sediments are reworked	No Active Intervention will allow fines to be released into the estuary system as sediments are reworked
Increasing storminess	With increased wave energy at defences, defences will become more expensive and technically difficult to maintain **HTL policy exposed to this uncertainty**	With increased wave energy at defences with increased storminess, a reduced foreshore will exacerbate wave energy further. Defences will become more expensive and technically difficult to maintain **ATL policy exposed to this uncertainty**	Realigning the defences will allow wave energy to be dissipated over a larger area, in a managed manner. However over time, with increased wave energy at defences, defences will become more expensive and technically difficult to maintain **MR policy exposed to this uncertainty**	No active intervention will result in uncontrolled flooding and erosion, however although NAI remains susceptible to increased storminess, NAI will allow wave energy to be dissipated over a larger area **NAI policy exposed to this uncertainty**

Uncertainty	Exposure to Uncertainty			
	HTL	**ATL**	**MR**	**NAI**
Land may be contaminated	Maintaining the defence line will continue to provide a suitable standard of protection for potentially contaminated land	Advancing the defence line may increase the standard of protection to potentially contaminated land	Contaminated land would require expensive remediation if MR was implemented, otherwise contaminants may be released into the estuary system **MR policy exposed to this uncertainty**	If the land is contaminated, NAI would allow contaminants to be released into the estuary system **MR policy exposed to this uncertainty**
Change in legislation on habitat designation **FRESHWATER HABITATS**	**Increased Importance**			
	Increased requirement to maintain and improve habitats, maintaining the defence line will provide a suitable standard of protection to freshwater habitats	Increased requirement to maintain and improve habitats, advancing the defence line will increase the standard of protection to freshwater habitats	Increased requirement to maintain and improve habitats, MR would result in the managed loss of freshwater habitats **MR policy exposed to this uncertainty**	Increased requirement to maintain and improve habitats, NAI would result in the uncontrolled loss of freshwater habitats **NAI policy exposed to this uncertainty**
	Decreased Importance			
	Decreased requirement to maintain and improve habitats, maintaining the defence line may not be justifiable **HTL policy exposed to this uncertainty**	Decreased requirement to maintain and improve habitats, advancing the defence line to provide an increased standard of protection may not be justifiable **ATL policy exposed to this uncertainty**	Decreased requirement to maintain and improve habitats, acceptable managed loss of freshwater habitats	Decreased requirement to maintain and improve habitats, acceptable uncontrolled loss of freshwater habitats
Change in legislation on habitat designation **INTERTIDAL HABITATS**	**Increased Importance**			
	Increased requirement to maintain and improve habitats, maintaining the defence line may result in coastal squeeze and loss of intertidal habitats	Increased requirement to maintain and improve habitats, advancing the defence line will result in the loss of intertidal habitats	Increased requirement to maintain and improve habitats, MR will result in the managed creation of intertidal habitat	Increased requirement to maintain and improve habitats, NAI will result uncontrolled flooding and intertidal habitat creation

Uncertainty	Exposure to Uncertainty			
	HTL	**ATL**	**MR**	**NAI**
	HTL policy exposed to this uncertainty	**ATL policy exposed to this uncertainty**		
	Decreased Importance			
	Decreased requirement to maintain and improve habitats, acceptable loss of habitat due to coastal squeeze when maintaining the defence line	Decreased requirement to maintain and improve habitats, acceptable loss of habitat with an advanced the defence line	Decreased requirement to maintain and improve habitats, MR for habitat creation may not be economically justifiable **MR policy exposed to this uncertainty**	Decreased requirement to maintain and improve habitats, therefore decreased importance of this habitat does not support a policy of NAI **NAI policy exposed to this uncertainty**

H6.2 Sensitivity Table

The following table identifies the uncertainties / risks which may affect each policy management unit, the potential consequences of the uncertainties, the main policies exposed to each uncertainty and in which epoch, and an overall assessment of the proposed policy in relation to its exposure to identified uncertainties.

Proposed Policy Unit		Epoch 1 (0-20 years)	Epoch 2 (20-50 years)	Epoch 3 (50-100 years)	Uncertainty	Consequence	Exposure to Uncertainty (Epochs 1, 2 and 3)		Overall assessment of proposed policy
E4 01	**Grain Tower to Colemouth Creek**	HTL	HTL	HTL	Change in land use – increased development (residential, commercial, infrastructure) (Former Oil refinery site proposed as Thames Gateway regeneration area)	Development of more residential properties and infrastructure could lead to continued requirement for HTL.	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	Acceptable policies, they are not unduly exposed to uncertainties compared to other policies
					Change in land use - (decommission of Power Station)	Reduced requirement for flood and erosion risk management	**HTL** **ATL** MR **NAI**	◆ 2,3 ◆ 2,3 ◆ 2,3	
					Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	
					Reductions in sediment supply	Reduction in protective foreshore cover, increased wave energy at defences. Defences may become more expensive and technically difficult to maintain.	**HTL** **ATL** MR NAI	◆ 2,3 ◆ 2,3	

Proposed Policy Unit		Epoch 1 (0-20 years)	Epoch 2 (20-50 years)	Epoch 3 (50-100 years)	Uncertainty	Consequence	Exposure to Uncertainty (Epochs 1, 2 and 3)		Overall assessment of proposed policy
					Increasing storminess	Increase in wave energy. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	
					Land may be contaminated - (due to Power Station)	Contaminants may be released unless expensive remediation is implemented.	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	
					Change in legislation on habitat designation	Reduced/increased requirement for protection/conservation of habitats	**HTL** **ATL** **MR** **NAI**	◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3	
E4 02	**Colemouth Creek to Bee Ness Jetty**	MR with localised HTL	MR with localised HTL	MR with localised HTL	Change in land use – increased development (infrastructure to proposed regeneration area)	Increased development of infrastructure could lead to continued requirement for HTL	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	MR / NAI are exposed to most uncertainties, however MR will only be more exposed in discrete areas along the frontage and in later epochs. HTL is less exposed to uncertainties
					Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	
					Reductions in sediment supply	Reduction in protective foreshore cover, increased wave energy at defences. Defences may become more expensive and technically difficult to maintain.	**HTL** **ATL** MR NAI	◆ 2,3 ◆ 2,3	

Proposed Policy Unit		Epoch 1 (0-20 years)	Epoch 2 (20-50 years)	Epoch 3 (50-100 years)	Uncertainty	Consequence	Exposure to Uncertainty (Epochs 1, 2 and 3)		Overall assessment of proposed policy
					Land may be contaminated - (due to Landfill)	Contaminants may be released unless expensive remediation is implemented.	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	
					Change in legislation on habitat designation	Reduced/increased requirement for protection/conservation of habitats	**HTL** **ATL** **MR** **NAI**	◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3	
E4 03	**Kingsnorth Power Station**	HTL	HTL	HTL	Change in land use - (New Power Station proposed alongside Kingsnorth Power station)	Development of a further Power Station could lead to continued requirement for HTL.	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	Acceptable policies, they are not unduly exposed to uncertainties compared to other policies
					Change in land use - (decommission of Power Station)	Reduced requirement for flood and erosion risk management	**HTL** **ATL** MR **NAI**	◆ 2,3 ◆ 2,3 ◆ 2,3	
					Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	
					Reductions in sediment supply	Reduction in protective foreshore cover, increased wave energy at defences. Defences may become more expensive and technically difficult to maintain.	**HTL** **ATL** MR NAI	◆ 2,3 ◆ 2,3	

Proposed Policy Unit		Epoch 1 (0-20 years)	Epoch 2 (20-50 years)	Epoch 3 (50-100 years)	Uncertainty	Consequence	Exposure to Uncertainty (Epochs 1, 2 and 3)		Overall assessment of proposed policy
					Land may be contaminated – (due to historic landfill & Power Station)	Contaminants may be released unless expensive remediation is implemented.	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	
					Change in legislation on habitat designation	Reduced/increased requirement for protection/conservation of habitats	**HTL** **ATL** **MR** **NAI**	◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3	
E4 04	**Power Station to Cockham Wood**	MR with localised HTL	MR with localised HTL	MR with localised HTL	Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	HTL / ATL are exposed to most uncertainties along some lengths of frontage, MR / NAI have the least exposure to uncertainty therefore suggesting that MR is a robust policy
					Reductions in sediment supply	Reduction in protective foreshore cover, increased wave energy at defences. Defences may become more expensive and technically difficult to maintain.	**HTL** **ATL** MR NAI	◆ 2,3 ◆ 2,3	
					Change in legislation on habitat designation	Reduced/increased requirement for protection/conservation of habitats	**HTL** **ATL** **MR** **NAI**	◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3	
E4 05	**Hoo Marina to Lower Upnor**	NAI	NAI	NAI	Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	HTL / ATL are exposed to most uncertainties, MR / NAI are

Proposed Policy Unit		Epoch 1 (0-20 years)	Epoch 2 (20-50 years)	Epoch 3 (50-100 years)	Uncertainty	Consequence	Exposure to Uncertainty (Epochs 1, 2 and 3)		Overall assessment of proposed policy
					Reductions in sediment supply	Reduction in protective foreshore cover, increased wave energy at defences. Defences may become more expensive and technically difficult to maintain.	**HTL** **ATL** MR NAI	◆ 2,3 ◆ 2,3	least exposed to uncertainties therefore suggesting NAI is a robust policy
					Change in legislation on habitat designation	Reduced/increased requirement for protection/conservation of habitats	**HTL** **ATL** **MR** **NAI**	◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3	
E406	**Lower Upnor to Medway bridge**	HTL	HTL	HTL	Change in land use – increased development (Strood Riverside proposed development area and regeneration of waterfront)	Development of more residential properties and infrastructure could lead to continued requirement for HTL.	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	MR / NAI are exposed to most uncertainties, HTL / ATL are least exposed therefore suggesting that HTL is a robust policy
					Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	
					Increased fluvial flows	Increasing rates of SLR result in faster flows in confined areas and increased erosion of defences. Defences may become more expensive and technically difficult to maintain	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 2,3 ◆ 2,3 ◆ 2,3	
					Land may be contaminated – (due to historic landfill)	Contaminants may be released unless expensive remediation is implemented.	HTL ATL **MR**	 ◆ 1,2,3	

Proposed Policy Unit		Epoch 1 (0-20 years)	Epoch 2 (20-50 years)	Epoch 3 (50-100 years)	Uncertainty	Consequence	Exposure to Uncertainty (Epochs 1, 2 and 3)		Overall assessment of proposed policy
							NAI	◆ 1,2,3	
E407	**Medway Bridge to North Halling**	HTL	HTL	HTL	Change in land use – increased development	Development of more residential and commercial properties and infrastructure could lead to continued requirement for HTL	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	HTL is less exposed to uncertainties, suggesting that HTL is a robust policy
					Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	
					Increased fluvial flows	Increasing fluvial flows will result in faster flows in confined areas and increased erosion of defences. Defences may become more expensive and technically difficult to maintain	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 2,3 ◆ 2,3 ◆ 2,3	
E408	**North Halling to Snodland**	MR with localised HTL	MR with localised HTL	MR with localised HTL	Change in land use – increased development	Development of more residential and commercial properties and infrastructure could lead to continued requirement for HTL	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	MR / NAI are exposed to most uncertainties, however MR will only be more exposed in discrete areas along the frontage
					Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	

Proposed Policy Unit		Epoch 1 (0-20 years)	Epoch 2 (20-50 years)	Epoch 3 (50-100 years)	Uncertainty	Consequence	Exposure to Uncertainty (Epochs 1, 2 and 3)		Overall assessment of proposed policy
					Increased fluvial flows	Increasing fluvial flows will result in faster flows in confined areas and increased erosion of defences. Defences may become more expensive and technically difficult to maintain	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 2,3 ◆ 2,3 ◆ 2,3	and in later epochs. HTL is less exposed to uncertainties
					Land may be contaminated – (due to historic landfill)	Contaminants may be released unless expensive remediation is implemented.	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	
					Change in legislation on habitat designation	Reduced/increased requirement for protection/conservation of habitats	**HTL** **ATL** **MR** **NAI**	◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3	
E4 09	**Snodland to Allington Lock**	HTL	MR with localised HTL	MR with localised HTL	Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	MR / NAI are exposed to most uncertainties, however MR will only be more exposed in discrete areas along the frontage and in later epochs. HTL is less exposed to uncertainties
					Increased fluvial flows	Increasing rates of SLR result in faster flows in confined areas and increased erosion of defences. Defences may become more expensive and technically difficult to maintain	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 2,3 ◆ 2,3 ◆ 2,3	
					Land may be contaminated – (due to industry)	Contaminants may be released unless expensive remediation is	HTL ATL		

Proposed Policy Unit		Epoch 1 (0-20 years)	Epoch 2 (20-50 years)	Epoch 3 (50-100 years)	Uncertainty	Consequence	Exposure to Uncertainty (Epochs 1, 2 and 3)		Overall assessment of proposed policy
						implemented.	**MR** **NAI**	◆ 1,2,3 ◆ 1,2,3	
					Change in legislation on habitat designation	Reduced/increased requirement for protection/conservation of habitats	**HTL** **ATL** **MR** **NAI**	◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3	
					Change in land use – increased development	Development of more residential and commercial properties and infrastructure could lead to continued requirement for HTL	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	
E4 10	**Allington Lock to north Wouldham**	HTL	MR with localised HTL	MR with localised HTL	Change in land use – increased development	Development of more residential and commercial properties and infrastructure could lead to continued requirement for HTL	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	MR / NAI are exposed to most uncertainties, however MR will only be more exposed in discrete areas along the frontage and in later epochs. HTL is less exposed to uncertainties
					Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	
					Increased fluvial flows	Increasing fluvial flows will result in faster flows in confined areas and increased erosion of defences. Defences may become more expensive and technically difficult to maintain	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 2,3 ◆ 2,3 ◆ 2,3	

Proposed Policy Unit		Epoch 1 (0-20 years)	Epoch 2 (20-50 years)	Epoch 3 (50-100 years)	Uncertainty	Consequence	Exposure to Uncertainty (Epochs 1, 2 and 3)		Overall assessment of proposed policy
					Change in legislation on habitat designation	Reduced/increased requirement for protection/conservation of habitats	**HTL** **ATL** **MR** **NAI**	◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3	
E4 11	**Wouldham Marshes**	MR	MR	MR	Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	Acceptable policies, they are not unduly exposed to uncertainties compared to other policies
					Increased fluvial flows	Increasing fluvial flows will result in faster flows in confined areas and increased erosion of defences. Defences may become more expensive and technically difficult to maintain	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 2,3 ◆ 2,3 ◆ 2,3	
					Change in legislation on habitat designation	Reduced/increased requirement for protection/conservation of habitats	**HTL** **ATL** **MR** **NAI**	◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3	
E4 12	**Medway Bridge to east St Mary's Island**	HTL	HTL	HTL	Change in land use – increased development (Rochester Riverside proposed Thames Gateway regeneration area; Chatham Riverside proposed development area; Chatham Docks)	Development of more residential and commercial properties and infrastructure could lead to continued requirement for HTL	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	MR / NAI are exposed to most uncertainties, HTL / ATL on balance are least exposed

Proposed Policy Unit		Epoch 1 (0-20 years)	Epoch 2 (20-50 years)	Epoch 3 (50-100 years)	Uncertainty	Consequence	Exposure to Uncertainty (Epochs 1, 2 and 3)		Overall assessment of proposed policy
					Land may be contaminated – (due to dockyard)	Contaminants may be released unless expensive remediation is implemented.	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	to uncertainties suggesting that HTL is a robust policy
					Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	
					Increased fluvial flows	Increasing fluvial flows will result in faster flows in confined areas and increased erosion of defences. Defences may become more expensive and technically difficult to maintain	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 2,3 ◆ 2,3 ◆ 2,3	
E4 13	**St Mary's Island to the Strand**	HTL	HTL	HTL	Change in land use – increased development (St Mary's Island regeneration area)	Development of more residential and commercial properties and infrastructure could lead to continued requirement for HTL	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	MR / NAI are exposed to most uncertainties, HTL / ATL on balance are least exposed to uncertainties suggesting that HTL is a robust policy
					Land may be contaminated – (due to historic landfill)	Contaminants may be released unless expensive remediation is implemented.	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	
					Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR**	◆ 2,3 ◆ 1,2,3 ◆ 3	

Proposed Policy Unit		Epoch 1 (0-20 years)	Epoch 2 (20-50 years)	Epoch 3 (50-100 years)	Uncertainty	Consequence	Exposure to Uncertainty (Epochs 1, 2 and 3)		Overall assessment of proposed policy
							NAI	◆ 3	
					Increased fluvial flows	Increasing fluvial flows will result in faster flows in confined areas and increased erosion of defences. Defences may become more expensive and technically difficult to maintain	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 2,3 ◆ 2,3 ◆ 2,3	
E4 14	**The Strand to west Motney Hill**	HTL	MR	MR	Change in land use – increased development	Development of more residential and commercial properties and infrastructure could lead to continued requirement for HTL	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	MR / NAI are exposed to most uncertainties, however MR will only be more exposed in later epochs. HTL is less exposed to uncertainties
					Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	
					Reductions in sediment supply	Reduction in protective foreshore cover, increased wave energy at defences. Defences may become more expensive and technically difficult to maintain.	**HTL** **ATL** MR NAI	◆ 2,3 ◆ 2,3	
					Land may be contaminated – (due to historic landfill)	Contaminants may be released unless expensive remediation is implemented.	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	
					Change in legislation on habitat	Reduced/increased requirement for	**HTL**	◆ 1,2,3	

Proposed Policy Unit		Epoch 1 (0-20 years)	Epoch 2 (20-50 years)	Epoch 3 (50-100 years)	Uncertainty	Consequence	Exposure to Uncertainty (Epochs 1, 2 and 3)		Overall assessment of proposed policy
					designation	protection/conservation of habitats	**ATL** **MR** **NAI**	◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3	
E4 15	**Motney Hill to Ham Green**	MR with opportunities for HTL	MR with opportunities for HTL	MR with opportunities for HTL	Change in land use – increased development	Development of more residential and commercial properties and infrastructure could lead to continued requirement for HTL	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	MR / NAI are exposed to most uncertainties, however MR will only be more exposed in discrete areas along the frontage and in later epochs. HTL is less exposed to uncertainties
					Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	
					Reductions in sediment supply	Reduction in protective foreshore cover, increased wave energy at defences. Defences may become more expensive and technically difficult to maintain.	**HTL** **ATL** MR NAI	◆ 2,3 ◆ 2,3	
					Land may be contaminated – (due to historic landfill)	Contaminants may be released unless expensive remediation is implemented.	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	
					Change in legislation on habitat designation	Reduced/increased requirement for protection/conservation of habitats	**HTL** **ATL** **MR** **NAI**	◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3	
E4	**Ham Green**	NAI	NAI	NAI	Change in land use – increased	Development of more residential and	HTL		Acceptable

