

Runswick Bay Strategy Economics Update

PREPARED FOR: Scarborough Borough Council

COPY TO:

BY: A Parsons

(Rev 1. Cost revisions and addition of contributions (FCRM GIA) calculation - M Cali)

(Rev 2. Cost and benefit revisions including future maintenance on south revetment - A Parsons. Yorkshire Water contribution - M Cali)

(Rev 3. Update for PAR – S Jenkinson / M Cali)

(Rev 4. Update costs for PAR – R Siddle (SBC) / M Cali)

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1. Introduction

This technical memorandum describes the approach to assessing the Do-Nothing damages and Do-Something option benefits for the Runswick Bay strategy review. The document then summarises the results of the FCRM Partnership Funding Calculator for Flood and Coastal Erosion Risk Management Grant in Aid (FCRM GiA).

2. Review of Coastal Strategy 2002 Economics

The previous strategy for Runswick Bay was developed in 2001 and finalised after consultation in November 2002. The 2002 strategy economics assessment used the Defra PAG3 spreadsheets and Middlesex 'Yellow Manual' approaches that were standard at the time and are presented in Appendix B. The appraisal used a 50 year assessment period years and Test Discount Rate of 6%, both of which have now been superseded. The base date for the estimated benefits and costs was given as Jan 2003.

Appendix B of the 2002 strategy lists the properties at risk over the 50 year period and gives a total estimated market value (MV) of about £10 million. The discounted PV damages for DN, assuming initiation of seawall failure in year 2 were £5.2 million. The strategy indicates that the probability of loss of properties was based on deterministic assessment and engineering judgement following site inspections and that those properties were assumed to be lost in years 7 to 12. Note that page 38/39 of the 2002 strategy report explains that some of these properties would not actually be lost to erosion until much later, but the access road and utilities would be lost by year 12. Alternative estimates of losses were estimated as sensitivity tests for different estimates of initial breach probability, giving values between £5.2 million and £1.4 million, depending upon assumptions made.

There was no inclusion of monetised amenity and recreational benefits, although it was recognised that there would be significant intangible losses. The preferred option in the 2002 strategy was estimated to have a capital cost of approximately £1.0million, and a whole life Present Value (PV) cost of £0.6 million (over 50 years), giving a Benefit Cost Ratio (BCR) of 4.9.

Due to changes in the appraisal requirements and significant time since the previous assessment, particularly in relation to recorded residential value changes, it has been considered necessary to fully revise the assessment in accordance with the latest guidance.

3. Update for 2015 project appraisal

The economic assessment has been carried out in accordance with the guidance given by Defra and the Environment Agency in the Flood and Coastal Erosion Risk Management Appraisal Guidance (Environment Agency, 2010) (FCERM-AG) and the Middlesex University Multi-Coloured Manual (MCM Handbook 2010). Spreadsheets for the economics calculations in standard FCERM-AG format are attached in Annex A and details of assumptions and specific methodology are given below.

All options considered in the economic assessment have been assessed over a 100-year period and all costs and benefits have been discounted in accordance with the recommendations of the HM Treasury 'Green Book' (HM Treasury, 2003). The base date for both costs and benefits is now March 2015.

3.1 Sub- Division of strategy frontage for economic appraisal

Often FCERM strategies subdivide the flood and coastal risk area on the basis of flood cells, shoreline geomorphology or coastal defence practice. However, in this case the whole of the village needs to be considered together as there is a single access road to the properties; the village is small with a compact layout on the cliff and the short length of defences. Therefore the overall strategy risk area has not been split into sub-units for the economic appraisal.

3.2 Options Assessed in the Economics Appraisal

The economic appraisal has been completed for the following short listed options that have been carried forward from the initial options assessment, see separate Strategic Options Technical note.

- Option 1 - Do nothing (mandatory baseline option);
- Option 2 - Do minimum (this option is assessed to be sustainable for 20 years);
- Option 3 - Rock apron at seawall;
- Option 5 - Stepped concrete revetment at seawall;
- Option 6 - Rock fillet (reduced section rock apron) to seawall;
- Options 7 & 8 - Rock groyne at Cobble Dump with reduced length rock fillet at the village seawall (combined option);

3.3 Cost of short listed options

The derivation of capital, maintenance and other costs for each of the options is described in the option assessment technical note. All options include the default 60% Optimism Bias added to the PV cost estimate (refer to Table 3.1) which makes allowance for detailed design elements such as overtopping modelling and beach access provision. Initial costs assumptions and breakdowns are included in Annex A.

