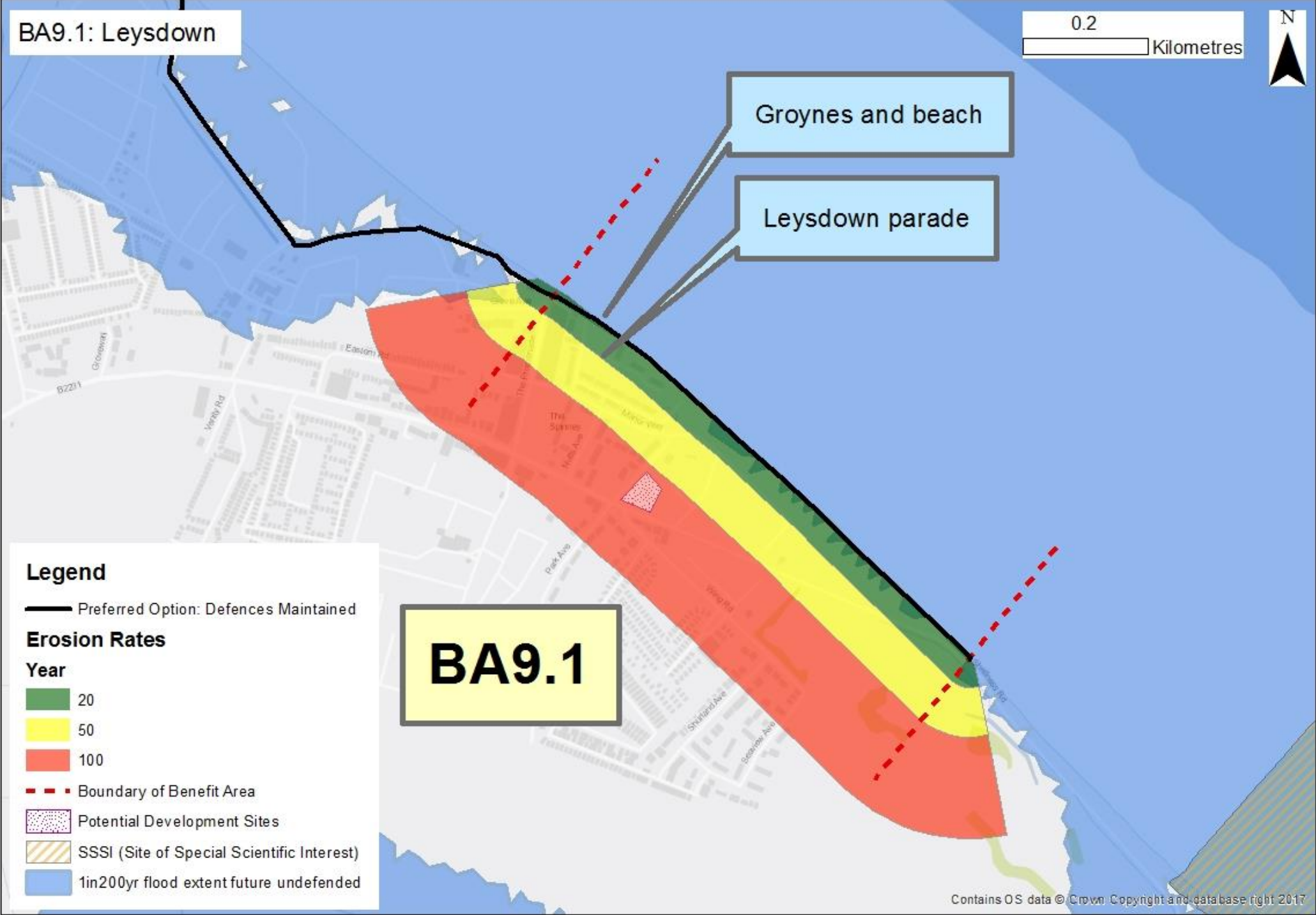


Benefit Area Name	9 - Leysdown
Benefit Unit Name	9.1 - Leysdown to Shellness
Frontage Length	0.4 km
Defence Structure Type	Embankments, walls, beach recharge, groynes
Min Standard of Protection (AEP%)	NA - the risk along the frontage is erosion
Residual Life (years)	Not available. Assumed 0 based on photographs

	0-20 years	20-50 years	50-100 years
SMP Policy	HTL and MR	HTL and MR	HTL and MR
Aiming to comply with policy	No- suggest alternative considerations		
Comment	Originally the SMP policy unit extended further south. However we have shortened it to include just the residential area, as it is more effective to define a management policy. Therefore we consider localised HTL from Leysdown Promenade to Park Avenue.		



