TECHNICAL APPENDIX



Southwold IA

Economic Technical Appendix

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Introduction

This document is an appendix to the Southwold Initial Assessment (IA) and provides information on the economic assessment considered for the long-term flood and erosion risk management of the Southwold frontage.

Study Area

Southwold is situated on the north Suffolk coast and is fronted by the sea on its eastern edge and by the River Blyth to the south.

For the purposes of the IA, the study area is defined as the frontage from the southern boundary of Easton Bavent Cliffs in the north to the southern boundary of Southwold town in the south, as shown in Figure 1.



Figure 1 - Study Area including Southwold

Economic Assessment

Background to Methodology

The approach that has been adopted for this appraisal follows the recommendations as defined under the Environment Agency's Flood and Coastal Erosion Risk Management Guidance (FCERM-AG) (Environment Agency, 2010) and the Middlesex University Multi-Coloured Manual and Handbook (Flood Hazard Research Centre, 2013 and 2015). These documents set out the principles that should be followed in undertaking the economic appraisal for flood and coastal erosion risk management schemes.

The economic appraisal has been developed against a baseline scenario of the damages associated with doing nothing, known as the 'Do Nothing' scenario. The economic costs and benefits (damages avoided) of 'Do Something' options to reduce/delay the realisation and/or magnitude of flooding and erosion risks have then been quantified. This information is then used to make decisions regarding preferred approaches, in line with the decision rule process of FCERM-AG (where applicable).

The appraisal aims to determine the most economically justifiable defence strategy for the next 50 years and all costs and benefits have been discounted in accordance with the recommendations of the HM Treasury 'Green Book' (HM Treasury, 2003). The baseline date for the economic assessment is 2018 Q1. 'Year 0' of the strategy has been taken to be the financial year 2018-2019. Only costs to be incurred after this date (for the ongoing/approved schemes) are included.

Damage Mechanisms

The purpose of defence provision is to reduce flood and erosion risk to people, property and the environment. Therefore, central to the economic appraisal of a defence strategy is calculation of the damages prevented by that defence. The study frontage is currently entirely protected by man-made defence structures, so the assessment of damages is largely based on the performance of these structures with or without maintenance and/or improvement.

Erosion Damages

The 2004 Southwold Coastal Frontage Project Appraisal Report prepared by Halcrow Group Ltd assessed historic erosion rates for the Southwold frontage. The erosion rate assessment was undertaken by comparing the alignment of the coastline from historic maps at two known dates prior to the construction of the defences. Erosion damages were calculated in blocks of ten years following failure of the defences as shown in Annex 1.

The historic erosion rates for the study area have been applied to the Southwold Town frontage at the predicted defence failure date. It is predicted that should no work be undertaken to maintain the existing defences over the Southwold Town frontage, then beach levels would steadily drop and a failure of the defences would occur over Years 18 to 28 (2036 to 2046). It is considered that the northern end would fail first due to its proximity to the critical Easton Marshes section, failure would then progress south as the frontage 'unzips', leading to failure of the southern-most section. For the erosion benefit analysis, failure of the Southwold Town frontage is assumed to occur in Year 18. The SMP also undertook an erosion analysis based on fixed points of 500 m intervals for a range of scenarios but the PAR approach was adopted as it will be at a higher level of detail for the Southwold frontage.

To calculate the damages that would result from erosion of the cliffline it was assumed that no erosion of the hinterland would occur until the defences fronting the area had failed. Once the defences had been assumed to fail it was possible to determine the extent of erosion at any time over the 50 year life of the scheme.

To calculate the damages relating to the other options the following assumptions were made:

• Do minimum – erosion damages were delayed by 5 years

• Maintain – defences would be maintained over the full 50 years of the strategy.

Flood Damages

Flooding by seawater can occur as a result of either overflow or overtopping of coastal or river structures. Overflow is experienced when water levels exceed the height of flood prevention structures; overtopping is experienced when water passes over the flood prevention structures due to wave action.

The primary risk of flooding is tidal flooding following breaching of the Easton Marshes seawall. Based on the current condition it is estimated that the defence has a residual life of < 5 years. Therefore, a breach could be expected by year 5 if no action is taken.

For the 2004 Southwold Coastal Frontage Project Appraisal Report (Halcrow Group Ltd) a flood distribution model was used to predict the extent and depth of flooding over a topographic grid, following a 100m breach in the seawall. The model outputs are shown in Annex 2. The western limit of the flood extent is defined by the embankment at Botany Marshes which was constructed as a recommendation of the 2005 PAR.

The flood extents and depths from the 2004 flood distribution model have been combined with georeferenced National Receptor Dataset and checked against Google and Bing maps and local knowledge to determine the assets at risk once breach occurs.

Assessment of Benefits

Present Value (PV) flood damages are calculated for the Do Nothing scenario by interpolating linearly between the modelled time epochs (years 0 and 49) to calculate an Annual Average Damage (AAD) for every year and discounting at the approved rate, whilst residential and commercial flood damages are capped at appropriate values.

Flood damages were estimated for the No Active Intervention, Do Minimum and Maintain options. The Maintain option ensures the avoidance of all damages due to coastal erosion and all damages due to flooding following breach. Recurrent flood damages remain where flooding occurs on return periods greater than the current standard of protection (taken as 0.5% AEP (1 in 200) return period). In accordance with The Green Book – Appraisal and Evaluation in Central Government (HM Treasury, 2003), an initial discount rate of 3.5% has been used for the assessment of all present value benefits and costs for Years 0 to 30, a rate of 3.0% for Years 31 to 75 and a rate of 2.5% thereafter.

A 50 year appraisal period has been used in accordance with FCERM-AG to ensure an appropriate period over which a robust comparison of shortlisted options can be made.

For development of the financial business case and partnership funding calculator for the preferred option a 15 year benefit period is adopted.

Residential Damages

Residential properties in the risk areas were identified from the National Receptor Dataset (NRD).

The NRD data was verified using Google and OS maps to confirm the number of residential and nonresidential properties. The review confirmed that there are approximately 61 residential properties and 39 non-residential properties affected under a 0.5% Annual Exceedance Probability (AEP) 1 in 200 return period on breach of the Easton marshes frontage. With regard to erosion damages, between year 18 and 28 then 81 non-residential properties are assumed lost to erosion (the majority of these are beach huts) but 0 residential properties are predicted to be affected up to year 28.

The market value of the residential properties in Southwold were identified using Land Registry information for the East of England (<u>http://houseprices.landregistry.gov.uk</u>) and updated to 2018 prices

using GDP Deflator Inflation Indices to the base date of Q1 2018. These values were used as write off and capping damage values.

Non-Residential Property Damages

Non-Residential Properties were identified from the National Receptor Dataset (NRD). Non-residential properties include properties such as shops, public conveniences and car parks. Market values were estimated from rateable values derived from (<u>https://www.gov.uk/government/statistics/non-domestic-rating-business-floorspace</u>) for the East Region and a yield factor as described in the MCM. The non-residential property market values have been updated using GDP deflator indices to Q1 2018.

A review of the non-residential properties listed was undertaken and where necessary MCM codes and areas were updated from a review of Google Earth. Street records and duplicate records were excluded from the assessment.

Recreational and amenity benefits

For the 2004 Project Appraisal Report (Halcrow Group Ltd) an assessment was undertaken to assess the recreational and amenity benefits of the preferred option in accordance with the MCM. The details of the PAR assessment are outlined in Appendix D of the 2005 PAR.

The analysis applied the perceived benefits from a recent recreational benefit study undertaken for a scheme at nearby Corton to Southwold visitor numbers provided by Waveney District Council (WDC).

For this Initial Assessment, the updated monetary gains and losses per adult visit with coastal protection scheme options for the Corton location were obtained from the 2018 MCM (Table 8.3) (FHRC, 2018).

Updated visitor numbers were obtained from the Economic Impact of Tourism Report, Southwold - 2015 produced by Destination Research. This report records that in 2015 there were a total of 1,393,000 day trips to Southwold and 174,000 staying nights. This gives an average of 1.567m visitors each year.

The Sunrise Coast Visitor Survey (WDC, 2003 cited in PAR 2004) for Southwold concludes that around 68% of visitors will visit the beach and 78% will visit the pier. For the recreational benefit analysis, to make a conservative assessment, it has been assumed that 50% of Southwold visitors (783,000) will visit the frontage annually. Of these, it has been assumed that most will visit the beach south of the Pier and only 20% visit the beach north of the Pier, which is relevant to the Easton Marshes analysis. These figures were used to convert the figures in MCM Table 8.3 into annual damages. Benefits and losses are calculated against the current seafront assessment (it was assumed that should the beach be maintained in its original condition there would be no associated benefit or loss).

The updated recreational and amenity benefits have been applied for a 50 year benefit period.

Transport Damages

Under the Do Nothing option, a cost of £2,760,469 is included in Year 5 to rebuild the A1095 access road and bridge between Reydon and Southwold. This is based on the cost to build an improved road and bridge in its existing location in Year 5 to resist future flood events.

A cost of £2,324,153 is included in Year 10 for the Do Minimum option.

Other Damages

In addition, the following assumptions were made in the economic assessment:

• The human related intangible benefits guidance calculates an economic value for the benefit of avoiding flooding based on the number of households and the standard of flood protection prior to and after implementation of the management option. The benefit is added to Improve schemes to monetise the effects of reduced stress (Defra, 2003). Human related intangible benefits have been valued in monetary terms in the economic damages assessment.

• Risk of injury or loss of life from flooding has been valued in monetary terms in the economic damages assessment. The FCERM-AG Risk to life guidance calculates an economic value for the risk to life in the flood area based on the number of properties at risk, the likely flood water velocity at those properties and the probability of failure of the defence.

Do Nothing

Damages have been accrued due to the loss of properties due to erosion. Erosion assets have been written off at the approximate year of erosion loss as predicted in the erosion trend lines in Annex 1.

Flood damages are incurred by assets due to extreme water level flooding from tidal water conditions following a breach in the defences. The onset of flooding has been linked to relate to the timing of failure of defences along the frontage. Under the Do Nothing all residential properties are written off under a 100% AEP (1 in 1) event on the occurrence of a breach in year 5.

A breakdown of the properties at risk from flooding and the results of Do Nothing economic analysis are summarised in Table 1.

Assets		PV Damages (£)
_		(50 year appraisal period)
Erosion	Residential property (write off)	2,494,055.62
	Non-residential property (write off)	2,355,983.24
Total Erosion Damages		4,850,039
Flood	Direct Residential Damage incl write-offs	13,029,308
	Direct NRP Damage incl write-offs	3,142,928
	Residential accommodation/evacuation	1,200,293
	NRP Indirect	258,537
	Vehicle Damages	688,329
	Emergency Response and Recovery	2,418,808
	Risk to Life	0
Total Flooding Damage	S	20,738,204
Transport Damages		2,760,049
Recreational and Amenity Damages		28,124,194
	Total PV Damages	56,473,246

Table 1 – Do Nothing Damage Summary (50 year appraisal period)

Do Something

Following the implementation of a Do Something option, there remains the possibility of damage occurring during extreme events. The damages that occur with an active intervention option in place are referred to as 'residual damages'. The difference between these damages and the damages sustained

under a Do Nothing option are termed the 'benefit', effectively valuing the benefit that the active intervention will bring.

Do Minimum

Reactive repair to defences along the tidal frontage is undertaken until it is probable that the poor state of the defences will prevent further repair. This will delay failure of defences by 5 years with breach delayed to year 10 at Easton Marshes and erosion delayed to year 23 along the Southwold frontage.

Maintain Options

The Maintain option involves the continuation of present practice, including the maintenance of the flood and coastal erosion assets, i.e., flood walls and control structures, and beach management.

The damages for Do Something options are presented in Table 2.

Do Something Option	PV Damages (£) (50 year appraisal period)
Do Minimum	54,203,049
Maintain	741,999

Table 2 – Do Something Present Value Damages (50 year appraisal period)

Assessment of Costs

Costs for the short listed options have been estimated in accordance with the FCERM-AG. Costs are estimated over the 50 year appraisal period to derive a Present Value (PV) cost for each option. This PV cost includes all costs that can reasonably be foreseen over the appraisal period including:

- Design costs (consultancy and client fees);
- Capital works costs;
- Maintenance costs.

Construction cost estimates have been determined for all short listed options from a review of similar schemes. Professional fees and additional costs have been derived by the project team and benchmarked against similar projects. The base date for all costs is 2018 Q1.

Table 3 describes the method for determining costs for the significant items. Generally, quantities were considered on a per linear metre basis but the table details where greater detail was considered.

Cost	Method of determining costs	Future considerations	
Beach Nourishment	Based on ENBE calculations of losses and PAR nourishment volumes.	Undertake full beach profile analysis along frontage to present day to have greater certainty in losses. Modelling of beach development.	
Timber groyne works	Per linear metre determination.	Modelling/analysis to fine tune characteristics of control structures.	

Table 3 - Method of determining quantity by item

Rock groyne works	Per linear metre determination.	Estimation of section from consideration of bed and water levels. Modelling/analysis to fine tune characteristics of control structures.
Rock revetment works	Based on approximation of section from consideration of recent beach dip analysis and per volume rates.	Confirm section with longer term analysis of beach levels at wall.
Seawall plating	Per linear metre determination.	Increase understanding of the condition of seawall.

To establish the costs the study area frontage has been split into three sections due to the different constraints and drivers affecting coastal protection and/or the lead authority responsible for the frontage. The identified frontages are:

- Waveney District Council (WDC) town frontage, located south of the pier
- WDC Easton Marshes (EM) frontage; located north of the pier
- Environment Agency (EA) Easton Marshes frontage; located north of the pier from the access ramp to the start of the cliffs at Easton Bavents.

Options identified in the options appraisal are detailed in Table 4 to Table 6.

Table 4 - Options shortlisted for WDC town frontage

Short-list ID	Option	Cost category
TF BL 1	Do Nothing (No repair)	Do Nothing
TF BL 2	Do Minimum (Patch and repair)	Do Minimum
TF SL 1	Beach Nourishment (existing grading)	Maintain
TF SL 2	Lengthen timber groyne(s)	Maintain
TF SL 3	Reduce timber groyne spacing	Maintain
TF SL 4	Modify timber groynes (T-Head)	Maintain

Table 5 - Options shortlisted for WDC Easton Marshes frontage

Short-list ID	Option	Cost category
WEM BL 1	Do Nothing (No repair)	Do Nothing
WEM BL 2	Do Minimum (Patch and repair)	Do Minimum
WEM SL 1	Modification of existing groyne length	Maintain
WEM SL 2	Modification of existing groyne spacing	Maintain
WEM SL 3	Modification of existing groyne shape/type (T-Head)	Maintain

Table 6 - Options shortlisted for EA Easton Marshes frontage

Short-list ID	Option	Cost category
EAEM BL 1	Do Nothing (No repair)	Do Nothing
EAEM BL 2	Do Minimum (Patch and repair)	Do Minimum
EAEM SL 1	Retain existing groynes, create new rock revetment and construct new northern control structure (J Groyne)	Maintain
EAEM SL 2	Dismantle existing groynes, create new rock revetment ad construct new northern control structure (J Groyne)	Maintain

The options identified were further considered to account for interaction between the separate frontages and to enable a consistent approach to be adopted along the whole frontage and appropriate costs established. This resulted in sub-options which have been labelled as sensitivities and are described in Table 7.