Note that Options 3 to 5 include costs for future maintenance and repairs to the rock armour, seawall and cliff stabilisation works not directly protected by the proposed capital scheme options described above. This refers to the existing defence constructed in 2000 which protects the south side of the village and the beach access. These future maintenance and repair works include rock armour reprofiling, drainage works, shear key piling and concrete patch repair.

Table 3.1: Summary of short listed option costs excluding appraisal (in order of increasing PV costs)

Option number	PV Costs £			
	Option 2	Option 6	Options 7 & 8	Option 3
Option name	Do Minimum (20 years)	Rock armour fillet	Rock groyne and reduced rock fillet	Rock armour apron
Capital Scheme Implementation Costs				
Construction costs	0	486,000	930,000	1,024,000
Site investigation and survey (10%)	0	48,600	93,000	102,400
Environmental mitigation (7.5%)	0	36,400	69,700	76,800
Environmental enhancement (incl.)	0	0	0	0
Site supervision (7.5%)	0	36,400	69,700	76,800
SBC staff costs	0	49,200	49,200	49,200
Consultant fees	0	54,300	54,300	54,300
Yorkshire Water service diversion	0	193,000	193,000	193,000
Optimism Bias (30%)	0	271,000	438,000	473,000
Sub Total	0	1,175,000	1,897,000	2,049,000
Maintenance (Year 0-4)				
New works maintenance	3,900	3,900	3,900	3,900
Existing southern defences maintenance	3,900	3,900	3,900	3,900
PV Other (env. etc 5%)	400	400	400	400
PV fees etc (12%)	900	900	900	900
Optimism Bias (30%)	2,700	2,700	2,700	2,700
Sub Total	11,800	11,800	11,800	11,800
Total Costs Year 0-4	11,800	1,187,000	1,909,000	2,061,000
Future Costs (Year 5-100)				
Capital	0	0	0	0
Maintenance	30,300	54,700	105,000	45,600
Existing southern defences maintenance	94,300	183,000	183,000	183,000
PV Other (env. etc 5%)	6,200	11,900	14,400	11,400
PV fees etc (12%)	14,900	28,600	34,600	27,500
Optimism Bias (30%)	43,700	83,500	101,000	80,400
Sub Total	189,000	362,000	439,000	348,000
Total PV Cost	201,000	1,550,000	2,350,000	2,410,000

Numbers are rounded

3.4 Assets at Risk under do-nothing

The assets at risk from flooding and erosion are defined as those within the tidal flood and coastal erosion risk areas. The different categories of assets at risk and the sources of data used to provide the quantities of assets at risk are listed below:

Residential Properties – Identified from Valuation Office website council tax valuation list. See section below for details on valuation.

Non-Residential Properties – Identified from Valuation Office website (www.voa.gov.uk). Non-residential properties include properties such as shops, self-catering holiday units, public conveniences, car parks, village reading room, sailing club building and life boat house and rescue boat station. Market values were estimated from the rateable value published by the VOA and a yield factor as described in the MCM.

Infrastructure – The access road into the village cannot be counted as it is assumed that it would be lost at the same time as the village properties and the use of the beach. The Yorkshire Water Pumping station is built into the coastal defences and has been included as a non-residential property based on its rateable value. No allowance for infrastructure such as electricity, gas, telecommunications or potable water supply has been included as it is assumed that the whole lower village would be lost at the same time.

Recreational assets – An assessment of recreational loss has been made based on annual visitor numbers (refer to Section 3.7).

Environmental assets – No losses or gains to environmental have been included.

3.5 Residential Property valuations

Residential properties in the risk area were identified from Valuation Office website (www.voa.gov.uk) council tax banding data list. In accordance with the MCM valuation of properties has used risk free market values, i.e. not taking into account reductions in value due to perceived or real flood and erosion risks.