Do Nothing Assets at Risk (Flooding)			
	Year 20 (undefended)	Year 50 (undefended)	Year 100 (undefended)
Residential	0	0	20
Commercial & Industrial	27	74	83
Agricultural (Ha)	0	1.525	9.58
Key Infrastructure	Leysdown parade	Leysdown parade Park Avenue	Leysdown parade Park Avenue Shellness Road
Social and Environmental Considerations	None	None	None

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)	N	Exclude - will not reduce the erosion risk
	Raise wall (upgrade)	N	Exclude - will not reduce the erosion risk
	Maintain rock revetment	N	Exclude - no rock revetment currently present
	Construct rock revetment	N	Exclude - limited benefits in constructing a revetment where embankments and walls are currently present and will not significantly reduce flood risk.
	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)	Y	Take forward - Beach currently present
	Construct rock groynes	Y	Take forward - will provide the same function as timber groynes currently present
	Maintain rock groynes	N	Exclude - no rock groynes currently present
	Construct timber structures	Y	Take forward - Timber structure currently present
	Maintain timber structures	Y	Take forward - Timber structure currently present
	Construct a tidal barrier	N	Exclude - not appropriate for this location, open coastline
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 walls, groynes and beach.	c) Maintain (capital) walls, groynes and beach.	d) Maintain defences and then Adaptation from year 50
To what extent does the option meet the objectives?				
1- Reduce Flood Risk	N	N	Y	Y
2 - Natura 2000 sites	N	N	N	N
3- Reduce maintenance	N	N	N	Y
4 - WFD	N	Y	Y	Y
5 - Local Plans	N	Y	Y	Y
Comment and decision on whether taken forward to shortlist	Y = baseline for economics.	Y - as baseline. Following 5 years a Do nothing scenario would occur due to failure of the defences.	Y= High SOP but defences need capital maintenance in the future.	Y = will tie in well with BA8.2

Short List of Options				
a) Do nothing				
b) Do minimum				
c) Maintain (capital) walls, groynes and beach (Do minimum).				
d) Maintain defences and then adaptation from year 50				

Assessment of Short List				
Option	a) Do nothing	b) Do minimum	c) Maintain (capital) walls, groynes and beach (Do minimum).	d) Maintain defences and then adaptation of property from year 50
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 for the first 50 years. After this adaptation of the properties will be undertaken
Technical Issue	Defences have no residual life (0 years)	Defences have no residual life (5 years)	Current defences have no residual life (0 years)	Current defences have no residual life (0 years). Detailed adaptation study would need to be undertaken
Assumptions/ Uncertainties	Assumes that all management is ceased. Main risk from erosion	Ongoing maintenance. Maintenance not sufficient to reduce risk of failure after year 5	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, however the main risk is from erosion, so the defences will be used to protect the toe of the cliff rather than reduce overtopping.	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, however the main risk is from erosion, so the defences will be used to protect the toe of the cliff rather than reduce overtopping.
SOP Provided (% AEP)	n/a (Erosion)	n/a (Erosion)	n/a (Erosion)	n/a (Erosion)
Value of Economics				
PV Capital Costs	£ -	£ -	£ 2,527,997	£ 3,343,930
PV Maintenance Costs	£ -	£ 100,625	£ 126,426	£ 95,185
PV Other Costs	£ -	£ -	£ 600,000	£ 600,000
Total Cost (including Optimism Bias) (PV)	£ -	£ 161,000	£ 5,207,078	£ 6,462,583
Value of Benefits	£ -	£ -	£ 13,660,068	£ 11,711,727
Benefit Cost Ratio (BCR)	0.0	13.3	2.6	1.8
PF Score	0%	74%	59%	46%
Further funding required to achieve 100% PF Score	£ -	£ 42,000	£ 2,144,964	£ 3,508,710
Flood/ erosion impacts				
Number of Residential Properties at risk under 0.1% AEP (flooding)	2	2	0	0
Number of Commercial properties at risk under 0.1% AEP (flooding)	0	0	0	15
PV Value of Properties (Total including AAD, write-offs, vehicle damages and Emergency Services)	£ 35	£ -	£ -	£ -
Erosion Damages	£ 11,166,835	£ 9,516,472	-	£ 476,443
Critical Infrastructure	Leysdown parade, Park Avenue, Shellness Road at risk	Leysdown parade, Park Avenue, Shellness Road at risk	Infrastructure protected against erosion	Infrastructure protected until year 50