Proposed Policy Unit		Epoch 1 (0-20 years)	Epoch 2 (20-50 years)	Epoch 3 (50-100 years)	Uncertainty	Consequence	Exposure to Uncertainty (Epochs 1, 2 and 3)		Overall assessment of proposed policy
16	**to east of Upchurch**				development	commercial properties and infrastructure could lead to continued requirement for HTL	ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	policies, they are not unduly exposed to uncertainties compared to other policies
					Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	
					Reductions in sediment supply	Reduction in protective foreshore cover, increased wave energy at defences. Defences may become more expensive and technically difficult to maintain.	**HTL** **ATL** MR NAI	◆ 2,3 ◆ 2,3	
					Change in legislation on habitat designation	Reduced/increased requirement for protection/conservation of habitats	**HTL** **ATL** **MR** **NAI**	◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3	
E4 17	**East of Upchurch to east Lower Halstow**	MR with localised HTL	MR with localised HTL	MR with localised HTL	Change in land use – increased development	Development of more residential and commercial properties and infrastructure could lead to continued requirement for HTL	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	Acceptable policies, they are not unduly exposed to uncertainties compared to other policies
					Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	
					Reductions in sediment supply	Reduction in protective foreshore	**HTL**	◆ 2,3	

Proposed Policy Unit		Epoch 1 (0-20 years)	Epoch 2 (20-50 years)	Epoch 3 (50-100 years)	Uncertainty	Consequence	Exposure to Uncertainty (Epochs 1, 2 and 3)		Overall assessment of proposed policy
						cover, increased wave energy at defences. Defences may become more expensive and technically difficult to maintain.	**ATL** MR NAI	◆ 2,3	
					Change in legislation on habitat designation	Reduced/increased requirement for protection/conservation of habitats	**HTL** **ATL** **MR** **NAI**	◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3	
E4 18	**Barksore Marshes**	MR	NAI	NAI	Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	Acceptable policies, they are not unduly exposed to uncertainties compared to other policies
					Reductions in sediment supply	Reduction in protective foreshore cover, increased wave energy at defences. Defences may become more expensive and technically difficult to maintain.	**HTL** **ATL** MR NAI	◆ 2,3 ◆ 2,3	
					Land may be contaminated – (due to landfill)	Contaminants may be released unless expensive remediation is implemented.	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	
					Change in legislation on habitat designation	Reduced/increased requirement for protection/conservation of habitats	**HTL** **ATL** **MR** **NAI**	◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3	

Proposed Policy Unit		Epoch 1 (0-20 years)	Epoch 2 (20-50 years)	Epoch 3 (50-100 years)	Uncertainty	Consequence	Exposure to Uncertainty (Epochs 1, 2 and 3)		Overall assessment of proposed policy
E4 19	**Funton to Raspberry Hill**	NAI	NAI	NAI	Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	HTL / ATL are exposed to most uncertainties, MR / NAI are least exposed to uncertainties therefore suggesting that NAI is a robust policy
					Reductions in sediment supply	Reduction in protective foreshore cover, increased wave energy at defences. Defences may become more expensive and technically difficult to maintain.	**HTL** **ATL** MR NAI	◆ 2,3 ◆ 2,3	
					Change in legislation on habitat designation	Reduced/increased requirement for protection/conservation of habitats	**HTL** **ATL** **MR** **NAI**	◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3	
E4 20	**Chetney Marshes**	MR	MR	MR	Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	HTL / ATL are exposed to most uncertainties, MR / NAI are least exposed to uncertainties therefore suggesting that MR is a robust policy
					Reductions in sediment supply	Reduction in protective foreshore cover, increased wave energy at defences. Defences may become more expensive and technically difficult to maintain.	**HTL** **ATL** MR NAI	◆ 2,3 ◆ 2,3	
					Change in legislation on habitat designation	Reduced/increased requirement for protection/conservation of habitats	**HTL** **ATL** **MR** **NAI**	◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3	

Proposed Policy Unit		Epoch 1 (0-20 years)	Epoch 2 (20-50 years)	Epoch 3 (50-100 years)	Uncertainty	Consequence	Exposure to Uncertainty (Epochs 1, 2 and 3)		Overall assessment of proposed policy
E421	**Kingsferry Bridge to Milton Creek**	HTL	HTL	HTL	Change in land use – increased development (Ridham Dock proposed commercial development area; Kemsley Fields Abbey Park proposed commercial development area)	Development of more residential and commercial properties and infrastructure could lead to continued requirement for HTL	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	MR / NAI are exposed to most uncertainties, HTL / ATL are least exposed to uncertainties therefore suggesting that HTL is a robust policy
					Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	
					Reductions in sediment supply	Reduction in protective foreshore cover, increased wave energy at defences. Defences may become more expensive and technically difficult to maintain.	**HTL** **ATL** MR NAI	◆ 3 ◆ 3	
					Land may be contaminated – (due to landfill & industry)	Contaminants may be released unless expensive remediation is implemented.	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	
					Change in legislation on habitat designation	Reduced/increased requirement for protection/conservation of habitats	**HTL** **ATL** **MR** **NAI**	◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3	
E422	**Milton Creek**	HTL	HTL	HTL	Change in land use – increased development	Development of more residential and commercial properties and	HTL ATL		MR / NAI are exposed to

Proposed Policy Unit		Epoch 1 (0-20 years)	Epoch 2 (20-50 years)	Epoch 3 (50-100 years)	Uncertainty	Consequence	Exposure to Uncertainty (Epochs 1, 2 and 3)		Overall assessment of proposed policy
						infrastructure could lead to continued requirement for HTL	**MR** **NAI**	◆ 1,2,3 ◆ 1,2,3	most uncertainties, HTL / ATL are least exposed to uncertainties therefore suggesting that HTL is a robust policy
					Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	
					Reductions in sediment supply	Reduction in protective foreshore cover, increased wave energy at defences. Defences may become more expensive and technically difficult to maintain.	**HTL** **ATL** MR NAI	◆ 3 ◆ 3	
					Land may be contaminated – (due to historic landfill and industry)	Contaminants may be released unless expensive remediation is implemented.	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	
E4 23	**Murston Pits to Faversham**	HTL	MR with localised HTL	MR with localised HTL	Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	HTL / ATL are exposed to most uncertainties especially in latter epochs, MR / NAI are least exposed to uncertainties therefore
					Reductions in sediment supply	Reduction in protective foreshore cover, increased wave energy at defences. Defences may become more expensive and technically difficult to maintain.	**HTL** **ATL** MR NAI	◆ 3 ◆ 3	

Proposed Policy Unit		Epoch 1 (0-20 years)	Epoch 2 (20-50 years)	Epoch 3 (50-100 years)	Uncertainty	Consequence	Exposure to Uncertainty (Epochs 1, 2 and 3)		Overall assessment of proposed policy
					Change in legislation on habitat designation	Reduced/increased requirement for protection/conservation of habitats	**HTL** **ATL** **MR** **NAI**	◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3	suggesting that MR is an acceptable policy in the long term
E4 24	**Faversham to Nagden**	HTL	HTL	HTL	Change in land use – increased development: (Restoration / economic regeneration of Faversham Creek)	Development of more residential and commercial properties and infrastructure could lead to continued requirement for HTL	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	Acceptable policies, they are not unduly exposed to uncertainties compared to other policies
					Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	
					Reductions in sediment supply	Reduction in protective foreshore cover, increased wave energy at defences. Defences may become more expensive and technically difficult to maintain.	**HTL** **ATL** MR NAI	◆ 3 ◆ 3	
					Change in legislation on habitat designation	Reduced/increased requirement for protection/conservation of habitats	**HTL** **ATL** **MR** **NAI**	◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3	
E4 25	**Shell Ness to Sayes Court**	MR	MR	MR	Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR**	◆ 2,3 ◆ 1,2,3 ◆ 3	HTL / ATL are exposed to most uncertainties,

Proposed Policy Unit		Epoch 1 (0-20 years)	Epoch 2 (20-50 years)	Epoch 3 (50-100 years)	Uncertainty	Consequence	Exposure to Uncertainty (Epochs 1, 2 and 3)		Overall assessment of proposed policy
							NAI	◆ 3	MR / NAI are least exposed to uncertainties therefore suggesting that MR is a robust policy
					Reductions in sediment supply	Reduction in protective foreshore cover, increased wave energy at defences. Defences may become more expensive and technically difficult to maintain.	**HTL** **ATL** MR NAI	◆ 3 ◆ 3	
					Increasing storminess	Increase in wave energy. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	
					Change in legislation on habitat designation	Reduced/increased requirement for protection/conservation of habitats	**HTL** **ATL** **MR** **NAI**	◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3	
E4 26	**Sayes Court to north Elmley Island**	MR	MR	MR	Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	HTL / ATL are exposed to most uncertainties, MR / NAI are least exposed to uncertainties therefore suggesting that MR is a robust
					Reductions in sediment supply	Reduction in protective foreshore cover, increased wave energy at defences. Defences may become more expensive and technically difficult to maintain.	**HTL** **ATL** MR NAI	◆ 3 ◆ 3	

Proposed Policy Unit		Epoch 1 (0-20 years)	Epoch 2 (20-50 years)	Epoch 3 (50-100 years)	Uncertainty	Consequence	Exposure to Uncertainty (Epochs 1, 2 and 3)		Overall assessment of proposed policy
					Change in legislation on habitat designation	Reduced/increased requirement for protection/conservation of habitats	**HTL** **ATL** **MR** **NAI**	◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3	policy
E4 27	**North Elmley Island to Kingsferry Bridge**	HTL	MR	MR	Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	HTL / ATL are exposed to most uncertainties, especially in latter epochs, therefore suggesting MR is an acceptable policy in the long term
					Reductions in sediment supply	Reduction in protective foreshore cover, increased wave energy at defences. Defences may become more expensive and technically difficult to maintain.	**HTL** **ATL** MR NAI	◆ 3 ◆ 3	
					Change in legislation on habitat designation	Reduced/increased requirement for protection/conservation of habitats	**HTL** **ATL** **MR** **NAI**	◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3	
E4 28	**Kingsferry Bridge to Rushenden**	HTL	MR	MR	Change in land use – increased development: (Rushenden proposed regeneration area)	Development of more residential and commercial properties and infrastructure could lead to continued requirement for HTL	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	MR / NAI are exposed to most uncertainties, however MR will only be more exposed in discrete areas along the frontage
					Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	

Proposed Policy Unit		Epoch 1 (0-20 years)	Epoch 2 (20-50 years)	Epoch 3 (50-100 years)	Uncertainty	Consequence	Exposure to Uncertainty (Epochs 1, 2 and 3)		Overall assessment of proposed policy
					Reductions in sediment supply	Reduction in protective foreshore cover, increased wave energy at defences. Defences may become more expensive and technically difficult to maintain.	**HTL** **ATL** MR NAI	◆ 2,3 ◆ 2,3	and in the last epoch. HTL / ATL are least exposed to uncertainties
					Increasing storminess	Increase in wave energy. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	
					Change in legislation on habitat designation	Reduced/increased requirement for protection/conservation of habitats	**HTL** **ATL** **MR** **NAI**	◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3	
					Land may be contaminated – (due to historic landfill)	Contaminants may be released unless expensive remediation is implemented.	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	
E429	**Rushenden to Sheerness**	HTL	HTL	HTL	Change in land use – increased development (Rushenden proposed regeneration area; Queenborough proposed regeneration area; Residential development proposed at the Blue Town end of Sheerness Docks)	Development of more residential and commercial properties and infrastructure could lead to continued requirement for HTL	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	MR / NAI are exposed to most uncertainties, HTL / ATL are least exposed to uncertainties therefore suggesting that

Proposed Policy Unit		Epoch 1 (0-20 years)	Epoch 2 (20-50 years)	Epoch 3 (50-100 years)	Uncertainty	Consequence	Exposure to Uncertainty (Epochs 1, 2 and 3)		Overall assessment of proposed policy
					Land may be contaminated – (due to landfill)	Contaminants may be released unless expensive remediation is implemented.	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	HTL is a robust policy
					Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	
					Reductions in sediment supply	Reduction in protective foreshore cover, increased wave energy at defences. Defences may become more expensive and technically difficult to maintain.	**HTL** **ATL** MR NAI	◆ 2,3 ◆ 2,3	
					Increasing storminess	Increase in wave energy. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	
E4 30	**Medway Islands**	NAI with monitoring	NAI with monitoring	NAI with monitoring	Increased rates of SLR	Increase in water levels. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	Acceptable policies, they are not unduly exposed to uncertainties compared to other policies
					Reductions in sediment supply	Reduction in protective foreshore cover, increased wave energy at defences. Defences may become more expensive and technically difficult to maintain.	**HTL** **ATL** MR NAI	◆ 2,3 ◆ 2,3	

Proposed Policy Unit		Epoch 1 (0-20 years)	Epoch 2 (20-50 years)	Epoch 3 (50-100 years)	Uncertainty	Consequence	Exposure to Uncertainty (Epochs 1, 2 and 3)		Overall assessment of proposed policy
					Increasing storminess	Increase in wave energy. Defences may become more expensive and technically more difficult to maintain.	**HTL** **ATL** **MR** **NAI**	◆ 2,3 ◆ 1,2,3 ◆ 3 ◆ 3	
					Change in legislation on habitat designation	Reduced/increased requirement for protection/conservation of habitats	**HTL** **ATL** **MR** **NAI**	◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3 ◆ 1,2,3	
					Land may be contaminated – (due to landfill)	Contaminants may be released unless expensive remediation is implemented.	HTL ATL **MR** **NAI**	 ◆ 1,2,3 ◆ 1,2,3	

Annex H1: Supporting Economic Appraisal Data – Damages/Benefits

A-H1.1 Summary of No Active Intervention Erosion Losses

Table 1: No Active Intervention Residential Erosion Losses

POLICY UNIT		0-20			20-50			50-100			TOTAL		
		No.	CV	PV	No.	CV	PV	No.	CV	PV	No.	CV	PV
E4 01	Grain Tower to Colemouth Creek												
E4 02	Colemouth Creek to Bee Ness Jetty												
E4 03	Kingsnorth Power Station												
E4 04	Power Station to Cockham Wood												
E4 05	Hoo Marina to Lower Upnor												
E4 06	Lower Upnor to Medway Bridge							9	£1307151	£92556	9	£1307151	£92556
E4 07	Medway Bridge to North Halling							2	£290478	£26756	2	£290478	£26756
E4 08	North Halling to Snodland				21	£3351873	£856604	27	£4122689	£332138	48	£7474562	£1188742
E4 09	Snodland to Allington Lock												
E4 10	Allington Lock to north Wouldham	1	£149395	£119419	23	£3436085	£903412	17	£2539715	£235603	41	£6125195	£1258434
E4 11	Wouldham Marshes												
E4 12	Medway Bridge to west St Mary's Island							1	£149395	£9566	1	£149395	£9566
E4 13	St Mary's Island to the Strand												
E4 14	The Strand to west Motney Hill												
E4 15	Motney Hill to Ham Green												
E4 16	Ham Green to east of Upchurch												
E4 17	East Upchurch to east Lower Halstow												

POLICY UNIT		0-20			20-50			50-100			TOTAL		
		No.	CV	PV	No.	CV	PV	No.	CV	PV	No.	CV	PV
E4 18	Barksore Marshes												
E4 19	Funton to Raspberry Hill												
E4 20	Chetney Marshes												
E4 21	Kingsferry Bridge to Milton Creek												
E4 22	Milton Creek												
E4 23	Murston Pits to Faversham												
E4 24	Faversham to Nagden												
E4 25	Shell Ness to Sayes Court												
E4 26	Sayes Court to east Elmley Island												
E4 27	North Elmley Island to Kingsferry Bridge												
E4 28	Kingsferry Bridge to Rushenden												
E4 29	Rushenden to Sheerness												
E4 30	Medway Islands												

Table 2: No Active Intervention Commercial Erosion Losses

POLICY UNIT		0-20			20-50			50-100			TOTAL		
		No.	CV	PV	No.	CV	PV	No.	CV	PV	No.	CV	PV
E4 01	Grain Tower to Colemouth Creek												
E4 02	Colemouth Creek to Bee Ness Jetty												
E4 03	Kingsnorth Power Station												
E4 04	Power Station to Cockham Wood												
E4 05	Hoo Marina to Lower Upnor												
E4 06	Lower Upnor to Medway Bridge							8	£13493763	£903375	8	£13493763	£903375
E4 07	Medway Bridge to North Halling				1	£145239	£26685	12	£1886951	£133874	13	£2032190	£160559
E4 08	North Halling to Snodland												
E4 09	Snodland to Allington Lock												
E4 10	Allington Lock to north Wouldham				2	£190572	£63556	1	£211957	£10581	3	£402528	£74137
E4 11	Wouldham Marshes												
E4 12	Medway Bridge to west St Mary's Island												
E4 13	St Mary's Island to the Strand												
E4 14	The Strand to west Motney Hill												
E4 15	Motney Hill to Ham Green												
E4 16	Ham Green to east of Upchurch												
E4 17	East Upchurch to east Lower Halstow												
E4 18	Barksore Marshes												
E4 19	Funton to Raspberry Hill												
E4 20	Chetney Marshes												

POLICY UNIT		0-20			20-50			50-100			TOTAL		
		No.	CV	PV	No.	CV	PV	No.	CV	PV	No.	CV	PV
E4 21	Kingsferry Bridge to Milton Creek												
E4 22	Milton Creek												
E4 23	Murston Pits to Faversham												
E4 24	Faversham to Nagden												
E4 25	Shell Ness to Sayes Court												
E4 26	Sayes Court to east Elmley Island												
E4 27	North Elmley Island to Kingsferry Bridge												
E4 28	Kingsferry Bridge to Rushenden												
E4 29	Rushenden to Sheerness												
E4 30	Medway Islands												

Table 3: No Active Intervention Combined Residential & Commercial Erosion Losses

POLICY UNIT		0-20			20-50			50-100			TOTAL		
		No.	CV	PV	No.	CV	PV	No.	CV	PV	No.	CV	PV
E4 01	Grain Tower to Colemouth Creek												
E4 02	Colemouth Creek to Bee Ness Jetty												
E4 03	Kingsnorth Power Station												
E4 04	Power Station to Cockham Wood												
E4 05	Hoo Marina to Lower Upnor												
E4 06	Lower Upnor to Medway Bridge							17	£14800914	£995931	17	£14800914	£995931
E4 07	Medway Bridge to North Halling				1	£145239	£26685	14	£2177429	£160630	15	£2322668	£187315
E4 08	North Halling to Snodland				21	£3351873	£856604	27	£4122689	£332138	48	£7474562	£1188742
E4 09	Snodland to Allington Lock												
E4 10	Allington Lock to north Wouldham	1	£149395	£119419	25	£3626657	£966968	18	£2751672	£246184	44	£6527723	£1332571
E4 11	Wouldham Marshes												
E4 12	Medway Bridge to west St Mary's Island							1	£149395	£9566	1	£149395	£9566
E4 13	St Mary's Island to the Strand												
E4 14	The Strand to west Motney Hill												
E4 15	Motney Hill to Ham Green												
E4 16	Ham Green to east of Upchurch												
E4 17	East Upchurch to east Lower Halstow												
E4 18	Barksore Marshes												
E4 19	Funton to Raspberry Hill												
E4 20	Chetney Marshes												

POLICY UNIT		0-20			20-50			50-100			TOTAL		
		No.	CV	PV	No.	CV	PV	No.	CV	PV	No.	CV	PV
E4 21	Kingsferry Bridge to Milton Creek												
E4 22	Milton Creek												
E4 23	Murston Pits to Faversham												
E4 24	Faversham to Nagden												
E4 25	Shell Ness to Sayes Court												
E4 26	Sayes Court to east Elmley Island												
E4 27	North Elmley Island to Kingsferry Bridge												
E4 28	Kingsferry Bridge to Rushenden												
E4 29	Rushenden to Sheerness												
E4 30	Medway Islands												

A-H1.2 Summary of Preferred Plan Erosion Losses

Analysis of preferred plan erosion losses using MDSF has indicated that no residential or commercial erosion losses are expected. However, in management unit E4 16, one residential property and greenhouses may be at increased risk from erosion in the long term. This will be dependant on future erosion rates along the frontage.