Table 7 – Option sensitivities

Frontage	Sensitivity	Compatibility
WDC Town frontage	No sensitivities – it is assumed all town frontage options are compatible with options north of the pier	All options
WDC Easton Marshes	Sensitivty a – assumes that groynes remain to EA EM frontage and therefore options are based on pressure being delayed on the WDC EM frontage. As this option delays the pressure reaching the WDC EM frontage deferring costs to the Waveney frontages to later in the appraisal period would be justifiable.	Compatible with EAEM SL1
	Sensitivity c – assumes that groynes are removed along EA EM frontage with rock revetment installed and pressure point is the northern extent of WDC EM.	Compatible with EAEM SL2 a
	Sensitivity e – assumes that groynes are removed along EA frontage and also the most northerly groyne in the WDC EM frontage with the rock revetment extended south. Option moves pressure point in to WDC EM frontage.	Compatible with EAEM SL2b
EA Easton Marshes	Sensitivity a – assumes that the revetment only extends to the most northern groyne in the WDC EM frontage	Compatible with WEM SL # c
	Sensitivity b – assumes that revetment extends into the WDC EM frontage.	Compatible with WEM SL # e

More detailed assumptions adopted for the development of costs for each option and sub-option are described in Table A3 1 to Table A3 3 in Annex 3.

A summary of the primary cost components in each Do Something option are also outlined in Annex 3.

Table A3 4 to Table A3 8 within the annex detail the cash and PV costs of the individual options and sensitivities.

Table A3 9 to Table A3 12 provide the itemised breakdown of the whole life cash costs.

To aid in selecting a preferred option, combinations of costs for the individual frontages were considered. Table A3 13 to Table A3 14 in Annex 3 detail all combinations considered. Table 8 provides a

description of the combination options considered for the preferred options and Table 9 the combined costs for the options likely to be selected as the preferred option.

The total PV cost over the life of the scheme is then subjected to an Optimism Bias (OB) adjustment. An OB of 60% has been assumed for the IA.

The PV cost calculator for combination options is attached to this document, labelled Annex 3_PV_Costs _Combined_Options.

Option number	Combination description	Options combined	
Combination 1	Do Minimum - All frontages (Note 23 years at WDC	(TF BL 2, WEM BL 2, EAEM BL	
	Town and 10 years along Easton Marshes)	2)	
	Cheapest Technical Option - Reduce groyne spacing		
	WDC Town, reduce groyne spacing and Revetment		
Combination 2	from R3-Easton Bavents including transition	TF SL 1, WEM SL 2 e, EAEM SL	
(Maintain 1)	structure at R4 and reduced WDC EM scheme (R1-	2 b)	
	R3)		
	Preferred Technical Option - Reduce spacing at town		
Combination 3 (Maintain 2)	frontage, rock T-Heads at WDC EM frontage and		
	revetment at EA EM frontage with groynes	1)	
	remaining intact	-)	
Combination 8	Preferred Technical Option with deferred cost at	(TE SL 3 DEE, WEL SL 3 a DEE,	
(Maintain 3)	WDC Frontage.	EAEM SL 1)	
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Table 9 -	Combination	costs
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Option number	Combination 1 Do Minimum	Combination 2 Cheapest Technical Option	Combination 3 Preferred Technical Option	Combination 8 Preferred Technical Option - Deferred
		Maintain 1	Maintain 2	Maintain 3
WDC Town	0	2,411,532	2,411,532	1,626,532
WDC Easton Marshes	0	2,189,350	1,997,650	1,430,600
EA Easton Marshes	0	2,015,300	2,149,700	2,149,700
Cash capital costs	0	6,616,182	6,558,882	5,206,832
WDC Town	840,000	1,094,210	1,094,210	919,234
WDC Easton Marshes	98,820	613,290	380,640	331,290
EA Easton Marshes	105,480	504,960	504,960	504,960
Cash operation and maintenance costs	1,044,300	2,212,460	1,979,810	1,755,484
WDC Town	0	100,000	100,000	100,000
WDC Easton Marshes	0	100,000	125,000	125,000
EA Easton Marshes	0	125,000	125,000	125,000
Cash Other Costs (Detailed design fees, Surveys etc.)	0	325,000	350,000	350,000

TOTAL CASH COSTS Excluding OB	1,044,300	9,153,642	8,888,692	7,312,316
OPTIMISM BIAS (OB) (60%)	626,580	5,492,185	5,333,215	4,387,390
TOTAL CASH COSTS. Including	1,670,880	14,645,828	14,221,908	11,699,706
OB				
WDC Town	0	1,147,394	1,147,394	629,406
WDC Easton Marshes	0	1,300,107	1,417,355	813,805
EA Easton Marshes	0	1,745,603	1,958,095	1,958,095
PV capital costs	0	4,193,104	4,522,844	3,401,306
WDC Town	489,910	500,663	500,663	399,657
WDC Easton Marshes	80,676	261,361	169,437	141,228
EA Easton Marshes	86,113	229,261	229,261	229,261
PV operation and	656,699	991,285	899,361	770,146
maintenance costs				
WDC Town	0	96,618	96,618	96,618
WDC Easton Marshes	0	96,618	120,773	120,773
EA Easton Marshes	0	120,773	120,773	120,773
PV other (Detailed design fees,	0	314,010	338,164	338,164
Surveys etc.)				
TOTAL PV COSTS. Excluding OB	656,699	5,498,398	5,760,370	4,509,616
OPTIMISM BIAS (OB) (60%)	394,019	3,299,039	3,456,222	2,705,770
TOTAL PV COSTS. Including OB	1,050,718	8,797,437	9,216,591	7,215,386
Cash Construction costs (yr 2)	0	3,143,950	3,857,200	2,209,700

The present value costs for both the cheapest and preferred technical option are relatively close (less than 300k in PV costs, less whole life cash costs). Adopting the preferred technical option of leaving the groynes along the EA frontage would justify the delay of implementation of the preferred scheme to the Waveney frontages as the pressure would be delayed when compared to the options which remove the groynes along the EA EM frontage.

Table 10 provides a breakdown of the whole life cash costs by item of works before optimism bias is applied. Table 11 includes optimism bias.

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	Combination 1 Do Minimum	Combination 2 Cheapest Technical Option	Combination 3 Preferred Technical Option	Combination 8 Preferred Technical Option
		option		- Deferred
		Maintain 1	Maintain 2	Maintain 3
Beach nourishment and recycling	0	1,401,532	1,814,032	1,414,032
Timber groyne works	0	1,740,000	1,560,000	900,000
Rock groyne works and modifications	0	478,000	855,500	855,500
Rock revetment works	0	2348400	1,791,600	1,537,800

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Seawall plating	0	633,250	522,750	484,500
Access works	0	15,000	15,000	15,000
Capital TOTAL (£)	1,044,300	6,616,182	6,558,882	5,206,832
Rock structures	204,300	810,320	758,880	709,530
maintenance				
Timber groynes	0	1,096,860	915,650	803,914
maintenance and				
refurbishment				
Seawall maintenance	0	305,280	305,280	242,040
Beach recycling	840,000	0	0	0
MAINTENANCE TOTAL (£)	0	2,212,460	1,979,810	1,755,484
Design & Survey (£)	0	325,000	350,000	350,000
TOTAL (£)	1,044,300	9,153,642	8,888,692	7,312,316

Table 11 Whole life cash cost breakdown of combination options including optimism bias

	Combination 1 Do Minimum	Combination 2 Cheapest Technical Option	Combination 3 Preferred Technical Option	Combination 8 Preferred Technical Option - Deferred
		Maintain 1	Maintain 2	Maintain 3
Beach nourishment and recycling	0	2,242,452	2,902,452	2,262,452
Timber groyne works	0	2,784,000	2,496,000	1,440,000
Rock groyne works and modifications	0	764,800	1,368,800	1,368,800
Rock revetment works	0	3,757,440	2,866,560	2,460,480
Seawall plating	0	1,013,200	836,400	775,200
Access works	0	24,000	24,000	24,000
Capital TOTAL (£)	0	10,585,892	10,494,212	8,330,932
Rock structures maintenance	326,880	1,296,512	1,214,208	1,135,248
Timber groynes maintenance and refurbishment	0	1,754,976	1,465,040	1,286,262
Seawall maintenance	0	488,448	488,448	387,264
Beach recycling	1,344,000	0	0	0
MAINTENANCE TOTAL (£)	0	3,539,936	3,167,696	2,808,775
Design & Survey (£)	0	520,000	560,000	560,000
TOTAL (£)	1,670,880	14,645,828	14,221,908	11,699,706

Identification of the Preferred Option

Cost Benefit Analysis

The CBA has been carried out in accordance with the procedures in FCERM-AG. The baseline CBA results are presented in Table 12. Maintain 3 (Combination 8) has the highest BCR and is identified as the economic leading option.

	<u>Proje</u>	ct Summary Sheet			
Client/Authority				Prepared (date)	17/09/2018
Waveney District Council				Printed	16/10/2018
Project name				Prepared by	LKUI
Project reference				Checked by	
Base date for estimates (vear 0)		2018 Q1		oneoned date	
Scaling factor (e.g. £m, £k, £)		£	(used for all costs	, losses and benef	its)
Year		0	30	75	, ,
Discount Rate		3.5%	3.00%	2.50%	
Optimism bias adjustment factor		60%			
Costs and benefits of options					
Ordina averbas	Outland	Costs and benefits £	Outland	Outland	Outlan 5
Option number	Option 1	Do Minimum All frontagos	Option 3 Maintain 1	Option 4 Maintain 2	Option 5
Option name	Flooding due to breach in	Elooding due to breach in	Iviantant 1 -	Ividii itdii i 2 -	Ivian tain 3 -
	vear 5 onset of erosion at	year 10 erosion delayed by			
AEP or SoP (where relevant)	Southwold in year 18	5 years	Maintain	Maintain	Maintain
COSTS:					
PV capital costs	0	656,699	4,193,104	4,522,844	3,401,306
PV operation and maintenance costs	0	0	991,285	899,361	770, 146
PV other	0	0	314,010	338,164	338, 164
Optimism bias adjustment	0	394,019	3,299,039	3,456,222	2,705,770
PV negative costs (e.g. sales)	0	0	0	0	0
PV contributions					
Total PV Costs £ excluding contributions	0	1,050,718	8,797,437	9,216,591	7,215,386
Total PV Costs £ taking contributions into account	0	1,050,718	8,797,437	9,216,591	7,215,386
Pl/ monetised flood damages	20 729 204	10 960 339	7/1 000	7/1 000	7/1 000
PV monetised flood damages avoided	20,730,204	877 866	19 996 205	19 996 205	19 996 205
PV monetised erosion damages	4 850 039	3 893 603	10,000,200	.0,000,200	.0,000,200
PV monetised erosion damages avoided (protected)	4,000,000	956.436	4,850.039	4,850.039	4,850.039
Transport damages	2,760,049	2,324,153	,,	,,	,,
Recreational and amenity damages	28,124,954	28,124,954			
Total monetised PV damages £	56,473,246	54,203,049	741,999	741,999	741,999
Total monetised PV benefits £		2,270,197	55,731,247	55,731,247	55,731,247
PV damages (from scoring and weighting)					
PV damages avoided/benefits (from scoring and weighting)					
PV benefits from ecosystem services	EC 472 246	F4 202 040	741 000	741.000	741.000
Total PV damages £	00,473,240	2 270 197	741,999 55 731 247	741,999 55 731 247	741,999 55 731 247
		2,270,197	33,731,247	33,731,247	33,731,247
excluding contributions					
Based on total PV benefits (in cludes benefits from scoring an	d weighting and ecosystem	services)			
Net Present Value NPV		1,219,479	46,933,810	46,514,656	48,515,861
Average benefit/cost ratio BCR		2.2	6.3	6.0	7.7
Incremental benefit/cost ratio IBCR			6.9	6.5	8.7
					Highest bcr
			IBCR>1	IBCR>1	IBCR>1
Based on monetised PV benefits (ex cludes benefits from sco	ring and weighting and ecos	system services)	10.000.010	10.511.050	10 515 001
Net Present Value NPV		1,219,479	46,933,810	46,514,656	48,515,861
Average benefit/cost ratio BCR		2.2	6.3	6.0	/./
			0.9	0.5	0.7 Highest bor
			IBCR>1	IBCR>1	IBCR>1
including contributions					
Taking account of contributions (in cludes benefits from score	ing and weighting and ecosy	stem services)			
Net Present Value NPV		1,219,479	46,933,810	46,514,656	48,515,861
Average benefit/cost ratio BCR		2.2	6.3	6.0	7.7
Incremental benefit/cost ratio IBCR			6.9	6.5	8.7
					Highest bcr
Pasad on monoticad DV honofita (or alvalas honofita for	ring and weighting and a	sustam convices)	IBCR>1	IBCR>1	IBCR>1
Desent Value NEV	ning and weighting and ecos	ysterri services)	46 022 910	16 514 6FC	18 515 961
Average benefit/cost ratio BCP		1,219,479	63	6.0	7 7
Incremental benefit/cost ratio BCR		2.2	6.9	6.5	87
			0.0	0.0	Highest bcr
			IBCR>1	IBCR>1	IBCR>1
Best practicable environmental option (WFD)					
Brief description of options:					
Option 1	Do-nothing				
	Do Minimum - All frontages ((Note 23 years at WDC Town a	and 10 years along	J Easton Marshes)	(TF BL 2, WEM
Option 2	BL 2, EAEM BL 2)				
	Maintain 1 - Cheapest Techr	nical Option - Reduce groyne s	pacing WDC Tow	n, Reduce groyne	spacing and
	Revetment from R3-Easton E	Bavents including transition stru	ucture at R4 and re	duced WDC EM	scheme (R1-
Option 3	R3)TF SL 1, WEM SL 2 e, E	AEM SL 2 b)			
	Maintain 2 - Preferred Techr	nical Option - Reduce spacing	at town frontage, r	ock T-Heads at W	DC EM
	frontange and revetment at E	A EM frontage with groynes r	emaining in tact		
Option 4	(IF SL 3, WEM SL 3 a, EAE	=M SL 1)			
	Maintain 3 - Preferred Techr	nical Option with deferred cost	at WDC Frontage	-	
Option 5	(TF SL 3 DEF, WEL SL 3 a	DEF, EAEM SL 1)			
Comments and assumptions					
commente ana assumptions.					

