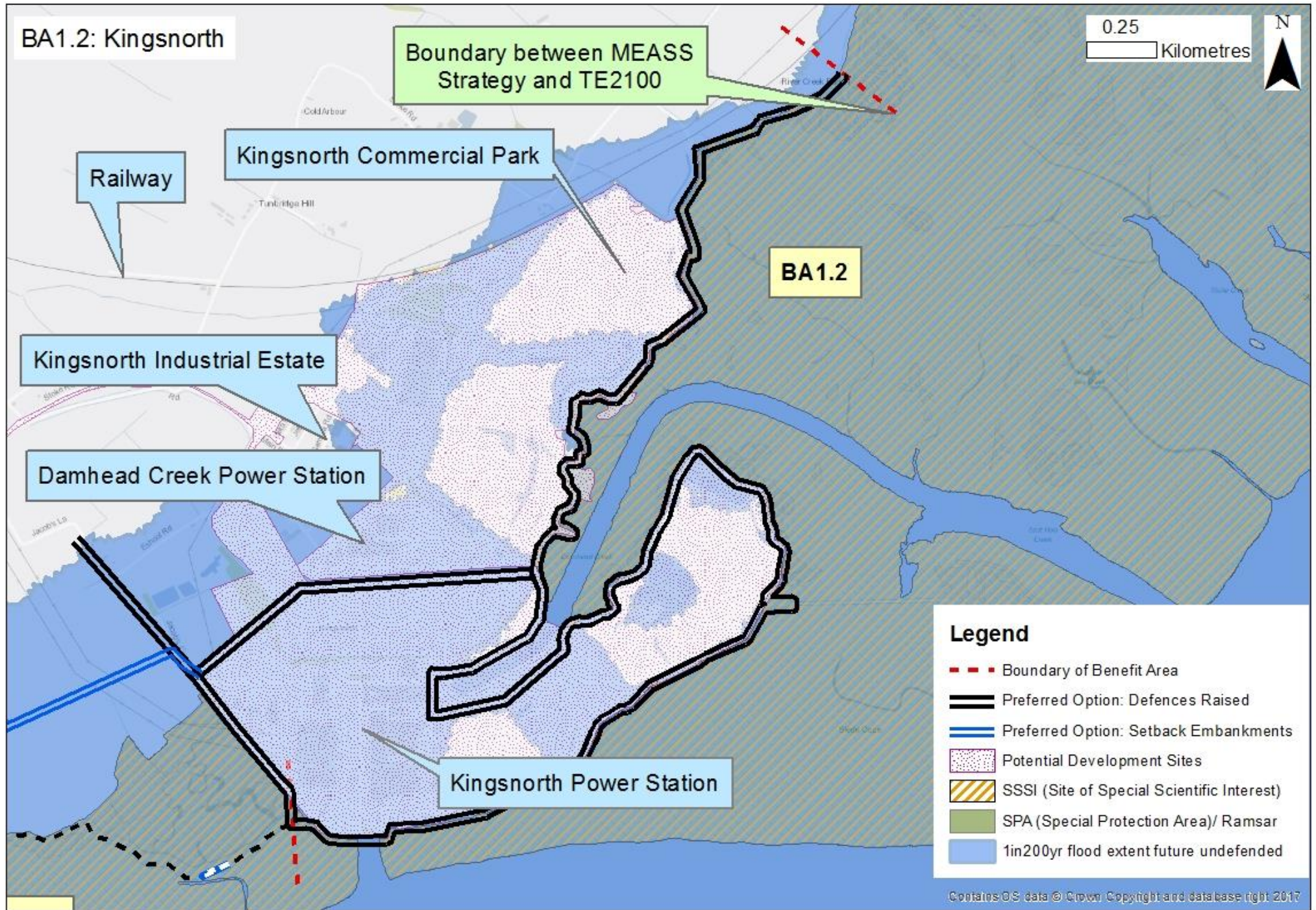


<b>Benefit Area Name</b>	1 - Hoo Peninsula
<b>Benefit Unit Name</b>	1.2 - Kingsnorth Power Station
<b>Frontage Length</b>	6.1 km
<b>Defence Structure Type</b>	Earth embankments, concrete walls, bank with rock revetment
<b>Min Standard of Protection (AEP%)</b>	50%
<b>Residual Life (years)</b>	10

	<b>0-20 years</b>	<b>20-50 years</b>	<b>50-100 years</b>
<b>SMP Policy</b>	HTL	HTL	HTL
<b>Aiming to comply with policy</b>	Agree with SMP		
<b>Comment</b>	Agree with SMP: HTL for all Epochs due to nature of assets protected.		



Do Nothing Assets at Risk (Flooding)				
	50% AEP (undefended)		0.5% AEP (undefended)	
	Current Year	100 year	Current Year	100 Years
<b>Residential</b>	0	1	3	5
<b>Commercial &amp; Industrial</b>	7	28	32	50
<b>Agricultural (Ha)</b>	10	25	27	46
<b>Key Infrastructure</b>	Kingsnorth Power Station, Damhead Creek Power Station, Kingsnorth Area Historic Landfill (inert).	Kingsnorth Power Station, Damhead Creek Power Station, Kingsnorth Industrial Estate, Railway alongside A228, Kingsnorth Area Historic Landfill (inert), Kingsnorth Power Station Historic Landfill.	Kingsnorth Power Station, Damhead Creek Power Station, Kingsnorth Industrial Estate, Railway alongside A228, Kingsnorth Area Historic Landfill (inert), Kingsnorth Power Station Historic Landfill.	Kingsnorth Power Station, Damhead Creek Power Station, Kingsnorth Industrial Estate, Railway alongside A228, Kingsnorth Area Historic Landfill (inert), Kingsnorth Power Station Historic Landfill.
<b>Social and Environmental Considerations</b>	Medway Estuary and Marshes SPA and SSSI (seaward)	Medway Estuary and Marshes SPA and SSSI (seaward)	Medway Estuary and Marshes SPA and SSSI (seaward)	Medway Estuary and Marshes SPA and SSSI (seaward)

Long List to Short List			
Potential Measures			
	Measures	Selected	Reasoning
Structural	Construct new embankment	Y	Take forward- embankments currently present
	Maintain embankment	Y	Take forward- embankments currently present
	Raise embankment (sustain)	Y	Take forward- embankments currently present
	Raise embankment (upgrade)	Y	Take forward- embankments currently present
	Construct new wall	Y	Take forward - walls currently present
	Maintain wall	Y	Take forward - walls currently present
	Raise wall (sustain)	Y	Take forward - walls currently present
	Raise wall (upgrade)	Y	Take forward - walls currently present
	Maintain rock revetment	Y	Take forward - rock revetment currently present
	Construct rock revetment	Y	Take forward - rock revetment currently present
	Install demountable defences	N	Exclude - demountable tend to be used where walls and embankments not viable or where regular access is required to the foreshore; however in this areas these defences are not viable and regular access is not required. Relatively costly option which is not the most efficient use of FDGiA funding compared to sustaining existing defences. It would require significant man resources to implement during a flood event. This would need to be discussed with Asset Owners at OBC stage.
	Install temporary defences	N	Exclude - significant resources to implement and potentially not the most efficient use of FDGiA funding compared to sustaining existing defences. This would need to be discussed with Asset Owners at OBC stage.
	Beach recharge (sand or shingle)	N	Exclude - the foreshore is mudflat/ saltmarsh and so technically unviable and potentially environmentally damaging in SPA habitat.
	Construct rock groynes	N	Exclude - the foreshore is mudflat/ saltmarsh and so technically unviable geotechnically and would not provide flood protection function. Also could cause damaging impacts on SPA habitat.
	Maintain rock groynes	N	Exclude - the foreshore is mudflat/ saltmarsh and so technically unviable geotechnically and would not provide flood protection function. Also could cause damaging impacts on SPA habitat.
Construct timber structures	N	Exclude - the foreshore is mudflat/ saltmarsh. Introduction of timber structures is not appropriate for the location. Could also cause damaging impacts on the SPA habitat.	
Maintain timber structures	N	N/A - no timber structures currently in place.	
Construct a tidal barrier	N	Exclude- likely to have significant environmental impacts, including on water quality (WFD), change in sedimentation in Estuary with wider impacts (environment, dredging, maintenance, navigation etc.). Also not suitable at this location due to morphology and limited number of properties that would benefit.	
Non-Structural	Implement monitoring	N	Not suitable as a single measure to implement the SMP policy. May be combined with structural measures.
	Implement flood warning system	N	Not suitable as a single measure to implement the SMP policy. May be combined with structural measures.
	Land use planning	N	Not suitable as a single measure to implement the SMP policy. May be combined with structural measures.
	Adaptation measures	N	Not suitable as a single measure to implement the SMP policy. May be combined with structural measures.
	Development control	N	Not suitable as a single measure to implement the SMP policy. May be combined with structural measures.
	Emergency response plans	N	Not suitable as a single measure to implement the SMP policy. May be combined with structural measures.
	Monitoring for health and safety only	N	Not suitable as a single measure to implement the SMP policy.

### Long List of Options

	a) Do nothing	b) Ongoing maintenance of embankment/seawall/revetment/sheet piling	c) Maintain SOP (capital) embankment/seawall/revetment/sheet piling	d) Raise embankment/seawall/revetment/sheet piling (sustain SOP) and new rock revetment	e) Raise embankment/seawall/revetment/sheet piling (upgrade SOP) and new rock revetment
<b>To what extent does the option meet the objectives?</b>					
<b>1- Reduce Flood Risk</b>	N	N	Y	Y	Y
<b>2 - Natura 2000 sites</b>	N	N	N	N	N
<b>3- Reduce maintenance</b>	N	N	N	N	N
<b>4 - WFD</b>	N	Y	Y	Y	Y
<b>5 - Local Plans</b>	N	Y	Y	Y	Y
<b>Comment and decision on whether taken forward to shortlist</b>	Y- as baseline. Standard of Protection (SOP) and residual life of defences very low along some sections (minimum SOP =2; minimum residual life = 0).	Y - as baseline. Following 15 years a Do nothing scenario would occur due to failure of the defences.	Y- Existing defences have low minimum SOP but capital works could be undertaken to improve existing residual life of asset which could then be maintained over 100 years. Significant number of key assets at risk.	Y- Could consider raising defences with sea level rise to ensure protection to power station and other assets.	Y – SOP very low so could be raised now especially in particularly low sections. Need to provide flood protection to key assets.