PV Value of Impacts on road and rail	-	£ -	-	-
PV Value of Tourism and Recreation Impacts	£2,385,419 (Leysdown)	£ 2,009,848	0 (Leysdown)	0 (Leysdown)
PV Value of Agriculture Impacts	-	£ -	-	-
Stakeholders Feedback				
Statutory Stakeholders/ SEG	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
Technical Feasibility				
Site Specific	n/a	n/a	n/a	n/a
Strategy Wide	n/a	n/a	n/a	n/a
WFD (Water Framework Directive)				
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
HRA (Habitats Regulation Assessment)				
Impact on SPA/ Ramsar qualifying features	3 These options are not likely to have significant effects on any Natura 2000 sites and their constituent qualifying features.	3 These options are not likely to have significant effects on any Natura 2000 sites and their constituent qualifying features.	3 These options are not likely to have significant effects on any Natura 2000 sites and their constituent qualifying features.	3 These options are not likely to have significant effects on any Natura 2000 sites and their constituent qualifying features.
Impacts on freshwater habitats	3 n/a - no designated freshwater habitats in the BA	3 n/a - no designated freshwater habitats in the BA	3 n/a - no designated freshwater habitats in the BA	3 n/a - no designated freshwater habitats in the BA
Impacts on intertidal habitats	3 n/a - no designated intertidal habitats in the BA	3 n/a - no designated intertidal habitats in the BA	3 n/a - no designated intertidal habitats in the BA	3 n/a - no designated intertidal habitats in the BA
Habitat Connectivity	3 No impacts, either beneficial or adverse.	3 No impacts, either beneficial or adverse.	3 No impacts, either beneficial or adverse.	3 No impacts, either beneficial or adverse.
SEA (Strategic Environmental Assessment)				
Historic Environment	3 No historical assets at risk	3 No historical assets at risk	3 No historical assets at risk	3 No historical assets at risk
Effects on population	1 Possible imminent risk to tourism infrastructure and livelihoods once the defences fail. If the area becomes less attractive to visit could have economic/ impacts on the population as the resort is on the main tourist resorts in the Swale.	1 Possible imminent risk to tourism infrastructure and livelihoods once the defences fail. If the area becomes less attractive to visit could have economic/ impacts on the population as the resort is on the main tourist resorts in the Swale.	3 Defences maintained to protect against erosion. Provides protection to the tourism infrastructure and livelihoods.	2 Tourism infrastructure maintained until year 50. After this there may be a risk of degradation of the area and potential negative effects on the local community.
Impact on plans/ programmes	3 Benefit area does not coincide with proposed development sites	3 Benefit area does not coincide with proposed development sites	3 Benefit area does not coincide with proposed development sites	3 Benefit area does not coincide with proposed development sites
Freshwater Biodiversity	3 No potential for habitat creation, site mainly consists of cliffs that are at risk from erosion.	4 No potential for habitat creation, site mainly consists of cliffs that are at risk from erosion.	3 No potential for habitat creation, site mainly consists of cliffs that are at risk from erosion.	3 No potential for habitat creation, site mainly consists of cliffs that are at risk from erosion.
Saline Biodiversity	3 n/a - coiffed frontage at risk of erosion, so limited saline habitats in the area.	3 n/a - coiffed frontage at risk of erosion, so limited saline habitats in the area.	3 n/a - coiffed frontage at risk of erosion, so limited saline habitats in the area.	3 n/a - coiffed frontage at risk of erosion, so limited saline habitats in the area.
Soil	3 No impacts predicted	3 No impacts predicted	3 No impacts predicted	3 No impacts predicted
Groundwater	3 No impacts predicted	3 No impacts predicted	3 No impacts predicted	3 No impacts predicted