Table 12 – FCDPAG Summary Sheet (50 year appraisal period)

Partnership Funding Calculators

The completed partnership funding calculator(s) are provided in Annex 4. A 15 year benefit period is used as this is the duration of time, after works are complete, before the next major investment, where a major investment is defined as "the next capital investment that exceeds 20% of this projects costs".

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Flood Hazard Research Centre (FHRC) (2015) Multicoloured Handbook for Economic Appraisal and CD.

HM Treasury, 2003. The Green Book – Appraisal and Evaluation in Central Government.

Annex 1 Erosion Trendlines



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Annex 2 Flood mapping



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1,000 Metres

Annex 3 Whole life costs

Cost assumptions

Table A3 1 Cost assumptions - WDC town frontage

WDC Town frontage	costing assumptions			
Option description	To construction	Capital costs	Maintenance requirements	Future costs
TF BL 1		No capital costs	No maintenance	No future costs
Do Nothing				
TF BL DM		No capital costs	No maintenance costs	Recycle Beach Material. Recycling would move
Do Minimum (Residual life = 23 years)				from lowering beach levels. No amenity consideration. Assume Year 7, 12, 16, 19, 21, 22 from year 0.
TF SL 1 Beach Nourishment (50- year appraisal period)	£65,000 for detailed design which includes £15,000 for surveys.	Beach renourishment in year 2 to bays T6-R1. Volume based on ENBE, 2016 calculations of beach volume change.	Refurbishments of groynes T6, T7 and T8 in year 2. Maintain timber groynes annually – assume maintenance requirement increases 2.5% annually due to deterioration and damage caused by exposure to sand and shingle in the surf-zone. This will return to initial value following groyne rebuild. Maintain seawall annually. Assumes seawall will be protected by renourished beach.	Renourish beach at the following frequency following construction; year 10,19,27,34,40,45 at T6-R1. Bays T1-T6, where bays have been performing better renourish every 15 years post construction. Volume based on previous volume installed during previous works (T1-T6). 25% of previous scheme recharge. Assume 5,000 m ³ of material would be available from recycling every 15 years. Rebuild groynes in year 20 and year 40 from
TF SL 2 Lengthen Timber Groynes (50-year appraisal period)	£100,000 for detailed design which includes £25,000 for surveys.	Extend timber groynes using timber. Length of extension based on reducing length to spacing ratio to 1.5. Beach renourishment in year 2 to bays T6-R1. Volume based on ENBE, 2016 calculations of beach volume change.	Refurbishments of groynes T6, T7 and T8 in year 2. Maintain timber groynes annually – assume maintenance requirement increases 2.5% annually due to deterioration and damage caused by exposure to sand and shingle in the surf-zone. This will return to initial value following groyne rebuild.	construction. Renourish beach at the following frequency following construction; year 15, 28, 39, 48 at T6- R1. Assume 25% of initial recharge. Bays T1-T6, where bays have been performing better renourish every 15 years post construction. Volume based on previous volume installed during previous works (T1-T6). Assume 25% of previous scheme recharge.

WDC Town frontage costing assumptions						
Option description	To construction	Capital costs	Maintenance requirements	Future costs		
			Maintain seawall annually. Assumes seawall will be protected by renourished beach.	Assume 5,000 m ³ of material would be available from recycling every 15 years. Rebuild groynes in year 20 and year 40 from construction.		
TF SL 3 Reduce Groyne Spacing (50-ear appraisal period)	£100,000 for detailed design which includes £25,000 for surveys.	Additional groynes between T6 and T7 and T7 and T8. Length of additional groynes based on achieving a spacing to length ratio of 1.5. Beach renourishment in year 2 to bays T6-R1. Volume based on ENBE, 2016 calculations of beach volume change.	Refurbishments of groynes T6, T7 and T8 in year 2. Maintain timber groynes annually – assume maintenance requirement increases 2.5% annually due to deterioration and damage caused by exposure to sand and shingle in the surf-zone. This will return to initial value following groyne rebuild. Maintain seawall annually. Assumes seawall will be protected by renourished beach.	Renourish beach at the following frequency following construction; year 15, 28, 39, 48 at T6- R1. Assume 25% of initial recharge. Bays T1-T6, where bays have been performing better renourish every 15 years post construction. Volume based on previous volume installed during previous works (T1-T6). Assume 25% of previous scheme recharge. Assume 5,000 m ³ of material would be available from recycling every 15 years. Rebuild groynes in year 20 and year 40 from construction.		
TF SL 4 Create T-Head with Rock (50-year appraisal period)	£125,000 for detailed design which includes £25,000 for surveys.	Create T-Head with rock to end of existing timber groynes. Assume effective bay width is based on achieving a ratio of spacing to groyne length of 1.5. Beach renourishment in year 2 to bays T6-R1. Volume based on ENBE, 2016 calculations of beach volume change.	Refurbishments of groynes T6, T7 and T8 in year 2. Maintain timber groynes annually – assume maintenance requirement increases 2.5% annually due to deterioration and damage caused by exposure to sand and shingle in the surf-zone. This will return to initial value following groyne rebuild. Maintain rock T-Head annually. Maintain seawall annually. Assumes seawall will protected by renourished beach.	Renourish beach at the following frequency following construction; year 18, 34, 48 at T6-R1. Assume 25% of initial recharge. Bays T1-T6, where bays have been performing better renourish every 15 years post construction. Volume based on previous volume installed during previous works (T1-T6). Assume 25% of previous scheme recharge. Assume 5,000 m ³ of material would be available from recycling every 15 years. Rebuild groynes in year 20 and year 40 from construction.		

Table A3 2 Cost assumptions - WDC Easton Marshes frontage

WDC Easton Marshes frontage costing assumptions						
Option description	To construction	Capital costs	Maintenance requirements	Future costs		
WEM BL 1		No capital costs	No maintenance	No future costs		
Do Nothing						
WEM BL 2		No capital costs	No maintenance	Move rock from existing structures to protect		
Do Minimum (Residual life = 10 years)				structures moved every 3 years from year 0.		
Se	ensitivity a - WDC Eas	ton Marshes based on adoption of EA option	on "EAEM SL 1" retaining groynes with future rev	etment works along WDC EM.		
WEM SL 1 a Modification of existing groyne length (50-year appraisal period)	£100,000 for detailed design which includes £25,000 for surveys.	Lengthen Groynes R2, R3 and R4 to 60m length to achieve ratio of groyne spacing to length of 1.5. Nourishment to bays R1-R2, R2-R3 and R3-R4 based on ENBE calculations. Assume total value to replace calculated losses. Rock Revetment R4-Ramp including Steel Plating to whole length.	Maintain rock groynes annually. Assume presence of beach will provide some protection from fluctuating beach levels. Maintain seawall annually. Maintain rock revetment annually and incorporating future installations.	To provide protection to seawall in future a rock revetment should be installed along the whole frontage along with plating to 25% of sheet pile toe of seawall. Rock Revetment year 30 to R3- R4 and year 40 to R2-R3. Renourish beach with 25% of initial nourishment in year 15, 28, 39 and 48.		
WEM SL 2 a Modification of existing groyne spacing (50-year appraisal period)	£100,000 for detailed design which includes £25,000 for surveys.	Construct 30m long intermediate timber groynes at centre of bays R2-R3 and R3-R4. Length based on achieving a spacing to length ratio of 1.5. Nourishment to bays R1-R2, R2-R3 and R3-R4 based on ENBE calculations. Assume total value to replace calculated losses. Rock Revetment R4-Ramp including Steel Plating to whole length.	Maintain rock groynes annually. Assume presence of beach will provide some protection from fluctuating beach levels. Maintain timber groynes annually – assume maintenance requirement increases 2.5% annually due to deterioration and damage caused by exposure to sand and shingle in the surf-zone. This will return to initial value following groyne rebuild. Maintain seawall annually.	To provide protection to seawall in future a rock revetment should be installed along the whole frontage along with plating to 25% of sheet pile toe of seawall. Rock Revetment year 30 to R3- R4 and year 40 to R2-R3. Renourish beach with 25% of initial nourishment in year 15, 28, 39 and 48. Groyne rebuild of timber groynes required in year 20 and year 40.		

WDC Easton Marshes frontage costing assumptions						
Option description	To construction	Capital costs	Maintenance requirements	Future costs		
			Maintain rock revetment annually and incorporating future installations.			
WEM SL 3 a Modification of existing groyne shape (50-year appraisal period)	£125,000 for detailed design which includes £25,000 for surveys.	Construction of 22.5m rock T-Head on end of existing rock groynes R2 to R4. Assume effective bay width is based on achieving a ratio of spacing to groyne length of 1.5. Nourishment to bays R1-R2, R2-R3 and R3-R4 based on ENBE calculations. Assume total value to replace calculated losses. Rock Revetment R4-Ramp including Steel Plating to whole length.	Maintain rock groynes and T-Head annually. Assume presence of beach will provide some protection from fluctuating beach levels. Maintain seawall annually. Maintain rock revetment annually and incorporating future installations.	To provide protection to seawall in future a rock revetment should be installed along the whole frontage along with plating to 25% of sheet pile toe of seawall. Rock Revetment year 40 to R3- R4 Renourish beach with 25% of initial nourishment in year 18, 34, 48 from construction.		
Sensitivity b - Not re	ported					
Sensitivity c - WDC E revetment along WD	aston Marshes based CEM to provide prote	on adoption of EA option "EAEM SL 2 a" weetion to seawall.	hich removes groynes R5-R8 and Install half groy	ne at R5 to smooth transition with future		
WEM SL 1 c Modification of existing groyne length (50-year appraisal period)	£100,000 for detailed design which includes £25,000 for surveys.	Lengthen Groynes R1, R2, R3 and R4 to 60m length to achieve ratio of groyne spacing to length of 1.5. Nourishment to bays R1-2, R2-R3 and R3-R4 based on ENBE calculations. Assume total value to replace calculated losses. Rock Revetment R4-Ramp including Steel Plating to whole length.	Maintain rock groynes annually. Assume presence of beach will provide some protection from fluctuating beach levels. Maintain seawall annually. Maintain rock revetment annually and incorporating future installations.	To provide protection to seawall in future a rock revetment should be installed along the whole frontage along with plating to 25% of sheet pile toe of seawall. Rock Revetment year 25 to R3- R4 and year 35 to R2-R3 from construction. Renourish beach with 25% of initial nourishment in year 15, 27, 37 and 45 from construction.		
WEM SL 2 c Modification of existing groyne spacing (50-year appraisal period)	£100,000 for detailed design which includes £25,000 for surveys.	Construct 30m long intermediate timber groynes at centre of bays R1-R2, R2-R3 and R3-R4. Length based on achieving a spacing to length ratio of 1.5. Nourishment to bays R1-R2, R2-R3 and R3-R4 based on ENBE calculations. Assume total value to replace calculated losses.	Maintain rock groynes annually. Assume presence of beach will provide some protection from fluctuating beach levels. Maintain timber groynes annually – assume maintenance requirement increases 2.5% annually due to deterioration and damage caused by exposure to sand and shingle in the surf-zone. This will return to initial value following groyne rebuild.	To provide protection to seawall in future a rock revetment should be installed along the whole frontage along with plating to 25% of sheet pile toe of seawall. Rock Revetment year 25 to R3- R4 and year 35 to R2-R3 from construction. Renourish beach with 25% of initial nourishment in year 15, 27, 37 and 45 from construction.		

WDC Easton Marshes	WDC Easton Marshes frontage costing assumptions						
Option description	To construction	Capital costs	Maintenance requirements	Future costs			
		Rock Revetment R4-Ramp including Steel Plating to whole length.	Maintain seawall annually. Maintain rock revetment annually and incorporating future installations.	Groyne rebuild of timber groynes required in year 20 and year 40 from construction.			
WEM SL 3 c Modification of existing groyne shape (50-year appraisal period)	£125,000 for detailed design which includes £25,000 for surveys.	Construction of 22.5m rock T-Head on end of existing rock groynes R1 to R4. Assume effective bay width is based on achieving a ratio of spacing to groyne length of 1.5. Nourishment to bays R1-R2, R2-R3 and R3-R4 based on ENBE calculations. Assume total value to replace calculated losses. Rock Revetment R4-Ramp including	Maintain rock groynes and T-Head annually. Assume presence of beach will provide some protection from fluctuating beach levels. Maintain seawall annually. Maintain rock revetment annually and incorporating future installations.	To provide protection to seawall in future a rock revetment should be installed along the whole frontage along with plating to 25% of sheet pile toe of seawall. Rock Revetment year 35 to R3- R4 and year 45 to R2-R3 from construction. Renourish beach with 25% of initial nourishment in year 16, 30 and 42 from construction.			
Consitivity of Not ro	norted	Steel Plating to whole length.					
Sensitivity a - NOLTE	ported Faston Marshes based	on adoption of FA option "FAFM SL 2 b" v	which removes grownes R4-R8 and Install half grow	me at R4 to smooth transition with future			
revetment installed a	along WDC EM to prov	vide protection to seawall.					
WEM SL 1 e Modification of existing groyne length (50-year appraisal period)	£100,000 for detailed design which includes £25,000 for surveys.	Lengthen Groynes R1, R2 and R3 to 60m length to achieve ratio of groyne spacing to length of 1.5. Remove half groyne R4 and reshape. Nourishment to bays R1-R2 and R2-R3 based on ENBE calculations. Based on total value, assume 2 out of 3 bays require nourishment and at a reduced quantity of 75% to account for the better performance of bays R1-R2 and R2-R3. Rock Revetment R3-Ramp including Steel Plating to whole length of R4 to ramp and 25% of wall at R3-R4.	Maintain rock groynes annually. Assume presence of beach will provide some protection from fluctuating beach levels. Maintain seawall annually. Maintain rock revetment annually and incorporating future installations.	To provide protection to seawall in future a rock revetment should be installed along the whole frontage along with plating to 25% of sheet pile toe of seawall. Rock Revetment year 20 to R2- R3, year 30 to R1-R2 and year 40 T8-R1 from construction. Renourish beach with 25% of initial nourishment in year 14, 25, 34 and 41 from construction.			
WEM SL 2 e	£100,000 for detailed design which includes	Construct 30m long intermediate timber groynes at centre of bays R1-R2,	Maintain rock groynes annually. Assume presence of beach will provide some protection from fluctuating beach levels.	To provide protection to seawall in future a rock revetment should be installed along the whole frontage along with plating to 25% of sheet pile			