### Short List of Options

a) Do nothing
b) Do minimum
c) Maintain (capital) embankment/seawall/rock revetment
d) Raise embankment/seawall (sustain) and new rock revetment
e) Raise embankment/seawall/revetment/sheet piling (upgrade) and new rock revetment

Assessment of Short List					
Option	a) Do nothing	b) Do minimum	c) Maintain (capital) embankment/seawall/rock revetment	d) Raise embankment/seawall (sustain) and new rock revetment	e) Raise embankment/seawall/revetment/sheet piling (upgrade) and new rock revetment
Description	Used as an economic baseline to compare the other options against.	Used as an economic baseline to compare the other options against.	Capital works are undertaken to maintain the current defences.	Capital works are undertaken to improve the current defences.	Capital works are undertaken to improve the current defences.
Technical Issue	Defences have 10 years residual life. Kingsnorth Area Historic Landfill (inert) potentially at risk.	Defences have 10 years residual life. Kingsnorth Area Historic Landfill (inert) potentially at risk.	Current defences have 10 years residual life. Potential for coastal squeeze, therefore compensatory intertidal habitat will need to be created elsewhere. Kingsnorth Area Historic Landfill (inert) potentially at risk.	Current defences have 10 years residual life. Potential for coastal squeeze, therefore compensatory intertidal habitat will need to be created elsewhere. Kingsnorth Area Historic Landfill (inert) potentially at risk.	Current defences have 10 years residual life. Potential for coastal squeeze, therefore compensatory intertidal habitat will need to be created elsewhere. Kingsnorth Area Historic Landfill (inert) potentially at risk.
Assumptions/Uncertainties	Assumes that all management and maintenance is ceased.	Ongoing maintenance. Maintenance not sufficient to reduce risk of failure after year 15.	The crest height of the defences remains the same as currently in place i.e. is not increased. Over time this will lead to a reduction in the SOP as the sea level rises.	The SOP provided by the defences is increased to the required standard over time. This option has a phased approach so the defences are raised in line with sea level rise at two phases i.e. capital works are undertaken in epoch 1 and again in year 50. This option will maintain the required SOP provided by the defences by keeping pace with sea level rise.	The crest height and SOP provided by the defences is increased. The crest heights will be raised to the level required to provide the SOP in 100 years time, i.e. the SOP will be greater than required during the first epoch; this will decline over time with sea level rise but will still provide an improved SOP in 100 years.
SOP Provided (% AEP) in 100 years	>50%	>50%	50%	0.1%	0.1%
<b>Value of Economics</b>					
PV Capital Costs	£ -	£ -	£ 10,852,370	£ 12,976,796	£ 16,958,921
PV Maintenance Costs	£ -	£ 191,875	£ 669,447	£ 774,634	£ 972,415
PV Other Costs	£ -	£ -	£ 536,466	£ 665,176	£ 594,621
Total Cost (including Optimism Bias) (PV)	£ -	£ 307,000	£ 19,293,253	£ 23,066,569	£ 29,641,531
Value of Benefits	£ -	£ 13,044,000	£ 38,247,951	£ 41,151,020	£ 41,151,020
Benefit Cost Ratio (BCR)	0.0	42.5	2.0	1.8	1.4
PF Score	0%	236%	11%	10%	8%
Further funding required to achieve 100% PF Score	£ -	£ -	£ 17,159,532	£ 20,771,567	£ 27,346,529
<b>Flood/ erosion impacts</b>					
Number of Residential Properties at risk under 0.1% AEP	6	6	5	0	0

Number of Commercial properties at risk under 0.1% AEP	71	71	62	0	0
PV Value of Properties (Total including AAD, write-offs, vehicle damages and Emergency Services)	£ 40,756,257	£ 27,763,271	£ 2,824,830	£ -	£ -
Critical Infrastructure	Kingsnorth Power Station, Damhead Creek Power Station, Kingsnorth Industrial Estate, Railway alongside A228.	Kingsnorth Power Station, Damhead Creek Power Station, Kingsnorth Industrial Estate, Railway alongside A228.	Kingsnorth Power Station, Damhead Creek Power Station, Kingsnorth Industrial Estate, Railway alongside A228.	No assets at risk	No assets at risk
PV Value of Impacts on road and rail	£212,115 Impacts to railway.	£184,118 Impacts to railway.	£63,194 Impacts to railway.	£3,256 Impacts to railway.	£3,256 Impacts to railway.
PV Value of Tourism and Recreation Impacts	-	-	-	-	-
PV Value of Agriculture Impacts	£198,530 Worst case scenario 43ha of Grade 1 agriculture land flooded and 11ha of Grade 4 flooded	£175,296 Worst case scenario 43ha of Grade 1 agriculture land flooded and 11ha of Grade 4 flooded	£30,928 Worst case scenario 42ha of Grade 1 agriculture land flooded and 11ha of Grade 4 flooded	£12,627 Worst case scenario 0.3ha of Grade 1 agriculture land flooded and 5ha of Grade 4 flooded	£12,627 Worst case scenario 0.3ha of Grade 1 agriculture land flooded and 5ha of Grade 4 flooded
<b>Stakeholders Feedback</b>					
Statutory Stakeholders/ SEG	No specific comments	No specific comments	No specific comments	No specific comments	No specific comments
Landowners	No specific comments	No specific comments	No specific comments	No specific comments	No specific comments
<b>Technical Feasibility</b>					
Site Specific	n/a	n/a	n/a	n/a	n/a
Strategy Wide	n/a	n/a	n/a	n/a	n/a
<b>WFD (Water Framework Directive)</b>					
Compliance assessment outcome	2 Some return to natural processes but uncontrolled	2 Some return to natural processes but uncontrolled	1 Heavily Modified Water Body (HMWB) maintained	1 Heavily Modified Water Body (HMWB) maintained	1 Heavily Modified Water Body (HMWB) maintained

HRA (Habitats Regulation Assessment)					
Impact on SPA/Ramsar qualifying features	<p>1</p> <p>Potential significant effects on the Medway Estuary and Marshes SPA and constituent qualifying features due to coastal squeeze. Although the defences are at risk of failure in year 10 which may allow saltmarsh and mudflat to form in place of the arable and grazing marsh behind.</p> <p>The saltmarsh and mudflat habitats of Stoke Saltings and Slede are predicted to shrink markedly, with potential impacts on breeding waders like redshank and oystercatcher, and a number of duck species. Potential loss of reed bed habitat around Damhead Creek could impact on Marsh Harrier breeding, as a breeding pair has been known to breed here in the recent past.</p>	<p>1</p> <p>Potential significant effects on the Medway Estuary and Marshes SPA and constituent qualifying features due to coastal squeeze. Although the defences are at risk of failure in year 15 which may allow saltmarsh and mudflat to form in place of the arable and grazing marsh behind.</p> <p>The saltmarsh and mudflat habitats of Stoke Saltings and Slede are predicted to shrink markedly, with potential impacts on breeding waders like redshank and oystercatcher, and a number of duck species. Potential loss of reed bed habitat around Damhead Creek could impact on Marsh Harrier breeding, as a breeding pair has been known to breed here in the recent past.</p>	<p>1</p> <p>Potential significant effects on the Medway Estuary and Marshes SPA and constituent qualifying features due to coastal squeeze.</p> <p>The saltmarsh and mudflat habitats of Stoke Saltings and Slede are predicted to shrink markedly, with potential impacts on breeding waders like redshank and oystercatcher, and a number of duck species. Potential loss of reed bed habitat around Damhead Creek could impact on Marsh Harrier breeding, as a breeding pair has been known to breed here in the recent past.</p> <p>The potentially overtopping of the sea defences may allow saltmarsh and mudflat to form in place of the arable and grazing marsh behind.</p>	<p>1</p> <p>Potential significant effects on the Medway Estuary and Marshes SPA and constituent qualifying features due to coastal squeeze.</p> <p>The saltmarsh and mudflat habitats of Stoke Saltings and Slede are predicted to shrink markedly, with potential impacts on breeding waders like redshank and oystercatcher, and a number of duck species. Potential loss of reed bed habitat around Damhead Creek could impact on Marsh Harrier breeding, as a breeding pair has been known to breed here in the recent past.</p> <p>No new habitat would be created behind the existing defences.</p>	<p>1</p> <p>Potential significant effects on the Medway Estuary and Marshes SPA and constituent qualifying features due to coastal squeeze.</p> <p>The saltmarsh and mudflat habitats of Stoke Saltings and Slede are predicted to shrink markedly, with potential impacts on breeding waders like redshank and oystercatcher, and a number of duck species. Potential loss of reed bed habitat around Damhead Creek could impact on Marsh Harrier breeding, as a breeding pair has been known to breed here in the recent past.</p> <p>No new habitat would be created behind the existing defences.</p>
Impacts on freshwater habitats	<p>3</p> <p>n/a - no designated freshwater habitats in the BA</p>	<p>3</p> <p>n/a - no designated freshwater habitats in the BA</p>	<p>3</p> <p>n/a - no designated freshwater habitats in the BA</p>	<p>3</p> <p>n/a - no designated freshwater habitats in the BA</p>	<p>3</p> <p>n/a - no designated freshwater habitats in the BA</p>
Impacts on intertidal habitats	<p>2</p> <p>Defences at risk of failure from year 10. Once they have failed there may be some development of tidal habitats which will begin to mitigate for coastal squeeze losses in the estuary. However this habitat development is uncontrolled and the quality of habitat that develops is unknown.</p>	<p>2</p> <p>Defences at risk of failure from year 15. Once they have failed there may be some development of tidal habitats which will begin to mitigate for coastal squeeze losses in the estuary. However this habitat development is uncontrolled and the quality of habitat that develops is unknown.</p>	<p>1</p> <p>The maintenance of the defences will lead to coastal squeeze over time. However with the increased risk of overtopping intertidal habitat may start to develop behind the defences but this is uncontrolled.</p>	<p>1</p> <p>Because the defences are improved there is the potential for coastal squeeze and the loss of designated intertidal habitat.</p>	<p>1</p> <p>Because the defences are improved there is the potential for coastal squeeze and the loss of designated intertidal habitat.</p>
Habitat Connectivity	<p>3</p> <p>Defences at risk of failure from year 10, so limited coastal squeeze. Additionally the failure of the defences may allow the natural roll-back of the intertidal habitat which will help mitigate against the loss of intertidal habitat in the wider estuary.</p>	<p>3</p> <p>Defences at risk of failure from year 15, so limited coastal squeeze. Additionally the failure of the defences may allow the natural roll-back of the intertidal habitat which will help mitigate against the loss of intertidal habitat in the wider estuary.</p>	<p>2</p> <p>Potential adverse effects on connectivity across northern part of Medway estuary as coastal squeeze takes effect. Loss of saltmarsh and mudflat habitat here, and across the estuary, would act to reduce available habitats.</p>	<p>2</p> <p>Potential adverse effects on connectivity across northern part of Medway estuary as coastal squeeze takes effect. Loss of saltmarsh and mudflat habitat here, and across the estuary, would act to reduce available habitats.</p>	<p>2</p> <p>Potential adverse effects on connectivity across northern part of Medway estuary as coastal squeeze takes effect. Loss of saltmarsh and mudflat habitat here, and across the estuary, would act to reduce available habitats.</p>
SEA (Strategic Environmental Assessment)					
Historic Environment	<p>3</p> <p>No observable historic assets at risk.</p>	<p>3</p> <p>No observable historic assets at risk.</p>	<p>3</p> <p>No observable historic assets at risk.</p>	<p>3</p> <p>No observable historic assets at risk.</p>	<p>3</p> <p>No observable historic assets at risk.</p>