Landscape (visual impact)	4 Revert to natural landscape overtime. This is assumed to be a positive impact.	4 Revert to natural landscape overtime. This is assumed to be a positive impact.	3 Defences maintained to reduce the risk of erosion, therefore there should be negligible change.	3 Revert to natural landscape once the adaptation is undertaken in year 50 and the defences are no longer maintained.
Carbon Storage	3 no loss or gain of carbon storage from erosion of the cliffs.	3 no loss or gain of carbon storage from erosion of the cliffs.	2 no loss or gain of carbon storage from erosion of the cliffs; but some carbon costs from construction	2 no loss or gain of carbon storage from erosion of the cliffs; but some carbon costs from construction
Ecosystem Services				
Qualitative Score from Ecosystem Services Assessment	-15	-14	-11	0
Comments	Degradation in some ES (e.g. natural hazard regulation and recreation and tourism) outweigh limited enhancement opportunities (e.g. aesthetic value, conservation habitat and fishery habitat)	Degradation in some ES (e.g. natural hazard regulation and recreation and tourism) outweigh limited enhancement opportunities (e.g. aesthetic value, conservation habitat and fishery habitat)	Degradation in some ES (e.g. natural hazard regulation, erosion regulation and recreation and tourism) and no opportunities for enhancement	Balance of opportunities for enhancing some ES (e.g. erosion regulation) with risks of degrading some ES (e.g. water regulation and water purification)
To what extent does the option meet the objectives?				
1- Reduce Flood Risk	N	N	Y	N
2 - Natura 2000 sites	N	N	N	N
3- Reduce maintenance	Y	Y	Y	Y
4 - WFD	N	N	N	N
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) walls, groynes and beach	d) Maintain defences and then adaptation of property from year 50
WFD (Water Framework Directive)				
Compliance assessment outcome	25	25	0	0
HRA (Habitats Regulation Assessment)				
Impact on SPA/ Ramsar qualifying features	50	50	50	50
Impacts on freshwater habitats	50	50	50	50
Impacts on intertidal habitats	50	50	50	50
Habitat Connectivity	50	50	50	50
SEA (Strategic Environmental Assessment)				
Historic Environment	50	50	50	50
Effects on population	0	0	50	25
Impact on plans/ programmes	50	50	50	50
Freshwater Biodiversity	50	50	50	50
Saline Biodiversity	50	50	50	50
Soil	50	50	50	50
Groundwater	50	50	50	50
Landscape (visual impact)	75	75	50	50
Carbon Storage	50	50	25	25
Total	650	650	625	600

Summary of Results				
Option	a) Do nothing	b) Do minimum	c) Maintain (capital) walls, groynes and beach (Do minimum).	d) Maintain defences and then adaptation of property from year 50
Costs	£ -	£ 161,000	£ 5,207,078	£ 6,462,583
Benefits	£ -	£ 2,134,000	£ 13,660,068	£ 11,711,727
NPV	£ -	£ 1,973,000	£ 8,452,990	£ 5,249,144
BCR	0.0	13.3	2.1	1.7
Environmental Scoring	650	650	625	600

Preferred Option Decision Making		
DLO	Leading Option at DLO Stage	Justification for Leading Option
DLO1 - Economic Assessment	b) Maintain (with capital works) walls, groynes and beach.	This option has the highest BCR and no other options have a BCR of greater than one.
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		

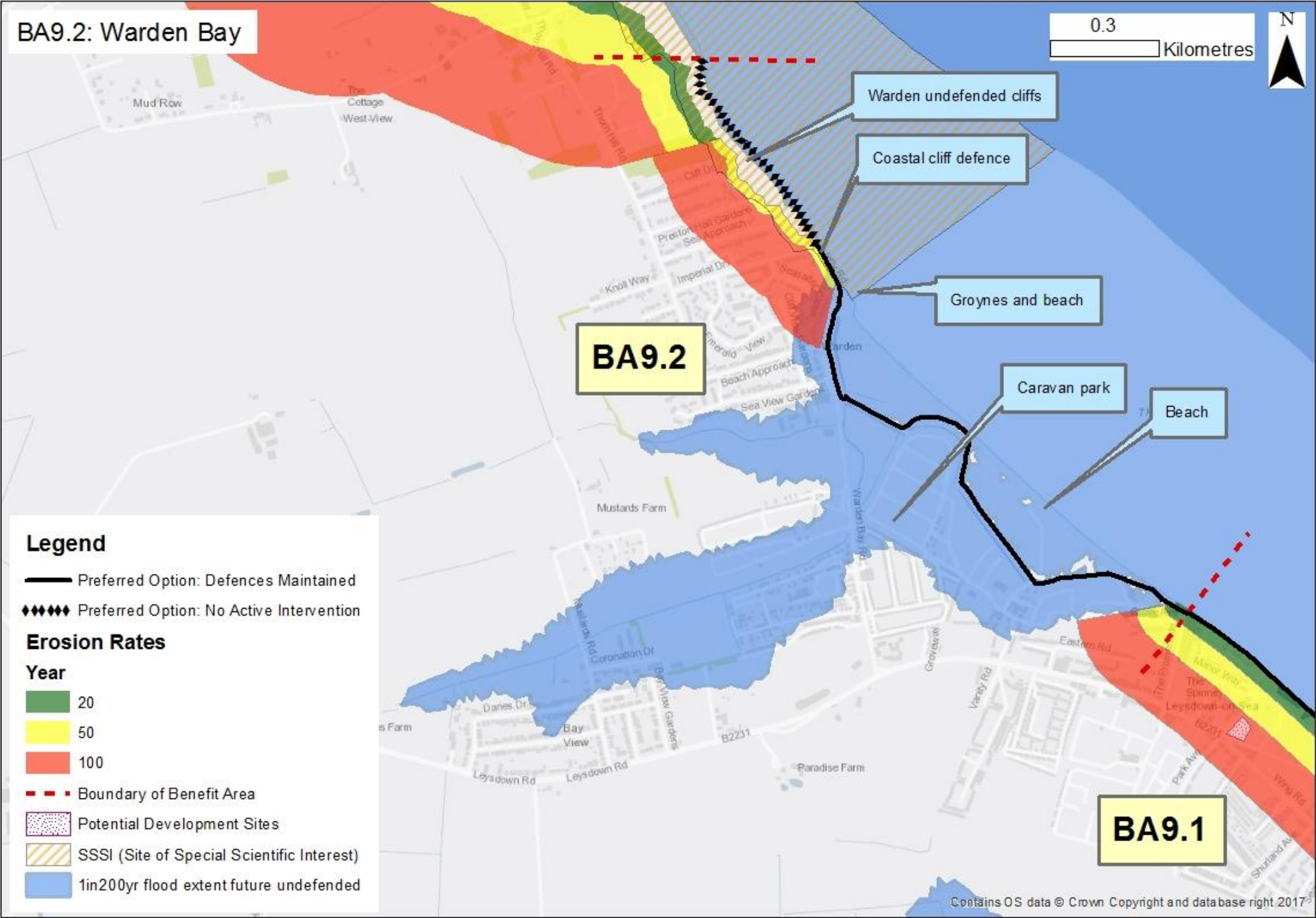
Preferred Option Name
Maintain (with capital works) walls, groynes and beach.