The approach taken was to obtain prices from recent sales from the Land Registry (<http://houseprices.landregistry.gov.uk/price-calculator>) and other internet sources (www.zoopla.co.uk) for the post code area. The average prices for the post code area and property types were then assigned to the individual identified properties on the basis of council tax banding.

Due to the desirable location the property values were expected to be relatively high compared to regional averages which are sometimes used for FCERM benefit estimates. The average property value in the village based on sales between 1995 and 2013, adjusted to 2013 prices using the Land Registry house price calculator is £271,000. The latest average regional house prices were also obtained (August 2013) for comparison and sensitivity tests. The average house prices in North Yorkshire by property type are:

- Detached £262,126
- Semi-detached £148,929
- Terraced £125,673
- Flat £119,875

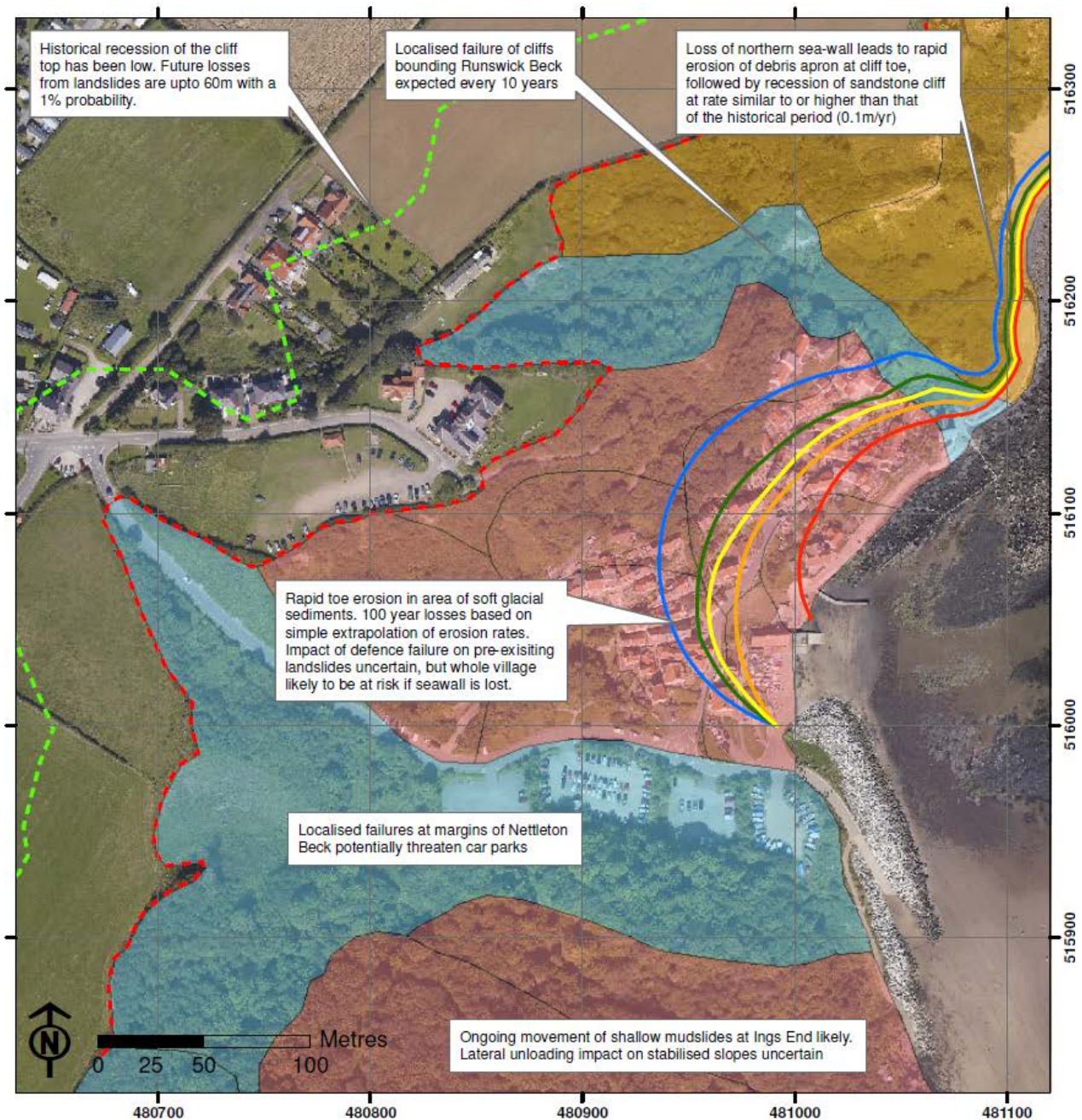
3.6 Identifications of timing of property losses under Do-Nothing