Effects on population	1 Kingsnorth power station at risk from flooding in year 10 therefore effects arising from the loss of essential infrastructure.	1 Kingsnorth power station at risk from flooding in year 15 therefore effects arising from the loss of essential infrastructure.	2 Gradual risk to the local community and agricultures as the risk of overtopping increases in line with sea level rise.	4 This option offers a reduced risk from flooding, limited impacts on community.	5 This option offers a reduced risk from flooding immediately, limited impacts on community.
Impact on plans/programmes	1 Large development site within the benefit area which is at risk of flooding from year 10.	1 Large development site within the benefit area which is at risk of flooding from year 15.	2 Large development site within the benefit area that may be at risk from overtopping over time.	4 Large development site within the benefit area will be at reduced risk from flooding.	5 Large development site within the benefit area will be at reduced risk from flooding immediately.
Freshwater Biodiversity	3 No potential for habitat creation	3 No potential for habitat creation	3 No potential for habitat creation	3 No potential for habitat creation	3 No potential for habitat creation
Saline Biodiversity	3 Defences at risk of failure from year 10 so there may start to be some intertidal habitat creation.	3 Defences at risk of failure from year 15 so there may start to be some intertidal habitat creation.	2 Impacts arising from coastal squeeze, but there may be some overtopping of the defences due to sea level rise.	1 Impacts arising from coastal squeeze	1 Impacts arising from coastal squeeze
Soil	1 Risk of degradation of the agricultural soils due to salt intrusion once the defences fail.	1 Risk of degradation of the agricultural soils due to salt intrusion once the defences fail.	2 Gradual degradation of the agricultural soils due to increasing risk of overtopping in line with climate change.	4 Soils at reduced risk of degradation as the defences are improved.	5 Soils at reduced risk of degradation as the defences are improved.
Groundwater	2 No impacts predicted on aquifers, but there is a risk of mobilisation of contaminants from the landfill site once the defences fail.	2 No impacts predicted on aquifers, but there is a risk of mobilisation of contaminants from the landfill site once the defences fail.	2 No impacts predicted on aquifers, but there is a risk of mobilisation of contaminants from the landfill sites over time as the risk of overtopping increases.	3 No impacts predicted on aquifers, or risk of mobilisation of contaminants from the landfill sites as the defences are improved.	3 No impacts predicted on aquifers, or risk of mobilisation of contaminants from the landfill sites as the defences are improved.
Landscape (visual impact)	4 Landscape change once the defences fail. Positive/negative effects depending on view and visual receptors, giving back to natural processes - assumed a benefit.	4 Landscape change once the defences fail. Positive/negative effects depending on view and visual receptors, giving back to natural processes - assumed a benefit.	3 No impact as crest level maintained. Increased risk of overtopping with sea level rise.	2 Degree of visual impact dependent on defence heights.	2 Degree visual impact dependent on defence heights.
Carbon Storage	2 Loss of intertidal habitat carbon storage from costal squeeze, however the defences will fail in year 10 so this may not be as significant as HTL options.	2 Loss of intertidal habitat carbon storage from costal squeeze, however the defences will fail in year 15 so this may not be as significant as HTL options.	2 Negligible - small loss of carbon storage through costal squeeze over time. Some carbon cost in construction.	2 Some carbon cost through construction and loss of habitat storage through costal squeeze.	2 Some carbon cost through construction and loss of habitat storage through costal squeeze.
<b>Ecosystem Services</b>					
Qualitative Score from Ecosystem Services Assessment	-27	-27	-24	-4	-4

Comments	Degradation in food provision, natural hazard regulation and erosion regulation outweigh enhancement in aesthetic value and there is limited opportunity for improving other ES.	Degradation in food provision, natural hazard regulation and erosion regulation outweigh enhancement in aesthetic value and there is limited opportunity for improving other ES.	Degradation in natural hazard regulation, erosion regulation and habitat provision for conservation and limited opportunity for significant improvements in other ES.	Mixture of enhancements (e.g. improved natural hazard and erosion regulation) and risks (e.g. degraded habitat provision for conservation).	Mixture of enhancements (e.g. improved natural hazard and erosion regulation) and risks (e.g. degraded habitat provision for conservation).
To what extent does the option meet the objectives?					
1- Reduce Flood Risk	N	N	Y	Y	Y
2 - Natura 2000 sites	N	N	N	N	N
3- Reduce maintenance	Y	Y	Y	Y	Y
4 - WFD	N	N	N	N	N
5 - Local Plans	N	N	Y	Y	Y



Environmental Scores					
100 = best option, 0 = worst option					
Option	a) Do nothing	b) Do minimum	c) Maintain (capital) embankment/seawall/rock revetment (Do minimum)	d) Raise embankment/seawall (sustain) and new rock revetment	e) Raise embankment/seawall/revetment/sheet piling (upgrade) and new rock revetment
<b>WFD (Water Framework Directive)</b>					
Compliance assessment outcome	25	25	0	0	0
<b>HRA (Habitats Regulation Assessment)</b>					
Impact on SPA/Ramsar qualifying features	0	0	0	0	0
Impacts on freshwater habitats	50	50	50	50	50
Impacts on intertidal habitats	25	25	0	0	0
Habitat Connectivity	50	50	25	25	25
<b>SEA (Strategic Environmental Assessment)</b>					
Historic Environment	50	50	50	50	50
Effects on population	0	0	25	75	100
Impact on plans/programmes	0	0	25	75	100
Freshwater Biodiversity	50	50	50	50	50
Saline Biodiversity	50	50	25	0	0
Soil	0	0	25	75	100
Groundwater	25	25	25	50	50
Landscape (visual impact)	75	75	50	25	25
Carbon Storage	25	25	25	25	25
<b>Total</b>	<b>425</b>	<b>425</b>	<b>375</b>	<b>500</b>	<b>575</b>

Summary of Results					
Option	a) Do nothing	b) Do minimum	c) Maintain (capital) embankment/seawall/rock revetment (Do minimum)	d) Raise embankment/seawall (sustain) and new rock revetment	e) Raise embankment/seawall/revetment/sheet piling (upgrade) and new rock revetment
<b>Costs</b>	£ -	£ 307,000	£ 19,293,253	£ 23,066,569	£ 29,641,531
<b>Benefits</b>	£ -	£ 13,044,000	£ 38,247,951	£ 41,151,020	£ 41,151,020
<b>NPV</b>	£ -	£ 12,738,000	£ 18,954,698	£ 18,084,451	£ 11,509,489
<b>BCR</b>	0.0	42.5	2.0	1.8	1.4
<b>Environmental Scoring</b>	425	425	375	500	575

### Preferred Option Decision Making

DLO	Leading Option at DLO Stage	Justification for Leading Option
<b>DLO1 - Economic Assessment</b>	Maintain (capital) embankment/seawall/ rock revetment.	This option has the highest BCR, however there is still a significant amount of contributions that will be required to allow the scheme to progress.
<b>DLO2 - Economic Sensitivities</b>	Maintain defences until year 5. Then raise (sustain) the embankment, seawall and rock revetment in year 5.	Delayed sustain option has highest BCR and better environmental scoring compared to the Maintain option.
<b>DLO3 - Review of Compensatory Intertidal Habitat Requirements</b>		
<b>DLO4 - Review of Compensatory Freshwater Habitat Requirements</b>		
<b>DLO5 - Modelling of Leading Options</b>		
<b>DLO6 - Consultation Phase</b>		

### Preferred Option Name

**Maintain defences until year 8. Then raise (sustain) the embankment, seawall and rock revetment in year 8.**

### Preferred Option

**Maintenance of the current defences (embankment, seawall and rock revetment) for the first 8 years. Following this the defences will be raised to 5.3m AOD and then raised again in year 50 to 6.6m AOD to ensure a 0.1% SoP in 100 years taking account of sea level rise.**

### Justification

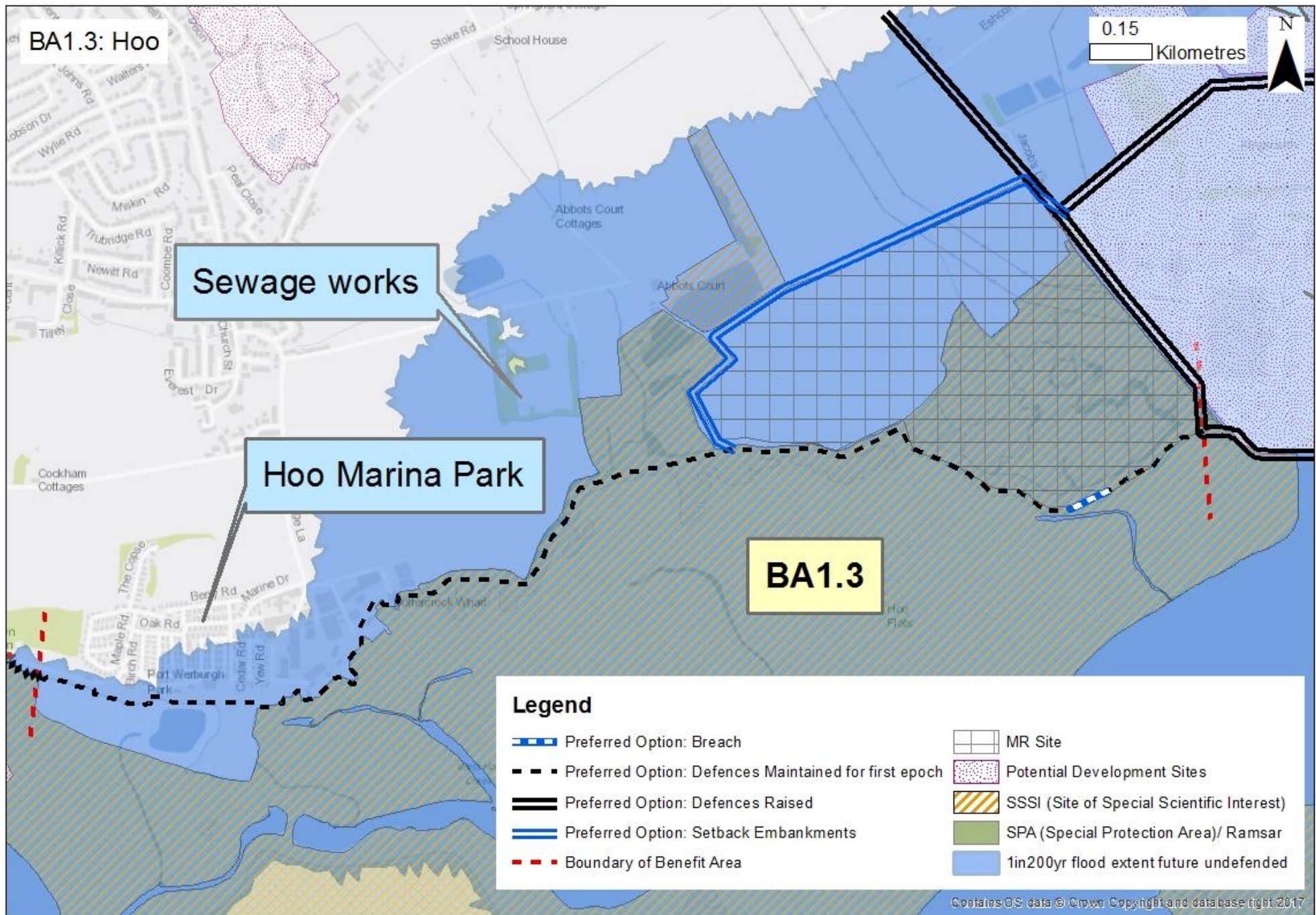
Maintain (capital) option has highest NPV and highest BCR following the Do Minimum and an incremental BCR greater than 1. However, the Maintain option is not desirable due to the potential impacts on nationally important infrastructure due to sea level rise and therefore it does not meet the Strategy objectives. Under local choices, the Sustain Option will be preferred and would require an additional £1.5m funding over 100 years.

### Preferred Option Costs

Cost	Benefits	BCR	PF Score
£ 22,054,260	£ 41,147,682	1.86	10%

<b>Benefit Area Name</b>	1 - Hoo Peninsula
<b>Benefit Unit Name</b>	1.3 - Kingsnorth Power Station
<b>Frontage Length</b>	3.3 km
<b>Defence Structure Type</b>	Earth embankments, concrete walls, bank with rock revetment
<b>Min Standard of Protection (AEP%)</b>	50
<b>Residual Life (years)</b>	10

	<b>0-20 years</b>	<b>20-50 years</b>	<b>50-100 years</b>
<b>SMP Policy</b>	MR with localised HTL	MR with localised HTL	MR with localised HTL
<b>Aiming to comply with policy</b>	No - suggest alternative considerations		
<b>Comment</b>	MR would cause loss of designated freshwater habitats. The label of 'MR with localised HTL' is misleading. The SMP actually suggests HTL with localised MR for all epochs as HTL lengths are longer than the defences proposed for MR. Perhaps there would also be less stakeholder concern if it presented this way around.		