WDC Easton Marshe	WDC Easton Marshes frontage costing assumptions							
Option description	To construction	Capital costs	Maintenance requirements	Future costs				
Modification of existing groyne spacing (50-year appraisal period)	£25,000 for surveys.	and R2-R3. Length based on achieving a spacing to length ratio of 1.5. Remove half groyne R4 and reshape. Nourishment to bays R1-R2 and R2-R3 based on ENBE calculations. Based on total value, assume 2 out of 3 bays require nourishment and at a reduced quantity of 75% to account for the better performance of bays R1-R2 and R2-R3. Rock Revetment R3-Ramp including Steel Plating to whole length of R4 to	Maintain timber groynes annually – assume maintenance requirement increases 2.5% annually due to deterioration and damage caused by exposure to sand and shingle in the surf-zone. This will return to initial value following groyne rebuild. Maintain seawall annually. Maintain rock revetment annually and incorporating future installations.	toe of seawall. Rock Revetment year 20 to R2- R3, year 30 to R1-R2 and year 40 T8-R1 from construction. Renourish beach with 25% of initial nourishment in year 14, 25, 34 and 41 from construction. Groyne rebuild of timber groynes required in year 20 and year 40 from construction.				
WEM SL 3 e Modification of existing groyne shape (50-year appraisal period)	£125,000 for detailed design which includes £25,000 for surveys.	 ramp and 25% of wall at R3-R4. Construction of 22.5m rock T-Head on end of existing rock groynes R1 to R3. Assume effective bay width is based on achieving a ratio of spacing to groyne length of 1.5. Remove half groyne R4 and reshape. Nourishment to bays R1-R2 and R2-R3 based on ENBE calculations. Based on total value, assume 2 out of 3 bays require nourishment and at a reduced quantity of 75% to account for the better performance of bays R1-R2 and R2-R3. Rock Revetment R3-Ramp including Steel Plating to whole length of R4 to ramp and 25% of wall at R3-R4. 	Maintain rock groynes and T-Head annually. Assume presence of beach will provide some protection from fluctuating beach levels. Maintain seawall annually. Maintain rock revetment annually and incorporating future installations.	To provide protection to seawall in future a rock revetment should be installed along the whole frontage along with plating to 25% of sheet pile toe of seawall. Rock Revetment year 25 to R2- R3, year 35 to R1-R2 and year 45 T8-R1 from construction. Renourish beach with 25% of initial nourishment in year 15, 28 and 40 from construction.				

EA Easton Marshes frontage costing assumptions							
Option description	To construction	Capital costs	Maintenance requirements	Future costs			
EAEM BL 1		No capital costs	No maintenance	No future costs			
Do Nothing							
EAEM BL 2		No capital costs	No maintenance	Move rock from existing structures to protect			
Do Minimum (Recidual life = 10				against stability failure.			
(Residual life = 10 years)				Assume 15% of groups volume moved and			
				placed every 3 years from year 0.			
This option is compa	tible with WDC Eastor	n Marshes options a and b		I			
EAEM SL 1	£125,000 for	Plating to 75% of seawall sheet pile toe	Maintain rock revetment annually.	Assume additional toe works will be required in			
Retain existing	detailed design	not repaired under emergency works.	Do not maintain existing groynes.	year 30 from construction. Assume 20% of initial			
groynes, create	£25,000 for	Construct rock revetment along whole frontage	Maintain new terminal J groyne structure.	groynes.			
revetment and	surveys.	Construct L growne at extent of Faston	Maintain seawall annually.				
construct new northern control		Marsh frontage. Assume 40m length in					
structure (50-year		Assume £15,000 lump sum for access					
appraisal period)		ramp earthworks and some surfacing					
		(stone).					
		Provide additional 50m of revetment at					
Sensitivity a - FA Fast	ton Marshes with R5 r	emoved and smoothed transition to WDC	Easton Marshes frontage - compatible with WDC	Faston Marshes sensitivities c and d			
FAEM SL 2 a	£125 000 for	Plating to 75% of seawall sheet nile too	Maintain rock revetment annually	Assume additional too works will be required in			
Dismantle existing	detailed design	not repaired under emergency works.	Maintain new terminal L grovne structure	year 20 and year 40 from construction due to			
groynes, create	which includes	Dismantle existing rock groynes and	Maintain seawall annually.	greater instability in beach levels. Assume 20%			
new rock	surveys.	reuse rock in revetment.					
construct new	- / -	Create half groyne at existing location of R5.					
structure (50-year appraisal period)		Construct rock revetment along whole frontage.					

EA Easton Marshes f	rontage costing assun	ptions		
Option description	To construction	Capital costs	Maintenance requirements	Future costs
		Construct J groyne at extent of Easton Marsh frontage. Assume 40m length in total. Assume £15,000 lump sum for access ramp. Provide additional 50m of revetment at transition to Easton Bavents.		
Sensitivity b - EA Eas	ton Marshes with R4	removed. Cost of transition detail included	with WDC Easton Marshes frontage - compatible	with WDC Easton Marshes sensitivities e and f
EAEM SL 2 b Dismantle existing groynes, create new rock revetment and construct new northern control structure (50-year appraisal period)	£125,000 for detailed design which includes £25,000 for surveys.	 Plating to 75% of seawall sheet pile toe not repaired under emergency works. Dismantle existing rock groynes and reuse rock in revetment. Construct rock revetment along whole frontage. Construct J groyne at extent of Easton Marsh frontage. Assume 40m length in total. Assume £15,000 lump sum for access ramp. Provide additional 50m of revetment at transition to Easton Bavents. 	Maintain rock revetment annually. Maintain new terminal J groyne structure. Maintain seawall annually.	Assume additional toe works will be required in year 20 and year 40 from construction due to greater instability in beach levels. Assume 20% of initial rock volume.

Individual Cash and PV costs

Table A3 4 Individual Cash and PV costs at WDC Town frontage not including optimism bias

	TF BL 2	TF SL 1	TF SL 2	TF SL 3	TF SL 4	TF SL 3 DEF
Option name	Do Minimum	Beach Nourishment	Lengthen Timber Groynes	Reduce groyne spacing	T-Heads to groyne ends	Reduce groyne spacing - Deferred Costs
Sensitivity adjustments						Costs deferred by 15 years
Cash capital costs	0	3,181,532	2,606,532	2,411,532	3,084,032	1,626,532
Cash operation and maintenance costs	840,000	913,000	913,000	1,094,210	1,055,560	919,234
Cash Other Costs (Detailed design fees, Surveys etc.)	0	65,000	100,000	100,000	125,000	100,000
Total Cash Costs	840,000	4,159,532	3,619,532	3,605,742	4,264,592	2,645,766
PV capital costs	0	1,321,539	1,312,209	1,147,394	1,948,162	629,406
PV operation and maintenance costs	489,910	418,537	418,537	500,663	483,262	399,657
PV other (Detailed design fees, Surveys etc.)	0	62,802	96,618	96,618	120,773	96,618
Total PV Costs	489,910	1,802,878	1,827,364	1,744,675	2,552,197	1,125,681
Cash Construction Cost - Yr. 2	0	250,000	655,000	490,000	1,465,000	0

Table A3 5 Individual Cash and PV costs at WDC Easton Marshes frontage not including optimism bias – Sensitivity a (consider in combination with EA Easton Marshes Option SL1)

Option number	WEM BL 2	WEM SL 1 a	WEM SL 2 a	WEM SL 3 a	WEM SL 3 a DEF	WEM	WEM	WEM
						SLID	SL 2 D	SL 3 D
Option name	Do Minimum	Lengthen Rock	Reduce Groyne	Create T-Head	Create T-Head			
		Groynes (50-year	Spacing (50-ear	with Rock (50-	with Rock (50-			
		appraisal period)	appraisal period)	year appraisal	year appraisal			
				period)	period) – Costs			
					deferred 15 years			
Scheme details/ Sensitivity		WDC Easton Mar	shes based on adopti	on of EA option retai	ining groynes with			
adjustments			future revetment w	orks along WDC EM.				
Cash capital costs	0	2,269,700	2,179,700	1,997,650	1,430,600			
Cash operation and maintenance	98,820	386,640	499,210	380,640	331,290			
costs						C		
Cash Other Costs (Detailed design	0	100,000	100,000	125,000	125,000	Sensit	ivity not re	eported
fees, Surveys etc.)								
Total Cash Costs	98,820	2,756,340	2,778,910	2,503,290	1,886,890			
PV capital costs	0	1,419,270	1,231,935	1,417,355	813,805			
PV operation and maintenance	80,676	165,765	216,727	169,437	141,228			
costs								
PV other (Detailed design fees,	0	96,618	96,618	120,773	120,773			
Surveys etc.)								
Total PV Costs	80,676	1,681,653	1,545,281	1,707,565	1,075,806			
Cash Construction Cost - Yr. 2	0	1,135,600	865,600	1,293,100	135,600			

Table A3 6 Individual Cash and PV costs at WDC Easton Marshes frontage not including optimism bias – Sensitivity c (consider in combination with EA Easton Marshes Option SL2 a)

Option number	WEM SL 1 c	WEM SL 2 c	WEM SL 3 c	WEM SL	WEM SL	WEM SL
				1 d	2 d	3 d
Option name	Lengthen Rock Groynes (50-	Reduce Groyne Spacing (50-	Create T-Head with Rock (50-			
	year appraisal period)	ear appraisal period)	year appraisal period)			
Scheme details/ Sensitivity	WDC Easton Marshes remove	e groynes R5-R8. Install half groyn	e at R5 with future revetment			
adjustments	along \	NDC EM. Cost EA revetment R4 to	o ramp.			
	Cor	npatible with EA option EAEM SL	2 b.			
Cash capital costs	2,696,750	2,651,750	2,492,200			
Cash operation and maintenance	410,040	613,215	395,040			
costs						
Cash Other Costs (Detailed	100,000	100,000	125,000			
design fees, Surveys etc.)			Sensit	ivity not rep	ported	
Total Cash Costs	3,206,790 3,364,965 3,012,240					
PV capital costs	1,643,540	1,446,554	1,696,302	_		
PV operation and maintenance	172,469	264,495	172,923			
costs						
PV other (Detailed design fees,	96,618	96,618	120,773	_		
Surveys etc.)						
Total PV Costs	1,912,628	1,807,668	1,989,998	1		
Cash Construction Cost - Yr. 2	1,270,600	955,600	1,495,600			

 Table A3 7 Individual Cash and PV costs at WDC Easton Marshes frontage not including optimism bias – Sensitivity e (consider in combination with EA Easton Marshes

 Option SL2 b)

Option number	WEM SL 1 e	WEM SL 2 e	WEM SL 3 e	WEM SL	WEM SL	WEM SL
				1 f	2 f	3 f
Option name	Lengthen Rock Groynes (50-	Reduce Groyne Spacing (50-	Create T-Head with Rock (50-			
	year appraisal period)	ear appraisal period)	year appraisal period)			
Scheme details/ Sensitivity	WDC Easton Marshes remove gr	oynes R4-R8. Install half groyne a	t R4 with future revetment along	-		
adjustments	WDC EN	M. Extend EA revetment to R3 from	m ramp.			
	Cor	mpatible with EA option EAEM SL	2 a.			
Cash capital costs	2,234,350	2,189,350	2,368,100			
Cash operation and maintenance	479,600	613,290	522,240			
costs						
Cash Other Costs (Detailed design	100,000	100,000	125,000			aartad
fees, Surveys etc.)				Sensit	ivity not rep	Jorteu
Total Cash Costs	2,813,950	2,902,640	3,015,340			
PV capital costs	1,445,434	1,300,107	1,566,413			
PV operation and maintenance	200,809	261,361	223,561			
costs						
PV other (Detailed design fees,	96,618	96,618	120,773			
Surveys etc.)						
Total PV Costs	1,742,861	1,658,086	1,910,747			
Cash Construction Cost - Yr. 2	1,115,650	890,650	1,318,150			

Table A3 8 Individual Cash and PV costs at EA Easton Marshes frontage (consider in combination with indicated WDC Easton Marshes option to ensure compatibility) not including optimism bias

Option number	EAEM BL 2	EAEM SL 1	EAEM SL 2a	EAEM SL 2b
Option name	Do Minimum	Retain existing groynes,	Dismantle existing groynes,	Dismantle existing groynes,
		create new rock revetment	create new rock revetment	create new rock revetment
		and construct new northern	and construct new northern	and construct new northern
		control structure (50-year	control structure (50-year	control structure (50-year
		appraisal period)	appraisal period)	appraisal period)
Sensitivity adjustment		Compatible with WEM	EA Easton Marshes with	EA Easton Marshes with
		sensitivity a	revetment costs. Assume R5	revetment costs. Assume R5
			is reinstated as a half groyne -	is removed - compatible with
			compatible with WEM	WEM sensitivity e
			sensitivity c	
Cash capital costs	0	2,149,700	2,103,100	2,015,300
Cash operation and maintenance	105,480	504,960	504,960	504,960
costs				
Cash Other Costs (Detailed design	0	125,000	125,000	125,000
fees, Surveys etc.)				
Total Cash Costs	105,480	2,779,660	2,733,060	2,645,260
PV capital costs	0	1,958,095	1,827,565	1,745,603
PV operation and maintenance costs	86,113	229,261	229,261	229,261
PV other (Detailed design fees,	0	120,773	120,773	120,773
Surveys etc.)				
Total PV Costs	86,113	2,308,129	2,177,599	2,095,636
Cash Construction Cost - Yr. 2	0	2,074,100	1,851,100	1,763,300

Cost Breakdown

Option number	TF BL 2	TF SL 1	TF SL 2	TF SL 3	TF SL 4	TF SL 3 deferred
Option name	Do	Beach	Lengthen	Reduce	T-Heads to	Reduce groyne
	Minimum	Nourishment	Timber	groyne	groyne	spacing -
			Groynes	spacing	ends	Deferred Costs
CAPITAL COSTS						
Beach	0	2,101,532	851,532	851,532	789,032	726,532
nourishment and						
recycling						
Timber groyne	0	1,080,000	1,755,000	1,560,000	1,080,000	900,000
works						
Rock groyne works	0	0	0	0	1,215,000	0
and modifications						
Capital TOTAL (£)	0	3,181,532	2,606,532	2,411,532	3,084,032	1,626,532
MAINTENANCE COST	TS					
Rock structures	0	0	0	0	142,560	0
maintenance						
Timber groynes	0	734,440	734,440	915,650	734,440	803,914
maintenance and						
refurbishment						
Seawall	0	178,560	178,560	178,560	178,560	115,320
maintenance						
Beach recycling	840,000					
MAINTENANCE	840,000	913,000	913,000	1,094,210	1,055,560	919,234
TOTAL (£)						
OTHER COSTS						
Design & Survey	0	65,000	100,000	100,000	125,000	100,000
(£)						
TOTAL (£)	840,000	4,159,532	3,619,532	3,605,742	4,264,592	2,645,766