The hazard map from the geomorphological assessment, see Figure 3.1, was used to identify timings of property loss.

Under the do-nothing scenario, once the seawall has failed the access road / paths to the majority of the 47 Residential and 11 non-residential properties in post code area TS13 5HU in the lower village would be lost between 3 and 10 years after failure. The other post code area in the lower village, TS13 5HT has some properties with an access lane coming off the main road down the cliff just above the car parks and so these 49 residential and 6 non-residential properties are assumed to be lost over a longer period of time, with 90% chance of loss between years 10 and 50 after initial defence failure.

Under the do-nothing option there is a risk that cliff failures and recession of the top cliff line would result in properties in the upper village in post code areas TS13 5HS and TS13 5JQ. In accordance with the erosion risk assessment a probabilistic approach has been used in the estimate of economic damages for these areas. The properties identified in TS13 5HS have been assumed to have a 4% chance of loss while those in 5JQ a 0.2% chance of loss in 100 years. For the do-minimum option it is assumed that the onset of cliff failures will be delayed by 20 years. Thus the potential damages are reduced.

The lower car parks, sailing club boat park and access road down the cliff are protected by the rock armour defences and cliff stabilisation works that were constructed in 1999. Although they are protected there is a significant risk that beyond 20 years outflanking of the defence from the failure in the village to the north and or from the active unprotected cliff to the south could initiate loss of these assets. It has been assumed that there is a 10% chance of loss of the access road and car parks by year 50 and a 50% chance by year 99. The values of the road and car parks themselves have not been included. This affects the timing of the amenity damages, see discussion in the following section.



Runswick Bay Coastal Strategy Study, 2013 Cliff Instability and Erosion Risk (0 to 100 years)

Cliff instability and erosion risk projections 0 to 100 years

Toe erosion projections adapted from HPR Drawing 1321/P/002

100 year losses

50 year losses

20 year losses

10 year losses

5 year losses

Cliff instability projection adapted from Futurecoast

100 year losses 1% probability

5 year losses 99% probability

Geomorphology and geohazard risk

Interpreted from 2010 aerial survey data

Sandstone cliff with actively eroding sea cliff

Locally active deep and shallow landslides

Incised streams with locally active landslides

Note: projections are subjective, based on previous work of others and measured historical recession rates.

Figure 3.1: Projections of cliff instability and erosion risk

3.7 Amenity Benefits

The value of recreational assets has been calculated using the Value of Enjoyment methodology as detailed in chapter 8 of the MCH (2010).

3.7.1 Adult recreation and amenity user numbers

Runswick Bay (refer to Figure 3.2) is a popular tourist destination on the Yorkshire Coast. According to www.discoveryyorkshirecoast.com [quotes in italics]:

Runswick Bay is a picture-postcard seaside village loved by both artists and holidaymakers.

The beach can be accessed via a steep 1 in 4 road with an accessible car park at the bottom....It has been frequently awarded the ENCAMS Seaside Award and if appropriate will be flying the distinctive blue and yellow flag.

Narrow paths wind between the attractive cottages and houses with their small colourful gardens. The thatched property on the seafront is one of the last remaining thatched houses on the Yorkshire coast. Everything appears to cling to the steep hillside. Due to the instability of the soft, slippery Jurassic shales there was a landslip in 1682 and the whole village had to be rebuilt. The village also consists of a camp site, caravan site, bed & breakfast and hotel accommodation, restaurant, cafe/tea shop, public house serving bar meals, public telephone box, regular bus service, and a church and picnic area.