Do Nothing Assets at Risk (Flooding)				
	50% AEP (undefended)		0.5% AEP (undefended)	
	Current Year	100 year	Current Year	100 Years
<b>Residential</b>	0	2	7	8
<b>Commercial &amp; Industrial</b>	22	42	62	127
<b>Agricultural (Ha)</b>	89	133	141	160
<b>Key Infrastructure</b>	Hoo Marina Park	Hoo Marina Park, Hoo sewage works, Abbots Court Road Historic Landfill (inert)	Hoo Marina Park, Hoo sewage works, Abbots Court Road Historic Landfill (inert)	Hoo Marina Park, Hoo sewage works, Abbots Court Road Historic Landfill (inert)
<b>Social and Environmental Considerations</b>	Natural England Coastal Path (Saxon Shore Way), Medway Estuary and Marshes SPA and SSSI (seaward and landward)	Natural England Coastal Path (Saxon Shore Way). Medway Estuary and Marshes SPA and SSSI (seaward and landward)	Natural England Coastal Path (Saxon Shore Way), Medway Estuary and Marshes SPA and SSSI (seaward and landward)	Natural England Coastal Path (Saxon Shore Way), Medway Estuary and Marshes SPA and SSSI (seaward and landward)

Long List to Short List

Potential Measures

	Measures	Selected	Reasoning
<b>Structural</b>	Construct new embankment	Y	Take forward- embankments currently present.
	Maintain embankment	Y	Take forward- embankments currently present.
	Raise embankment (sustain)	Y	Take forward- embankments currently present.
	Raise embankment (upgrade)	Y	Take forward- embankments currently present.
	Construct new wall	N	Exclude - limited benefits in constructing a new wall where embankments are currently present.
	Maintain wall	N	Exclude - no walls currently present.
	Raise wall (sustain)	N	Exclude - no walls currently present.
	Raise wall (upgrade)	N	Exclude - no walls currently present.
	Maintain rock revetment	Y	Take forward - rock revetment currently present.
	Construct rock revetment	Y	Take forward - rock revetment currently present.
	Install demountable defences	N	Exclude - relatively costly option which is not the most efficient use of FDGiA funding compared to sustaining existing defences. It would require significant man resources to implement during a flood event. This would need to be discussed with Asset Owners at OBC stage.
	Install temporary defences	N	Exclude - no significant assets at risk to warrant installation of temporary defences (significant resources to implement).
	Beach recharge (sand or shingle)	N	Exclude - the foreshore is mudflat/ saltmarsh and so technically unviable and potentially environmentally damaging in SPA habitat.
	Construct rock groynes	N	Exclude - the foreshore is mudflat/ saltmarsh and so technically unviable geotechnically and would not provide flood protection function.
	Maintain rock groynes	N	Exclude - the foreshore is mudflat/ saltmarsh and so technically unviable geotechnically and would not provide flood protection function.
	Construct timber structures	N	Exclude - the foreshore is mudflat/ saltmarsh. Introduction of timber structures is not appropriate for the location. Could also cause damaging impacts on the SPA habitat.
Maintain timber structures	N	N/A - no timber structures present.	
Construct a tidal barrier	N	Exclude- likely to have significant environmental impacts, including on water quality (WFD), change in sedimentation in Estuary with wider impacts (environment, dredging, maintenance, navigation etc.). Also not suitable at this location due to morphology and limited number of properties that would benefit.	
<b>Non-Structural</b>	Implement monitoring	N	Not suitable as a single measure to implement the SMP policy. May be combined with structural measures.
	Implement flood warning system	N	Not suitable as a single measure to implement the SMP policy. May be combined with structural measures.
	Land use planning	N	Not suitable as a single measure to implement the SMP policy. May be combined with structural measures.
	Adaptation measures	N	Not suitable as a single measure to implement the SMP policy. May be combined with structural measures.
	Development control	N	Not suitable as a single measure to implement the SMP policy. May be combined with structural measures.
	Emergency response plans	N	Not suitable as a single measure to implement the SMP policy. May be combined with structural measures.
	Monitoring for health and safety only	N	Not suitable as a single measure to implement the SMP policy.

Long List of Options					
	a) Do nothing	b) Ongoing maintenance of embankment/seawall/revetment/sheet piling	c) Maintain SOP (capital) embankment/seawall/revetment/sheet piling	d) Raise embankment/seawall/revetment/sheet piling (sustain SOP) and new rock revetment	e) Raise embankment/seawall/revetment/sheet piling (upgrade SOP) and new rock revetment
<b>To what extent does the option meet the objectives?</b>					
1- Reduce Flood Risk	N	N	Y	Y	Y
2 - Natura 2000 sites	N	N	N	N	N
3- Reduce maintenance	N	N	N	N	N
4 - WFD	N	Y	Y	Y	Y
5 - Local Plans	N	Y	Y	Y	Y
<b>Comment and decision on whether taken forward to shortlist</b>	Y- as baseline. Standard of Protection (SOP) and residual life of defences very low along some sections (minimum SOP =2; minimum residual life = 0).	Y - as baseline. Following year 15 a Do nothing scenario would occur due to the failure of the defences.	Y- Existing defences have low minimum SOP but capital works could be undertaken to improve existing residual life of asset which could then be maintained over 100 years. Significant number of key assets at risk.	Y- Could consider raising defences with sea level rise to ensure protection to power station and other assets.	Y – SOP very low so could be raised now especially in particularly low sections. Need to provide flood protection to key assets.

Long List of Options (continued)			
	f) Construct new set back embankment at identified managed realignment sites and maintain existing embankment and revetment.	g) Construct new set back embankment at identified managed realignment sites and raise existing embankment and revetment (sustain SOP)	h) Construct new set back embankment at identified managed realignment sites and raise existing embankment and revetment (upgrade SOP)
<b>To what extent does the option meet the objectives?</b>			
1- Reduce Flood Risk	Y	Y	Y
2 - Natura 2000 sites	Y	Y	Y
3- Reduce maintenance	TBC	TBC	TBC
4 - WFD	TBC	TBC	TBC
5 - Local Plans	TBC	TBC	TBC
<b>Comment and decision on whether taken forward to shortlist</b>	Y - realignment site is designated (SPA) but still needs consideration at short list stage for compensation requirements.	Y - realignment site is designated (SPA) but still needs consideration at short list stage for compensation requirements.	Y - realignment site is designated (SPA) but still needs consideration at short list stage for compensation requirements.

Short List of Options
a) Do nothing
b) Do minimum
c) Maintain (capital) embankment and revetment
d) Raise embankment and revetment (sustain)
e) Raise embankment and revetment (upgrade)
f) Construct new set back embankment at identified managed realignment sites and maintain existing embankment and revetment.
g) Construct new set back embankment at identified managed realignment sites and raise embankment revetment (sustain)
h) Construct new set back embankment at identified managed realignment sites and raise embankment revetment (upgrade)

Assessment of Short List				
Option	a) Do nothing	b) Do minimum	c) Maintain (capital) embankment/seawall/rock revetment (Do minimum)	d) Raise embankment/seawall (sustain) and new rock revetment
Description	Used as an economic baseline to compare the other options against.	Used as an economic baseline to compare the other options against.	Capital works are undertaken to maintain the current defences.	Capital works are undertaken to maintain the current defences.
Technical Issue	Defences have 20 years residual life. Potential for coastal squeeze, therefore compensatory intertidal habitat will need to be created elsewhere. Designated habitat and therefore compensatory habitat is required.	Defences have 20 years residual life. Potential for coastal squeeze, therefore compensatory intertidal habitat will need to be created elsewhere. Designated habitat and therefore compensatory habitat is required.	Current defences have 20 years residual life. Potential for coastal squeeze, therefore compensatory intertidal habitat will need to be created elsewhere. Designated habitat and therefore compensatory habitat is required in future due to increased overtopping from sea level rise.	Current defences have 20 years residual life. Potential for coastal squeeze, therefore compensatory intertidal habitat will need to be created elsewhere. Designated habitat continue to be protected from inundation. If new structures have increased footprint may require some compensatory habitat.
Assumptions/ Uncertainties	Assumes that all management and maintenance is ceased.	Ongoing maintenance. Maintenance not sufficient to reduce risk of failure after year 15.	The crest height of the defences remains the same as currently in place i.e. is not increased. Over time this will lead to a reduction in the SOP as the sea level rises.	The SOP provided by the defences is increased to the required standard over time. This option has a phased approach so the defences are raised in line with sea level rise at two phases i.e. capital works are undertaken in epoch 1 and again in year 50. This option will maintain the required SOP provided by the defences by keeping pace with sea level rise.
SOP Provided (% AEP)	>50%		50%	1.0%
Value of Economics				
PV Capital Costs	£ -	£ -	£ 1,893,317	£ 3,120,380
PV Maintenance Costs	£ -	£ 85,525	£ 438,881	£ 487,161
PV Other Costs	£ -	£ -	£ 187,905	£ 309,671
Total Cost (including Optimism Bias) (PV)	£ -	£ 136,840	£ 4,032,165	£ 6,267,539
Value of Benefits	£ -	£ 194,566	£ 2,047,645	£ 4,298,230
Benefit Cost Ratio (BCR)	0.0	2.4	0.5	0.7
PF Score	0%	13%	3%	4%

Assessment of Short List				
Option	e) Raise embankment/seawall/revetment/sheet piling (upgrade) and new rock revetment	f) Construct new set back embankment at identified managed realignment sites and maintain existing embankment and revetment.	g) Construct new set back embankment at identified managed realignment sites and raise embankment revetment (sustain)	h) Construct new set back embankment at identified managed realignment sites and raise embankment revetment (upgrade)
Description	Capital works are undertaken to maintain the current defences.	Development of MR site. Capital works undertaken on remaining defences to maintain the current defences	Development of MR site. Capital works undertaken to improve the remaining defences	Development of MR site. Capital works undertaken to improve the remaining defences
Technical Issue	Current defences have 20 years residual life. Potential for coastal squeeze, therefore compensatory intertidal habitat will need to be created elsewhere. Designated habitat continue to be protected from inundation. If new structures have increased footprint may require some compensatory habitat.	Current defences have 20 years residual life. Potential increase of the existing defence line by constructing new setback defences. Some engineering of the high ground could be required to achieve better flooding. The MR is freshwater designated habitat and therefore compensatory habitat is required. Based on current sea levels the MR site would create 30ha of saltmarsh and 12ha of mudflat. With 100 years sea level rise there could be 26ha of saltmarsh and 28ha of mudflat.	Current defences have 20 years residual life. Potential increase of the existing defence line by constructing new setback defences. Some engineering of the high ground could be required to achieve better flooding. The MR is freshwater designated habitat and therefore compensatory habitat is required. Based on current sea levels the MR site would create 30ha of saltmarsh and 12ha of mudflat. With 100 years sea level rise there could be 26ha of saltmarsh and 28ha of mudflat.	Current defences have 20 years residual life. Potential increase of the existing defence line by constructing new setback defences. Some engineering of the high ground could be required to achieve better flooding. The MR is freshwater designated habitat and therefore compensatory habitat is required. Based on current sea levels the MR site would create 30ha of saltmarsh and 12ha of mudflat. With 100 years sea level rise there could be 26ha of saltmarsh and 28ha of mudflat.
Assumptions/ Uncertainties	The crest height and SOP provided by the defences is increased. The crest heights will be raised to the level required to provide the SOP in 100 years time, i.e. the SOP will be greater than required during the first epoch, but this will decline over time with sea level rise but will still provide at least the SOP that the defence was upgraded to.	MR site to provide at least 1% AEP SOP to protect property etc. directly behind. The crest height of the remaining defences remains the same as currently in place i.e. is not increased. Over time this will lead to a reduction in SOP for these sections of defence as the sea level rises. Cost for compensatory habitat not included at initial shortlist stage.	MR site to provide at least 1% AEP SOP. The SOP provided by the remaining defences is increased to the required standard over time. This option has a phased approach so the defences are raised in line with sea level rise at two phases i.e. capital works are undertaken in epoch 1 and again in year 50. This will maintain the required SOP provided by the defences by keeping pace with sea level rise. Cost for compensatory habitat not included at initial shortlist stage.	MR site to provide at least 1% AEP SOP. The SOP provided by the remaining defences is increased. The crest height and SOP provided by the defences is increased. The crest heights will be raised to the level required to provide the SOP in 100 years time, i.e. the SOP will be greater than required during the first epoch, but this will decline over time with sea level rise but will still provide at least the SOP that the defence was upgraded to. Cost for compensatory habitat not included at initial shortlist stage.
SOP Provided (% AEP)	1.0%	50% in some areas, 1.0% for MR site	1.0%	1.0%
<b>Value of Economics</b>				
PV Capital Costs	£ 5,527,948	£ 2,514,864	£ 4,355,950	£ 5,666,540
PV Maintenance Costs	£ 872,803	£ 370,751	£ 412,850	£ 341,306
PV Other Costs	£ 457,854	£ 221,797	£ 409,171	£ 458,009
Total Cost (including Optimism Bias) (PV)	£ 10,973,768	£ 4,971,860	£ 8,284,754	£ 10,345,370
Value of Benefits	£ 4,497,454	£ 2,222,809	£ 4,348,704	£ 4,542,545
Benefit Cost Ratio (BCR)	0.4	0.4	0.5	0.4
PF Score	2%	56%	35%	28%