Table A3 9 Cash cost breakdown WDC Town frontage not including optimism bias

Table A3 10 Cash cost breakdown	WDC Easton Marshes frontag	ae not includina optimism bias ('1of2)
		je not meruang optimism slas (

Option number	WEM BL 2	WEM SL 1 a	WEM SL 2 a	WEM SL 3 a	WEM SL 3 a DEF
Option name	Do Minimum	Lengthen Rock Groynes (50- year appraisal period)	Reduce Groyne Spacing (50- year appraisal period)	Create T-Head with Rock (50- year appraisal period)	Create T-Head with Rock (50- year appraisal period) - Deferred Costs
CAPITAL COSTS					
Beach nourishment and recycling	0	1,100,000	1,100,000	962,500	687,500
Timber groyne works	0	0	360,000	0	0
Rock groyne works and modifications	0	450,000	0	607,500	607,500
Rock revetment works	0	592,200	592,200	338,400	84,600
Seawall plating	0	127,500	127,500	89,250	51,000
Capital TOTAL (£)	0	2,269,700	2,179,700	1,997,650	1,430,600
MAINTENANCE COSTS					
Rock structures maintenance	98,820	329,040	260,400	323,040	273,690
Timber groynes maintenance and refurbishment	0	0	181,210	0	0
Seawall maintenance	0	57,600	57,600	57,600	57,600
MAINTENANCE TOTAL (£)	98,820	386,640	499,210	380,640	331,290
OTHER COSTS					
Design & Survey (£)	0	100,000	100,000	125,000	125,000
TOTAL (£)	98,820	2,756,340	2,778,910	2,503,290	1,886,890

Note: Sensitivities b, d and f are not reported

Table A3 11 Cash cost breakdown WDC Easton Marshes frontage not including optimism bias (2of2)

Option number	WEM SL 1 c	WEM SL 2 c	WEM SL 3 c	WEM SL 1 e	WEM SL 2 e	WEM SL 3 e
Option name	Lengthen Rock Groynes (50-year appraisal period)	Reduce Groyne Spacing (50- ear appraisal period)	Create T- Head with Rock (50- year appraisal period)	Lengthen Rock Groynes (50-year appraisal period)	Reduce Groyne Spacing (50- ear appraisal period)	Create T- Head with Rock (50- year appraisal period)
CAPITAL COSTS						
Beach nourishment and recycling	1,100,000	1,100,000	962,500	550,000	550,000	481,250
Timber groyne works	0	270,000	0	0	180,000	0
Rock groyne works and modifications	585,000	270,000	810,000	413,000	188,000	615,500
Rock revetment works	846,000	846,000	592,200	1,071,600	1,071,600	1,071,600
Seawall plating	165,750	165,750	127,500	199,750	199,750	199,750
Capital TOTAL (£)	2,696,750	2,651,750	2,492,200	2,234,350	2,189,350	2,368,100
MAINTENANCE COST	S					
Rock structures maintenance	352,440	283,800	337,440	422,000	374,480	464,640
Timber groynes maintenance and refurbishment	0	271,815	0	0	181,210	0
Seawall maintenance	57,600	57,600	57,600	57,600	57,600	57,600
MAINTENANCE TOTAL (£)	410,040	613,215	395,040	479,600	613,290	522,240
OTHER COSTS						
Design & Survey (£)	100,000	100,000	125,000	100,000	100,000	125,000
TOTAL (£)	3,206,790	3,364,965	3,012,240	2,813,950	2,902,640	3,015,340
	٨	lote: Sensitivities	b. d and f are no	ot reported		

Option number	EAEM BL 2	EAEM SL 1	EAEM SL 2a	EAEM SL 2b
Option name	Do Minimum	Retain existing	Dismantle existing	Dismantle existing
		groynes, create	groynes, create	groynes, create
		new rock	new rock	new rock
		revetment and	revetment and	revetment and
		construct new	construct new	construct new
		northern control	northern control	northern control
		structure (50-year	structure (50-year	structure (50-year
		appraisal period)	appraisal period)	appraisal period)
Rock groyne works and	0	248,000	439,600	290,000
modifications				
Rock revetment works	0	1,453,200	1,356,600	1,276,800
Seawall plating	0	433,500	433,500	433,500
Access works	0	15,000	15,000	15,000
Capital TOTAL (£)	0	2,149,700	2,244,700	2,015,300
Rock structures maintenance	105,480	435,840	435,840	435,840
Seawall maintenance	0	69,120	69,120	69,120
MAINTENANCE TOTAL (£)	105,480	504,960	504,960	504,960
Design & Survey (£)	0	125,000	125,000	125,000
TOTAL (£)	105,480	2,779,660	2,874,660	2,645,260

Table A3 12 Cash cost breakdown EA Easton Marshes frontage not including optimism bias

Combination costs

Table A3 13 Combination options 1 to 4 not including optimism bias

	Combination 1	Combination 2	Combination 3	Combination 4
Combination	Do Minimum - All	Cheapest Technical	Preferred Technical	Rock revetment R3-R8
description	frontages (Note 23	Option - Reduce	Option - Reduce	 Reduce spacing at
	years at WDC Town	groyne spacing WDC	spacing at town	town frontage, rock T-
	and 10 years along	Town, reduce groyne	frontage, rock T-	Heads at WDC EM
	Easton Marshes) (TF	spacing and	Heads at WDC EM	frontage but extend
	BL 2, WEM BL 2,	Revetment from R3-	frontage and	revetment to R3 and
	EAEM BL 2)	Easton Bavents	revetment at EA EM	then along EA EM
		including transition	frontage with groynes	frontage. Remove
		structure at R4 and	remaining intact	groynes.
		reduced WDC EM	(TF SL 3, WEM SL 3 a,	(TF SL 3, WEM SL 3 e,
		scheme (R1-R3)	EAEM SL 1)	EAEM SL 2b)
		(TF SL 1, WEM SL 2 e,		
		EAEM SL 2 b)		
WDC Town	0	2,411,532	2,411,532	2,411,532
WDC Easton Marshes	0	2,189,350	1,997,650	2,368,100
EA Easton Marshes	0	2,015,300	2,149,700	2,015,300
Cash capital costs	0	6,616,182	6,558,882	6,794,932
WDC Town	840,000	1,094,210	1,094,210	1,094,210
WDC Easton Marshes	98,820	613,290	380,640	522,240
EA Easton Marshes	105,480	504,960	504,960	504,960
Cash operation and	1,044,300	2,212,460	1,979,810	2,121,410
maintenance costs				
WDC Town	0	100,000	100,000	100,000
WDC Easton Marshes	0	100,000	125,000	125,000
EA Easton Marshes	0	125,000	125,000	125,000
Cash Other Costs	0	325,000	350,000	350,000
(Detailed design fees,				
Surveys etc.)				
TOTAL CASH COSTS	1,044,300	9,153,642	8,888,692	9,266,342
WDC Town	0	1,147,394	1,147,394	1,147,394
WDC Easton Marshes	0	1,300,107	1,417,355	1,566,413
EA Easton Marshes	0	1,745,603	1,958,095	1,745,603
PV capital costs	0	4,193,104	4,522,844	4,459,409
WDC Town	489,910	500,663	500,663	500,663
WDC Easton Marshes	80,676	261,361	169,437	223,561
EA Easton Marshes	86.113	229.261	229.261	229.261
PV operation and	656.699	991.285	899.361	953.485
maintenance costs		,		,
WDC Town	0	96.618	96.618	96.618
WDC Easton Marshes	0	96.618	120.773	120.773
EA Easton Marshes	0	120.773	120.773	120.773
PV other (Detailed	0	314.010	338.164	338.164
design fees, Surveys		,	,	,
etc.)				
TOTAL PV COSTS	656.699	5,498.398	5,760.370	5,751.059
Cash Construction	0	3.143.950	3,857.200	3.571.450
costs (yr. 2)	-		-,,	

Table A3 14 Combination options 5-8 not including optimism bias

	Combination 5	Combination 6	Combination 7	Combination 8
Combination	Rock revetment R4-R8	Most Expensive	R3-R8 Revetment	Preferred Technical
description	- Reduce spacing at	technical option T	option with deferred	Option with deferred
	town frontage, rock T-	Heads to WDC Town	costs at town	cost at WDC Frontage
	Heads at WDC EM	and WDC Easton	frontage	-
	frontage but extend	Marshes and	(TF SL 3 DEF, WEM SL	(TF SL 3 DEF, WEM SL
	revetment to R4 and	Revetment with	3 e, EAEM SL 2 b)	3 a DEF, EAEM SL 1)
	then along EA EM	Groynes EA Easton		
	frontage. Remove	Marshes		
	groynes.	(TF SL 4, WEM SL 3 a,		
	(TF SL 3, WEM SL 3 c,	EAEM SL 1)		
	EAEM SL 2 a)			
WDC Town	2,411,532	3,084,032	1,626,532	1,626,532
WDC Easton Marshes	2,492,200	1,997,650	2,368,100	1,430,600
EA Easton Marshes	2,103,100	2,149,700	2,015,300	2,149,700
Cash capital costs	7,006,832	7,231,382	6,009,932	5,206,832
WDC Town	1,094,210	1,055,560	919,234	919,234
WDC Easton Marshes	395,040	380,640	522,240	331,290
EA Easton Marshes	504,960	504,960	504,960	504,960
Cash operation and	1,994,210	1,941,160	1,946,434	1,755,484
maintenance costs				
WDC Town	100,000	125,000	100,000	100,000
WDC Easton Marshes	125,000	125,000	125,000	125,000
EA Easton Marshes	125,000	125,000	125,000	125,000
Cash Other Costs	350,000	375,000	350,000	350,000
(Detailed design fees,				
Surveys etc.)				
TOTAL CASH COSTS	9,351,042	9,547,542	8,306,366	7,312,316
WDC Town	1,147,394	1,948,162	629,406	629,406
WDC Easton Marshes	1,696,302	1,417,355	1,566,413	813,805
EA Easton Marshes	1,827,565	1,958,095	1,745,603	1,958,095
PV capital costs	4,671,261	5,323,612	3,941,422	3,401,306
WDC Town	500,663	483,262	399,657	399,657
WDC Easton Marshes	172,923	169,437	223,561	141,228
EA Easton Marshes	229,261	229,261	229,261	229,261
PV operation and	902,847	881,960	852,478	770,146
maintenance costs				
WDC Town	96,618	120,773	96,618	96,618
WDC Easton Marshes	120,773	120,773	120,773	120,773
EA Easton Marshes	120,773	120,773	120,773	120,773
PV other (Detailed	338,164	362,319	338,164	338,164
design fees, Surveys				
etc.)	5 012 272	6 567 004	5 433 064	4 500 646
TOTAL PV COSTS	5,912,272	6,567,891	5,132,064	4,509,616
Cash Construction	3,836,700	4,832,200	3,081,450	2,209,700
COSIS (Vr. Z)				