A-H1.3 Summary of No Active Intervention Flooding Losses

Policy Unit		FMU	Residential		Commercial		Total (Residential + commercial)		Agricultural Land (Hectares)							Total cost of agricultural land lost
			No.	CV	No.	CV	No.	CV	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Non Agricultural	Urban	
E4 01	Grain Tower to Colemouth Creek	11	135	£27,663,255	31	£104,680,367	166	£132,343,622	5.5	5.5	0.0	103.1	0.0	0.0	39.1	£702,733
E4 02	Colemouth Creek to Bee Ness Jetty	11,13	137	£28,073,081	35	£105,720,104	172	£133,793,185	10.5	5.5	0.2	103.1	0.0	0.6	41.3	£739,822
E4 03	Kingsnorth Power Station	16,18	110	£22,540,430	54	£126,931,703	164	£149,472,133	11.7	0.0	0.4	5.7	0.0	1.1	17.3	£120,575
E4 04	Power Station to Cockham Wood	16	110	£22,540,430	54	£126,931,703	164	£149,472,133	11.7	0.0	0.4	5.7	0.0	0.0	17.3	£166,626
E4 05	Hoo Marina to Lower Upnor		0	£0	0	£0	0	£0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	£0
E4 06	Lower Upnor to Medway Bridge	22,23,26	355	£52,753,325	1,059	£239,845,592	1,414	£292,598,917	1.8	0.3	2.6	0.0	3.4	0.0	6.3	£55,049
E4 07	Medway Bridge to North Halling	26,28	132	£19,171,548	13	£7,699,839	145	£26,871,387	0.0	1.0	6.0	0.0	0.0	0.0	0.0	£52,682
E4 08	North Halling to Snodland	29,31,33, 35	808	£188,525,416	147	£106,130,483	955	£294,655,899	0.0	4.2	1.4	25.7	0.0	0.0	15	£195,786
E4 09	Snodland to Allington Lock	35	799	£187,203,891	145	£106,001,135	944	£293,205,026	0.0	4.1	1.3	19.8	0.0	0.0	15	£158,286
E4 10	Allington Lock to north Wouldham	30,32,34, 36,37	119	£22,855,571	125	£72,008,498	244	£94,864,069	0.0	5.3	0.3	6.4	0.0	0.0	3.5	£76,571
E4 11	Wouldham Marshes	27	7	£1,045,765	0	£0	7	£1,045,765	0.0	2.2	0.6	7.8	0.0	0.0	0.0	£67,132
E4 12	Medway Bridge to east St Mary's Island	25,24,21	1897	£270,178,589	374	£144,234,112	2,271	£414,412,701	0.0	0.0	2.4	0.0	0.0	0.0	32.4	£18,577

Policy Unit		FMU	Residential		Commercial		Total (Residential + commercial)		Agricultural Land (Hectares)							Total cost of agricultural land lost
			No.	CV	No.	CV	No.	CV	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Non Agricultural	Urban	
E4 13	St Mary's Island to the Strand	21,17	1503	£228,042,996	178	£108,026,822	1,681	£336,069,818	5.9	0.5	0.0	5.1	0.0	0.0	18.1	£74,415
E4 14	The Strand to west Motney Hill	17	535	£93,799,789	16	£2,771,917	551	£96,571,706	5.9	0.5	0.0	5.1	0.0	0.0	1.6	£74,415
E4 15	Motney Hill to Ham Green	15,17	538	£94,391,671	19	£3,017,524	557	£97,409,195	10.6	0.5	0.0	14.9	0.0	0.0	1.6	£165,443
E4 16	Ham Green to east of Upchurch		0	£0	0	£0	0	£0	0	0	0	0	0	0	0	£0
E4 17	East Upchurch to east Lower Halstow	14	73	£14,473,387	14	£1,460,184	87	£15,933,571	6.7	4.2	1.1	0.7	0.0	0.1	0.0	£86,602
E4 18	Barksore Marshes	12	1	£197,294	0	£0	1	£197,294	0.0	0.9	0.3	0.0	0.0	0.8	0.0	£11,519
E4 19	Funton to Raspberry Hill		0	£0	0	£0	0	£0	0	0	0	0	0	0	0	£0
E4 20	Chetney Marshes	8,10	83	£16,375,402	5	£886,544	88	£17,261,946	0.9	0.6	0.3	62.8	0.0	0.0	0.0	£395,701
E4 21	Kingsferry Bridge to Milton Creek	7	0	£0	21	£21,411,146	21	£21,411,146	0.1	0.0	0.7	25.3	0.0	0.0	0.0	£160,116
E4 22	Milton Creek	5,6	3013	£460,181,546	348	£107,348,734	3,361	£567,530,280	28.5	1.5	4.7	25.6	0.0	22.7	5.7	£478,277
E4 23	Murston Pits to Faversham	3,5	624	£125,311,722	229	£51,795,163	853	£177,106,885	34.2	1.6	6.0	106.6	0.0	20.6	2.9	£1,013,827
E4 24	Faversham to Nagden	1	150	£30,180,000	15	£1,813,693	165	£31,993,693	7.9	5.1	115.2	0.9	0.0	0.0	4.8	£978,691
E4 25	Shell Ness to Sayes Court	2	7	£1,017,786	6	£577,849	13	£1,595,635	0.0	0.0	7.0	125.4	14.5	0.0	0.0	£907,040
E4 26	Sayes Court to east	4,2	10	£1,453,980	6	£577,849	16	£2,031,829	0.0	0.0	15.8	285.2	31.8	0.0	0.0	£2,054,79

Policy Unit		FMU	Residential		Commercial		Total (Residential + commercial)		Agricultural Land (Hectares)							Total cost of agricultural land lost
			No.	CV	No.	CV	No.	CV	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Non Agricultural	Urban	
	Elmley Island															8
E4 27	North Elmley Island to Kingsferry Bridge	4	3	£436,194	0	£0	3	£436,194	0.0	0.0	8.8	159.8	17.3	0.0	0.0	£1,147,757
E4 28	Kingsferry Bridge to Rushenden	9	7335	£1,039,436,877	879	£301,185,509	8,214	£1,340,622,386	0.0	0.0	5.4	30.5	5.6	0.0	63.2	£261,605
E4 29	Rushenden to Sheerness	9	7335	£1,039,436,877	879	£301,185,509	8,214	£1,340,622,386	0.0	0.0	5.4	30.5	5.6	0.0	63.2	£261,605
E4 30	Medway Islands	19,20	0	£0	0	£0	0	£0	0.0	0.0	0.0	0.0	0.0	5.5	0.0	£20,538

Annex H2: Supporting economic appraisal data for SMP Costs

This annex presents the full preferred scenario costs developed for the SMP. 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 SMP Procedural Guidance (Defra, 2006). This sets replacement costs for linear structures (e.g. revetments, seawalls) at £2.7million/km and cost for beach management schemes at £5.1million/km. Groyne field costs and embankments are taken as £0.6million/km;
- Maintenance costs taken from NADNAC study prepared for Defra (2004). This sets annual maintenance cost for linear structures and for groyne fields at £10k/km and for beach schemes £20k/km;
- Assumed design life (and thus full scheme reconstruction will be required) as 100 years for linear defences, 50 years for beach schemes and 30 years for 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;
- Optimism bias (at 60%) to be applied to all costs when examining BCR, to reflect uncertainty in broad level analysis at SMP scale;
- For "low cost" defence structures use same rate as groynes; and,
- Rates for typical defences types used:

Defence Type	Cost per km	
	Replacement	Maintenance
BEACH (B)	£5,100,000	£20,000
LINEAR (L)	£2,700,000	£10,000
GROYNE/OTHER (G)	£600,000	£10,000

A-H2.1 Defence Costs for Preferred policies

LOCATION		PERIOD	POLICY	REPLACEMENT				MAINTENANCE				CV TOTALS				PV COSTS	
				B (£m)	L (£m)	G (£m)	COST (£m)	B (£m)	L (£m)	G (£m)	COST (£m)	TOTAL COST (£m)	TOTAL WITH OPTIMISM BIAS (£m)	FINAL TOTAL (£m)		TOTAL (£m)	CUMULATIVE TOTAL (£M)
E4 01	Grain Tower to Colemouth Creek	0 to 20	HTL				-		0.90	0.40	1.30	1.30	2.08			0.96	
		20 to 50	HTL		18.23	1.80	20.03		1.35	0.60	1.95	21.98	35.16			7.77	
		50 to 100	HTL			4.80	4.80		4.50	1.20	5.70	10.50	16.80	54.04		1.12	9.85
E4 02	Colemouth Creek to Bee Ness Jetty	0 to 20	MR with localised HTL			1.20	1.20			0.70	0.70	1.90	3.04			1.72	
		20 to 50	MR with localised HTL			4.05	4.05			1.35	1.35	5.40	8.64			1.88	
		50 to 100	MR with localised HTL			10.80	10.80			2.70	2.70	13.50	21.60	33.28		1.43	5.03
E4 03	Kingsnorth Power Station	0 to 20	HTL				-		0.40	0.80	1.20	1.20	1.92			0.88	
		20 to 50	HTL		8.10	3.60	11.70		0.60	1.20	1.80	13.50	21.60			4.76	
		50 to 100	HTL			9.60	9.60		2.00	2.40	4.40	14.00	22.40	45.92		1.49	7.13
E4 04	Power Station to Cockham Wood	0 to 20	MR with localised HTL			0.72	0.72		0.20	0.30	0.50	1.22	1.95			1.09	
		20 to 50	MR with localised HTL		4.05	1.89	5.94		0.30	0.63	0.93	6.87	10.99			2.42	
		50 to 100	MR with localised HTL			5.04	5.04		1.00	1.86	2.86	7.90	12.64	25.58		0.84	4.35
E4 05	Hoo Marina to Lower Upnor	0 to 20	NAI				-				-	-	-			-	

LOCATION		PERIOD	POLICY	REPLACEMENT				MAINTENANCE				CV TOTALS				PV COSTS	
				B (£m)	L (£m)	G (£m)	COST (£m)	B (£m)	L (£m)	G (£m)	COST (£m)	TOTAL COST (£m)	TOTAL WITH OPTIMISM BIAS (£m)	FINAL TOTAL (£m)		TOTAL (£m)	CUMULATIVE TOTAL (£M)
		20 to 50	NAI				-				-	-	-			-	
		50 to 100	NAI				-				-	-	-	-		-	-
E4 06	Lower Upnor to Medway bridge	0 to 20	HTL		5.40	0.60	6.00		0.60	0.90	1.50	7.50	12.00			5.36	
		20 to 50	HTL		20.25	1.80	22.05		1.95	1.05	3.00	25.05	40.08			8.75	
		50 to 100	HTL			3.60	3.60		7.00	1.40	8.40	12.00	19.20	71.28		1.28	15.39
E4 07	Medway Bridge to North Halling	0 to 20	HTL		1.35	1.20	2.55		0.05	0.20	0.25	2.80	4.48			2.73	
		20 to 50	HTL			1.80	1.80		0.23	0.60	0.83	2.63	4.20			0.91	
		50 to 100	HTL			4.80	4.80		0.50	1.20	1.70	6.50	10.40	19.08		0.69	4.33
E4 08	North Halling to Snodland	0 to 20	MR with localised HTL			2.28	2.28		0.20	0.38	0.58	2.86	4.58			2.71	
		20 to 50	MR with localised HTL		4.05	3.42	7.47		0.30	1.14	1.44	8.91	14.26			3.13	
		50 to 100	MR with localised HTL			9.12	9.12		1.00	2.28	3.28	12.40	19.84	38.67		1.32	7.15
E4 09	Snodland to Allington Lock	0 to 20	HTL		2.70	1.20	3.90		0.10	0.90	1.00	4.90	7.84			3.85	
		20 to 50	MR with localised HTL			4.37	4.37		0.45	1.46	1.91	6.27	10.03			2.32	
		50 to 100	MR with localised HTL			11.64	11.64		1.00	2.91	3.91	15.55	24.88	42.75		1.74	7.91
E4 10	Allington Lock to north Wouldham	0 to 20	HTL		3.38	5.70	9.08		0.13	0.95	1.08	10.15	16.24			8.14	

LOCATION		PERIOD	POLICY	REPLACEMENT				MAINTENANCE				CV TOTALS				PV COSTS	
				B (£m)	L (£m)	G (£m)	COST (£m)	B (£m)	L (£m)	G (£m)	COST (£m)	TOTAL COST (£m)	TOTAL WITH OPTIMISM BIAS (£m)	FINAL TOTAL (£m)		TOTAL (£m)	CUMULATIVE TOTAL (£M)
		20 to 50	MR with localised HTL			7.07	7.07		0.56	2.36	2.92	9.98	15.97				
		50 to 100	MR with localised HTL			13.92	13.92		1.25	5.47	6.72	20.64	33.02	65.24			8.14
E4 11	Wouldham Marshes	0 to 20	MR			1.92	1.92			0.32	0.32	2.24	3.58			1.93	
		20 to 50	MR			2.88	2.88			0.96	0.96	3.84	6.14			1.23	
		50 to 100	MR			6.12	6.12			2.18	2.18	8.30	13.28	23.01		0.89	4.05
E4 12	Medway Bridge to west St Mary's Island	0 to 20	HTL				-		1.40		1.40	1.40	2.24			1.03	
		20 to 50	HTL		28.35		28.35		2.10		2.10	30.45	48.72			10.79	
		50 to 100	HTL				-		7.00		7.00	7.00	11.20	62.16		0.74	12.56
E4 13	St Mary's Island to the Strand	0 to 20	HTL				-		0.85		0.85	0.85	1.36			0.63	
		20 to 50	HTL		17.21		17.21		1.28		1.28	18.49	29.58			6.55	
		50 to 100	HTL				-		4.25		4.25	4.25	6.80	37.74		0.45	7.63
E4 14	The Strand to west Motney Hill	0 to 20	HTL				-		0.70		0.70	0.70	1.12			0.52	
	(Realigned Embankment)	20 to 50	MR		10.53	0.27	10.80		0.78	0.09	0.87	11.67	18.67			4.17	
		50 to 100	MR			0.72	0.72		2.60	0.18	2.78	3.50	5.60	25.39		0.40	5.08
	(Realigned Revetment)	0 to 20	HTL				-		0.70		0.70	0.70	1.12			0.52	
		20 to 50	MR		11.75		11.75		0.87		0.87	12.62	20.18			4.65	

LOCATION		PERIOD	POLICY	REPLACEMENT				MAINTENANCE				CV TOTALS				PV COSTS	
				B (£m)	L (£m)	G (£m)	COST (£m)	B (£m)	L (£m)	G (£m)	COST (£m)	TOTAL COST (£m)	TOTAL WITH OPTIMISM BIAS (£m)	FINAL TOTAL (£m)		TOTAL (£m)	CUMULATIVE TOTAL (£M)
E4 15	Motney Hill to Ham Green	50 to 100	MR				-		2.90		2.90	2.90	4.64	25.94		0.31	5.47
		0 to 20	MR with localised HTL			0.75	0.75		1.52	0.13	1.65	2.40	3.83			1.96	
	(Realigned Embankment)	20 to 50	MR with localised HTL		30.78	1.13	31.91		2.28	0.38	2.66	34.56	55.30			12.23	
		50 to 100	MR with localised HTL			3.00	3.00		7.60	0.75	8.35	11.35	18.16	77.29		1.21	15.40
	(Realigned Revetment)	0 to 20	MR with localised HTL		3.38		3.38		1.65		1.65	5.02	8.03			4.59	
		20 to 50	MR with localised HTL		30.78		30.78		2.84		2.84	33.62	53.80			11.89	
		50 to 100	MR with localised HTL				-		8.85		8.85	8.85	14.16	75.99		0.94	17.42
E4 16	Ham Green to east of Upchurch	0 to 20	NAI				-				-	-	-			-	
		20 to 50	NAI				-				-	-	-			-	
		50 to 100	NAI				-				-	-	-	-		-	-
E4 17	East Upchurch to east Lower Halstow	0 to 20	MR with localised HTL			0.84	0.84		0.32	0.14	0.46	1.30	2.08			1.18	
	(Realigned Embankment)	20 to 50	MR with localised HTL		6.48	1.26	7.74		0.48	0.42	0.90	8.64	13.82			3.05	
		50 to 100	MR with localised HTL			3.36	3.36		1.60	0.84	2.44	5.80	9.28	25.18		0.62	4.84