Preferred Option
Capital works will be undertaken on the current defences to ensure that they remain in place to protect the toe of the cliff from erosion.

Justification
This option has an incremental BCR greater than 1 and the highest NPV value.

Preferred Option Costs											
<table><tr><th>Cost</th><th>Benefits</th><th>BCR</th><th>PF Score</th></tr><tr><td>£ 5,612,181</td><td>£ 13,660,068</td><td>2.4</td><td>54%</td></tr></table>				Cost	Benefits	BCR	PF Score	£ 5,612,181	£ 13,660,068	2.4	54%
Cost	Benefits	BCR	PF Score								
£ 5,612,181	£ 13,660,068	2.4	54%								

Benefit Area Name	9 - Leysdown		
Benefit Unit Name	9.2 - Warden Point to Leysdown		
Frontage Length	2.1 km		
Defence Structure Type			
Min Standard of Protection (AEP%)	4%		
Residual Life (years)	25		
	0-20 years	20-50 years	50-100 years
SMP Policy	HTL and MR	HTL and MR	HTL and MR
Aiming to comply with policy	Yes		
Comment	Agree with HTL and localised MR for all epochs. HTL at Jetty Road and along Leysdown Promenade, MR in between the two areas of HTL. Roll-back of property along the Warden Cliffs in order to implement MR.		



Do Nothing Assets at Risk (Flooding)				
	50% AEP (undefended)		0.5% AEP (undefended)	
	Current Year	100 year	Current Year	100 Years
Residential	0	1	1	155
Commercial & Industrial	0	5	13	359
Agricultural (Ha)	0	14.3	21.5	62.8
Key Infrastructure	None	Warden Bay Road	Warden Bay Road	Warden Bay Road, Jetty Road
Social and Environmental Considerations	None	Caravan Park	Caravan Park	Caravan Park

Do Nothing Assets at Risk (Erosion)			
	Year 20 (undefended)	Year 50 (undefended)	Year 100 (undefended)
Residential	0	8	219
Commercial & Industrial	0	21	43
Agricultural (Ha)	0	0	6.81
Key Infrastructure	None	Jetty Road	Jetty Road
Social and Environmental Considerations	Sheppey Cliffs and Foreshore SSSI	Sheppey Cliffs and Foreshore SSSI	Sheppey Cliffs and Foreshore SSSI