Further funding required to achieve 100% PF Score	£ -	£ 119,000	£ 3,918,407	£ 6,021,681
<b>Flood/ erosion impacts</b>				
Number of Residential Properties at risk under 0.1% AEP	8	8	8	0
Number of Commercial properties at risk under 0.1% AEP	127	127	121	0
PV Value of Properties (Total including AAD, write-offs, vehicle damages and Emergency Services)	£ 3,745,975	£ 3,489,438	£ 2,319,736	£ 193,840.59
Critical Infrastructure	Hoo Marina Park, Hoo sewage works	Hoo Marina Park, Hoo sewage works	Hoo Marina Park, Hoo sewage works	No assets at risk
PV Value of Impacts on road and rail	-	-	-	-
PV Value of Tourism and Recreation Impacts	-	-	-	-
PV Value of Agriculture Impacts	£796,570 Worst case scenario 104ha of Grade 1 agriculture land flooded, 6ha of Grade 3 flooded, and 58ha of Grade 4 flooded	£721,700 Worst case scenario 104ha of Grade 1 agriculture land flooded, 6ha of Grade 3 flooded, and 58ha of Grade 4 flooded	£175,164 Worst case scenario 102ha of Grade 1 agriculture land flooded, 6ha of Grade 3 flooded, and 58ha of Grade 4 flooded	£50,474 Worst case scenario 47ha of Grade 1 agriculture land flooded, 4ha of Grade 3 flooded, and 52ha of Grade 4 flooded
<b>Stakeholders Feedback</b>				
Statutory Stakeholders/ SEG	No specific comments	No specific comments	No specific comments	No specific comments
Landowners	Would like some form of defence to be maintained	Would like some form of defence to be maintained	Preferred Option	Preferred Option
<b>Technical Feasibility</b>				
Site Specific	n/a	n/a	n/a	n/a



Further funding required to achieve 100% PF Score	£ 10,716,842	£ 2,196,860	£ 5,415,258	£ 7,465,105
<b>Flood/ erosion impacts</b>				
Number of Residential Properties at risk under 0.1% AEP	0	8	0	0
Number of Commercial properties at risk under 0.1% AEP	0	121	0	0
PV Value of Properties (Total including AAD, write-offs, vehicle damages and Emergency Services)	£ -	£ 2,319,736	£ 193,840.59	£ -
Critical Infrastructure	No assets at risk	Hoo Marina Park, Hoo sewage works	No assets at risk	No assets at risk
PV Value of Impacts on road and rail	-	-	-	-
PV Value of Tourism and Recreation Impacts	-	-	-	-
PV Value of Agriculture Impacts	£45,091 Worst case scenario 1ha of Grade 1 agriculture land flooded, 1ha of Grade 3 flooded, and 12ha of Grade 4 flooded	£0 Land compensation included in option costs.	£0 Land compensation included in option costs.	£0 Land compensation included in option costs.
<b>Stakeholders Feedback</b>				
Statutory Stakeholders/ SEG	No specific comments	No specific comments	No specific comments	Members of the SEG mentioned that they were happy with this option
Landowners	Preferred Option	Potentially open to further discussions but would prefer HTL	Potentially open to further discussions but would prefer HTL	Potentially open to further discussions but would prefer HTL
<b>Technical Feasibility</b>				
Site Specific	n/a	50-60% of the site flooded on the modelled Spring tide. Some engineering of the high ground could be required to achieve better flooding. Increase of the existing defence line by 656m by constructing new setback defences. MR site would create 30ha of saltmarsh and 12ha of mudflat. With 100 years sea level rise there could be 26ha of saltmarsh and 28ha of mudflat.	50-60% of the site flooded on the modelled Spring tide. Some engineering of the high ground could be required to achieve better flooding. Increase of the existing defence line by 656m by constructing new setback defences. MR site would create 30ha of saltmarsh and 12ha of mudflat. With 100 years sea level rise there could be 26ha of saltmarsh and 28ha of mudflat.	50-60% of the site flooded on the modelled Spring tide. Some engineering of the high ground could be required to achieve better flooding. Increase of the existing defence line by 656m by constructing new setback defences. MR site would create 30ha of saltmarsh and 12ha of mudflat. With 100 years sea level rise there could be 26ha of saltmarsh and 28ha of mudflat.

Strategy Wide	n/a	n/a	n/a	n/a
<b>WFD (Water Framework Directive)</b>				
Compliance assessment outcome	2 Some return to natural processes but uncontrolled	2 Some return to natural processes but uncontrolled	1 Heavily Modified Water Body (HMWB) maintained	1 Heavily Modified Water Body (HMWB) maintained
<b>HRA (Habitats Regulation Assessment)</b>				
Impact on SPA/ Ramsar qualifying features	<p>1</p> <p>Potential significant effects on the Medway Estuary and Marshes SPA and constituent qualifying features due to coastal squeeze. Although the defences are at risk of imminent failure which may allow saltmarsh and mudflat to form in place of the arable and grazing marsh behind although this would result in the loss of designated freshwater grazing marsh.</p> <p>The saltmarsh and mudflat habitats of Hoo Flats are predicted to shrink, with potential impacts on breeding waders and wildfowl using those habitats for foraging, roosting and breeding.</p> <p>Once the defences fail there will be inundation of the freshwater designated habitats, which will impact on the species that use these areas.</p>	<p>1</p> <p>Potential significant effects on the Medway Estuary and Marshes SPA and constituent qualifying features due to coastal squeeze. Although the defences are at risk of imminent failure which may allow saltmarsh and mudflat to form in place of the arable and grazing marsh behind although this would result in the loss of designated freshwater grazing marsh.</p> <p>The saltmarsh and mudflat habitats of Hoo Flats are predicted to shrink, with potential impacts on breeding waders and wildfowl using those habitats for foraging, roosting and breeding.</p> <p>Once the defences fail there will be inundation of the freshwater designated habitats, which will impact on the species that use these areas.</p>	<p>1</p> <p>There would be potential significant effects on the intertidal Medway Estuary and Marshes SPA and constituent qualifying features due to coastal squeeze.</p> <p>The saltmarsh and mudflat habitats of Hoo Flats are predicted to shrink, with potential impacts on breeding waders and wildfowl using those habitats for foraging, roosting and breeding.</p> <p>The potential overtopping of the defences may allow saltmarsh and mudflat to form in place of the designated arable and grazing marsh behind, although this would result in the loss of designated freshwater grazing marsh.</p>	<p>1</p> <p>There would be potential significant effects on the intertidal Medway Estuary and Marshes SPA and constituent qualifying features due to coastal squeeze.</p> <p>The saltmarsh and mudflat habitats of Hoo Flats are predicted to shrink, with potential impacts on breeding waders and wildfowl using those habitats for foraging, roosting and breeding.</p>
Impacts on freshwater habitats	<p>1</p> <p>Yes. Compensatory habitat would be required in advance of failure of the defence (year 20) to compensate for the loss of freshwater grazing marsh.</p>	<p>1</p> <p>Yes. Compensatory habitat would be required in advance of failure of the defence (year 25) to compensate for the loss of freshwater grazing marsh.</p>	<p>1</p> <p>Increased risk of overtopping with sea level rise may result in loss of freshwater habitat and compensatory habitat being required.</p>	<p>3</p> <p>Defences are improved so the freshwater habitat will be protected.</p>

Strategy Wide	n/a	Site completely flooded during extreme events. Potential reduction of the flood risk in the Upper Medway during extreme events.	Site completely flooded during extreme events. Potential reduction of the flood risk in the Upper Medway during extreme events.	Site completely flooded during extreme events. Potential reduction of the flood risk in the Upper Medway during extreme events.
<b>WFD (Water Framework Directive)</b>				
Compliance assessment outcome	1 Heavily Modified Water Body (HMWB) maintained	4 Return to a more natural process	4 Return to a more natural process	4 Return to a more natural process
<b>HRA (Habitats Regulation Assessment)</b>				
Impact on SPA/ Ramsar qualifying features	1 There would be potential significant effects on the intertidal Medway Estuary and Marshes SPA and constituent qualifying features due to coastal squeeze.  The saltmarsh and mudflat habitats of Hoo Flats are predicted to shrink, with potential impacts on breeding waders and wildfowl using those habitats for foraging, roosting and breeding.	1 There would be potential significant effects on the intertidal Medway Estuary and Marshes SPA and constituent qualifying features due to coastal squeeze where the defence line is held.  The saltmarsh and mudflat habitats of Hoo Flats are predicted to shrink, with potential impacts on breeding waders and wildfowl using those habitats for foraging, roosting and breeding.  The Managed Realignment would allow the gradual creation of mudflat and saltmarsh, although it would take time to develop to the same quality of habitat as that likely to be lost in front of the defences. MR Site 2 (c.27.6 ha) would be entirely within SPA Designated habitats, mostly freshwater grazing marsh.	1 There would be potential significant effects on the intertidal Medway Estuary and Marshes SPA and constituent qualifying features due to coastal squeeze.  The saltmarsh and mudflat habitats of Hoo Flats are predicted to shrink, with potential impacts on breeding waders and wildfowl using those habitats for foraging, roosting and breeding.  The Managed Realignment would allow the gradual creation of mudflat and saltmarsh, although it would take time to develop to the same quality of habitat as that likely to be lost in front of the defences. MR Site 2 (c.27.6 ha) would be entirely within SPA Designated habitats, mostly freshwater grazing marsh.	1 There would be potential significant effects on the intertidal Medway Estuary and Marshes SPA and constituent qualifying features due to coastal squeeze.  The saltmarsh and mudflat habitats of Hoo Flats are predicted to shrink, with potential impacts on breeding waders and wildfowl using those habitats for foraging, roosting and breeding.  The Managed Realignment would allow the gradual creation of mudflat and saltmarsh, although it would take time to develop to the same quality of habitat as that likely to be lost in front of the defences. MR Site 2 (c.27.6 ha) would be entirely within SPA Designated habitats, mostly freshwater grazing marsh.
Impacts on freshwater habitats	3 Defences are improved so the freshwater habitat will be protected.	1 Yes, compensatory freshwater habitat will be required to compensate for the loss of freshwater grazing marsh and associated habitats.	1 Yes, compensatory freshwater habitat will be required to compensate for the loss of freshwater grazing marsh and associated habitats.	1 Yes, compensatory freshwater habitat will be required to compensate for the loss of freshwater grazing marsh and associated habitats.