LOCATION		PERIOD	POLICY	REPLACEMENT				MAINTENANCE				CV TOTALS				PV COSTS	
				B (£m)	L (£m)	G (£m)	COST (£m)	B (£m)	L (£m)	G (£m)	COST (£m)	TOTAL COST (£m)	TOTAL WITH OPTIMISM BIAS (£m)	FINAL TOTAL (£m)		TOTAL (£m)	CUMULATIVE TOTAL (£M)
	(Realigned Revetment)	0 to 20	MR with localised HTL		3.78		3.78		0.46		0.46	4.24	6.78			4.12	
		20 to 50	MR with localised HTL		6.48		6.48		1.11		1.11	7.59	12.14			2.67	
		50 to 100	MR with localised HTL				-		3.00		3.00	3.00	4.80	23.73		0.32	7.11
E4 18	Barksore Marshes	0 to 20	MR			0.12	0.12			0.02	0.02	0.14	0.22			0.14	
	(Realigned Embankment)	20 to 50	NAI				-				-	-	-			-	
		50 to 100	NAI				-				-	-	-	0.22		-	0.14
	(Realigned Revetment)	0 to 20	MR		0.54		0.54		0.02		0.02	0.56	0.90			0.56	
		20 to 50	NAI				-				-	-	-			-	
		50 to 100	NAI				-				-	-	-	0.90		-	0.56
E4 19	Funton to Raspberry Hill	0 to 20	NAI				-				-	-	-			-	
		20 to 50	NAI				-				-	-	-			-	
		50 to 100	NAI				-				-	-	-	-		-	-
E4 20	Chetney Marshes	0 to 20	MR		22.14	0.96	23.10		0.82	0.60	1.42	24.52	39.23			17.70	
	(Realigned Embankment)	20 to 50	MR			1.44	1.44		3.69	0.48	4.17	5.61	8.98			1.87	
		50 to 100	MR			3.84	3.84		8.20	0.96	9.16	13.00	20.80	69.01		1.38	20.95
	(Realigned Revetment)	0 to 20	MR		26.46		26.46		0.98		0.98	27.44	43.90			20.74	

LOCATION		PERIOD	POLICY	REPLACEMENT				MAINTENANCE				CV TOTALS				PV COSTS	
				B (£m)	L (£m)	G (£m)	COST (£m)	B (£m)	L (£m)	G (£m)	COST (£m)	TOTAL COST (£m)	TOTAL WITH OPTIMISM BIAS (£m)	FINAL TOTAL (£m)		TOTAL (£m)	CUMULATIVE TOTAL (£M)
		20 to 50	MR				-		4.41		4.41	4.41	7.06			1.44	
		50 to 100	MR				-		9.80		9.80	9.80	15.68	66.64		1.04	23.22
E4 21	Kingsferry Bridge to Milton Creek	0 to 20	HTL				-		0.75		0.75	0.75	1.20			0.55	
		20 to 50	HTL		15.19		15.19		1.13		1.13	16.31	26.10			5.78	
		50 to 100	HTL				-		3.75		3.75	3.75	6.00	33.30		0.40	6.73
E4 22	Milton Creek	0 to 20	HTL				-		1.20		1.20	1.20	1.92			0.88	
		20 to 50	HTL		24.30		24.30		1.80		1.80	26.10	41.76			9.25	
		50 to 100	HTL				-		6.00		6.00	6.00	9.60	53.28		0.64	10.77
E4 23	Murston Pits to Faversham	0 to 20	HTL				-		3.60		3.60	3.60	5.76			2.65	
	(Realigned Embankment)	20 to 50	MR with localised HTL		30.38	5.67	36.05		2.25	1.89	4.14	40.19	64.30			15.02	
		50 to 100	MR with localised HTL			15.12	15.12		7.50	3.78	11.28	26.40	42.24	112.30		3.32	20.99
	(Realigned Revetment)	0 to 20	HTL				-		3.60		3.60	3.60	5.76			2.65	
		20 to 50	MR with localised HTL		55.89		55.89		4.14		4.14	60.03	96.05			25.00	
		50 to 100	MR with localised HTL				-		13.8		13.80	13.80	22.08	123.89		1.47	29.11
E4 24	Faversham to Nagden	0 to 20	HTL				-		0.80		0.80	0.80	1.28			0.59	

LOCATION		PERIOD	POLICY	REPLACEMENT				MAINTENANCE				CV TOTALS				PV COSTS	
				B (£m)	L (£m)	G (£m)	COST (£m)	B (£m)	L (£m)	G (£m)	COST (£m)	TOTAL COST (£m)	TOTAL WITH OPTIMISM BIAS (£m)	FINAL TOTAL (£m)		TOTAL (£m)	CUMULATIVE TOTAL (£M)
		20 to 50	HTL		16.20		16.20		1.20		1.20	17.40	27.84			6.16	
		50 to 100	HTL				-		4.00		4.00	4.00	6.40	35.52		0.43	7.18
E4 25	Shell Ness to Sayes Court	0 to 20	MR			0.96	0.96			0.16	0.16	1.12	1.79			1.08	
	(Realigned Embankment)	20 to 50	MR			1.44	1.44			0.48	0.48	1.92	3.07			0.67	
		50 to 100	MR			3.84	3.84			0.96	0.96	4.80	7.68	12.54		0.51	2.26
	(Realigned Revetment)	0 to 20	MR		4.32		4.32		0.16		0.16	4.48	7.17			4.44	
		20 to 50	MR				-		0.72		0.72	0.72	1.15			0.24	
		50 to 100	MR				-		1.60		1.60	1.60	2.56	10.88		0.17	4.84
E4 26	Sayes Court to north Elmley Island	0 to 20	MR			7.80	7.80			1.30	1.30	9.10	14.56			7.45	
	(Realigned Embankment)	20 to 50	MR			11.70	11.70			3.90	3.90	15.60	24.96			4.83	
		50 to 100	MR			22.20	22.20			9.30	9.30	31.50	50.40	89.92		3.37	15.64
	(Realigned Revetment)	0 to 20	MR		14.85	4.50	19.35		0.55	0.75	1.30	20.65	33.04			19.00	
		20 to 50	MR			6.75	6.75		2.48	2.25	4.73	11.48	18.36			3.33	
		50 to 100	MR			9.00	9.00		5.50	6.00	11.50	20.50	32.80	84.20		2.21	24.53
E4 27	North Elmley Island to Kingsferry Bridge	0 to 20	HTL				-		0.45		0.45	0.45	0.72			0.33	
	(Realigned Embankment)	20 to 50	MR		4.05	0.72	4.77		0.30	0.24	0.54	5.31	8.50			2.57	
		50 to 100	MR			1.92	1.92		1.00	0.48	1.48	3.40	5.44	14.66		0.43	3.33

LOCATION		PERIOD	POLICY	REPLACEMENT				MAINTENANCE				CV TOTALS				PV COSTS	
				B (£m)	L (£m)	G (£m)	COST (£m)	B (£m)	L (£m)	G (£m)	COST (£m)	TOTAL COST (£m)	TOTAL WITH OPTIMISM BIAS (£m)	FINAL TOTAL (£m)		TOTAL (£m)	CUMULATIVE TOTAL (£M)
	(Realigned Revetment)	0 to 20	HTL				-		0.45		0.45	0.45	0.72			0.33	
		20 to 50	MR		7.29		7.29		0.54		0.54	7.83	12.53			3.84	
		50 to 100	MR				-		1.80		1.80	1.80	2.88	16.13		0.19	4.36
E4 28	Kingsferry Bridge to Rushenden	0 to 20	HTL			3.00	3.00			0.50	0.50	3.50	5.60			2.50	
	(Realigned Embankment)	20 to 50	MR			3.33	3.33			1.11	1.11	4.44	7.10			1.39	
		50 to 100	MR			5.28	5.28			2.82	2.82	8.10	12.96	25.66		0.93	4.82
	(Realigned Revetment)	0 to 20	HTL			3.00	3.00			0.50	0.50	3.50	5.60			2.50	
		20 to 50	MR			1.35	1.35			0.45	0.45	1.80	2.88			0.65	
		50 to 100	MR			2.64	2.64			1.06	1.06	3.70	5.92	14.40		0.45	3.60
E4 29	Rushenden to Sheerness	0 to 20	HTL		12.83	0.60	13.43		0.48	0.10	0.58	14.00	22.40			9.94	
		20 to 50	HTL			0.90	0.90		2.14	0.30	2.44	3.34	5.34			1.03	
		50 to 100	HTL			1.20	1.20		4.75	0.80	5.55	6.75	10.80	38.54		0.72	11.69
E4 30	Medway Islands	0 to 20	NAI				-				-	-	-			-	
		20 to 50	NAI				-				-	-	-			-	
		50 to 100	NAI				-				-	-	-	-		-	-

A-H2.2 Defence costs for Hold the Line policy (Economic sensitivity analysis)

LOCATION		PERIOD	REPLACEMENT				MAINTENANCE				CV TOTALS			PV COSTS	
			B £m	L £m	G £m	COST £m	B £m	L £m	G £m	COST £m	TOTAL COST £m	TOTAL WITH OPTIMISM BIAS £m	FINAL TOTAL £m	TOTAL £m	CUMULATIVE TOTAL £m
E4 01	Grain Tower to Colemouth Creek	0 to 20				0		0.9	0.4	1.3	1.3	2.08		0.96	
		20 to 50		18.23	1.8	20.025		1.35	0.6	1.95	21.975	35.16		7.77	
		50 to 100			4.8	4.8		4.5	1.2	5.7	10.5	16.8	54.04	1.11	9.84
E4 02	Colemouth Creek to Bee Ness Jetty	0 to 20				0			1.2	1.2	1.2	1.92		0.88	
		20 to 50			5.4	5.4			1.8	1.8	7.2	11.52		2.51	
		50 to 100			14.4	14.4			3.6	3.6	18	28.8	42.24	1.91	5.30
E4 03	Kingsnorth Power Station	0 to 20				0		0.4	0.8	1.2	1.2	1.92		0.89	
		20 to 50		8.1	3.6	11.7		0.6	1.2	1.8	13.5	21.6		4.76	
		50 to 100			9.6	9.6		2	2.4	4.4	14	22.4	45.92	1.48	7.13
E4 04	Power Station to Cockham Wood	0 to 20				0		0.2	0.5	0.7	0.7	1.12		0.44	
		20 to 50		4.05	2.25	6.3		0.3	0.75	1.05	7.35	11.76		2.38	
		50 to 100			6	6		1	1.5	2.5	8.5	13.6	26.48	0.74	3.56
E4 05	Hoo Marina to Lower Upnor	0 to 20				0				0	0	0		0.00	

LOCATION		PERIOD	REPLACEMENT				MAINTENANCE				CV TOTALS			PV COSTS	
			B £m	L £m	G £m	COST £m	B £m	L £m	G £m	COST £m	TOTAL COST £m	TOTAL WITH OPTIMISM BIAS £m	FINAL TOTAL £m	TOTAL £m	CUMULATIVE TOTAL £m
		20 to 50				0				0	0	0		0.00	
		50 to 100				0				0	0	0	0	0.00	0.00
E4 06	Lower Upnor to Medway bridge	0 to 20		5.4	0.6	6		0.6	0.9	1.5	7.5	12		5.36	
		20 to 50		20.25	1.8	22.05		1.95	1.05	3	25.05	40.08		8.75	
		50 to 100			3.6	3.6		7	1.4	8.4	12	19.2	71.28	1.28	15.39
E4 07	Medway Bridge to North Halling	0 to 20		1.35	1.2	2.55		0.05	0.2	0.25	2.8	4.48		2.73	
		20 to 50			1.8	1.8		0.225	0.6	0.825	2.625	4.2		0.91	
		50 to 100			4.8	4.8		0.5	1.2	1.7	6.5	10.4	19.08	0.69	4.33
E4 08	North Halling to Snodland	0 to 20			3	3		0.2	0.5	0.7	3.7	5.92		3.51	
		20 to 50		4.05	4.5	8.55		0.3	1.5	1.8	10.35	16.56		3.63	
		50 to 100			12	12		1	3	4	16	25.6	48.08	1.70	8.84
E4 09	Snodland to Allington Lock	0 to 20		2.7	1.2	3.9		0.1	0.9	1	4.9	7.84		3.85	
		20 to 50			4.95	4.95		0.45	1.65	2.1	7.05	11.28		2.45	
		50 to 100			13.2	13.2		1	3.3	4.3	17.5	28	47.12	1.86	8.15

LOCATION		PERIOD	REPLACEMENT				MAINTENANCE				CV TOTALS			PV COSTS	
			B £m	L £m	G £m	COST £m	B £m	L £m	G £m	COST £m	TOTAL COST £m	TOTAL WITH OPTIMISM BIAS £m	FINAL TOTAL £m	TOTAL £m	CUMULATIVE TOTAL £m
E4 10	Allington Lock to north Wouldham	0 to 20		3.375	5.70	9.075		0.125	0.95	1.075	10.15	16.24		8.14	
		20 to 50			8.55	8.55		0.563	2.85	3.4125	11.9625	19.14		3.63	
		50 to 100			15	15		1.25	7	8.25	23.25	37.2	72.58	2.49	14.26
E4 11	Wouldham Marshes	0 to 20			2.1	2.1			0.35	0.35	2.45	3.92		1.75	
		20 to 50			3.15	3.15			1.05	1.05	4.2	6.72		1.18	
		50 to 100			4.2	4.2			2.8	2.8	7	11.2	21.84	0.76	3.68
E4 12	Medway Bridge to west St Mary's Island	0 to 20				0		1.4		1.4	1.4	2.24		1.03	
		20 to 50		28.35		28.35		2.1		2.1	30.45	48.72		10.79	
		50 to 100				0		7		7	7	11.2	62.16	0.74	12.56
E4 13	St Mary's Island to the Strand	0 to 20				0		0.85		0.85	0.85	1.36		0.63	
		20 to 50		17.21		17.213		1.275		1.275	18.4875	29.58		6.55	
		50 to 100				0		4.25		4.25	4.25	6.8	37.74	0.45	7.63
E4 14	The Strand to west Motney Hill	0 to 20				0		0.7		0.7	0.7	1.12		0.51	
		20 to 50		14.18		14.175		1.05		1.05	15.225	24.36		5.39	

LOCATION		PERIOD	REPLACEMENT				MAINTENANCE				CV TOTALS			PV COSTS	
			B £m	L £m	G £m	COST £m	B £m	L £m	G £m	COST £m	TOTAL COST £m	TOTAL WITH OPTIMISM BIAS £m	FINAL TOTAL £m	TOTAL £m	CUMULATIVE TOTAL £m
		50 to 100				0		3.5		3.5	3.5	5.6	31.08	0.37	6.28
E4 15	Motney Hill to Ham Green	0 to 20				0		1.6		1.6	1.6	2.56		1.18	
		20 to 50		32.4		32.4		2.4		2.4	34.8	55.68		12.33	
		50 to 100				0		8		8	8	12.8	71.04	0.85	14.35
E4 16	Ham Green to east of Upchurch	0 to 20				0		0.35		0.35	0.35	0.56		0.26	
		20 to 50		7.088		7.0875		0.525		0.525	7.6125	12.18		2.70	
		50 to 100				0		1.75		1.75	1.75	2.8	15.54	0.19	3.14
E4 17	East Upchurch to east Lower Halstow	0 to 20				0		0.35		0.35	0.35	0.56		0.26	
		20 to 50		7.088		7.0875		0.525		0.525	7.6125	12.18		2.70	
		50 to 100				0		1.75		1.75	1.75	2.8	15.54	0.19	3.14
E4 18	Barksore Marshes	0 to 20		13.5		13.5		0.5		0.5	14	22.4		9.94	
		20 to 50				0		2.25		2.25	2.25	3.6		0.73	
		50 to 100				0		5		5	5	8	34	0.53	11.20

LOCATION		PERIOD	REPLACEMENT				MAINTENANCE				CV TOTALS			PV COSTS	
			B £m	L £m	G £m	COST £m	B £m	L £m	G £m	COST £m	TOTAL COST £m	TOTAL WITH OPTIMISM BIAS £m	FINAL TOTAL £m	TOTAL £m	CUMULATIVE TOTAL £m
E4 19	Funton to Raspberry Hill	0 to 20				0		0.4		0.4	0.4	0.64		0.29	
		20 to 50		8.1		8.1		0.6		0.6	8.7	13.92		3.08	
		50 to 100				0		2		2	2	3.2	17.76	0.21	3.59
E4 20	Chetney Marshes	0 to 20		29.7		29.7		1.1		1.1	30.8	49.28		21.86	
		20 to 50				0		4.95		4.95	4.95	7.92		1.61	
		50 to 100				0		11		11	11	17.6	74.8	1.17	24.65
E4 21	Kingsferry Bridge to Milton Creek	0 to 20				0		0.75		0.75	0.75	1.2		0.55	
		20 to 50		15.19		15.188		1.125		1.125	16.3125	26.1		5.78	
		50 to 100				0		3.75		3.75	3.75	6	33.3	0.40	6.73
E4 22	Milton Creek	0 to 20				0		1.2		1.2	1.2	1.92		0.88	
		20 to 50		24.3		24.3		1.8		1.8	26.1	41.76		9.24	
		50 to 100				0		6		6	6	9.6	53.28	0.64	10.77
E4 23	Murston Pits to Faversham	0 to 20				0		3.6		3.6	3.6	5.76		2.65	
		20 to 50		72.9		72.9		5.4		5.4	78.3	125.28		27.73	