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	N	Exclude - no rock revetment currently present
	Construct rock revetment	N	Exclude - limited benefits in constructing a revetment where embankments and walls are currently present and will not significantly reduce flood risk.
	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)	Y	Take forward - Beach recharge currently present
	Construct rock groynes	Y	Take forward - will provide the same function as timber groynes currently present
	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	Y	Take forward - Timber structure currently present
	Maintain timber structures	Y	Take forward - Timber structure currently present
	Construct a tidal barrier	N	Exclude - not appropriate for this location
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 embankments, walls, groynes and beach and adaptation along Warden Cliffs	c) Maintain SOP (capital) embankments walls, groynes and beach and adaptation along Warden Cliffs	d) Raise (sustain SOP) embankments walls, groynes and beach and adaptation along Warden Cliffs	e) Raise (upgrade SOP) embankments walls, groynes and beach and adaptation along Warden Cliffs
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	N	N	N	N	N
4 - WFD	N	Y	Y	Y	Y
5 - Local Plans	NA	NA	NA	NA	NA
Comment and decision on whether taken forward to shortlist	Y = baseline for economics	Y - as baseline. Following 5 years a Do nothing scenario would occur due to failure of the defences.	Y = Very low SOP and residual life, therefore capital maintenance required.	Y= existing SOP very low so defences could be increased with sea level rise.	N= limited assets at risk therefore unlikely to be economically viable.

* Maintenance requirements currently unknown, as will depend on the MR sites taken forwards

Long List of Options			
	f) Construct new setback embankment at realignment site in 20 years, maintain SOP of existing walls along remaining frontage and adaptation along Warden Cliffs	g) Construct new setback embankment at realignment site in 20 years, raise (sustain SOP) existing walls along remaining frontage and adaptation along Warden Cliffs	h) Construct new setback embankment at realignment site in 20years, raise (upgrade SOP) existing walls along remaining frontage and adaptation along Warden Cliffs.
To what extent does the option meet the objectives?			
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	NA	NA	NA
Comment and decision on whether taken forward to shortlist	Y = realignment site not designated. However will not contribute towards intertidal habitat compensation objective due to environment. MR has been delayed to the second epoch to allow time for the community and landowners to adapt.	Y= as above. Existing SOP very low so defences could be increased with sea level rise.	N = limited assets at risk therefore unlikely to be economically viable.

Short List of Options
a) Do nothing
b) Do minimum
c) Maintain (capital) embankments walls, groynes and beach and adaptation along Warden Cliffs (Do minimum)
d) Raise (sustain) embankments walls, groynes and beach and adaptation along Warden Cliffs
e) * Construct new setback embankment at realignment site in 20 years, maintain walls along remaining frontage and adaptation along Warden Cliffs
f) * Construct new setback embankment at realignment site in 20 years , raise (sustain) walls along remaining frontage and adaptation along Warden Cliffs

*This MR option was screened out following consultation with environmental stakeholders - see 'Review of Managed Sites' report (October 2016) for further detail

Assessment of Short List				
Option	a) Do nothing	b) Do minimum	c) Maintain (capital) embankments walls, groynes and beach and adaptation along Warden Cliffs	d) Raise (sustain) embankments walls, groynes and beach and adaptation along Warden Cliffs
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
Technical Issue	Defences have 25 years residual life.	Defences have 30 years residual life.	Current defences have 25 years residual life.	Current defences have 25 years residual life.
Assumptions/ Uncertainties	Assumes that all management is ceased.	Ongoing maintenance. Maintenance not sufficient to reduce risk of failure after year 30	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%	4%	0.5%
Value of Economics				
PV Capital Costs	£ -	£ -	£ 1,289,977	£ 2,946,580
PV Maintenance Costs	£ -	£ 93,750	£ 131,332	£ 132,797
PV Other Costs	£ -	£ -	£ 143,041	£ 295,390
Total Cost (including Optimism Bias) (PV)	£ -	£ 150,000	£ 2,502,959	£ 5,399,629
Value of Benefits	£ -	£ -	£ 9,062,872	£ 9,545,050
Benefit Cost Ratio (BCR)	0.0	14.4	3.6	1.8
PF Score	0%	80%	25%	12%
Further funding required to achieve 100% PF Score	£ -	£ 30,000	£ 1,877,330	No specific comments
Flood/ erosion impacts				
Number of Residential Properties at risk under 0.1% AEP	221	221	63	3
Number of Commercial properties at risk under 0.1% AEP	335	335	226	0
PV Value of Properties (Total including AAD, Erosion Damages	£ 5,091,597	£ 3,450,880	£ 461,424	£ -
Critical Infrastructure	Electricity sub station	Electricity sub station	Electricity sub station	Electricity sub station
PV Value of Impacts on road and rail	-	£ -	-	-
PV Value of Tourism and Recreation Impacts	£45,681 Warden Beach	£ 37,318	£18,412 Warden Beach	-
PV Value of Agriculture Impacts	£51,178 Worst case 71ha Grade 3 agricultural land flooded.	£ 47,604	£2,341 Worst case 31ha Grade 3 agricultural land flooded.	-
Stakeholders Feedback				
Statutory Stakeholders/ SEG	HTL preferred to protect the tourism industry	HTL preferred to protect the tourism industry	HTL preferred to protect the tourism industry	HTL preferred to protect the tourism industry
Landowners	No specific comments	No specific comments	No specific comments	No specific comments
Technical Feasibility				
Site Specific	n/a	n/a	n/a	n/a
Strategy Wide	n/a	n/a	n/a	n/a
WFD (Water Framework Directive)				