Client/Authority		Present Value Co	ests for all options					heet Nr. 1of1										
Waveney District Council Environment Ag Project name Southwold ECPM Initial Assessment	gency	Resu	ults £											Prepared (da 12/10/2018 Checked by Drinted Checked date				
Project reference		De Min	Comb. 1 Comb. 2 Co nimum - All frontages Chespest Technical Preferred Te	nb. 3 chrical Option	Comb. 4 C Rock revetment R3-R8 - Rock rev	Comb. 5 Comb. 6 Comb. 7 Comb.	b. 7 Com ment option Preferred Tech	. 8 ical Option						Prepared by D. Hunt				
		(Note Town Easton	a 23 years at WDC Option - Reduce groyne - Reduce sy and 10 years along spacing WDC Town, frontage, ro n Marshea) (TF BL 2, Reduce groyne specing WDC EM (acing at town k T-Heads at ontance and	Reduce specing at town frontage, rock T-Heads at WDC EM frontance but WDC EI	e spacing at town option T Heads to WDC with deferred cost s, rock T-Heads at Town and WDC Easton frontage EM frontance but Marshes and Revetment (TF SL 3 DEF. W	osta at town with deferred o ge Fronta WEM SL 3 (TF SL 3 DEF	nataat WDC e - WEL SL 3										
		WEM	(BL 2, EAÈM BL 2) and Revelment from RS- Easton Bavents including frontage v transition structure at R4. semain	at EÁ EM th groynes to in Net	extend revelopment to R3 extend r and then along EA EM and the firsteam Remove	exvetment to R4 with Groynes EA Easton e, EAEM SL en along EA EM Marshes tane Remove (TE SL 4 WEM SL 3 e	BL 2 b) a DEF, EA	MSL 1)										
			and reduced WDC EM (TF SL 3, scheme (R1-R3) EAE (TF SL 1, WFM SL 2 e	IEM SL 3 a, ISL 1)	(TF SL 3, WEM SL 3 e, (TF SL 3 FAFM SL 2b) FA	groynes. EAEM SL 1) 3, WEM SL 3 c, EM SI 2 a)												
Base date for estimates (year 0) Jan-2 Scaling factor (e.g. £m, £k, £) £	2018 E	PV total costs	EAEM SL 2 b) 656,699 5,498,398 5,76	0,370	5,751,059 5;	5,912,272 6,567,891 5,132,06	064 4,509	516										
Initial discount rate 3.5	5%	Construction Costs	0 3,143,950 3,85	7,200	3,571,450 3,	1,836,700 4,832,200 3,081,45	450 2,209	100										
		Cheapest Technics groyne specing WD	al Option - Reduce DC Town, Reduce		Preferred Technical O	Option - Reduce		ock revetment R3-R8 - Reduc	e specing	Rock revetment R4-R8 -	Reduce spacing							
Do M years a	Minimum - All frontages (Note 23 at WDC Town and 10 years along	groyne spacing and f Easton Bavents in structure at R4 and	Revenment from R3- notuding transition I reduced WDC EM		at WDC EM frontage EA EM frontage with gr	ge, rock T-Heads and revelment at roynes remaining		it town frontage, rock T-Heads M frontange but extend revetin nd then along EA EM frontage	at WDC ent to R3 Remove	at town frontage, rock T- EM frontange but extend and then along EA EM fro	Heads at WDC revelment to R4 ontage. Remove		Most Expensive technical option T Head to WDC Town and WDC Easton Marshe and Revetment with Groynes EA Easto	da Ra M	R3-R8 Revelment option wit costs at lown frontia	n deferred R	Preferred Technical Option wil cost at WDC Frontage	a deferred
Comb. 1	en Marshea) (TF BL 2, WEM BL 2, EAEM BL 2) TOTALS: PV PV PV PV Negative Nega	Comb. 2 (TF SL 1, WEM SL	(R1-R3) 2.e, EAEM SL 2.b) TOTALS: PV PV Negative	PV PV Negative	Comb. 3 (TF SL 3, WEM SL 3)	A EAEMSL 1) TOTALS: PV PV PV Negative	PV PV Comb.4	groynes. (TF SL 3, WEM SL 3 e, EAEN No	(SL 2b) TOTALS: PV PV PV Igative	PV Comb. 5 (TF SL 3, WEM SL 3 c, Negative	EAEMSL 2 #) TOTALS: PV PV P	PV PV Negative	Comb. 6 (TF SL 4, WEM SL 3 a, EAEM SL 1) Negative	TOTALS: PV PV PV PV PV	tive Comb. 7	AEMSL2 TOTALS: PV PV PV PV legative No	Comb. 8 (TFSL3DEF, WELSL3aD SL1)	TOTALS: PV PV PV PV spative Negative
cash sum Capital Maint.	t. Other costs Cash Capital Maint Other costs 0 0 0 1.044.300 656.699 0 0	Capital Maint. Other 0 6.616.182 2.212.460 325	r costs Cash Capital Maint 5.000 0 9.153.642 4.193.104 991.285	Other costs 314.010 0	Capital Maint. Other 6.558.882 1.979.810 350.00	costs Cash Capital Maint Oti 00 0 8.888.692 4.522.844 899.361 3	Other costs Capital 338.164 0 6.794.932	laint. Other co 121.410 350.000	sts Cash Capital Maint Other 0 9.266.342 4.459.409 953.485 338.164	Capital Maint. Other 0 7.006.832 1.994.210 350.00	costs Cash Capital Maint 0 0 0 9.351.042 4.671.261 902.847	Other costs 338.164 0	Capital Maint. Other costs 7.231.382 1.941.160 375.000	Cash Capital Maint Other cost 0 9.547.542 5.323.612 881.960 362.319	Capital Maint. Other 0 6.009.932 1.946.434 350.000	osts Cash Capital Maint Other co 0 8.306.366 3.941.422 852.478 338.164	sts Capital Maint. Other c 0 5.206.832 1.755.484 350.000	of 7.312.316 3.401.306 770.146 338.164
year Factor		0 0 0	0 0 0 0	0 0	0 0	0 0 0		0 0		0 0 0	0 0 0 0	0 0	0 0 0	0 0 0 0		0 0 0 0	0 0 0 0	0 0 0 0
1 0.966 0 2 0.934 0		0 0 0 325	5,000 325,000 0 0 0 3,153,550 2,934,911 8,962	314,010 0 0 0	0 0 0 350,0	000 350,000 0 0 0 0 3,866,800 3,600,737 8,962	338,164 0 0 0 0 3,571,450	0 350,000 9,600 0	350,000 0 0 338,164 3,581,050 3,333,987 8,962 0	0 0 0 350,00 0 3,836,700 9,600	0 350,000 0 0 0 3,846,300 3,581,601 8,962	338,164 0 0 0	0 0 375,000 4,832,200 9,600 0	375,000 0 0 362,319 4,841,800 4,510,910 8,962 0	0 0 0 350,000 0 3,081,450 9,600 0	350,000 0 0 338,164 3,091,050 2,876,567 8,962 0	0 0 0 350,000 0 2,209,700 9,600 0	350,000 0 0 338,164 0 2,219,300 2,062,779 8,962 0 0
4 0.871 0 5 0.842 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 40,450 0 0 40,930 0 0 41,422	0 40,450 0 36,484 0 40,930 0 35,668 0 41,422 0 34,876	0 0	0 0 37,870 0 0 38,270 0 0 38,680	0 37,870 0 34,157 0 38,270 0 33,350 0 38,680 0 32,568		40,070 0 40,480 0	40,070 0 34,919 0 40,480 0 34,083 0	0 0 38,270 0 0 38,680	0 37,870 0 34,157 0 38,270 0 33,350 0 38,680 0 32,568	0 0	0 37,960 0 0 37,960 0 0 38,288 0	37,940 0 33,949 0 37,960 0 33,080 0 38,288 0 32,237 0	0 0 32,750 0 0 0 33,070 0 0 0 33,398 0	32,750 0 29,539 0 33,070 0 28,819 0 33,398 0 28,120 0	0 0 28,620 0 0 0 28,940 0 0 0 29,268 0	28,940 0 25,874 0 0 28,940 0 25,220 0 0 29,268 0 24,643 0 0
6 0.814 68,100 7 0.786 140,000 9 0.759 0	0 0 68,100 55,399 0 0 0 0 140,000 110,039 0 0	0 0 41,926 0 0 42,443 0 0 42,973	0 41,926 0 34,107 0 42,443 0 33,360 0 42,973 0 33,260	0 0	0 0 39,100 0 0 39,531	0 39,100 0 31,808 0 39,531 0 31,071 0 20,973 0 20,355	0 0 0	40,900 0 41,331 0 41,773 0	40,900 0 33,272 0 41,331 0 32,486 0 41,773 0 21,722 0	0 0 39,100 0 0 39,531	0 39,100 0 31,808 0 39,531 0 31,071 0 90.073 0 30,556	0 0	0 38,624 0 0 38,969 0 0 20,222 0	38,624 0 31,421 0 38,969 0 30,629 0 39,922 0 29,922 0	0 0 33,734 0 0 0 34,079 0 0 24,022 0	33,734 0 27,443 0 34,079 0 26,786 0 24,422 0 29,148 0	0 0 29,604 0 0 29,949 0 0 0 29,949 0	29,604 0 24,083 0 0 29,949 0 23,539 0 0 20,202 0 23,539 0 0
9 0.734 68,100 10 0.709 0	0 0 68,100 49,967 0 0 0 0 0 0 0 0	0 0 43,516 0 0 44,073	0 43,516 0 31,929 0 44,073 0 31,244	0 0	0 0 40,425 0 0 40,889	0 40,425 0 29,661 0 40,889 0 28,987		42,225 0 42,689 0	42,225 0 30,982 0 42,689 0 30,263 0	0 0 40,425 0 0 40,889	0 40,425 0 29,661 0 40,889 0 28,987		0 39,684 0 0 40,055 0	39,684 0 29,117 0 40,055 0 28,396 0	0 0 34,794 0 0 0 35,165 0	34,794 0 25,529 0 35,165 0 24,929 0	0 0 30,664 0 0 0 31,035 0	30,664 0 22,499 0 0 31,035 0 22,001 0 0
11 0.685 0 12 0.662 140,000 13 0.639 0	0 0 0 0 0 0 0 0 0 140,000 92,650 0 0 0 0 0 0 0 0	0 0 44,643 0 0 45,228 0 0 45,828	0 44,643 0 30,578 0 45,228 0 29,931 0 45,828 0 29,302	0 0	0 0 41,364 0 0 41,852 0 0 42,351	0 41,364 0 28,332 0 41,852 0 27,697 0 42,351 0 27,080		43,652 0 44,151 0	43,164 0 29,565 0 43,652 0 28,888 0 44,151 0 28,231 0	0 0 41,364 0 0 41,852 0 0 42,351	0 41,364 0 28,332 0 41,852 0 27,697 0 42,351 0 27,080		0 40,436 0 0 40,825 0 0 41,225 0	40,436 0 27,696 0 40,825 0 27,018 0 41,225 0 26,359 0	0 0 35,546 0 0 0 35,935 0 0 0 36,335 0	35,546 0 24,347 0 35,935 0 23,781 0 36,335 0 23,233 0	0 0 31,416 0 0 0 31,805 0 0 0 32,205 0	31,416 0 21,518 0 0 31,805 0 21,048 0 0 32,205 0 20,592 0 0
14 0.618 0 15 0.597 0 16 0.577 140.000		0 0 46,442 0 0 47,072	0 46,442 0 28,691 0 47,072 0 28,097 0 196,467 20,640 27,510	0 0	0 0 42,863	0 42,863 0 26,480 0 43,388 0 25,898 0 43,936 0 25,898	0 0 0	44,663 0 45,188 0 45,729 0	44,663 0 27,592 0 45,188 0 26,972 0 45,796 0 26,972 0	0 0 42,863 0 0 43,388	0 42,863 0 26,480 0 43,388 0 25,898 42,926 0 26,293	0 0	0 41,635 0 0 42,055 0 0 42,055 0	41,635 0 25,721 0 42,055 0 25,102 0 42,485 0 24,601 0	0 0 36,745 0 0 0 37,165 0 0 27,165 0	36,745 0 22,700 0 37,165 0 22,183 0 37,595 0 21,681 0	0 0 32,615 0 0 33,035 0 0 23,445 0	32,615 0 20,149 0 0 33,035 0 19,718 0 0 22,465 0 19,728 0
17 0.557 0 18 0.538 0		0 179,677 48,379 0 0 49,057	0 228,057 100,117 26,957 0 49,057 0 26,411	0 0	0 179,677 44,478 0 0 45,043	0 224,155 100,117 24,783 0 45,043 0 24,249	0 0 248,427	46,278 0 46,843 0	294,705 138,425 25,786 0 46,843 0 25,218 0	0 179,677 44,478 0 137,500 45,043	0 224,155 100,117 24,783 0 182,543 74,025 24,249		117,177 42,926 0 0 43,378 0	160,103 65,292 23,919 0 43,378 0 23,353 0	0 675,927 19,950 0 0 0 39,670 0	695,877 376,629 11,116 0 39,670 0 21,357 0	0 1,764,677 15,820 0 0 0 37,870 0	1,780,497 983,285 8,815 0 0 37,870 0 20,388 0 0
20 0.503 0 21 0.486 140,000	0 0 140,000 72,822 0 0 0 0 0 0 0 0 0 0 0 140,000 67,980 0 0	0 0 49,753 0 0 50,465 0 0 51,195	0 40,753 0 25,879 0 50,465 0 25,362 0 51,195 0 24,859	0 0	0 0 45,622 0 137,500 46,216 0 0 46,825	0 45,622 0 23,731 0 183,716 69,103 23,227 0 46,825 0 22,737		47,422 0 48,016 0 48,625 0	47,422 0 24,667 0 48,016 0 24,131 0 48,625 0 23,611 0	0 0 45,522 0 0 46,216 0 0 46,825	0 45,622 0 23,731 0 46,216 0 23,227 0 46,825 0 22,737	0 0	0 43,842 0 200,000 44,317 0 0 44,804 0	43,842 0 22,804 0 244,317 100,513 22,272 0 44,804 0 21,755 0	0 0 40,070 0 0 0 40,480 0 0 0 40,900 0	40,070 0 20,843 0 40,480 0 20,344 0 40,900 0 19,860 0	0 0 38,270 0 0 0 38,680 0 0 0 39,100 0	38,680 0 19,439 0 0 39,100 0 18,966 0 0
22 0.469 140,000 23 0.453 0 24 0.438 0	0 0 140,000 65,681 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 1,042,050 21,250 0 0 42,250 0 0 42,250	0 1,063,300 488,878 9,969 0 42,250 0 19,151 0 42,730 0 19,751	0 0	0 660,000 21,870 0 0 37,870 0 29 270	0 681,870 309,639 10,260 0 37,870 0 17,166 0 39,270 0 16,761	0 0 660,000	23,670 0 39,670 0 40,070 0	683,670 309,639 11,105 0 39,670 0 17,982 0 40,070 0 17,549 0	0 660,000 21,870 0 0 37,870	0 681,870 309,639 10,260 0 37,870 0 17,166 0 29,270 0 16,761	0 0	540,000 24,840 0 0 37,640 0 0 37,640 0	564,840 253,341 11,654 0 37,640 0 17,062 0 27,660 0 16,605 0	0 0 41,331 0 0 41,773 0 0 42,225 0	41,331 0 19,390 0 41,773 0 18,935 0 42,225 0 19,493 0	0 0 39,531 0 0 39,973 0 0 40,425 0	39,531 0 18,546 0 0 39,973 0 18,119 0 0 40,425 0 17,774 0
25 0.423 0 26 0.409 0		0 0 43,222 0 0 43,726	0 43,222 0 18,289 0 43,726 0 17,877	0 0	0 0 38,270 0 38,680 0 0 39,100	0 38,680 0 16,761 0 39,100 0 15,986		40,070 0 40,480 0 40,900 0	40,070 0 17,349 0 40,480 0 17,129 0 40,900 0 16,722 0	0 0 38,680 0 39,100	0 38,680 0 16,761 0 39,100 0 15,986	0 0	0 38,288 0 0 38,624 0	38,288 0 16,201 0 38,624 0 15,791 0	0 0 42,225 0 0 0 42,689 0 0 0 43,164 0	42,689 0 18,064 0 43,164 0 17,647 0	0 0 40,425 0 0 0 40,889 0 0 0 41,364 0	40,889 0 17,302 0 0 41,364 0 16,911 0
27 0.395 0 28 0.382 0 29 0.369 0		0 320,750 44,243 0 0 44,773 0 0 45,316	0 364,993 126,700 17,477 0 44,773 0 17,088 0 45,316 0 16,710	0 0	0 0 39,531 0 0 39,973 0 0 40,425	0 39,531 0 15,615 0 39,973 0 15,256 0 40,425 0 14,907		41,331 0 43,573 0 44,025 0	43,573 0 16,630 0 44,025 0 16,234 0	0 252,000 39,531 0 0 39,973 0 0 40,425	0 291,531 99,543 15,615 0 39,973 0 15,256 0 40,425 0 14,907	0 0	0 39,322 0 0 39,684 0	38,969 0 15,393 0 39,322 0 15,007 0 39,684 0 14,633 0	0 544,050 43,652 0 0 0 45,951 0 0 0 46,463 0	45,951 0 17,538 0 46,463 0 17,133 0	0 0 41,852 0 0 0 42,351 0 0 0 42,863 0	41,852 0 16,532 0 0 42,351 0 16,164 0 0 42,863 0 15,866 0 0
30 0.356 0 31 0.346 0 32 0.336 0		0 62,500 45,873 0 0 46,443 0 409,227 47,028	0 108,373 22,267 16,343 0 46,443 0 16,065 0 466,256 137,429 15,793	0 0	0 62,500 40,889 0 0 41,364 0 117,177 41,852	0 103,389 22,267 14,568 0 41,364 0 14,308 0 159,029 39,351 14,055	0 0 131,250 0 0 0 0	44,489 0 44,964 0 45,452 0	175,739 46,762 15,850 0 44,964 0 15,553 0 162,629 39,351 15,264 0	0 62,500 40,889 0 0 41,364 0 254,677 41,852	0 103,389 22,267 14,568 0 41,364 0 14,308 0 296,529 85,527 14,055	0 0	0 40,055 0 0 40,436 0 117,177 40,825 0	40,055 0 14,271 0 40,436 0 13,987 0 158,003 39,351 13,710 0	0 68,750 46,988 0 0 0 47,526 0 0 179,677 48,078 0	115,738 24,494 16,741 0 47,526 0 16,439 0 227,755 60,340 16,146 0	0 0 43,388 0 0 0 43,926 0 0 179,677 44,478 0	43,388 0 15,458 0 0 43,926 0 15,194 0 0 224,155 60,340 14,937 0 0
33 0.326 0 34 0.317 0		0 0 49,428 0 0 50,042	0 49,428 0 16,116 0 50,042 0 15,841	0 0	0 0 42,351 0 0 42,863	0 42,351 0 13,808 0 42,863 0 13,568		45,951 0 46,463 0	45,951 0 14,982 0 46,463 0 14,708 0	0 0 42,351 0 0 42,863	0 42,351 0 13,808 0 42,863 0 13,568	0 0	0 41,225 0 0 41,635 0	41,225 0 13,441 0 41,635 0 13,179 0	0 0 48,643 0 0 0 49,222 0	48,643 0 15,860 0 49,222 0 15,581 0	0 0 45,043 0 0 0 45,622 0	45,043 0 14,486 0 0 45,622 0 14,442 0 0
35 0.307 0 36 0.298 0 37 0.290 0		0 0 50,672 0 68,750 51,317 0 0 51,979	0 50,672 0 15,573 0 120,067 20,513 15,312 0 51,979 0 15,058	0 0	0 0 43,388 0 137,500 43,926 0 75,600 44,478	0 43,388 0 13,334 0 181,426 41,027 13,107 0 120,078 21,900 12,885	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	46,988 0 47,526 0 48,078 0	46,988 0 14,441 0 47,526 0 14,181 0 340,128 84,603 13,927 0	0 0 43,388 0 0 43,926 0 292,050 44,478	0 43,388 0 13,334 0 43,926 0 13,107 0 336,528 84,603 12,885		0 42,055 0 200,000 42,485 0 75,600 42,926 0	42,055 0 12,925 0 242,485 59,676 12,677 0 118,526 21,900 12,435 0	0 0 49,816 0 0 0 50,425 0 0 952,050 25,470 0	49,816 0 15,310 0 50,425 0 15,046 0 977,520 275,796 7,378 0	0 137,500 46,216 0 0 0 46,825 0 0 735,600 21,870 0	183,716 42,258 14,203 0 0 46,825 0 13,971 0 0 757,470 213,094 6,335 0 0
38 0.281 0 39 0.273 0		0 0 52,657 0 0 53,353	0 52,657 0 14,810 0 53,353 0 14,568 0 54,065 0 14,223	0 0	0 0 45,043 0 0 45,622	0 45,043 0 12,668 0 45,622 0 12,457 0 46,216 0 12,252	0 0 0	50,443 0 51,022 0	50,443 0 14,187 0 51,022 0 13,932 0 51,646 0 13,694 0	0 0 46,843 0 0 47,422	0 46,843 0 13,175 0 47,422 0 12,949 0 49,016 0 12,720	0 0	0 43,378 0 0 43,842 0 0 44,217 0	43,378 0 12,200 0 43,842 0 11,971 0 44,217 0 11,770 0	0 0 43,270 0 0 0 43,670 0 0 0 43,670 0 0	43,270 0 12,170 0 43,670 0 11,924 0 44,070 0 11,924 0	0 0 37,870 0 0 0 38,270 0 0	37,870 0 10,651 0 0 38,270 0 10,450 0 0 29,590 0 10,254 0 0
41 0.257 0 42 0.250 0		0 62,500 54,795 0 1,009,600 24,850	0 117,295 16,086 14,103 0 1,034,450 252,285 6,210	0 0	0 62,500 46,825 0 952,050 21,870	0 109,325 16,086 12,052 0 973,920 237,904 5,465	0 0 62,500 0 0 728,750	52,225 0 27,270 0	114,725 16,086 13,442 0 756,020 182,105 6,814 0	0 62,500 48,625 0 660,000 23,670	0 111,125 16,086 12,515 0 683,670 164,925 5,915	0 0	0 44,804 0 832,050 24,840 0	44,804 0 11,532 0 856,890 207,918 6,207 0	0 0 44,500 0 0 68,750 44,931 0	44,500 0 11,454 0 113,681 17,180 11,228 0	0 0 39,100 0 0 0 39,531 0	39,100 0 10,064 0 0 39,531 0 9,878 0 0
43 0.243 0 44 0.236 0 45 0.229 0		0 68,750 45,650 0 0 46,130 0 0 46,622	0 114,400 16,679 11,075 0 46,130 0 10,866 0 46,622 0 10,662	0 0	0 0 39,670 0 0 40,070 0 0 40,480	0 39,670 0 9,624 0 40,070 0 9,438 0 40,480 0 9,257		43,270 0 43,670 0 44,080 0	43,270 0 10,498 0 43,670 0 10,286 0 44,080 0 10,080 0	0 0 39,670 0 137,500 40,070 0 0 40,480	0 39,670 0 9,624 0 177,570 32,387 9,438 0 40,480 0 9,257	0 0	0 39,440 0 0 39,760 0 0 40,088 0	39,440 0 9,568 0 39,760 0 9,365 0 40,088 0 9,167 0	0 0 45,373 0 0 0 45,825 0 0 62,500 46,289 0	45,873 0 11,008 0 45,825 0 10,794 0 108,789 14,293 10,585 0	0 0 39,973 0 0 0 40,425 0 0 62,500 40,889 0	30,973 0 9,698 0 0 40,425 0 9,522 0 0 103,389 14,293 9,351 0 0
46 0.222 0 47 0.216 0 48 0.209 0		0 0 47,126 0 117,177 47,643 0 48,173	0 47,126 0 10,463 0 164,821 25,258 10,270 0 48,173 0 10,081	0 0	0 0 40,900 0 117,177 41,331 0 41,773	0 40,900 0 9,081 0 158,508 25,258 8,909 0 41,773 0 8,742	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	44,500 0 44,931 0 46,973 0	44,500 0 9,880 0 421,708 81,216 9,685 0 46,973 0 9,830 0	0 0 40,900 0 409,227 41,331 0 0 43,573	0 40,900 0 9,081 0 450,558 88,211 8,909 0 43,573 0 9,119	0 0	0 40,424 0 117,177 40,769 0 0 41,122 0	40,424 0 8,975 0 157,946 25,258 8,788 0 41,122 0 8,605 0	0 0 46,764 0 0 376,777 47,252 0 0 0 49,351 0	46,764 0 10,383 0 424,029 81,216 10,185 0 49,351 0 10,328 0	0 0 41,364 0 0 117,177 41,852 0 0 0 42,351 0	41,364 0 9,184 0 0 159,029 25,258 9,021 0 0 42,351 0 8,863 0 0
49 0.203 0 50 0.197 0		0 0 48,716 0 62,500 49,273	0 48,716 0 9,898 0 111,773 12,329 9,720	0 0	0 0 42,225 200,000 42,689	0 42,225 0 8,579 0 242,689 39,453 8,421	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	47,425 0 47,889 0	47,425 0 9,636 0 110,389 12,329 9,447 0	0 0 44,025 0 62,500 44,489	0 44,025 0 8,945 0 106,989 12,329 8,776	0 0	0 41,484 0 200,000 41,855 0	41,484 0 8,429 0 241,855 39,453 8,256 0	0 0 25,150 0 0 0 25,150 0	25,150 0 5,110 0 25,150 0 4,961 0	0 0 18,150 0 0 0 18,150 0	18,150 0 3,688 0 0 18,150 0 3,580 0 0
51 0.192 0 52 0.186 0 53 0.181 0				0 0				0 0				0 0						
54 0.175 0 55 0.170 0		0 0 0		0 0			0 0 0	0 0		0 0 0		0 0					0 0 0 0	
57 0.160 0 58 0.156 0				0 0														
59 0.151 0 60 0.147 0 61 0.143 0				0 0														
62 0.138 0 63 0.134 0		0 0 0		0 0			0 0 0	0 0		0 0 0		0 0					0 0 0 0	
65 0.127 0 66 0.123 0		0 0 0		0 0				0 0		0 0 0		0 0	0 0 0					
67 0.119 0 68 0.116 0 69 0.112 0				0 0				0 0				0 0						
70 0.109 0 71 0.106 0 72 0.103 0		0 0 0		0 0				0 0		0 0 0		0 0						
73 0.100 0 74 0.097 0		0 0 0		0 0				0 0		0 0 0		0 0	0 0 0					
75 0.094 0 76 0.092 0 77 0.090 0				0 0				0 0										
78 0.087 0 79 0.085 0		0 0 0		0 0			0 0 0	0 0		0 0 0		0 0	0 0 0		0 0 0 0		0 0 0 0	
80 0.083 0 81 0.081 0 82 0.079 0				0 0				0 0				0 0						
83 0.077 0 84 0.075 0 85 0.074 0		0 0 0		0 0			0 0 0	0 0				0 0						
86 0.072 0 87 0.070 0		0 0 0		0 0			0 0 0	0 0		0 0 0		0 0	0 0 0					
88 0.068 0 89 0.067 0 90 0.065 0				0 0				0 0				0 0						
91 0.063 0 92 0.062 0	0 0 0 0 0	0 0 0		0 0		0 0 0 0	0 0 0	0 0	0 0 0 0	8		0 0	0 0 0		0 0 0		0 0 0	
94 0.059 0 95 0.057 0		0 0 0		0 0			0 0 0	0 0				0 0						
96 0.056 0 97 0.055 0 98 0.053 0		0 0 0		0 0			0 0 0	0 0				0 0						
99 0.052 0	0 0 0 0 0	0 0 0	0 0 0	0 0	0 0	0 0 0 0	0 0	ō õ	0 0 0 0	0 0 0	0 0 0 0	0 0	0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0