LOCATION		PERIOD	REPLACEMENT				MAINTENANCE				CV TOTALS			PV COSTS	
			B £m	L £m	G £m	COST £m	B £m	L £m	G £m	COST £m	TOTAL COST £m	TOTAL WITH OPTIMISM BIAS £m	FINAL TOTAL £m	TOTAL £m	CUMULATIVE TOTAL £m
		50 to 100				0		18		18	18	28.8	159.84	1.91	32.30
E4 24	Faversham to Nagden	0 to 20				0		0.8		0.8	0.8	1.28		0.59	
		20 to 50		16.2		16.2		1.2		1.2	17.4	27.84		6.16	
		50 to 100				0		4		4	4	6.4	35.52	0.43	7.18
E4 25	Shell Ness to Sayes Court	0 to 20			1.8	1.8			0.3	0.3	2.1	3.36		1.50	
		20 to 50			2.7	2.7			0.9	0.9	3.6	5.76		1.01	
		50 to 100			3.6	3.6			2.4	2.4	6	9.6	18.72	0.65	3.15
E4 26	Sayes Court to north Elmley Island	0 to 20			7.2	7.2			1.2	1.2	8.4	13.44		5.99	
		20 to 50			10.8	10.8			3.6	3.6	14.4	23.04		4.04	
		50 to 100			14.4	14.4			9.6	9.6	24	38.4	74.88	2.59	12.62
E4 27	North Elmley Island to Kingsferry Bridge	0 to 20				0		0.45		0.45	0.45	0.72		0.33	
		20 to 50		9.113		9.1125		0.675		0.675	9.7875	15.66		4.80	
		50 to 100				0		2.25		2.25	2.25	3.6	19.98	0.24	5.37

LOCATION		PERIOD	REPLACEMENT				MAINTENANCE				CV TOTALS			PV COSTS	
			B £m	L £m	G £m	COST £m	B £m	L £m	G £m	COST £m	TOTAL COST £m	TOTAL WITH OPTIMISM BIAS £m	FINAL TOTAL £m	TOTAL £m	CUMULATIVE TOTAL £m
E4 28	Kingsferry Bridge to Rushenden	0 to 20			3	3			0.5	0.5	3.5	5.6		2.49	
		20 to 50			4.5	4.5			1.5	1.5	6	9.6		1.68	
		50 to 100			6	6			4	4	10	16	31.2	1.08	5.26
E4 29	Rushenden to Sheerness	0 to 20		12.83	0.6	13.425		0.475	0.1	0.575	14	22.4		9.94	
		20 to 50			0.9	0.9		2.138	0.3	2.4375	3.3375	5.34		1.03	
		50 to 100			1.2	1.2		4.75	0.8	5.55	6.75	10.8	38.54	0.72	11.70
E4 30	Medway Islands	0 to 20				0				0	0	0		0.00	
		20 to 50				0				0	0	0		0.00	
		50 to 100				0				0	0	0	0	0.00	0.00

Annex H3: Supporting information for Sensitivity Testing

Proposed climate change scenarios (Defra, 2006)[6]:

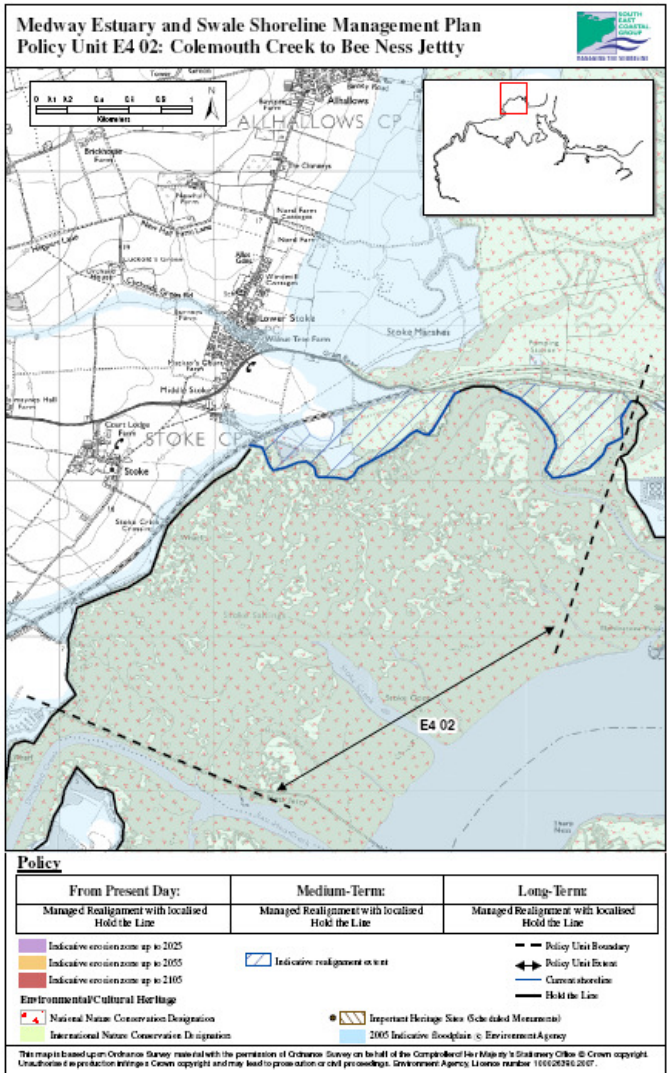
Area	Assumed Vertical Land Movement (mm/yr)	Net Sea level Rise (mm/yr)			
		1990-2025	2025-2055	2055-2085	2085-2115
South-East of England	-0.8	4	8.5	12	15
Indicative Sensitivity Range - Peak river flow volume (within estuaries)		+10%	+20%		
Indicative Sensitivity Range – Extreme Wave Height / Offshore wave height (at entrances to estuaries)		+5% +5%		+10% +10%	

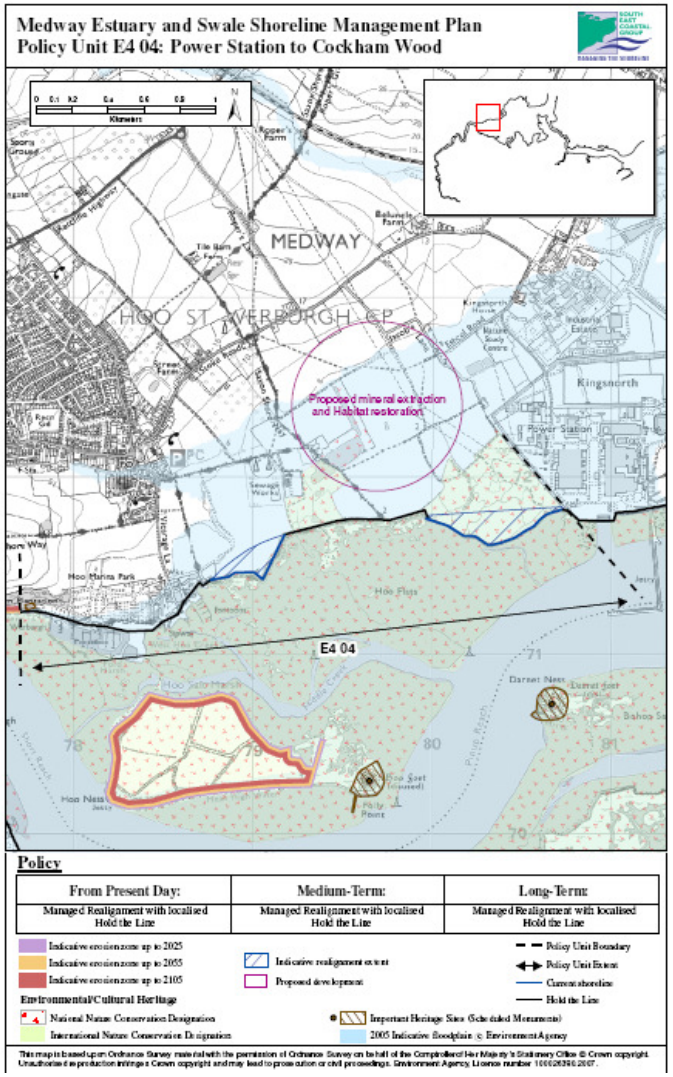
Consequences for the Medway and Swale estuaries (in mOD) with regards to Defra (2006) climate change predictions:

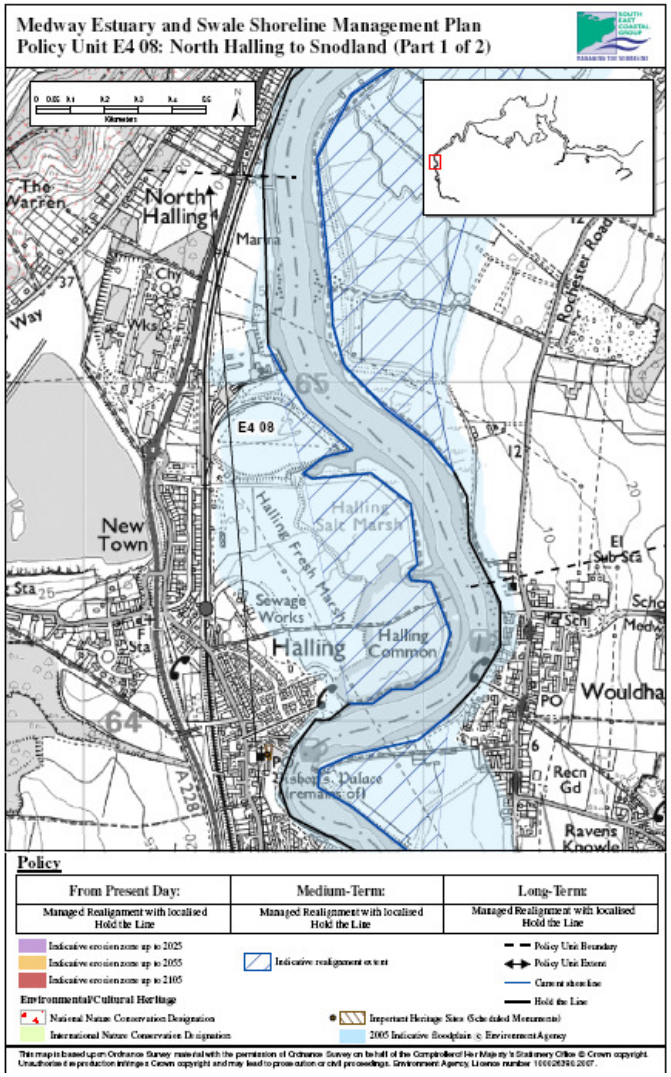
	MHWS				MSL			
	Present	2025 (+76mm)	2055 (+255 mm)	2105 (+660 mm)	Present	2025 (+76m m)	2055 (+255 mm)	2105 (+660 mm)
Medway								
Sheerness	**2.90m**	2.98m	3.23m	3.89m	**0.10m**	0.18m	0.43m	1.09m
Bee Ness	**3.20m**	3.28m	3.53m	4.19m	**0.18m**	0.26m	0.51m	1.17m
Bartlett Creek	**3.10m**	3.18m	3.43m	4.09m	**no data**	-	-	-
Chatham	**3.30m**	3.38m	3.63m	4.29m	**0.20m**	0.28m	0.53m	1.19m
Rochester (Strood Pier)	**3.26m**	3.34m	3.59m	4.25m	**0.17m**	0.25m	0.50m	1.16m
Wouldham	**3.49m**	3.57m	3.82m	4.48m	**0.58m**	0.66m	0.91m	1.57m
New Hythe	**3.55m**	3.63m	3.88m	4.54m	**1.38m**	1.55m	1.71m	2.37m
Allington Lock	**3.58m**	3.66m	3.91m	4.57m	**0.84m**	0.92m	1.17m	1.83m
Swale								
Chetney Marshes (using slope)	**3.00m**	3.08m	3.33m	3.99m	**-0.89m**	-0.81m	-0.56m	1.01m
Grovehurst Jetty	**2.90m**	2.98m	3.23m	3.89m	**no data**	-	-	-
Faversham	**2.80m**	2.88m	3.13m	3.79m	**no data**	-	-	-

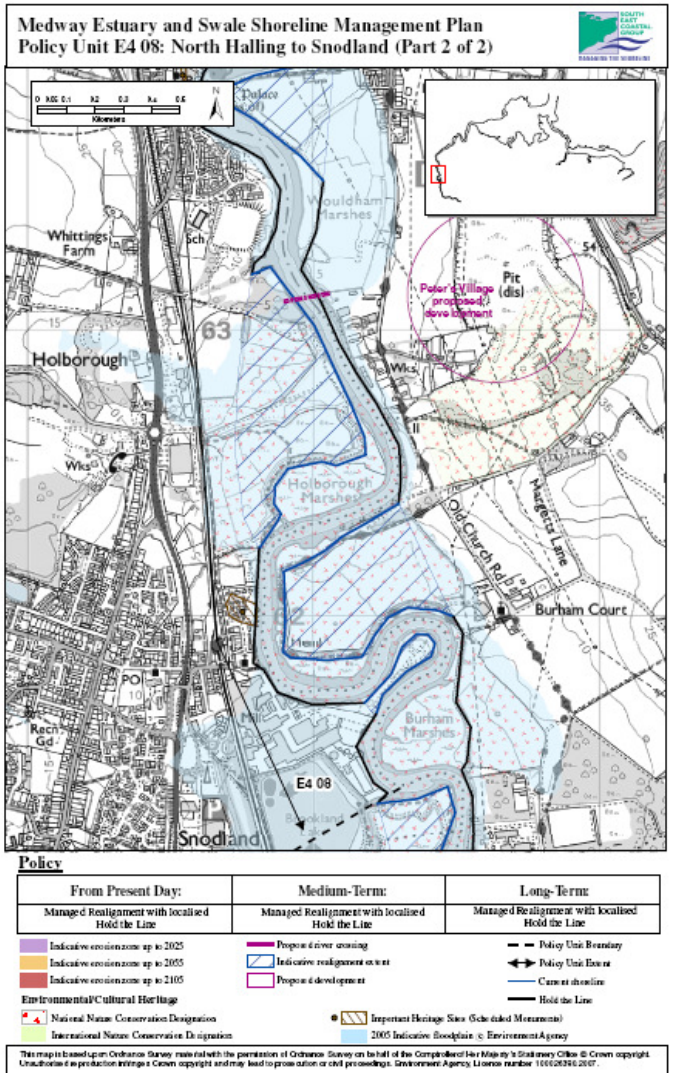
[6] Defra (2006) Flood and Coastal Defence Appraisal Guidance, FCDPAG3 Economic Appraisal, Supplementary Note to Operating Authorities – Climate Change Impacts, October 2006.

Annex H4: Example Managed Realignment Extents for Economic Calculations


Medway Estuary and Swale Shoreline Management Plan
Policy Unit E4 02: Colemouth Creek to Bee Ness Jettty
ALLHALLOWS CP
STOKE CP
E4 02
Policy
From Present Day:
Managed Realignment with localised Hold the Line
Medium-Term:
Managed Realignment with localised Hold the Line
Long-Term:
Managed Realignment with localised Hold the Line
Indicative erosion zone up to 2025
Indicative erosion zone up to 2055
Indicative erosion zone up to 2105
Indicative realignment extent
Policy Unit Boundary
Policy Unit Extent
Current shoreline
Hold the Line
Environmental/Cultural Heritage
National Nature Conservation Designation
International Nature Conservation Designation
Important Heritage Sites (Scheduled Monuments)
2005 Indicative floodplain © Environment Agency


Medway Estuary and Swale Shoreline Management Plan
Policy Unit E4 04: Power Station to Cockham Wood
MEDWAY
HOO ST WERBURGH CP
Proposed mineral extraction and Habitat restoration
E4 04
Policy
From Present Day:
Managed Realignment with localised Hold the Line
Medium-Term:
Managed Realignment with localised Hold the Line
Long-Term:
Managed Realignment with localised Hold the Line
Indicative erosion zone up to 2025
Indicative erosion zone up to 2055
Indicative erosion zone up to 2105
Indicative realignment extent
Proposed development
Policy Unit Boundary
Policy Unit Extent
Current shoreline
Hold the Line
Environmental/Cultural Heritage
National Nature Conservation Designation
International Nature Conservation Designation
Important Heritage Sites (Scheduled Monuments)
2005 Indicative floodplain © Environment Agency


Medway Estuary and Swale Shoreline Management Plan
Policy Unit E4 08: North Halling to Snodland (Part 1 of 2)
The Warren
North Halling
Marina
Rochester Road
Way
E4 08
New Town
Halling Salt Marsh
Halling Fresh Marsh
Sewage Works
Halling
Halling Common
Wouldha
Recn Gd
Ravens Knowle
Policy
From Present Day:
Managed Realignment with localised Hold the Line
Medium-Term:
Managed Realignment with localised Hold the Line
Long-Term:
Managed Realignment with localised Hold the Line
Indicative erosion zone up to 2025
Indicative erosion zone up to 2055
Indicative erosion zone up to 2105
Indicative realignment extent
Policy Unit Boundary
Policy Unit Extent
Current shoreline
Hold the Line
Environmental/Cultural Heritage
National Nature Conservation Designation
International Nature Conservation Designation
Important Heritage Sites (Scheduled Monuments)
2005 Indicative floodplain © Environment Agency