Compliance assessment outcome	2 Some return to more natural processes but uncontrolled	2 Some return to more natural processes but uncontrolled	1 Heavily Modified Water Body (HMWB) maintained	1 Heavily Modified Water Body (HMWB) maintained
HRA (Habitats Regulation Assessment)				
Impact on SPA/ Ramsar qualifying features	3 These options are not likely to have significant effects on any Natura 2000 sites and their constituent qualifying features.	3 These options are not likely to have significant effects on any Natura 2000 sites and their constituent qualifying features.	3 These options are not likely to have significant effects on any Natura 2000 sites and their constituent qualifying features.	3 These options are not likely to have significant effects on any Natura 2000 sites and their constituent qualifying features.
Impacts on freshwater habitats	3 n/a - no designated freshwater habitats in the BA	3 n/a - no designated freshwater habitats in the BA	3 n/a - no designated freshwater habitats in the BA	3 n/a - no designated freshwater habitats in the BA
Impacts on intertidal habitats	3 n/a - no designated intertidal habitats in the BA	3 n/a - no designated intertidal habitats in the BA	3 n/a - no designated intertidal habitats in the BA	3 n/a - no designated intertidal habitats in the BA
Habitat Connectivity	3 No impacts, either beneficial or adverse.	3 No impacts, either beneficial or adverse.	3 No impacts, either beneficial or adverse.	3 No impacts, either beneficial or adverse.
SEA (Strategic Environmental Assessment)				
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	1 Potential risk of flooding and erosion following the failure of the defences in year 25, resulting in loss of amenity. This could have impacts on the tourism industry and for the local community.	1 Potential risk of flooding and erosion following the failure of the defences in year 30, resulting in loss of amenity. This could have impacts on the tourism industry and for the local community.	2 Potential risk of increased overtopping with sea level rise resulting in loss of amenity and tourism economy over time	4 Defences improved so amenity and tourism economy at reduced risk from flooding.
Impact on plans/ programmes	1 Proposed development site at risk from flooding/ erosion following the failure of the defences in year 25.	1 Proposed development site at risk from flooding/ erosion following the failure of the defences in year 30.	2 Proposed development site at risk from flooding over time with increased risk of overtopping due to sea level rise.	5 Proposed development site at reduced risk from flooding/ erosion as the defences are improved.
Freshwater Biodiversity	3 No potential for habitat creation, BA quite densely populated and one of the main tourism resorts in the Swale.	4 No potential for habitat creation, BA quite densely populated and one of the main tourism resorts in the Swale.	3 No potential for habitat creation, BA quite densely populated and one of the main tourism resorts in the Swale.	3 No potential for habitat creation, BA quite densely populated and one of the main tourism resorts in the Swale.
Saline Biodiversity	3 Once the defences fail there may be the opportunity for intertidal habitat development, however this is unlikely due to the open coast, and the current absence of intertidal habitat in the BA.	3 Once the defences fail there may be the opportunity for intertidal habitat development, however this is unlikely due to the open coast, and the current absence of intertidal habitat in the BA.	3 Overtime there may be the opportunity for intertidal habitat development as the risk of overtopping increases, however this is unlikely due to the open coast, and the current absence of intertidal habitat in the BA.	3 No intertidal habitat in the area to be lost, and no opportunities for habitat creation as the defences are improved.