Impacts on intertidal habitats	2 Yes, until defences are predicted to fail (from year 20). Development of tidal habitats once defences fail will begin to mitigate for coastal squeeze.	2 Yes, until defences are predicted to fail (from year 25). Development of tidal habitats once defences fail will begin to mitigate for coastal squeeze.	1 Yes, coastal squeeze until overtopping happens regularly enough that tidal habitats develop in place of the freshwater grazing marsh.	1 Yes because the defences are improved there is the potential for coastal squeeze and the loss of designated intertidal habitat.
Habitat Connectivity	1 Potential adverse effects on connectivity across northern part of Medway estuary as coastal squeeze takes effect until the defences fail. Once the defences fail there will be impacts on the connectivity of freshwater habitats.	1 Potential adverse effects on connectivity across northern part of Medway estuary as coastal squeeze takes effect until the defences fail. Once the defences fail there will be impacts on the connectivity of freshwater habitats.	1 Potential adverse effects on connectivity across northern part of Medway estuary as coastal squeeze takes effect. With sea level rise there will be increased risk of overtopping and impacts on the connectivity of freshwater habitats.	1 Potential adverse effects on connectivity across northern part of Medway estuary as coastal squeeze takes effect.
<b>SEA (Strategic Environmental Assessment)</b>				
Historic Environment	3 No observable historic assets at risk	3 No observable historic assets at risk	3 No observable historic assets at risk	3 No observable historic assets at risk
Effects on population	2 Small number of homes and amenity at risk from year 20 when the defences fail	2 Small number of homes and amenity at risk from year 25 when the defences fail	2 Small number of homes and amenity at risk overtime with increased risk of overtopping	3 Homes and amenity at a reduced risk from flooding due to improvement to the defences
Impact on plans/ programmes	1 Potential development sites at risk once the defences fail (year 20)	1 Potential development sites at risk once the defences fail (year 25)	2 Potential risk to development sites overtime as sea levels rise and the risk of overtopping increases	4 Development sites protected against flooding
Freshwater Biodiversity	1 Impacts on freshwater habitats when the defences fail in year 20. Potential impacts on warblers and some raptor species present in reed beds.	1 Impacts on freshwater habitats when the defences fail in year 25. Potential impacts on warblers and some raptor species present in reed beds.	2 Gradual impacts on freshwater habitats as the risk of overtopping increases with sea level rise. Potential impacts on warblers and some raptor species present in reed beds.	3 No Impact predicted on freshwater biodiversity as the defences are improved.

Impacts on intertidal habitats	1 Yes because the defences are improved there is the potential for coastal squeeze and the loss of designated intertidal habitat.	4 No, once MR takes place and habitats begin to form.  The managed nature of the proposed works would allow control over area, rate, and to a certain extent quality of newly formed habitat, so would be preferable (as a means of mitigating for coastal squeeze) to the Do Nothing or Maintain options.	4 No, once MR takes place and habitats begin to form.  The managed nature of the proposed works would allow control over area, rate, and to a certain extent quality of newly formed habitat, so would be preferable (as a means of mitigating for coastal squeeze) to the Do Nothing or Maintain options.	4 No, once MR takes place and habitats begin to form.  The managed nature of the proposed works would allow control over area, rate, and to a certain extent quality of newly formed habitat, so would be preferable (as a means of mitigating for coastal squeeze) to the Do Nothing or Maintain options.
Habitat Connectivity	1 Potential adverse effects on connectivity across northern part of Medway estuary as coastal squeeze takes effect.	4 Yes, major benefits to habitat connectivity, once MR triggers the reforming of saltmarsh and mudflat, and compensatory freshwater habitat has become established.	4 Yes, major benefits to habitat connectivity, once MR triggers the reforming of saltmarsh and mudflat, and compensatory freshwater habitat has become established.	4 Yes, major benefits to habitat connectivity, once MR triggers the reforming of saltmarsh and mudflat, and compensatory freshwater habitat has become established.
<b>SEA (Strategic Environmental Assessment)</b>				
Historic Environment	3 No observable historic assets at risk	3 No observable historic assets at risk	3 No observable historic assets at risk	3 No observable historic assets at risk
Effects on population	3 Homes and amenity at a reduced risk from flooding due to improvement to the defences	2 Coastal path will need to be realigned at MR site. However there may be properties at risk in future	4 Coastal path will need to be realigned at MR site. Homes and amenity at a reduced risk from flooding.	5 Coastal path will need to be realigned at MR site. Homes and amenity at a reduced risk from flooding.
Impact on plans/ programmes	5 Development sites protected against flooding immediately	2 Development sites not in MR areas, but potential risk to development sites as sea levels rise and there is overtopping in the areas where the defences are held.	4 Development sites protected against flooding	5 Development sites protected against flooding immediately
Freshwater Biodiversity	3 No Impact predicted on freshwater biodiversity as the defences are improved.	1 Loss of freshwater SPA habitat as it is converted to intertidal habitat as a result of managed realignment	1 Loss of freshwater SPA habitat as it is converted to intertidal habitat as a result of managed realignment	1 Loss of freshwater SPA habitat as it is converted to intertidal habitat as a result of managed realignment

Saline Biodiversity	2 Until the defences fail there will be loss of intertidal habitat arising from coastal squeeze, resulting in a loss of saltmarsh connectivity. Once the defences fail there is the potential for uncontrolled development of intertidal habitat which could alleviate the loss of intertidal habitat within the wider estuary, but the extent and quality of this is unknown.	2 Until the defences fail there will be loss of intertidal habitat arising from coastal squeeze, resulting in a loss of saltmarsh connectivity. Once the defences fail there is the potential for uncontrolled development of intertidal habitat which could alleviate the loss of intertidal habitat within the wider estuary, but the extent and quality of this is unknown.	1 Loss of intertidal habitat arising from coastal squeeze. Although with sea level rise there may be some overtopping of the defences, which could allow the development of intertidal habitats behind the defences, but this is uncontrolled.	1 Loss of intertidal habitat arising from coastal squeeze, saltmarsh connectivity will be lost
Soil	2 Once the defences fail in year 20 there will be a loss of agricultural soils, including grade 1	2 Once the defences fail in year 25 there will be a loss of agricultural soils, including grade 1	3 Gradual degradation of agricultural soils due to the increased risk of overtopping in line with sea level rise.	5 Agricultural land protected
Groundwater	3 No impacts predicted on aquifers, but risk of contaminant release from the landfill once the defences fail.	3 No impacts predicted on aquifers, but risk of contaminant release from the landfill once the defences fail.	3 No impacts predicted on the aquifers, but gradual increase to overtopping may result in the release of contaminants from the landfill overtime.	3 No impacts predicted
Landscape (visual impact)	4 Significant change once the defences fail but reverting to natural processes. Positive/negative effects depending on view and visual receptors	4 Significant change once the defences fail but reverting to natural processes. Positive/negative effects depending on view and visual receptors	3 Gradual change as the risk of overtopping increases with sea level rise, but will revert to natural processes. Positive/negative effects depending on view and visual receptors	2 Change incremental over years as height of wall raised gradual change to landscape
Carbon Storage	2 Some loss of carbon storage from loss of saltmarsh until the defences fail. After this there may be creation of new intertidal habitat but the extent and quality of this is unknown.	2 Some loss of carbon storage from loss of saltmarsh until the defences fail. After this there may be creation of new intertidal habitat but the extent and quality of this is unknown.	1 Some loss of carbon storage from gradual loss of saltmarsh. Carbon cost from construction	1 Some loss of carbon storage from gradual loss of saltmarsh. Carbon cost from construction
<b>Ecosystem Services</b>				
Qualitative Score from Ecosystem Services Assessment	-57	-57	-35	-17
Comments	Major degradation in large number of ES (e.g. food provision, freshwater provision, natural hazard regulation, erosion regulation, tourism) outweigh limited enhancement opportunities (e.g. aesthetic quality)	Major degradation in large number of ES (e.g. food provision, freshwater provision, natural hazard regulation, erosion regulation, tourism) outweigh limited enhancement opportunities (e.g. aesthetic quality)	Moderate gradual degradation in large number of ES (e.g. food provision, freshwater provision, natural hazard regulation, erosion regulation, tourism) outweigh limited enhancement opportunities (e.g. aesthetic quality)	Degradation in some ES (e.g. aesthetic quality, provision of habitat for conservation, provision of habitat for fisheries) outweigh enhancement opportunities (e.g. natural hazard regulation)
<b>To what extent does the option meet the objectives?</b>				

1- Reduce Flood Risk	N	N	Y	Y
2 - Natura 2000 sites	N	N	N	N
3- Reduce maintenance	Y	Y	Y	Y
4 - WFD	N	N	N	N
5 - Local Plans	N	N	Y	Y

Saline Biodiversity	1 Loss of intertidal habitat arising from coastal squeeze, saltmarsh connectivity will be lost	5 Coastal squeeze alleviated in managed realignment area.	5 Development of the MR site will alleviate intertidal habitat losses arising from coastal squeeze. However compensatory habitat will be required for the freshwater species at risk	5 Development of the MR site will alleviate intertidal habitat losses arising from coastal squeeze. However compensatory habitat will be required for the freshwater species at risk
Soil	5 Agricultural land protected	1 Agricultural land lost to managed realignment	1 Agricultural land lost to managed realignment	1 Agricultural land lost to managed realignment
Groundwater	3 No impacts predicted	3 No impacts predicted	3 No impacts predicted	3 No impacts predicted
Landscape (visual impact)	2 Height of wall increased resulting in likely visual impact.	1 Significant landscape change from managed realignment. Positive/negative effects depending on view and visual receptors, but reverting to natural processes	1 Significant landscape change from managed realignment. Positive/negative effects depending on view and visual receptors, but reverting to natural processes	1 Significant landscape change from managed realignment. Positive/negative effects depending on view and visual receptors, but reverting to natural processes
Carbon Storage	1 Some loss of carbon storage from gradual loss of saltmarsh. Carbon cost from construction	1 Carbon storage at managed realignment site if saltmarsh is converted from agricultural land. Carbon cost during construction.	1 Carbon storage at managed realignment site if saltmarsh is converted from agricultural land. Carbon cost during construction.	1 Carbon storage at managed realignment site if saltmarsh is converted from agricultural land. Carbon cost during construction.
<b>Ecosystem Services</b>				
Qualitative Score from Ecosystem Services Assessment	-20	32	50	50
Comments	Degradation in some ES (e.g. aesthetic quality, provision of habitat for conservation, provision of habitat for fisheries) outweigh enhancement opportunities (e.g. natural hazard regulation)	Enhancement in many ES (e.g. habitat provision for conservation, habitat provision for conservation) outweighs degradation in some services (e.g. Food provision, freshwater provision)	Enhancement in most ES (e.g. habitat provision for conservation, habitat provision for conservation) which outweighs degradation in limited number of services (e.g. Food provision, freshwater provision)	Enhancement in most ES (e.g. habitat provision for conservation, habitat provision for conservation) which outweighs degradation in limited number of services (e.g. Food provision, freshwater provision)
<b>To what extent does the option meet the objectives?</b>				