Medway Estuary and Swale Shoreline Management Plan
Policy Unit E4 08: North Halling to Snodland (Part 2 of 2)
Whittings Farm
Wouldham Marshes
Peter's Village proposed development
Pit (dis)
Holborough
Holborough Marshes
Old Church Rd
Hargers Lane
Burham Court
Burham Marshes
Recn Gd
E4 08
Snodland
Policy
From Present Day:
Managed Realignment with localised Hold the Line
Medium-Term:
Managed Realignment with localised Hold the Line
Long-Term:
Managed Realignment with localised Hold the Line
Indicative erosion zone up to 2025
Indicative erosion zone up to 2055
Indicative erosion zone up to 2105
Proposed river crossing
Indicative realignment extent
Proposed development
Policy Unit Boundary
Policy Unit Extent
Current shoreline
Hold the Line
Environmental/Cultural Heritage
National Nature Conservation Designation
International Nature Conservation Designation
Important Heritage Sites (Scheduled Monuments)
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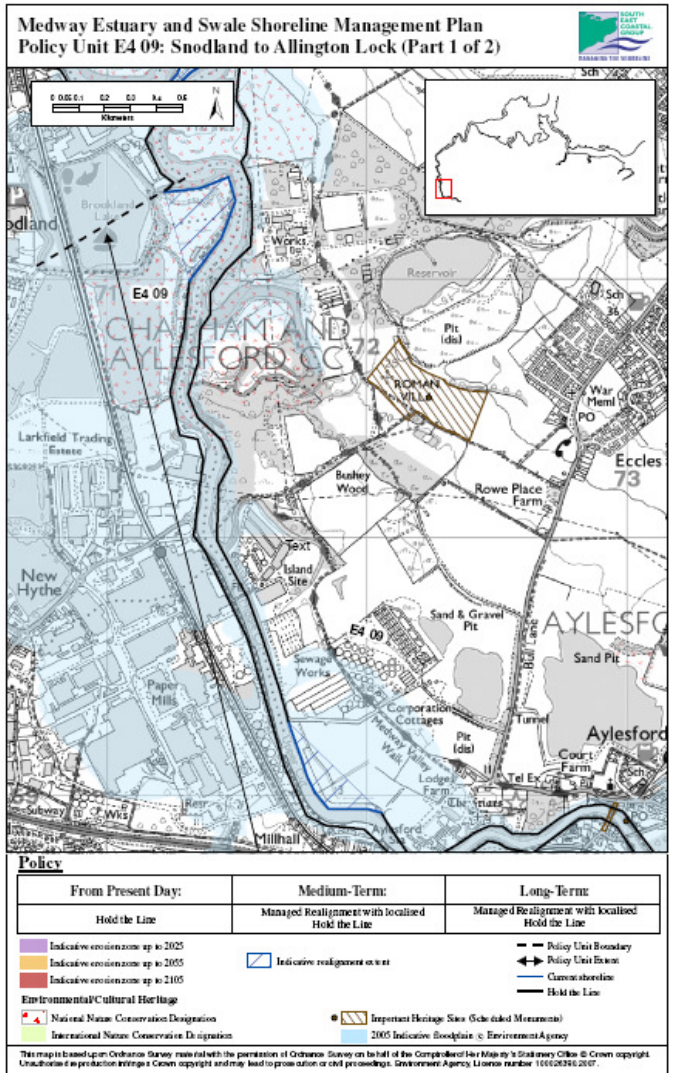
Medway Estuary and Swale Shoreline Management Plan
Policy Unit E4 09: Snodland to Allington Lock (Part 1 of 2)
E4 09
CHATHAM AND AYLESFORD CC
ROMAN VILLA
Eccles
Rowe Place Farm
Bushey Wood
Sand & Gravel Pit
Sand Pit
Aylesford
Court Farm
Corporation Cottages
Sewage Works
Paper Mills
New Hythe
Larkfield Trading Estate
Millhall
Policy
From Present Day:
Hold the Line
Medium-Term:
Managed Realignment with localised Hold the Line
Long-Term:
Managed Realignment with localised Hold the Line
Indicative erosion zone up to 2025
Indicative erosion zone up to 2055
Indicative erosion zone up to 2105
Indicative realignment extent
Policy Unit Boundary
Policy Unit Extent
Current shoreline
Hold the Line
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National Nature Conservation Designation
International Nature Conservation Designation
Important Heritage Sites (Scheduled Monuments)
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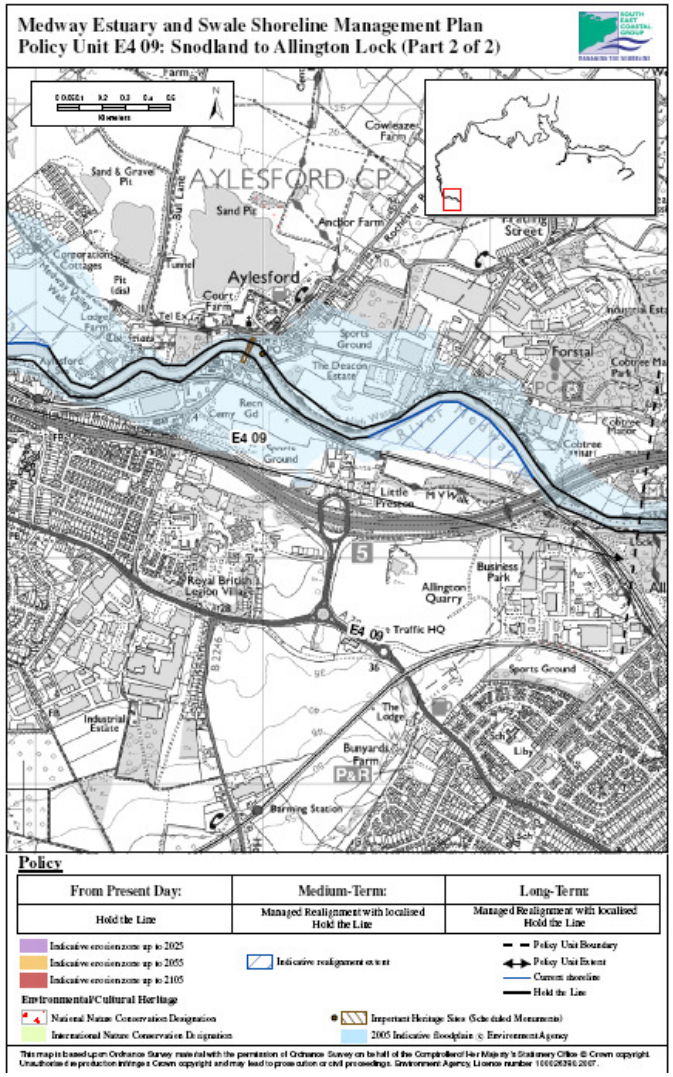
Medway Estuary and Swale Shoreline Management Plan
Policy Unit E4 09: Snodland to Allington Lock (Part 2 of 2)
AYLESFORD CP
Aylesford
Court Farm
Sand Pit
Anchor Farm
Forstal
E4 09
Little Preston
Allington Quarry
Business Park
Royal British Legion Village
Industrial Estate
Sports Ground
Bunyards Farm
Barming Station
Policy
From Present Day:
Hold the Line
Medium-Term:
Managed Realignment with localised Hold the Line
Long-Term:
Managed Realignment with localised Hold the Line
Indicative erosion zone up to 2025
Indicative erosion zone up to 2055
Indicative erosion zone up to 2105
Indicative realignment extent
Policy Unit Boundary
Policy Unit Extent
Current shoreline
Hold the Line
Environmental/Cultural Heritage
National Nature Conservation Designation
International Nature Conservation Designation
Important Heritage Sites (Scheduled Monuments)
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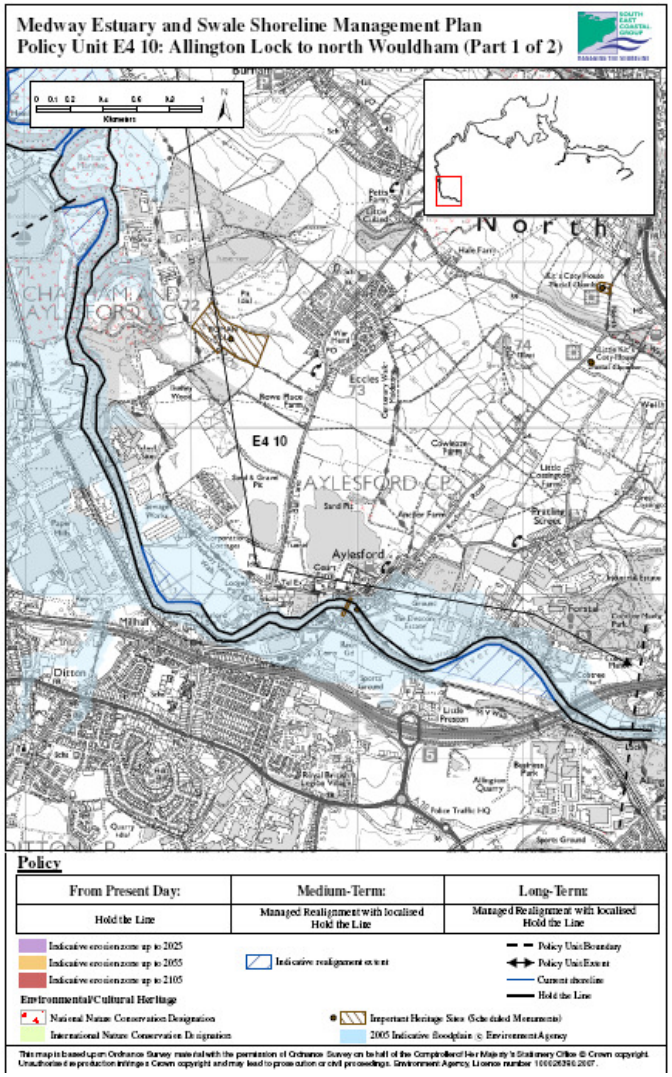
Medway Estuary and Swale Shoreline Management Plan
Policy Unit E4 10: Allington Lock to north Wouldham (Part 1 of 2)
North
E4 10
Aylesford
Ditton
Policy
From Present Day:
Medium-Term:
Long-Term:
Hold the Line
Managed Realignment with localised Hold the Line
Indicative erosion zone up to 2025
Indicative erosion zone up to 2055
Indicative erosion zone up to 2105
Indicative realignment extent
Policy Unit Boundary
Policy Unit Extent
Current shoreline
Hold the Line
Environmental/Cultural Heritage
National Nature Conservation Designation
International Nature Conservation Designation
Important Heritage Sites (Scheduled Monuments)
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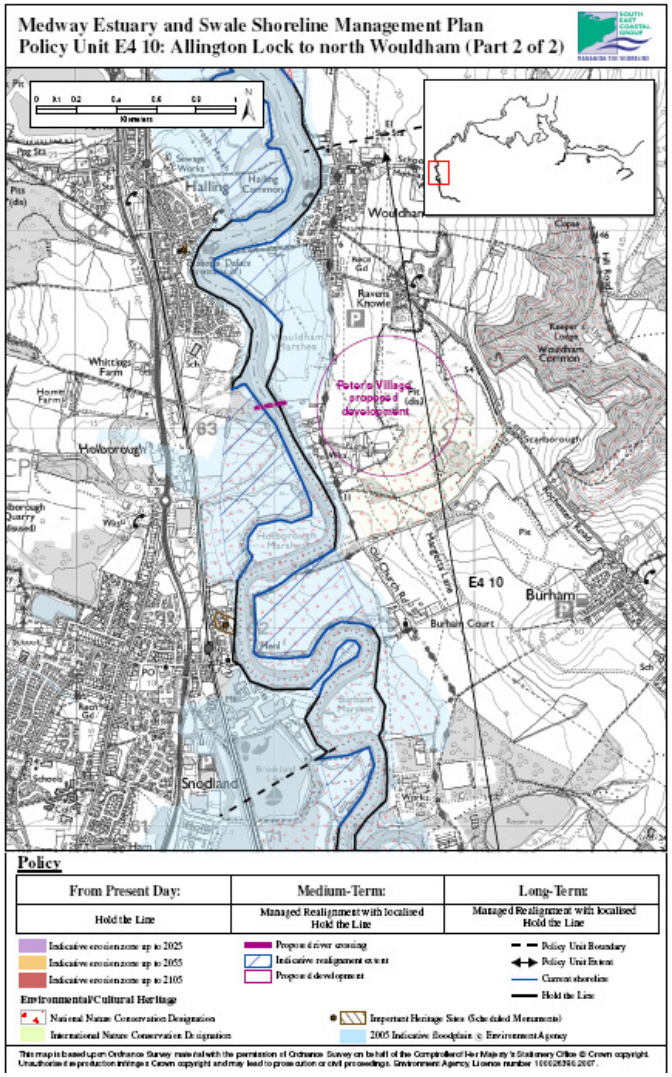
Medway Estuary and Swale Shoreline Management Plan
Policy Unit E4 10: Allington Lock to north Wouldham (Part 2 of 2)
Halling
Wouldham
Peter's Village proposed development
Holborough
E4 10
Burham
Snodland
Policy
From Present Day:
Medium-Term:
Long-Term:
Hold the Line
Managed Realignment with localised Hold the Line
Indicative erosion zone up to 2025
Indicative erosion zone up to 2055
Indicative erosion zone up to 2105
Proposed river crossing
Indicative realignment extent
Proposed development
Policy Unit Boundary
Policy Unit Extent
Current shoreline
Hold the Line
Environmental/Cultural Heritage
National Nature Conservation Designation
International Nature Conservation Designation
Important Heritage Sites (Scheduled Monuments)
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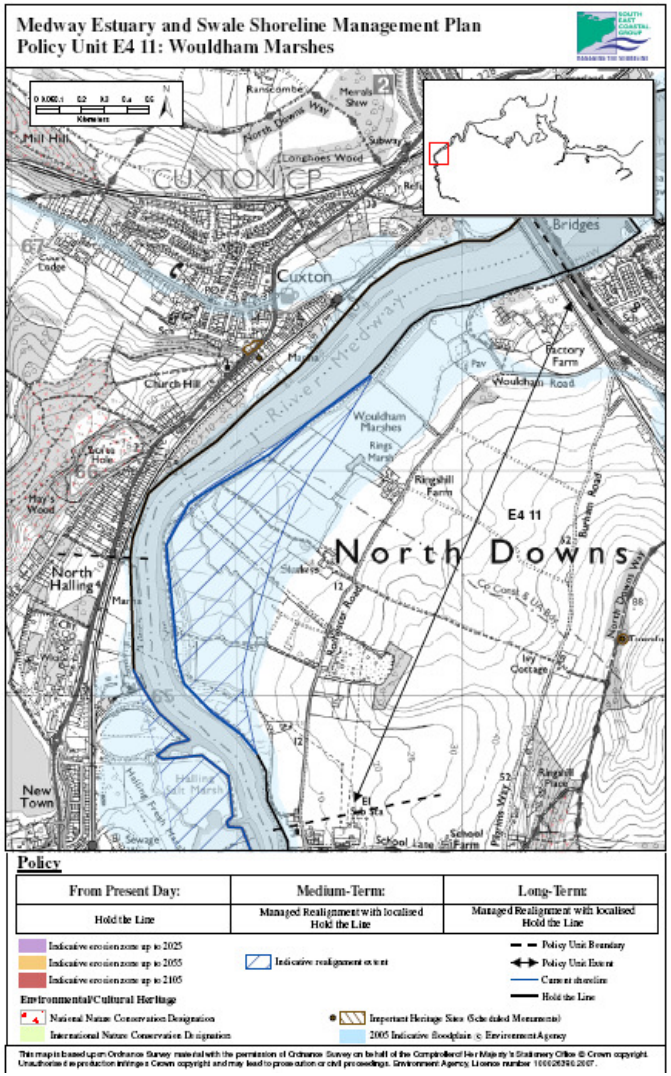
Medway Estuary and Swale Shoreline Management Plan
Policy Unit E4 11: Wouldham Marshes
North Downs
E4 11
Cuxton
Wouldham Marshes
Ringshill Farm
Factory Farm
Woulcham Road
Church Hill
North Halling
New Town
Policy
From Present Day:
Hold the Line
Medium-Term:
Managed Realignment with localised Hold the Line
Long-Term:
Managed Realignment with localised Hold the Line
Indicative erosion zone up to 2025
Indicative erosion zone up to 2055
Indicative erosion zone up to 2105
Indicative realignment extent
Policy Unit Boundary
Policy Unit Extent
Current shoreline