App C1 - Combined Options

Sheet Nr. 1of1

Annex 3 PV Costs Combined Options

Present Value Costs for all options

Annex 4 Partnership Funding Calculator FCRM Partnership Funding Calculator for Flood and Coastal Erosion Risk Management Grant in Aid (FCRM GiA)

Version 6 January 2014				
Project Name Unique Project Number	Southwold IA Maintain 1 - Cheapest technical option			
All figures are in £'s Figures in Blue to be entered onto Mediu	m Term Plan		\z\z	Key Input cells Calculated cells
SUMMARY: prospect of FCRM GiA fundi	ng			
Raw Partnership Funding Score		20% (1)	Schen Effe Effective	te Benefit to Cost Ratio: 3.31 to 1 ctive return to taxpayer: 3.31 to 1 return on contributions: n/a to 1
External Contribution or saving required to a	chieve an Adjusted Score of 100%	4,175,886 (2)	Cell (2) shows the minimum	amount of contributions and/or reductions in
Adjusted Partnership Funding Score (PF)		20% (3)	scheme cost that are require Further increases on this will	d to raise the Adjusted PF Score to at least 100%. improve this scheme's chances of an FCRM GiA
PV FCERM GiA towards the up-front cost	is of this scheme (PV Cost for Approval)	- (4)	allocation in the desired year entered into cells(9,10,12) ar	 Planned savings and contributions should be ad cells(14-17). See NOTE below.
<u>1. Scheme details</u> Risk Management Authority type of asset ma	intainer	LA (5)	Yes (6)	Oberhalls Assessed has been taken
Duration of Benefits (years)		15 (7)	and that double countin	g of benefits has been avoided ?
PV Whole-Life Benefits:		19,448,305 (8)		
PV Costs PV Appraisal Costs PV design & Construction Costs Sub Total - PV Cost for Approval (appraisal,d	esign,construction)	502,415 (9) 4,695,858 (10) 5,198,273 (11)	All costs and benefits mus Life basis over the Dur Contributions are ident Preser	It be on a Present Value (PV) Whole- ation of Benefits period. Where Hifed these should also be on a nt Value basis.
PV Post-Construction Costs PV Whole-Life Costs: PV Contributions secured to date		681,382 (12) 5,879,655 (13)	The total value of any necess maintenance (ongoing costs) means.	sary contributions will depend on whether is funded through revenue FCRM GiA, or by other
PV Local Levy secured to date PV Public Contributions secured to date PV Private Contributions secured to date PV Finding form other Environment Agency func PV Total Contributions secured to date WARNING: Contributions less than minimum	tions/sources secured to date required in cell (2)	(14) (15) (16) (17) (18)	NOTE: This scheme is to be 5). Capital FCRM GIA will fun 11) with any shortfall needing cells(14-17). Future ongoing them are a matter for local a in cells(14-17). It is recomme during scheme development ongoing costs (cell12).	maintained by an RMA other than the EA (ref cell and the appropriate share of the up-front costs (cell g to be paid for via contributions identified in costs (cell 12) and any contributions towards greement by the RMA and should NOT be included anded that the RMA takes the opportunities created to separately secure contributions towards future
2. Qualifying benefits under Outcome Me Number of households in: 20% most deprived areas 21-40% most deprived areas 60% least deprived areas	Asure 2: households better protected against flood ris Before 23 17 21 At: Moderate Significant Very risk risk significant risk	k Moderate risk	After Significant Very risk significant risk E), compared with a household	Change due to scheme 0 0 0 -23 -17 -21 Moderate Significant Very risk Very risk at low risk 150 600 1,350
Change in household damages, in: 20% most deprived areas 21-40% most deprived areas 60% least deprived areas	Per year <u>£</u> - <u>£</u> - <u>-</u> <u>£</u> 42,000		E - £ - £ - -£ 630,000	Qual. benefits (discounted) OM2 (20%) £ - OM2 (2140%) £ - OM2 (60%) £ 525,731
3. Qualifying benefits under Outcome Me Number of households in: 20% most deprived areas 214-0% most deprived areas 60% least deprived areas	asure 3: households better protected against coastal Before Long-term loss Medium-term loss	erosion Damages p Annual dama Loss expecte Present value discounted b	er household avoided: ges avoided sd in e of Year 1 loss (i.e. first year dam ased on when loss is expected)	E 6,000 E 6,000 50 20 years 2 1,184 E 3,015 Long-term loss Medium-term loss loss loss
Change in household damages, in: 20% most deprived areas 21-40% most deprived areas 60% least deprived areas	Year 1 loss avoided <u>£</u> - <u>£</u> - <u>£</u> -		Over lifetime of scheme: £ - £ - £ - £ -	Qual. benefits (discounted): OM3 (20%) £ - OM3 (21-40%) £ - OM3 (60%) £ -
4. Qualifying benefits under Outcome Me	asure 4: statutory environmental obligations met		Assumed henefite per unit	Qual honofite (discounted)
OM4a Hectares OM4b Hectares OM4c Kilometre	of net water-dependent habitat created of net intertidal habitat created s of protected river improved		$\begin{array}{c} \underline{\pounds} & 15,000 \\ \underline{\pounds} & 50,000 \\ \underline{\pounds} & 80,000 \end{array}$	OM4a £ - OM4b £ - OM4c £ - OM4c £ - OM4c £ -
5. Qualifying benefits arising from the ov	erall scheme, for entry into the Medium-Term Plan			
OM, deprivation: Qual. ber OM1 £ OM2 20% mot. £ 214-00% £ Least 60% £ 214-00% £ Least 60% £ Least 60% £	efits: Payment rate: 18,922,574 5.56 p in the £1 - 45.0 - 30.0 525,731 20.0 - 45.0 - 30.0 - 45.0 - 30.0 - 45.0 - 20.0	FCRM GIA £ £ £ £ £ £ £ £ £ £ £ £ £	contribution: 1.051,254 - 105,146 - - - -	
Total	19,448,305	£	1,156,400 Maximum for C	Outcomes delivered. The actual value any scheme
Sensitivity Testing. It is important that users o below. Users should consider how appropriate thes	, f this calculator appreciate the implications on funding from changes e are to their project, what other tests may be appropriate and how b	to input data which may become nece set to use the information with all thos	is elligible for m ssary as the project develops and be e that may be involved in the project.	nay be less. etter information is available. Five typical tests are provided