1- Reduce Flood Risk	Y	Y	Y	Y
2 - Natura 2000 sites	N	Y	Y	Y
3- Reduce maintenance	Y	Y	Y	Y
4 - WFD	N	Y	Y	Y
5 - Local Plans	Y	Y	Y	Y

Environmental Scores				
100 = best option, 0 = worst option				
Option	a) Do nothing	b) Do minimum	c) Maintain (capital) embankment/seawall/rock revetment (Do minimum)	d) Raise embankment/seawall (sustain) and new rock revetment
<b>WFD (Water Framework Directive)</b>				
Compliance assessment outcome	25	25	0	0
<b>HRA (Habitats Regulation Assessment)</b>				
Impact on SPA/ Ramsar qualifying features	0	0	0	0
Impacts on freshwater habitats	0	0	0	50
Impacts on intertidal habitats	25	25	0	0
Habitat Connectivity	0	0	0	0
<b>SEA (Strategic Environmental Assessment)</b>				
Historic Environment	50	50	50	50
Effects on population	25	25	25	50
Impact on plans/ programmes	0	0	25	75
Freshwater Biodiversity	0	0	25	50
Saline Biodiversity	25	25	0	0
Soil	25	25	50	100
Groundwater	0	0	0	0
Landscape (visual impact)	75	75	50	25
Carbon Storage	25	25	0	0
<b>Total</b>	<b>275</b>	<b>275</b>	<b>225</b>	<b>400</b>

Environmental Scores (continued)				
100 = best option, 0 = worst option				
Option	e) Raise embankment/seawall/revetment/sheet piling (upgrade) and new rock revetment	f) Construct new set back embankment at identified managed realignment sites and maintain existing embankment and revetment.	g) Construct new set back embankment at identified managed realignment sites and raise embankment revetment (sustain)	h) Construct new set back embankment at identified managed realignment sites and raise embankment revetment (upgrade)
<b>WFD (Water Framework Directive)</b>				
Compliance assessment outcome	0	75	75	75
<b>HRA (Habitats Regulation Assessment)</b>				
Impact on SPA/ Ramsar qualifying features	0	0	0	0
Impacts on freshwater habitats	50	0	0	0
Impacts on intertidal habitats	0	75	75	75
Habitat Connectivity	0	75	75	75
<b>SEA (Strategic Environmental Assessment)</b>				
Historic Environment	50	50	50	50
Effects on population	50	25	75	100
Impact on plans/ programmes	100	25	75	100
Freshwater Biodiversity	50	0	0	0
Saline Biodiversity	0	100	100	100
Soil	100	0	0	0
Groundwater	0	0	0	0
Landscape (visual impact)	25	0	0	0
Carbon Storage	0	0	0	0
<b>Total</b>	<b>425</b>	<b>425</b>	<b>525</b>	<b>575</b>

Summary of Results				
Option	a) Do nothing	b) Do minimum	c) Maintain (capital) embankment/seawall/rock revetment (Do minimum)	d) Raise embankment/seawall (sustain) and new rock revetment
Costs	£ -	£ 136,841	£ 4,032,165	£ 6,267,539
Benefits	£ -	£ 331,407	£ 2,047,645	£ 4,298,230
NPV	£ -	£ 194,566	-£ 1,984,521	-£ 1,969,309
BCR	0.0	2.4	0.5	0.7
Environmental Scoring	275	275	225	400

Summary of Results (continued)				
Option	e) Raise embankment/seawall/revetment/sheet piling (upgrade) and new rock revetment	f) Construct new set back embankment at identified managed realignment sites and maintain existing embankment and revetment.	g) Construct new set back embankment at identified managed realignment sites and raise embankment revetment (sustain)	h) Construct new set back embankment at identified managed realignment sites and raise embankment revetment (upgrade)
Costs	£ 10,973,768	£ 4,971,860	£ 8,284,754	£ 10,345,370
Benefits	£ 4,497,454	£ 2,222,809	£ 4,348,704	£ 4,542,545
NPV	-£ 6,476,314	-£ 2,749,051	-£ 3,936,050	-£ 5,802,825
BCR	0.4	0.4	0.5	0.4
Environmental Scoring	425	425	525	575

Preferred Option Decision Making		
DLO	Leading Option at DLO Stage	Justification for Leading Option
DLO1 - Economic Assessment	Do minimum - ongoing maintenance until year 25, followed by NAI.	The current defences have a 25 year median residual life if maintenance continues and have a positive BCR if maintained until residual life fails, enabling HTL policy in the short term.
DLO2 - Economic Sensitivities		
DLO3 - Review of Compensatory Intertidal Habitat Requirements		
DLO4 - Review of Compensatory Freshwater Habitat Requirements	Ongoing maintenance until year 25, followed by No Active Intervention (NAI). Freshwater habitat compensation required by year 25 (capital works in year 20).	The current defences have a 25-year median residual life and have a positive BCR if maintained until residual life fails, enabling HTL policy in the short term. After this there is a legal requirement to compensate for the loss of SPA habitat.
DLO5 - Modelling of Leading Options		
DLO6 - Consultation Phase	Ongoing maintenance until year 25, followed by No Active Intervention (NAI). Managed Realignment site at the east of the site with freshwater habitat compensation required in year 5.	The current defences have a 25-year median residual life and have a positive BCR if maintained until residual life fails, enabling HTL policy in the short term. The justification for the MR site is related to the Strategy wide requirement for coastal squeeze compensation.

Preferred Option Name
Ongoing maintenance until year 25, followed by No Active Intervention (NAI). Managed Realignment site at the east of the site with freshwater habitat compensation required in year 5.

Preferred Option
<p><b>Maintenance (patch and repair) of the current defences (earth embankments and rock revetment) for the first 25 years. After this all maintenance will be ceased which will increase the risk of failure of the defences.</b></p> <p><b>Additionally, construction of a MR site from year 5 to the east of the BA to help compensate for the strategy wide coastal squeeze impacts. Setback embankments would be constructed to manage tidal water and a breach in the current defences created. This will also require compensatory freshwater habitat.</b></p>

Justification
<p>Due to the limited assets at risk in the area, options to hold the line long term do not provide a BCR above one. The current defences have a 25-year median residual life. If patch and repair maintenance continues, the overall BCR is above one and the NPV is positive, enabling HTL policy in the short term. The justification for the MR site is related to the Strategy wide requirement for coastal squeeze compensation. This site has preferable topography to maximise habitat creation and is located close to areas of the SPA/Ramsar which are projected to experience large losses in saltmarsh over the strategy.</p>

Preferred Option Costs			
Cost	Benefits	BCR	PF Score
£ 146,899	£ 331,407	2.3	13%

**Managed Realignment**

**Managed Realignment site proposed at Abbots court in Year 5.**

PV Cost	Hectares of saltmarsh created
£ 4,991,058	29.6 ha

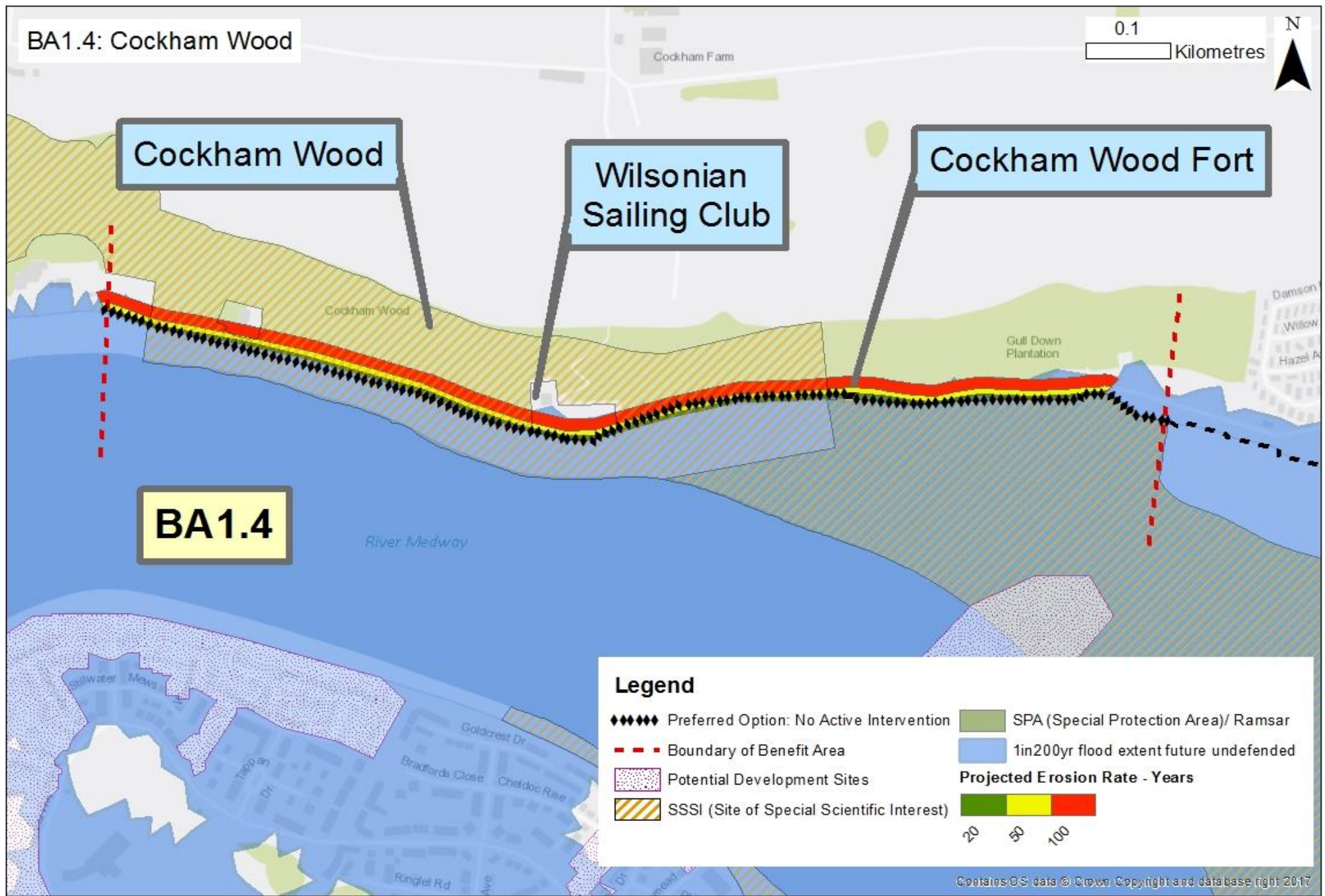
**Impacts on freshwater designated habitat**

**Ramsar and SPA habitat at risk from Year 25. Cost effectiveness analysis shows preferred management approach: Provide compensation by year 25.**

Cost of providing compensation for impacts	Cost of holding the line with SLR
£ 1,772,269	£ 4,032,165

<b>Benefit Area Name</b>	1 - Hoo Peninsula
<b>Benefit Unit Name</b>	1.4 - Cockham Wood
<b>Frontage Length</b>	1.3 km
<b>Defence Structure Type</b>	Shingle beach with earth embankment, sea wall with concrete revetment
<b>Min Standard of Protection (AEP%)</b>	N/A - the risk along the frontage is erosion
<b>Residual Life (years)</b>	20

	<b>0-20 years</b>	<b>20-50 years</b>	<b>50-100 years</b>
<b>SMP Policy</b>	NAI	NAI	NAI
<b>Aiming to comply with policy</b>	Agree with SMP		
<b>Comment</b>	Agree with SMP: NAI for all epochs as the steep sided cliff (limited current defences) will erode naturally in time. There are limited assets behind defences and the site has geological importance.		