Runswick Bay beach is a small sheltered beach with rock pools either side of the bay. The beach is in front of a charming village which plays host to a sailing club as well as a number of pleasure and fishing boats. Ideal for families and walkers



Figure 3.2: Runswick Bay village and seawall – December 2013

The MCM 2010 methodology for estimating amenity benefits splits the visitor types into three categories:

Staying visitors: Anyone staying away from home for one or more nights.

There is limited accommodation in the village and a Runswick Bay Caravan & Camping Park is located at Bank Top with about 20 static caravans and 35 pitches. There are a number of rental properties in the village so there may be up to say a 100 units. Assuming utilisation of 40% gives say 20 weeks occupancy per year; typical party of 2 adults, average length of stay of 5 nights, gives $100 \times 20 \times 5 \times 2 = 20,000$ staying visits per year.

Day visitors: Anyone starting and finishing their trip from their permanent home.

Scarborough Borough as a whole attracts approximately 7 million visitors each year, the vast majority (81%) of whom arrive by private car (source: Welcome to Yorkshire.). Scarborough Borough coast's annual total in

2007 was estimated at 807,000 (Ref: Yorkshire Tourist Board Cambridge Summary Report 2007 Scarborough District).

The annual numbers of local visitors will be limited by the numbers of residential properties in the rural area. If we assume say 10% of visitors go to Runswick Bay, the annual Day visitors estimate is say 80,000.

Local visitors: Those living within a three-mile radius of a site.

There are limited numbers of properties (>200?) due to the rural surroundings. Assume say 1 visit per week, gives say 10,000 visits per year.

This gives a total initial estimate of say 110,000 visits per year.

Data from public car park usage:

In order to confirm the above rough estimate of visitor numbers the annual revenue income data for the car parks has been reviewed, see Table 3.2. There are two car parks, one at the top of the village with 100 spaces and one at the bottom with 80 spaces. Prior to 2008/9 only the car park on the bottom was charged for, but after this 'Bank Top' park also became pay and display. The Council does not charge for parking at Runswick Bay from 31st of October to the 1st of March so the income is only for 8 months. Furthermore charging is for the hours of 9.00 to 18.00, 7 days per week. The cost of parking for 1 hour is £2 at present. In 2012 the costs were £2 for 2 hours, £3 for 4 hours.

If we assume a £3 charge for each visit and average of 1.5 adults per car, then £60,000 income indicates about 30,000 visitors paying to use the car parks. The rate of visits would be expected to be lower during the 4 winter months of the year when there is no charge for parking. If we assume say 80% reduction over the winter then there may be around say 4,000 additional visitors in the winter.

It is noted that local visitors and sailing club members probably have alternative parking arrangements such as the residents car park or may not visit by car, or if they do visit outside fee paying hours. It is not known how many visitors arrive on foot using the Cleveland Way or by cycle using the coastal cycle path, but both are popular routes. Some of the staying visitors will not need to use the public car parks as parking will be provided, e.g. at the camp site. Furthermore there are half hourly bus services along the coast between Middlesbrough and Whitby that provide a public transport route to the village.

Table 3.2 Car parking income for Runswick Bay

Financial Year	Income
2002/03	£34,151
2003/4	£40,858
2004/5	£42,001
2005/6	£42,492
2006/7	£42,786
2007/8	£45,764
2008/9	£50,274
2009/10	£58,312
2010/11	£59,145
2011/12	£64,971
2012/13	£59,970

Data from National Park:

The North York Moors National Park (NYMP) website holds a number of documents reporting visitor statistics. Their fact leaflet on Tourism in the North York Moors National Park is rather dated and gives statistics from the mid to late 1990s. This indicates that there were about 10 million annual visitor days to the NYMNP in 1998. The data on visits to selected attractions (see Figure 3.3) shows that 6% of day trippers and 21% of holiday makers reported visiting Runswick Bay.