As scenario above Sensitivity 1 - Change in PV Whole Life Cost (25% increase) Sensitivity 2 - Change in OM2 - 50% of households in Very Significant (Before) risk may already be in Significant Risk band Sensitivity 3 - Change in OM3 - 50% of households in Medium Term loss (Before) may already be in Long Term loss Sensitivity 4 - Increase Duration of Benefits by 25%

 Score
 Contribution for 100% Score (Ek)

 20%
 4,175,886

 7%
 6,037,767

 19%
 4,188,474

 20%
 4,175,886

 2%
 5,092,893

 19%
 4,189,380
 Raw Score

END OF WORKSHEET

ECRM Partnership Funding Coloulator for Flood and Coostal Fracion Rick Management Grant in Aid (ECRM GIA)

Project Name Unique Project Number	Southwold IA				
		ed technical obtion			
					Maria lancata a lla
All figures are in £'s Figures in Blue to be entered onto Mediur	m Term Plan			\z\z	Calculated cells
SUMMARY: prospect of FCRM GiA fundin	<u>ıg</u>			5	Scheme Benefit to Cost Ratio: 2.80 to 1
Raw Partnership Funding Score			17% (1)	Effe	ective return on contributions: n/a to 1
External Contribution or saving required to	achieve an Adjusted Score of	100%	5,251,580 (2)	Cell (2) shows the minim	num amount of contributions and/or reductions in scheme
Adjusted Partnership Funding Score (PF)			17% (3)	increases on this will imp	raise the Adjusted PF Score to at least 100%. Further prove this scheme's chances of an FCRM GiA allocation
PV FCERM GiA towards the up-front cost	s of this scheme (PV Cost fo	r Approval)	- (4)	cells(9,10,12) and cells(14-17). See NOTE below.
<u>1. Scheme details</u> Risk Management Authority type of asset m	aintainer		LA (5)	Yes (6)	hat a Stratagia Approach has been taken
Duration of Benefits (years)			15 (7)	and that double co	unting of benefits has been avoided ?
PV Whole-Life Benefits:			19,448,305 (8)		
PV Costs				All costs and benefits Life basis over the	Duration of Benefits period. Where
PV Appraisal Costs PV design & Construction Costs Sub Total - PV Cost for Approval (appraisal,	design,construction)		<u>541,063</u> (9) <u>5,761,180</u> (10) 6,302,243 (11)	Contributions are iden	titried these should also be on a Present Value basis.
PV Post-Construction Costs			634,249 (12)		
· · · ································			0,330,432 (13)	The total value of any ne	ecessary contributions will depend on whether
PV Contributions secured to date			(14)	maintenance (ongoing c means.	osts) is funded through revenue PCRM GIA, or by other
PV Local Levy secured to date PV Public Contributions secured to date			(14)	Capital FCRM GiA will fu	and the appropriate share of the up-front costs (cell 1)
PV Private Contributions secured to date PV Funding form other Environment Agency fur	nctions/sources secured to date		(16)	with any shortfall needing Future ongoing costs (ce	g to be paid for via contributions identified in cells(14-17). Il 12) and any contriubutions towards them are a matter
PV Total Contributions secured to date	m required in cell (2)		0 (18)	for local agreement by the	he RMA and should NOT be included in cells(14-17). It is
WARNING. Contributions less than minimul	n required in cen (2)			development to separate	ely secure contributions towards future ongoing costs
2. Qualifying benefits under Outcome Mer Number of households in: 20% most deprived areas 21:40% most deprived areas 60% least deprived areas	At: Moderate Sign risk r	rotected against flood risk fore 17 21 ficant Very isk significant risk	Moder risk Annual damages avoid	After ate Significant Very risk significan risk led (£), compared with a hous	Change due to scheme 0 0 0
Change in household damages in:		Per vear	5	Over lifetime of schen	ne Qual benefits (discounted
20% most deprived areas	£	-]	£ -	OM2 (20%) £ -
60% least deprived areas	-£	42,000		-£ 630,00	0 OM2 (60%) £ 525,731
3. Qualifying benefits under Outcome Me	asure 3: households better p	rotected against coastal ero	osion		
20% most deprived areas		Before	Damage Annual d	es per nousenoid avoided: lamages avoided	£ 6,000 £ 6,000
21-40% most deprived areas 60% least deprived areas			Loss exp Present	ected in value of Year 1 loss (i.e. first yea	t damages, £ 1,184 £ 3,015
	Long-te	erm loss Medium-term loss	discount	ed based on when loss is expec	ted) Long-term Medium-term loss loss
Change in household damages, in:		Year 1 loss avoided	<u>.</u>	Over lifetime of schem	e: Qual. benefits (discounted)
20% most deprived areas 21-40% most deprived areas	£		_	£ -	OM3 (20%) £ - OM3 (21-40%) £ -
60% least deprived areas	£	-]	£ -	OM3 (60%) £ -
4. Qualifying benefits under Outcome Mea	asure 4: statutory environme	ntal obligations met		Assumed henefits per ur	hit. Qual benefits (discounted)
OM4a Hectares	of net water-dependent habita	t created		£ 15,00	0 OM4a £ -
OM4b Hectares OM4c Kilometre	of het intertidal habitat created	I		£ 50,00 £ 80,00	0 0M4b £ - 0 0M4c £ -
					OM4L£ -
5. Qualifying benefits arising from the over	arall scheme, for entry into the	ne Medium-Term Plan			
OM, deprivation: Qual. ber OM1 £	18,922,574	t rate: 5.56 p in the £1	FCRM C	GiA contribution: 1,051,254	
OM2 20% most £		45.0	£		
Least 60% £	525,731	20.0	£	105,146	
20% most £ 21-40% £		45.0 30.0	£	-	
		20.0	£	-	
Least 60% £ OM4 £		100.0	£	-	
Least 60% £ OM4 £ Total £	19,448,305	100.0	£	- 1,156,400 Maximum elligible for	for Outcomes delivered. The actual value any scheme is

As scenario above Sensitivity 1 - Change in PV Whole Life Cost (25% increase) Sensitivity 2 - Change in OM2 - 50% of households in Very Significant (Before) risk may already be in Significant Risk band Sensitivity 3 - Change in OM3 - 50% of households in Medium Term loss (Before) may already be in Long Term loss Sensitivity 5 - Reduce Duration of Benefits by 25%

 17%
 5.251.580

 6%
 7.405.005

 16%
 5.264.516

 17%
 5.251.580

 2%
 6.193.948

 16%
 5.265.447

Raw Score Contribution for 100% Score (£k)

END OF WORKSHEET

FCRM Partnershin Funding Calculator for Flood and Coastal Frosion Risk Management Grant in Aid (FCRM GiA)

Version 8 Janu	ary 2014	any calculator for Fi			timanayement ofa		
Project Name	t Number	Southwold	A Preferred tech	vical option with	deferred costs		
Unique Projec	t Number	Wantan 3		lical option with	deletted costs		
All figures are in £ Figures in Blue to	's be entered or	nto Medium Term Plan				\z\z	Key Input cells Calculated cells
SUMMARY: prosp	ect of FCRM	GiA funding					Scheme Benefit to Cost Ratio: 4.50 to 1
Raw Partnership Fu	Inding Score			I	27% (1)		Effective return to taxpayer: 4.50 to 1 Effective return on contributions: n/a to 1
External Contribution	on or saving re	equired to achieve an Adjuste	d Score of 100%		2,814,616 (2)	Cell (2) shows the	e minimum amount of contributions and/or reductions in scheme
Adjusted Partnersh	ip Funding Sc	ore (PF)			27% (3)	increases on this	will improve this scheme's chances of an FCRM GiA allocation
PV FCERM GiA to	wards the up-	front costs of this scheme (F	V Cost for Approva	I)	- (4)	cells(9,10,12) and	d cells(14-17). See NOTE below.
<u>1. Scheme details</u> Risk Management A	Authority type	of asset maintainer			LA (5)	Yes (6)	
Duration of Benefits	s (years)				15 (7)	Is evidence ava and that do	Illable that a Strategic Approach has been taken, uble counting of benefits has been avoided ?
PV Whole-Life Bene	efits:				19,448,305 (8)		
PV Costs						All costs and be Life basis o	enefits must be on a Present Value (PV) Whole- ver the Duration of Benefits period. Where
PV Appraisal Costs PV design & Constru Sub Total - PV Cost	ction Costs	(appraisal,design,construction	1)		541,063 (9) 3,300,446 (10) 3,841,509 (11)	Contributions a	re identified these should also be on a Present Value basis.
PV Post-Construction	n Costs				484,476 (12)		
PV Whole-Life Cost	s:				4,325,985 (13)	The total value of	f any necessary contributions will depend on whether
PV Contributions se	ecured to date					maintenance (on means.	going costs) is funded through revenue FCRM GiA, or by other
PV Local Levy secure PV Public Contributio	ed to date ons secured to o	date			(14) (15)	NOTE: This sche Capital FCRM Gi	me is to be maintained by an RMA other than the EA (ref cell 5) A will fund the appropriate share of the up-front costs (cell 11)
PV Private Contribution	ons secured to	date	ed to date		(16)	with any shortfall	needing to be paid for via contributions identified in cells(14-17)
PV Total Contributio	ons secured to	o date	eu lo uale		0 (18)	for local agreeme	ent by the RMA and should NOT be included in cells(14-17). It is
WARNING: Contribu	utions less tha	in minimum required in cell (2)			recommended the development to s	at the RMA takes the opportunities created during scheme eparately secure contributions towards future ongoing costs
						(cell12).	
2. Qualifying benef	fits under Out	come Measure 2: household	s better protected a	gainst flood risk			
Number of househo 20% most deprived a	lds in: reas		Before			After	Change due to scheme
21-40% most deprive	d areas			~ ~ ~			
60% least deprived a	leas	At: Moderate	Significant	Very	Moder	rate Significant	Very Moderate Significant Very
		risk	risk	significant risk	risk	i risk si	gnificant risk risk significant risk <u>risk</u>
					Annual damages avoid	ded (£), compared with	a household at low risk 150 600 1,350
Change in househol 20% most deprived a	d damages, in reas	:	F £	Per year -		Over lifetime of	f scheme Qual. benefits (discounted) - OM2 (20%) £ -
21-40% most deprive	d areas		£	-		£	- OM2 (21-40%) £ -
60% least deprived al	reas		-1.	42,000		-£	030,000 UM2 (00%) £ 525,731
3. Qualifying benef Number of househo	lds in:	come Measure 3: household	s better protected a Bei	gainst coastal eros fore	bion Damage	es per household avoide	ed:
20% most deprived a 21-40% most deprive	reas d areas				Annual o Loss exp	damages avoided pected in	£ 6,000 £ 6,000 50 20 years
60% least deprived a	reas		Long-term loss	Medium-term loss	Present discount	value of Year 1 loss (i.e. f ed based on when loss is	irst year damages, <u>£ 1,184</u> <u>£ 3,015</u> s expected) Long-term Medium-term
			, in the second s				loss loss
Change in househol	d damages, in	:	Y	ear 1 loss avoided:		Over lifetime of	scheme: Qual. benefits (discounted):
21-40% most deprive	d areas		£	-		£	- OM3 (21-40%) £ -
60% least deprived a	reas		£	-		£	- OM3 (60%) £ -
4. Qualifying benef Payments under:	fits under Out	come Measure 4: statutory e	environmental obliga	ations met		Assumed benefits	per unit: Qual. benefits (discounted):
OM4a OM4b		Hectares of net water-dependent	dent habitat created tat created			£	15,000 OM4a £ -
OM4c		Kilometres of protected river	improved			£	80,000 OM4c £ -
5 Qualité :							
out in the second second	ins arising fro	on the overall scheme, for el	nity into the Mealum	-rerm Plan			
OM, deprivation: OM1	1	Qual. benefits: £ 18,922,574	Payment rate: 5.56 p	o in the £1	FCRM (£	A contribution: 1,051,254	
OM2	20% most 21-40%	£ -	45.0		£		
01/2	Least 60%	£ 525,73	1 20.0		£	105,146	
OM3	20% most 21-40%	£ -	45.0		£	-	
0M4	Least 60%	£ -	20.0		£	-	
Total		£ 19,448,30	5		£	1,156,400 Max	ximum for Outcomes delivered. The actual value any scheme is
Sensitivity Testing	. It is important t	hat users of this calculator appreciat	e the implications on fundir	ng from changes to input	data which may become neces	ellig sary as the project develops	pole for may be less. and better information is available. Five typical tests are provided below.
Users should consider h	now appropriate th	hese are to their project, what other t	ests may be appropriate a	nd how best to use the i	nformation with all those that may	y be involved in the project.	

As scenario above Sensitivity 1 - Change in PV Whole Life Cost (25% increase) Sensitivity 2 - Change in OM2 - 50% of households in Very Significant (Before) risk may already be in Significant Risk band Sensitivity 3 - Change in OM3 - 50% of households in Medium Term loss (Before) may already be in Long Term loss Sensitivity 5 - Reduce Duration of Benefits by 25%

Contribution for 100% Score (£k) Raw Score 2,814,616 4,339,784 2,827,260 2,814,616 3,735,664 2,828,169 27% 10% 26% 27% 3% 26%

END OF WORKSHEET