Do Nothing Assets at Risk (Erosion)			
	Year 20 (undefended)	Year 50 (undefended)	Year 100 (undefended)
<b>Residential</b>	0	0	0
<b>Commercial &amp; Industrial</b>	0	0	1
<b>Agricultural (Ha)</b>	0.4	0.8	1.7
<b>Key Infrastructure</b>	None	None	None
<b>Social and Environmental Considerations</b>	Cockham Wood Fort, Medway Estuary and Marshes SPA and Tower Hill to Cockham Wood SSSI	Cockham Wood Fort, Medway Estuary and Marshes SPA and Tower Hill to Cockham Wood SSSI	Cockham Wood Fort, Medway Estuary and Marshes SPA and Tower Hill to Cockham Wood SSSI

Long List to Short List			
Potential Measures			
	Measures	Selected	Reasoning
<b>Structural</b>	Construct new embankment	N	Exclude - limited benefits and will not implement the SMP Policy
	Maintain embankment	N	Exclude - limited benefits and will not implement the SMP Policy
	Raise embankment (sustain)	N	Exclude - limited benefits and will not implement the SMP Policy
	Raise embankment (upgrade)	N	Exclude - limited benefits and will not implement the SMP Policy
	Construct new wall	N	Exclude - limited benefits and will not implement the SMP Policy
	Maintain wall	N	Exclude - limited benefits and will not implement the SMP Policy
	Raise wall (sustain)	N	Exclude - limited benefits and will not implement the SMP Policy
	Raise wall (upgrade)	N	Exclude - limited benefits and will not implement the SMP Policy
	Maintain rock revetment	N	Exclude - limited benefits and will not implement the SMP Policy
	Construct rock revetment	N	Exclude - limited benefits and will not implement the SMP Policy
	Install demountable defences	N	Exclude - limited benefits and will not implement the SMP Policy
	Install temporary defences	N	Exclude - limited benefits and will not implement the SMP Policy
	Beach recharge (sand or shingle)	N	Exclude - limited benefits and will not implement the SMP Policy
	Construct rock groynes	N	Exclude - limited benefits and will not implement the SMP Policy
	Maintain rock groynes	N	Exclude - limited benefits and will not implement the SMP Policy
	Construct timber structures	N	Exclude - limited benefits and will not implement the SMP Policy
	Maintain timber structures	N	Exclude - limited benefits and will not implement the SMP Policy
Construct a tidal barrier	N	Exclude - limited benefits and will not implement the SMP Policy	
<b>Non-Structural</b>	Implement monitoring	N	Exclude - limited defences to monitor (suggest monitor for health and safety only)
	Implement flood warning system	N	Exclude - erosion risk
	Land use planning	N	Exclude - limited benefits so unlikely to attract FDGiA funding
	Adaptation measures	N	Exclude - limited benefits so unlikely to attract FDGiA funding
	Development control	N	Exclude - limited benefits so unlikely to attract FDGiA funding
	Emergency response plans	N	Exclude - limited benefits so unlikely to attract FDGiA funding
	Monitoring for health and safety only	Y	Take forwards - will support the SMP policy

Long List of Options		
	a) Do nothing	b) Monitoring only
To what extent does the option meet the objectives?		
1- Reduce Flood Risk	N/A	N/A
2 - Natura 2000 sites	Y	Y*
3- Reduce maintenance	Y	Y
4 - WFD	N	TBC
5 - Local Plans	-	-
Comment and decision on whether taken forward to shortlist	Y- as baseline	Y- Defences have a high standard of protection and residual life. Site of geological interest could be supported by allowing erosion to continue. NAI SMP policy therefore monitoring is the only suitable option.

Short List of Options	
a)	Do nothing
b)	Maintain (capital) embankment and revetment



Assessment of Short List		
Option	a) Do nothing	b) Monitoring only
Description	Used as an economic baseline to compare the other options against.	No capital works completed but monitoring of the cliffs is undertaken for health and safety.
Technical Issue	Defences have 20 years residual life.	Current defences have 20 years residual life.
Assumptions/ Uncertainties	Assumes that all management is ceased.	No capital works.
SOP Provided (% AEP)	N/A (Erosion)	N/A (Erosion)
Value of Economics		
PV Capital Costs	£ -	£ -
PV Maintenance Costs	£ -	£ -
PV Other Costs	£ -	£ -
Total Cost (including Optimism Bias) (PV)	£ -	£ -
Value of Benefits	£ -	£ -
Benefit Cost Ratio (BCR)	0.0	0.0
PF Score	0%	0%
Further funding required to achieve 100% PF	£ -	£ -
Flood/ erosion impacts		
Number of Residential Properties at risk under 0.1% AEP	0	0
Number of Commercial properties at risk under 0.1% AEP	0	0
PV Value of Properties (Total including AAD, write-offs, vehicle damages and Emergency Services)	£ -	£ -
Erosion Damages	£ 36,669	£ 36,669
Critical Infrastructure	No assets at risk	No assets at risk
PV Value of Impacts on road and rail	-	-
PV Value of Tourism and Recreation Impacts	-	-
PV Value of Agriculture Impacts	£26,067 Worst case scenario 5ha of Grade 3 agricultural land flooded	£26,067 Worst case scenario 5ha of Grade 3 agricultural land flooded
Stakeholders Feedback		
Statutory Stakeholders/ SEG	No specific comments	No specific comments
Landowners	No specific comments	No specific comments
Technical Feasibility		
Site Specific	n/a	n/a
Strategy Wide	n/a	n/a
WFD (Water Framework Directive)		
Compliance assessment outcome	2 Returning to natural processes but uncontrolled.	2 Returning to natural processes but uncontrolled.

<b>HRA (Habitats Regulation Assessment)</b>		
Impact on SPA/ Ramsar qualifying features	<p>2</p> <p>There may be potential significant effects on the intertidal Medway Estuary and Marshes SPA and its constituent qualifying features due to coastal squeeze.</p> <p>Up to 10.8 ha of mudflat within the SPA could be lost, but the cliffs are eroding naturally so this could help reduce the impacts</p>	<p>2</p> <p>There may be potential significant effects on the intertidal Medway Estuary and Marshes SPA and its constituent qualifying features due to coastal squeeze.</p> <p>Up to 10.8 ha of mudflat within the SPA could be lost, but the cliffs are eroding naturally so this could help reduce the impacts</p>
Impacts on freshwater habitats	<p>3</p> <p>n/a - no designated freshwater habitats in the BA</p>	<p>3</p> <p>n/a - no designated freshwater habitats in the BA</p>
Impacts on intertidal habitats	<p>2</p> <p>Potential for coastal squeeze as the rate of cliff retreat may be less than the rate of sea level rise and resultant coastal squeeze. However this will require further detailed monitoring.</p>	<p>2</p> <p>Potential for coastal squeeze as the rate of cliff retreat may be less than the rate of sea level rise and resultant coastal squeeze. However this will require further detailed monitoring.</p>
Habitat Connectivity	<p>3</p> <p>No notable impacts are predicted, due to the small relative size of habitat lost, and the position to the edge of the SPA and the estuary.</p>	<p>3</p> <p>No notable impacts are predicted, due to the small relative size of habitat lost, and the position to the edge of the SPA and the estuary.</p>
<b>SEA (Strategic Environmental Assessment)</b>		
Historic Environment	<p>1</p> <p>Loss of Cockham Wood Fort</p>	<p>1</p> <p>Loss of Cockham Wood Fort</p>
Effects on population	<p>1</p> <p>Loss of use of Cockham wood, and coastal path. Potential adverse impacts on amenity and for the community.</p>	<p>1</p> <p>Loss of use of Cockham wood, and coastal path. Potential adverse impacts on amenity and for the community.</p>
Impact on plans/ programmes	<p>1</p> <p>Potential development areas at risk of erosion</p>	<p>1</p> <p>Potential development areas at risk of erosion</p>
Freshwater Biodiversity	<p>1</p> <p>Habitat at risk from erosion, area of particular importance for bees and wasps. SSSI in the area for biology &amp; geology which could be affected, although the geology SSSI benefits from erosion.</p>	<p>1</p> <p>Habitat at risk from erosion, area of particular importance for bees and wasps. SSSI in the area for biology &amp; geology which could be affected, although the geology SSSI benefits from erosion.</p>
Saline Biodiversity	<p>3</p> <p>No impact</p>	<p>3</p> <p>No impact</p>
Soil	<p>2</p> <p>Woodland soil loss due to erosion</p>	<p>2</p> <p>Woodland soil loss due to erosion</p>
Groundwater	<p>3</p> <p>no impact predicted</p>	<p>3</p> <p>no impact predicted</p>
Landscape (visual impact)	<p>3</p> <p>Continuing the natural processes, but there will still be a change to the landscape due to the erosion. positive or negative dependent on perception</p>	<p>3</p> <p>Continuing the natural processes, but there will still be a change to the landscape due to the erosion. positive or negative dependent on perception</p>

Carbon Storage	1 Loss of woodland carbon storage as woodland area is eroded	1 Loss of woodland carbon storage as woodland area is eroded
<b>Ecosystem Services</b>		
Qualitative Score from Ecosystem Services Assessment	-81	-79
Comments	Major degradation in large number of ES (e.g. Natural hazard regulation, erosion regulation, tourism) with no clear opportunities for enhancement in any ES	Major degradation in large number of ES (e.g. Natural hazard regulation, erosion regulation, tourism) with no clear opportunities for enhancement in any ES
<b>To what extent does the option meet the objectives?</b>		
1- Reduce Flood Risk	N	N
2 - Natura 2000 sites	N	N
3- Reduce maintenance	Y	Y
4 - WFD	Y	Y
5 - Local Plans	Y	Y

Environmental Scores		
100 = best option, 0 = worst option		
Option	a) Do nothing	b) Monitoring only
<b>WFD (Water Framework Directive)</b>		
Compliance assessment outcome	25	25
<b>HRA (Habitats Regulation Assessment)</b>		
Impact on SPA/ Ramsar qualifying features	25	25
Impacts on freshwater habitats	50	50
Impacts on intertidal habitats	25	25
Habitat Connectivity	50	50
<b>SEA (Strategic Environmental Assessment)</b>		
Historic Environment	0	0
Effects on population	0	0
Impact on plans/ programmes	0	0
Freshwater Biodiversity	0	0
Saline Biodiversity	50	50
Soil	25	25
Groundwater	50	50
Landscape (visual impact)	50	50
Carbon Storage	0	0
<b>Total</b>	<b>350</b>	<b>350</b>

Summary of Results		
Option	a) Do nothing	b) Monitoring only
<b>Costs</b>	£ -	£ -
<b>Benefits</b>	£ -	£ -
<b>NPV</b>	£ -	£ -
<b>BCR</b>	0.0	0.0
<b>Environmental Scoring</b>	350	350

Preferred Option Decision Making		
DLO	Leading Option at DLO Stage	Justification for Leading Option
DLO1 - Economic Assessment	No Active Intervention (NAI).	No short listed options were identified which provided increased protection and NAI aligns with SMP policy too.
DLO2 - Economic Sensitivities		
DLO3 - Review of Compensatory Intertidal Habitat Requirements		
DLO4 - Review of Compensatory Freshwater Habitat Requirements		
DLO5 - Modelling of Leading Options		
DLO6 - Consultation Phase		

Preferred Option Name
No Active Intervention (NAI)

Preferred Option
In line with current management, no maintenance will be undertaken. Rate of cliff retreat will increase with sea level rise, but this will support the SSSI designation at the site.

Justification
No short listed options were identified to provide erosion protection long this frontage. NAI aligns with SMP policy and requirements of the SSSI.

Preferred Option Costs			
Cost	Benefits	BCR	PF Score
N/A	N/A	N/A	N/A