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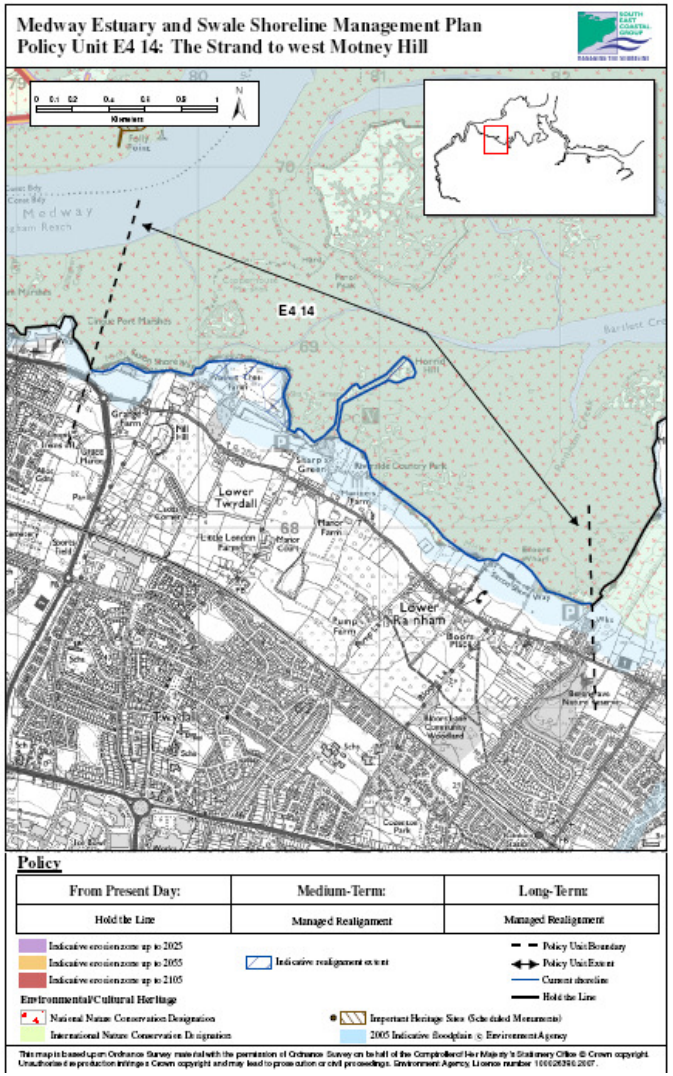
Medway Estuary and Swale Shoreline Management Plan
Policy Unit E4 14: The Strand to west Motney Hill
E4 14
Lower Twydall
Lower Rainham
Policy
From Present Day:
Hold the Line
Medium-Term:
Managed Realignment
Long-Term:
Managed Realignment
Indicative erosion zone up to 2025
Indicative erosion zone up to 2055
Indicative erosion zone up to 2105
Indicative realignment extent
Policy Unit Boundary
Policy Unit Extent
Current shoreline
Hold the Line
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National Nature Conservation Designation
International Nature Conservation Designation
Important Heritage Sites (Scheduled Monuments)
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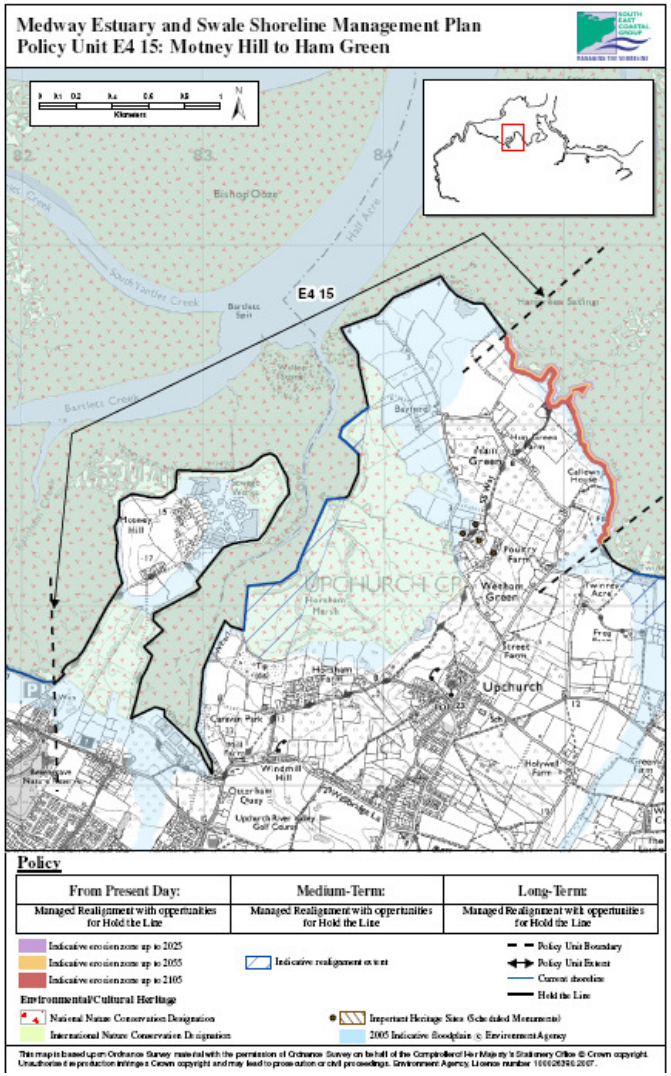
Medway Estuary and Swale Shoreline Management Plan
Policy Unit E4 15: Motney Hill to Ham Green
E4 15
Upchurch
Policy
From Present Day:
Managed Realignment with opportunities for Hold the Line
Medium-Term:
Managed Realignment with opportunities for Hold the Line
Long-Term:
Managed Realignment with opportunities for Hold the Line
Indicative erosion zone up to 2025
Indicative erosion zone up to 2055
Indicative erosion zone up to 2105
Indicative realignment extent
Policy Unit Boundary
Policy Unit Extent
Current shoreline
Hold the Line
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National Nature Conservation Designation
International Nature Conservation Designation
Important Heritage Sites (Scheduled Monuments)
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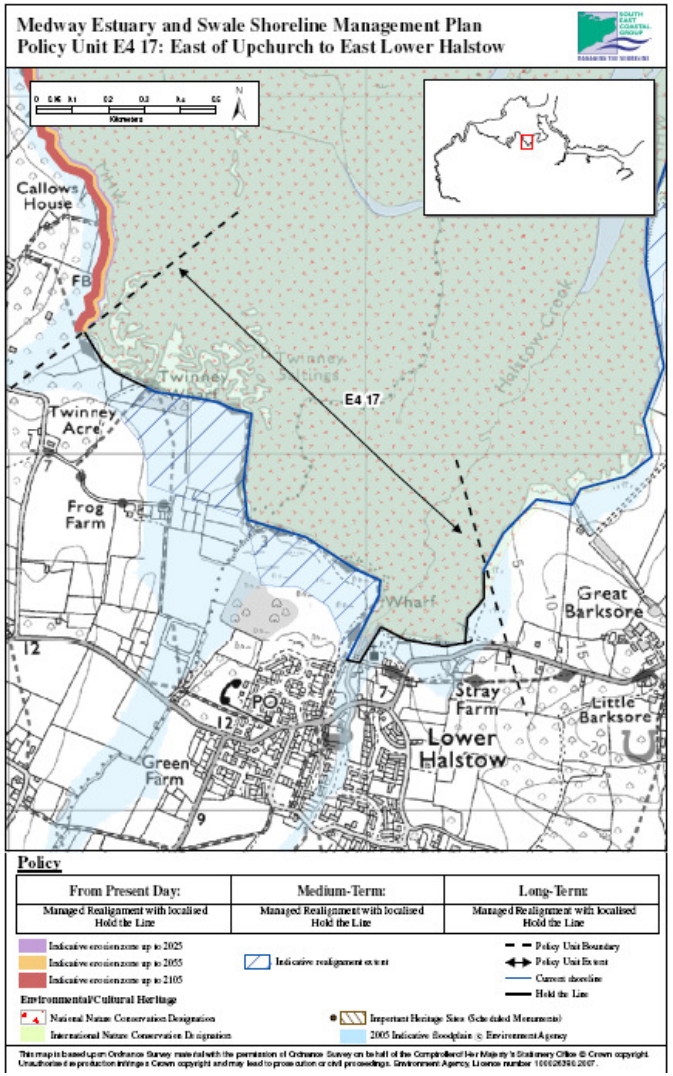
Medway Estuary and Swale Shoreline Management Plan
Policy Unit E4 17: East of Upchurch to East Lower Halstow
Callows House
E4 17
Twinney Acre
Frog Farm
Great Barksore
Little Barksore
Stray Farm
Lower Halstow
Green Farm
Policy
From Present Day:
Managed Realignment with localised Hold the Line
Medium-Term:
Managed Realignment with localised Hold the Line
Long-Term:
Managed Realignment with localised Hold the Line
Indicative erosion zone up to 2025
Indicative erosion zone up to 2055
Indicative erosion zone up to 2105
Indicative realignment extent
Policy Unit Boundary
Policy Unit Extent
Current shoreline
Hold the Line
Environmental/Cultural Heritage
National Nature Conservation Designation
International Nature Conservation Designation
Important Heritage Sites (Scheduled Monuments)
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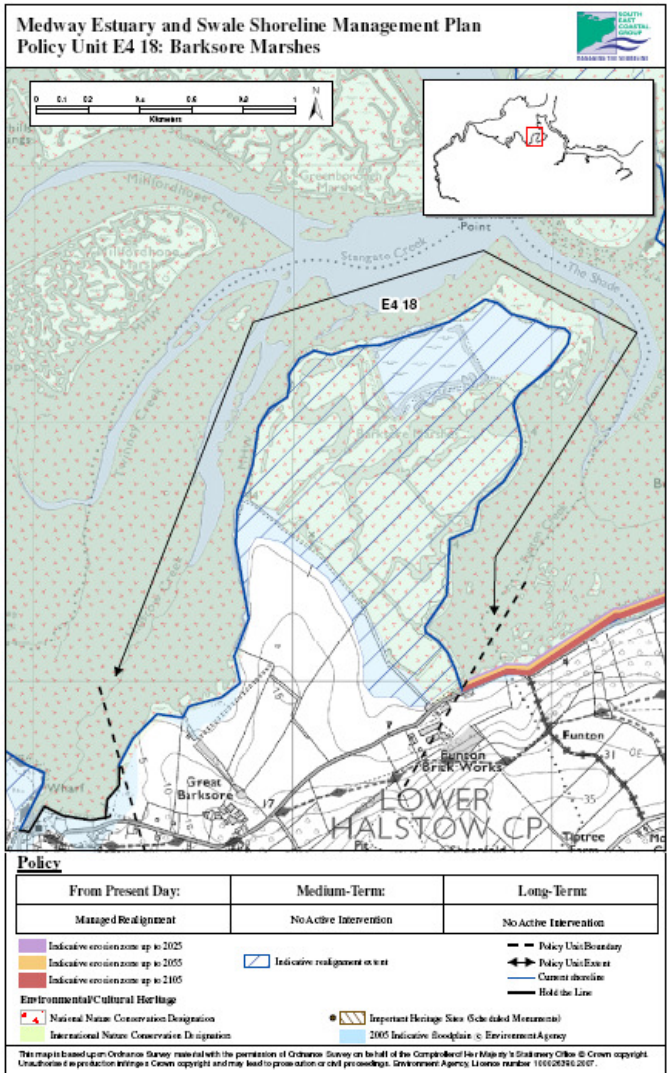
Medway Estuary and Swale Shoreline Management Plan
Policy Unit E4 18: Barksore Marshes
E4 18
Great Barksore
Funton
Funton Brick Works
LOWER HALSTOW CP
Tidtree
Policy
From Present Day:
Medium-Term:
Long-Term:
Managed Realignment
No Active Intervention
No Active Intervention
Indicative erosion zone up to 2025
Indicative erosion zone up to 2055
Indicative erosion zone up to 2105
Indicative realignment extent
Policy Unit Boundary
Policy Unit Extent
Current shoreline
Hold the Line
Environmental/Cultural Heritage
National Nature Conservation Designation
International Nature Conservation Designation
Important Heritage Sites (Scheduled Monuments)
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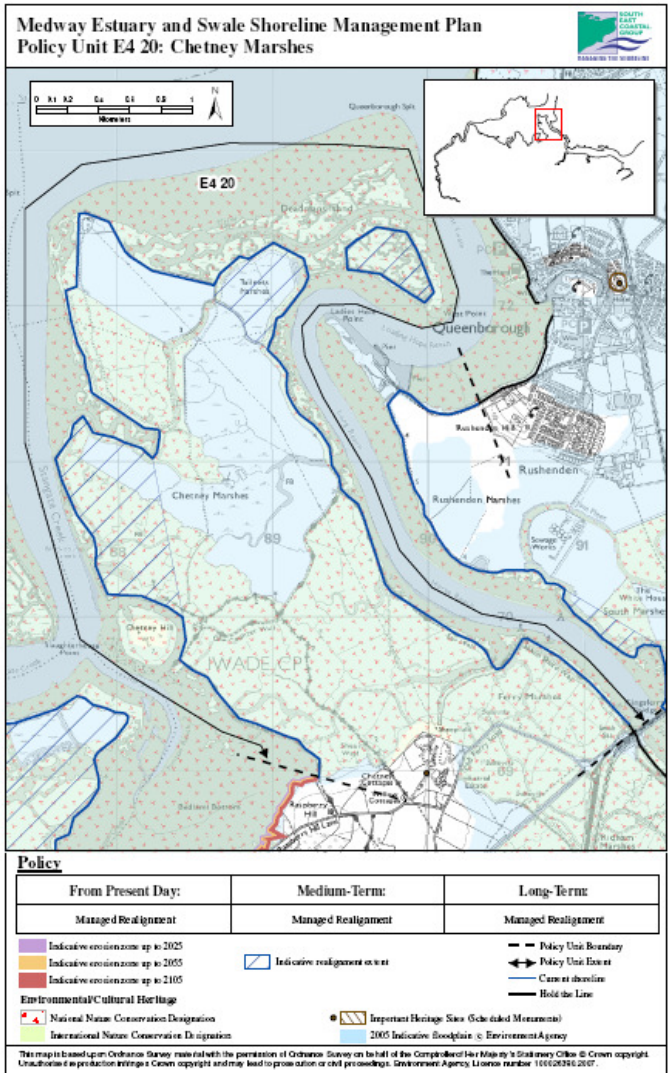
Medway Estuary and Swale Shoreline Management Plan
Policy Unit E4 20: Chetney Marshes
E4 20
Queenborough
Rushenden
Rushenden Marshes
Chetney Marshes
WADE CP
Policy
From Present Day:
Medium-Term:
Long-Term:
Managed Realignment
Managed Realignment
Managed Realignment
Indicative erosion zone up to 2025
Indicative erosion zone up to 2055
Indicative erosion zone up to 2105
Indicative realignment extent
Policy Unit Boundary
Policy Unit Extent
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Environmental/Cultural Heritage
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International Nature Conservation Designation
Important Heritage Sites (Scheduled Monuments)
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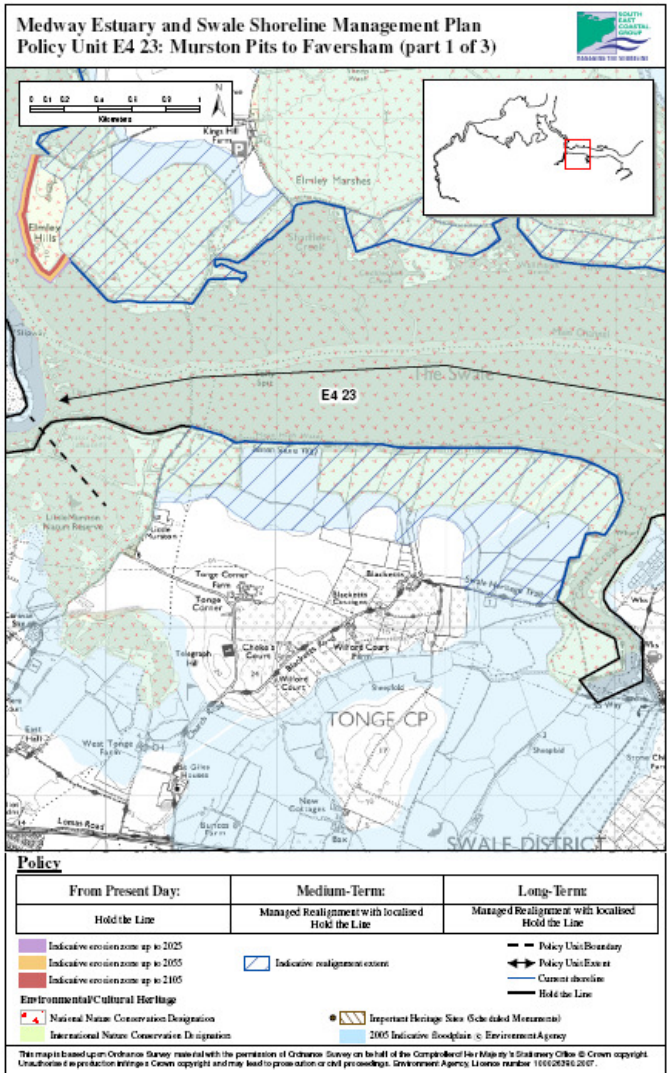
Medway Estuary and Swale Shoreline Management Plan
Policy Unit E4 23: Murston Pits to Faversham (part 1 of 3)
E4 23
TONGE CP
SWALE DISTRICT
Policy
From Present Day:
Hold the Line
Medium-Term:
Managed Realignment with localised Hold the Line
Long-Term:
Managed Realignment with localised Hold the Line
Indicative erosion zone up to 2025
Indicative erosion zone up to 2055
Indicative erosion zone up to 2105
Indicative realignment extent
Policy Unit Boundary
Policy Unit Extent
Current shoreline
Hold the Line
Environmental/Cultural Heritage
National Nature Conservation Designation
International Nature Conservation Designation
Important Heritage Sites (Scheduled Monuments)
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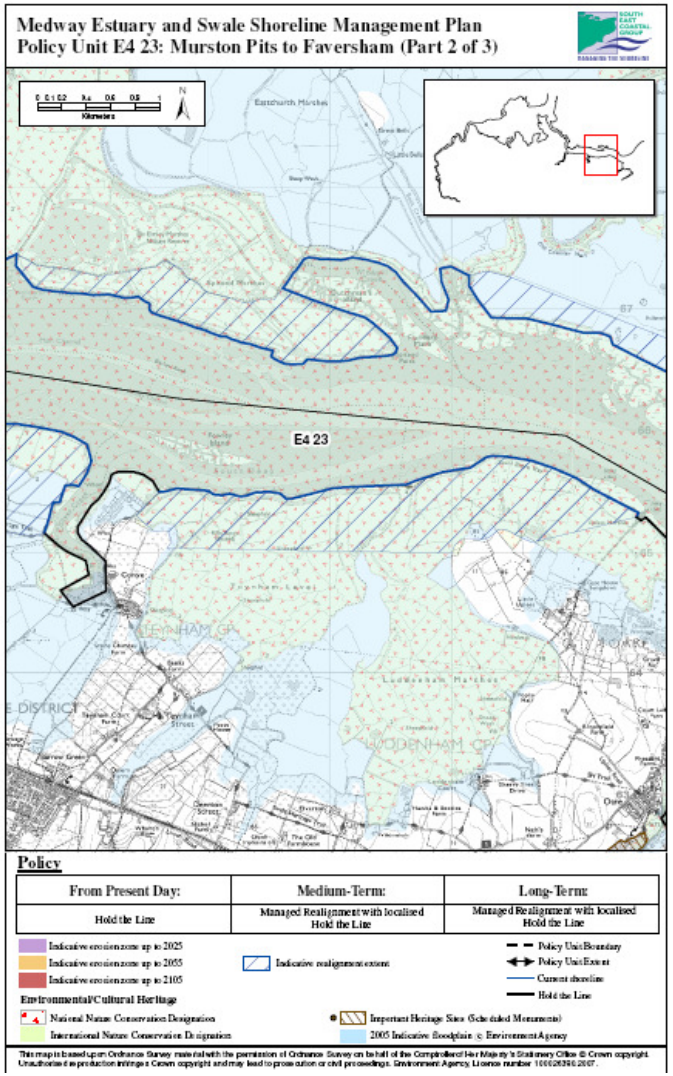
Medway Estuary and Swale Shoreline Management Plan
Policy Unit E4 23: Murston Pits to Faversham (Part 2 of 3)
E4 23
Policy
From Present Day:
Hold the Line
Medium-Term:
Managed Realignment with localised Hold the Line
Long-Term:
Managed Realignment with localised Hold the Line