FIG. 4 SELECTED ATTRACTIONS / PLACES VISITED

Location	% of respondents	
	Day Trippers	Holidaymakers
Whitby*	25	83
Pickering*	27	62
Goathland	26	61
Robin Hoods Bay	13	59
Helmsley	32	37
Hutton - le - Hole	21	28
Staithes	8	32
Thornton-le-Dale	11	19
Runswick Bay	6	21
Moors Centre, Danby	9	18
Dalby Forest	5	18
Falling Foss / May Beck	2	7
Broxa Forest	0	1
None of these	17	1

Source: Tourism in the North York Moors National Park

Figure 3.3 Places visited in North York Moors National Park

The 10 million total visitors was split 40% day visitors to the park and 60% holiday visitors (i.e. those staying away from home either inside or outside the NYMNP). The day tripper visitor numbers to Runswick from NYMNP day trippers can be estimated as $6\% \times 40\% \times 10,000,000 = 240,000$. Assuming holidaymaker visitors stay for 5 days on average and visit Runswick once gives a figure of $21\% \times 60\% \times 10,000,000 / 5 = 252,000$. This gives a total estimate of 492,000 annual visits, which appears very high compared to the initial estimate of 110,000.

The National Trail officer for the Cleveland Way supplied people count data for the Cleveland Way, see Table 3.3 below, which indicates around 30,000 people per year. This data was measured at Saltburn, but the National Trail officer considered it would be fairly representative for Runswick Bay.

Table 3.3 Cleveland Way People Count data (as measured at Saltburn)

	2008	2009	2010	2011	2012	2013
January	780*	784	444	724	700*	650
February	750*	751	329	536	1458	1348
March	900	2169	1510	2314	3825	1322
April	1566	2921	2801	3493	2437	2592
May	3330	3469	3031	2698	3292	3811
June	2533	3131	2695	3209	3132	3390
July	3000	3757	3277	3814	3432	4524
August	3200	5037	4093	3797	4772	4802
September	2366	3605	2618	3332	3698	3028
October	1048	2340	1840	2673	2030	2135
November	797	1087	745	1320	1079	1551
December	1006	638	179	1094	641	1187
TOTALS	21276	29689	23562	29004	30496	30340

It is noted that the Whitby FCERM Strategy benefits evaluation quoted figures from Tourism UK indicating 1.5 million total visitor days to Whitby in 2004/05. Using the data in Figure 3.3 for a similar calculation for Whitby would indicate 1 million day trippers and just under a million holiday makers, i.e. 25% higher than the Tourism UK numbers.

It is therefore considered that the initial estimate of 110,000 day visitors is a reasonable, possibly lower bound estimate of annual adult day visits that can be taken forward to the economic assessment.

3.7.2 Options that result in gains or losses

Recreation benefits may have the following two components:

1. The prevention of further deterioration - losses with the 'Do nothing' option.
2. A reinstatement of the condition of the site from the current state to a better one – gains. For example, beach nourishment for coastal protection purposes may result in a 'better' beach in recreational terms.

In this case the options that are under consideration are assumed to relate only to component 1, i.e. prevention of losses that would occur under do-nothing.

3.7.3 Determine the onset of amenity / recreational losses

In the case of the do-nothing option for the Runswick Bay coastal defences continued visits would still be possible after the village seawall has failed because the access road and car parks are protected by the 1999 rock armour scheme and associated cliff stabilisation. These assets have longer residual life and are not expected to be lost until up to 50 years from commencement of the strategy.

Data is not available on the % of visitors going to the beach or to the village. While there may be fewer visitors as the village is progressively lost there is no evidence on which to make an assessment of changes and so if the road and beach access remains open it is assumed visitors will keep coming at the same rate.

The timing of onset of damages needs consideration. Although under do-nothing the rock armour is assumed to have a residual life of up to 50 years, loss of the road and car parks may occur before this due to outflanking from the north or south. A probabilistic approach to derivation of PV damages has therefore been taken, assuming that there is a 0.1% annual chance of failure in year 10, 10% chance in year 50 and 50% chance in year 99.

3.7.4 Value of enjoyment of individual visits

No specific visitor survey data to provide estimates of the value of a visit are available for Runswick Bay and a site specific survey is beyond the scope of this study. Use is therefore made of published data available in the MCM, 2013 in accordance with the recommendations for strategic assessments.