Soil	2 Loss of agricultural land following the failure of the defences. However limited areas at risk	2 Loss of agricultural land following the failure of the defences. However limited areas at risk	3 Increased risk overtime to agricultural land as the risk of overtopping increases. However limited areas at risk.	4 Defences improved so reduced risk to agricultural land.
Groundwater	3 No impacts predicted	3 No impacts predicted	3 No impacts predicted	3 No impacts predicted
Landscape (visual impact)	4 Change but reverting to natural processes.	4 Change but reverting to natural processes.	3 Potential for increased overtopping over time which may have slight visual impact.	2 Visual impacts resulting from raising defence heights
Carbon Storage	3 Negligible	3 Negligible	2 Some carbon cost due to maintenance	2 Some carbon cost due to increased construction
Ecosystem Services				
Qualitative Score from Ecosystem Services Assessment	-19	-19	-16	-3
Comments	Degradation in various ES (e.g. natural hazard regulation, erosion regulation and recreation and tourism) outweigh limited enhancement opportunities (e.g. aesthetic value, conservation habitat and fishery habitat)	Degradation in various ES (e.g. natural hazard regulation, erosion regulation and recreation and tourism) outweigh limited enhancement opportunities (e.g. aesthetic value, conservation habitat and fishery habitat)	Gradual degradation in some ES (e.g. natural hazard and recreation and tourism) outweigh limited enhancement opportunities (e.g. aesthetic value and fishery habitat)	Balance of opportunities for enhancing some ES (e.g. natural hazard regulation and erosion regulation) with risks of degrading other ES (e.g. climate regulation and aesthetic value)
To what extent does the option meet the objectives?				
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	Y	Y	Y	Y

Environmental Scores				
100 = best option, 0 = worst option				
Option	a) Do nothing	b) Do minimum	c) Maintain (capital) embankments walls, groynes and beach and adaptation along Warden Cliffs	d) Raise (sustain) embankments walls, groynes and beach and adaptation along Warden Cliffs
WFD (Water Framework Directive)				
Compliance assessment outcome	25	25	0	0
HRA (Habitats Regulation Assessment)				
Impact on SPA/ Ramsar qualifying features	50	50	50	50
Impacts on freshwater habitats	50	50	50	50
Impacts on intertidal habitats	50	50	50	50
Habitat Connectivity	50	50	50	50
SEA (Strategic Environmental Assessment)				
Historic Environment	50	50	50	50
Effects on population	0	0	25	75
Impact on plans/ programmes	0	0	25	100
Freshwater Biodiversity	50	50	50	50
Saline Biodiversity	50	50	50	50
Soil	25	25	50	75
Groundwater	50	50	50	50
Landscape (visual impact)	75	75	50	25
Carbon Storage	50	50	25	25
Total	575	575	575	700

Summary of Results				
Option	a) Do nothing	b) Do minimum	c) Maintain (capital) embankments walls, groynes and beach and adaptation along Warden Cliffs (Do minimum)	d) Raise (sustain) embankments walls, groynes and beach and adaptation along Warden Cliffs
Costs	£ -	£ 150,000	£ 2,502,959	£ 5,399,629
Benefits	£ -	£ 2,162,000	£ 9,062,872	£ 9,545,050
NPV	£ -	£ 2,012,000	£ 6,559,913	£ 4,145,421
BCR	0.0	14.0	3.6	1.8
Environmental Scoring	575	575	575	700

Preferred Option Decision Making		
DLO	Leading Option at DLO Stage	Justification for Leading Option
DLO1 - Economic Assessment	Maintain (with capital works) embankments walls, groynes and beach. NAI and localised property adaptation along Warden Cliffs.	This option has the highest BCR and no other options have a BCR of greater than one.
DLO2 - Economic Sensitivities		
DLO3 - Review of Compensatory Intertidal Habitat Requirements		
DLO4 - Review of Compensatory Freshwater		
DLO5 - Modelling of Leading Options		
DLO6 - Consultation Phase		

Preferred Option Name
Maintain (with capital works) embankments walls, groynes and beach. No Active Intervention (NAI) and localised property adaptation along Warden Cliffs.

Preferred Option
Capital works will be undertaken on the defences to ensure that they remain in place, however the SoP will not be improved with sea level rise, so the current minimum SoP of 4% AEP will decline over time. There will be a NAI policy on the SSSI designated cliffs at Warden, but costs have been included for relocating property away from the cliff top.

Justification
This option has the highest BCR and an incremental BCR above 1. Other options do not have a high enough incremental benefit cost ratio to justify protecting to a higher standard of protection. Property relocation allows for management of the risk to residents whilst maintaining the integrity of the SSSI cliffs.

Preferred Option Costs														
<table><tr><th>Cost</th><th>Benefits</th><th>BCR</th><th colspan="2">PF Score</th></tr><tr><td>£ 2,771,368</td><td>£ 9,062,872</td><td>3.27</td><td colspan="2">23%</td></tr></table>					Cost	Benefits	BCR	PF Score		£ 2,771,368	£ 9,062,872	3.27	23%	
Cost	Benefits	BCR	PF Score											
£ 2,771,368	£ 9,062,872	3.27	23%											