Indicative erosion zone up to 2025
Indicative erosion zone up to 2055
Indicative erosion zone up to 2105
Indicative realignment extent
Policy Unit Boundary
Policy Unit Extent
Current shoreline
Hold the Line
Environmental/Cultural Heritage
National Nature Conservation Designation
International Nature Conservation Designation
Important Heritage Sites (Scheduled Monuments)
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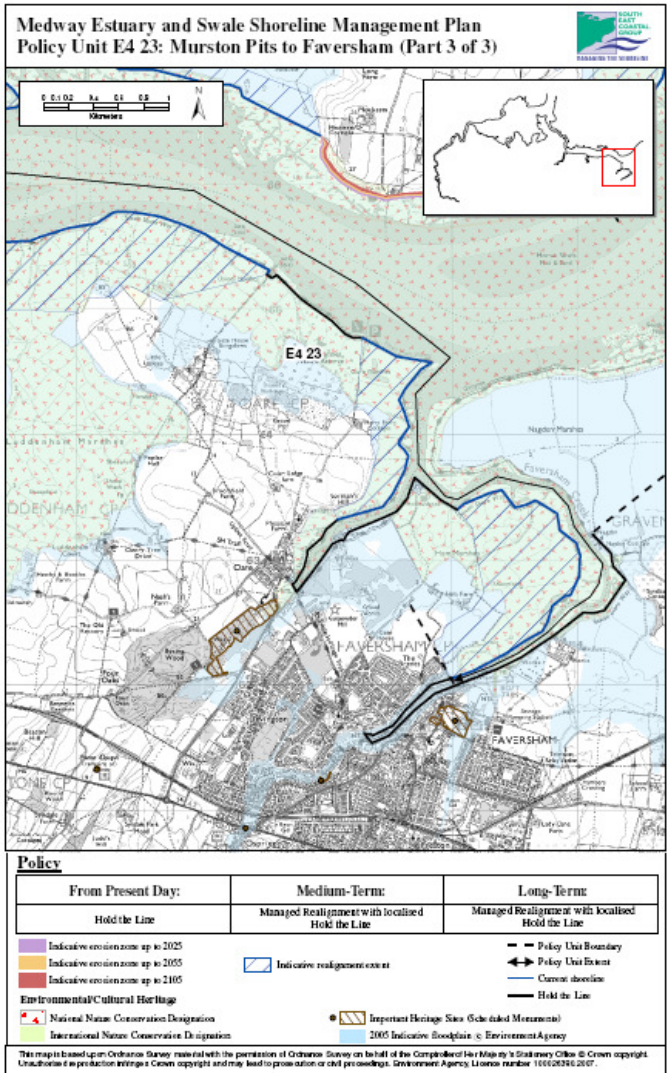
Medway Estuary and Swale Shoreline Management Plan
Policy Unit E4 23: Murston Pits to Faversham (Part 3 of 3)
E4 23
Policy
From Present Day:
Hold the Line
Medium-Term:
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Long-Term:
Managed Realignment with localised Hold the Line
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Indicative erosion zone up to 2055
Indicative erosion zone up to 2105
Indicative realignment extent
Policy Unit Boundary
Policy Unit Extent
Current shoreline
Hold the Line
Environmental/Cultural Heritage
National Nature Conservation Designation
International Nature Conservation Designation
Important Heritage Sites (Scheduled Monuments)
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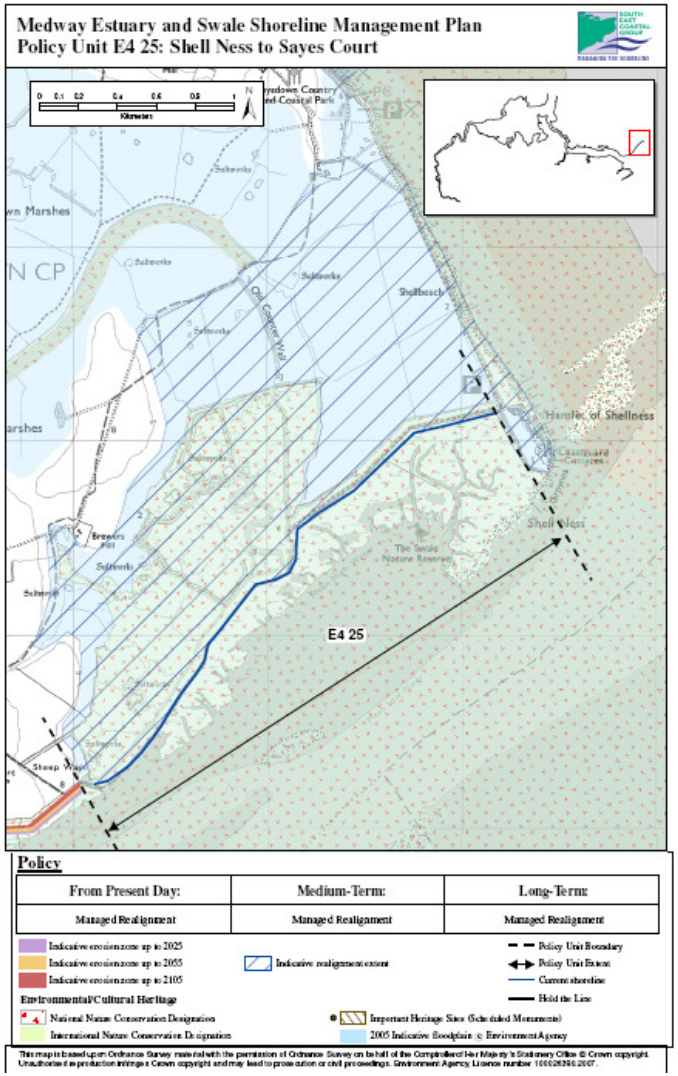
Medway Estuary and Swale Shoreline Management Plan
Policy Unit E4 25: Shell Ness to Sayes Court
E4 25
Policy
From Present Day:
Managed Realignment
Medium-Term:
Managed Realignment
Long-Term:
Managed Realignment
Indicative erosion zone up to 2025
Indicative erosion zone up to 2055
Indicative erosion zone up to 2105
Indicative realignment extent
Policy Unit Boundary
Policy Unit Extent
Current shoreline
Hold the Line
Environmental/Cultural Heritage
National Nature Conservation Designation
International Nature Conservation Designation
Important Heritage Sites (Scheduled Monuments)
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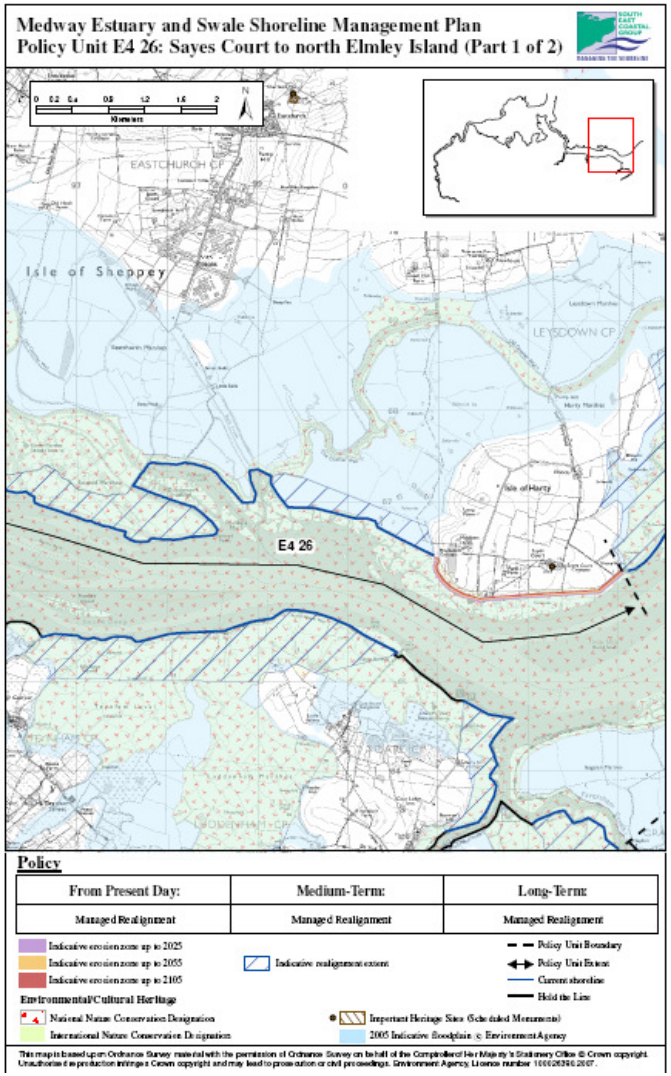
Medway Estuary and Swale Shoreline Management Plan
Policy Unit E4 26: Sayes Court to north Elmley Island (Part 1 of 2)
Isle of Sheppey
E4 26
Policy
From Present Day:
Medium-Term:
Long-Term:
Managed Realignment
Managed Realignment
Managed Realignment
Indicative erosion zone up to 2025
Indicative erosion zone up to 2055
Indicative erosion zone up to 2105
Indicative realignment extent
Policy Unit Boundary
Policy Unit Extent
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Environmental/Cultural Heritage
National Nature Conservation Designation
International Nature Conservation Designation
Important Heritage Sites (Scheduled Monuments)
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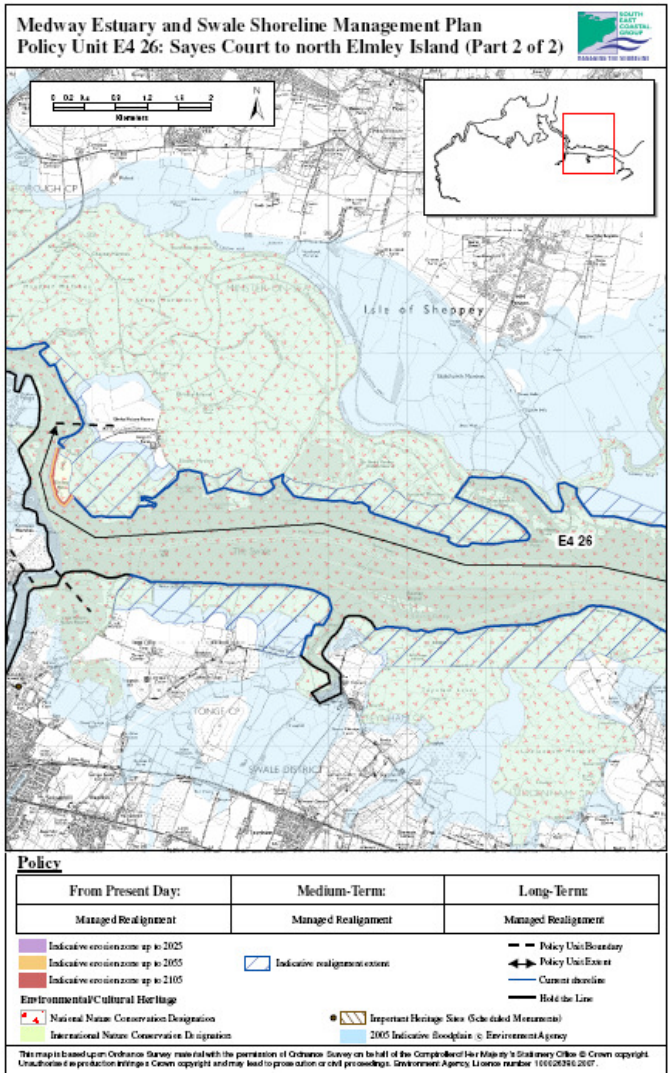
Medway Estuary and Swale Shoreline Management Plan
Policy Unit E4 26: Sayes Court to north Elmley Island (Part 2 of 2)
Isle of Sheppey
E4 26
Policy
From Present Day:
Medium-Term:
Long-Term:
Managed Realignment
Managed Realignment
Managed Realignment
Indicative erosion zone up to 2025
Indicative erosion zone up to 2055
Indicative erosion zone up to 2105
Indicative realignment extent
Policy Unit Boundary
Policy Unit Extent
Current shoreline
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Environmental/Cultural Heritage
National Nature Conservation Designation
International Nature Conservation Designation
Important Heritage Sites (Scheduled Monuments)
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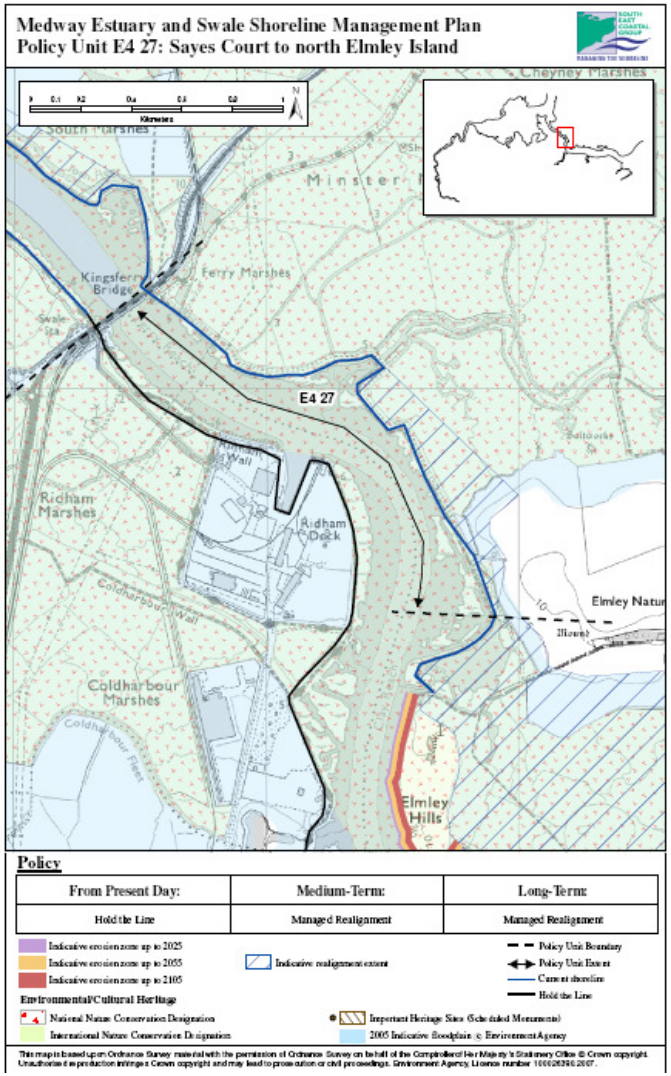
Medway Estuary and Swale Shoreline Management Plan
Policy Unit E4 27: Sayes Court to north Elmley Island
Cheyney Marshes
South Marshes
Minster
Kingsferry Bridge
Ferry Marshes
E4 27
Ridham Marshes
Ridham Dock
Coldharbour Marshes
Elmley Hills
Policy
From Present Day:
Medium-Term:
Long-Term:
Hold the Line
Managed Realignment
Managed Realignment
Indicative erosion zone up to 2025
Indicative erosion zone up to 2055
Indicative erosion zone up to 2105
Indicative realignment extent
Policy Unit Boundary
Policy Unit Extent
Current shoreline
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Environmental/Cultural Heritage
National Nature Conservation Designation
International Nature Conservation Designation
Important Heritage Sites (Scheduled Monuments)
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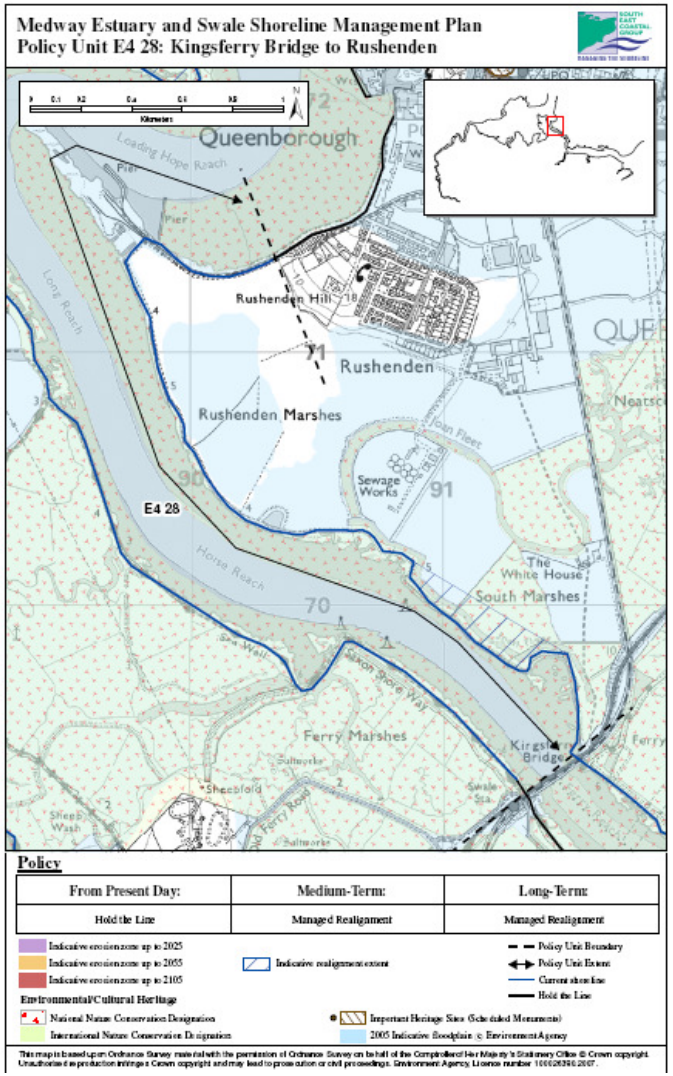
Medway Estuary and Swale Shoreline Management Plan
Policy Unit E4 28: Kingsferry Bridge to Rushenden
Queenborough
Rushenden Hill
Rushenden
Rushenden Marshes
E4 28
Sewage Works
The White House
South Marshes
Ferry Marshes
Kingsferry Bridge
Policy
From Present Day:
Medium-Term:
Long-Term:
Hold the Line
Managed Realignment
Managed Realignment
Indicative erosion zone up to 2025
Indicative erosion zone up to 2055
Indicative erosion zone up to 2105
Indicative realignment extent
Policy Unit Boundary
Policy Unit Extent
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Hold the Line
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National Nature Conservation Designation
International Nature Conservation Designation
Important Heritage Sites (Scheduled Monuments)
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