3.7.5 MCM 2013 Data for recreational / amenity gains and losses at coastal sites

		£ per adult visit updated to 2013	
		Mean gain with options	Mean loss with 'Do nothing'
Beach and promenade erosion			
Yellow Manual Standard data: 4 sites	Nourished beach and promenade	3.00	7.22
Lee-on-Solent	(a) Shingle beach renourishment	1.72	3.72
	(b) Rock groynes with shingle beach renourishment	1.68	
Herne Bay Visitors Centre	(a) Reef or jetty with no boat facilities	5.05	6.94
	(b) Reef or jetty with boat facilities	2.62	
	(c) Higher seawall, and promenade, rock groynes	-3.24	
Cliftonville	(a) Concrete lower promenade	4.50	6.94
	(b) Rock lower promenade	2.66	
Corton	(a) Hold the line for a limited period. Short term protection to cliff, limited access to beach and along seawall	2.58	2.60
	(b) Hold the line for a longer period >50 years. Full access along renewed seawall and onto all the beach from village	11.56	
	(c) Managed retreat. Sea defences and seawall removed to leave a 'natural' seafront, direct access from village to beach	1.80	
St Mildred's Bay	Improved beach and promenade	2.82	10.40
Hastings	Beach improvement		7.35
Breach Scenarios			
Hengistbury Head	(a) 5 rock groynes full cliff protection	0.04	4.33
	(b) 3 rock groynes partial protection	-2.43	
	(c) Beach nourishment Annual disruption	-3.65	
Hurst Spit	Slightly enlarged shingle spit	0.68	6.53

NB. This is Table 8.6 in the MCM 2013

None of the standard locations quoted in MCM 2013 are very similar to Runswick Bay. However, Herne Bay and Cliftonville may be most similar and have Do-Nothing losses per visit of £6.94.

The benefits related to visiting an alternative site need to be allowed for when evaluating the do-nothing damages. Other similar sites on the Yorkshire coast are Robin Hoods Bay and Staithes. Another alternative venue is Sandsend, which has beach and car parks, but is located on the main road and does not have the unique setting associated with Runswick Bay. Visitors could transfer to one or other of these sites, so in order to properly estimate the loss of enjoyment of a do-nothing option for Runswick Bay we would need to understand (i) the difference in value of Runswick compared to the alternative sites and (ii) the additional costs of visiting the alternative. However, the estimated visitor numbers above already assume that only 10% of visitors come to Runswick. Staithes is closer to centre of population in the Tees Valley and Robin Hoods Bay is closer to Scarborough, so both alternatives are already busier. The additional cost of visiting Runswick Bay must relate to its unique appeal. Runswick Bay combines a sandy beach with very good access

to a public car park at the beach along with an attractive coastal village. Although Staithes, Robin Hoods Bay and Sandsend offer their own particular appeals, neither of these can offer this combination.

For this initial assessment to support the strategy, we will assume that the actual loss per adult visit would be either 25% of the value derived above i.e. 25% of £6.94 = £1.74 or that the losses relate to the cost of travelling 5 miles further = $5 \times 0.45 = £2.25$. Assuming the mean gives an approximate estimate of total annual recreational and amenity damages, after loss of access, of $£2.00 \times 110,000$ visitors = £220,000. Assigning failure probabilities over 100 years gives us the total recreational damages summarised in Table 3.4. The table also summarises all the damages and benefits associated with the short listed options.

Table 3.4: Summary of short listed option damages and benefits (in same order as Table 3.1)

Option number	Damages and Benefits £ (to 3 significant figures)				
	Option 1	Option 2	Option 6	Options 7&8	Option 3
Option name	Do-nothing	Do Minimum (20 years)	Rock fillet	Rock groyne and reduced rock fillet	Rock armour apron
AEP or SoP (where relevant)	N/A	N/A	N/A	N/A	N/A
Total monetised PV damages	19,500,000	9,770,000	720,000	720,000	720,000
PV recreational damages	2,320,000	1,650,000	0	0	0
Total monetised PV benefits		9,720,000	18,800,000	18,800,000	18,800,000
Total monetised & recreational PV benefits		10,400,000	21,100,000	21,100,000	21,100,000

Numbers are rounded

3.8 Summary of results and economically preferred option

A summary of do nothing damages, PV costs, and average BCRs in the standard format recommended in the FCERM-AG is given in Table 3.5. As in previous short list option tables, this summary follows the option naming used in the initial options assessment but the options have been arranged in order of increasing costs. This facilitates the use of the FCERM-AG decision rule.

3.8.1 Initial commentary on selection of economically preferred option

All do-something options have $BCR > 5$ and are therefore economically worthwhile.

The **Do-Minimum option** has the highest average BCR and lowest PV costs. However, do-minimum would not protect the village from erosion for the 100 year assessment and so has lower significantly lower benefits than the other do-something options that would provide more protection.

All the do-something options that allow for holding the line of defence over the 100 year assessment have the same monetised PV benefits of just over £20 million (or over £18 million for residential, commercial and agricultural benefits only). By far the cheapest of these is the **rock fillet, Option 6**, which has an average BCR of 18 (including contributions, see below) and 14 (without) and incremental BCR compared to the do-Minimum of 11, therefore easily exceeding the decision rule requirement of $iBRC > 1$ to move to the next option.

There are presently no monetised additional benefits to justify the additional costs of the other hold the line do-something options. Where the benefits are the same the economically preferred option selection initially uses a least cost basis, unless there are technical, social or environmental benefits that have not been valued to be taken into account. The next most expensive option is the reduced rock fillet with rock groyne, but this cost is nearly double for no identified additional economic benefits. The full rock armour apron is slightly more costly than the reduced rock fillet with rock groyne, but does provide more direct protection to the village seawall. The concrete stepped apron is far more costly.

External contributions

There may be an opportunity to improve the benefit / cost ratio through the mechanism of identifying and obtaining a commitment to external funding. At the project funding group meeting (held on 6th March 2014) a declaration by the Runswick Bay Residents Association indicated that £100,000 contribution could be made available towards a capital scheme option.

Yorkshire Water installed and now maintain the foul water pumping station located on the seawall. An initial approach to Yorkshire Water by Scarborough Borough Council was met with agreement in principal to provide a contribution towards the scheme. This contribution will be as a total contribution to enabling works on the existing sewer network estimated at £260,000. It is estimated that an average contribution by Yorkshire Water would therefore be in the region of £260,000.

No other contributions have been sourced at this stage and whilst no firm commitment in writing has actually been received, Scarborough Borough Council are confident that these contributions will materialise and are thus included in the project summary sheet (Table 3.5).

Social, environmental and technical aspects

Further considerations of the social, environmental and technical aspects of the options and overall option choice were developed using an assessment in the Appraisal Summary Table, refer to Annex B. These have been discussed with the client and stakeholders.

Table 3.5: Economics project summary sheet for short listed options

Project Summary Sheet					
Client/Authority			Prepared (date)		23/06/2015
Scarborough Borough Council			Printed		28/07/2015
Project name			Prepared by		S. Jenkinson
Runswick Bay Strategy Review			Checked by		M Cali
Project reference			Checked date		27/07/2015
Base date for estimates (year 0)			Mar-2015		
Scaling factor (e.g. £m, £k, £)			£k (used for all costs, losses and benefits)		
Year			0 30 75		
Discount Rate			3.5% 3.00% 2.50%		
Optimism bias adjustment factor			30%		
Costs and benefits of options			0.0% 98.2% 99.0% 99.1%		
Costs and benefits £k					
Option number	Option 1	Option 2	Option 6	Options 7&8	Option 3
Option name	Do-nothing	Do Minimum (20 years)	Rock fillet	Rock groyne and reduced rock fillet	Rock armour apron
AEP or SoP (where relevant)	N/A	N/A	N/A	N/A	N/A
COSTS:					
PV capital costs	0	0	486	930	1,024
PV other (SI 10%, Env. 7.5%, Site super. 7.5%)	0	0	121	232	256
PV maintenance incl. ex. southern def. (Year 0-4)	0	9	9	9	9
PV maintenance incl. ex. southern def, fees, env. (Year 5-100)	0	146	278	338	268
PV SBC staff costs	0	0	49	49	49
PV consultants fees	0	0	54	54	54
PV cost Yorkshire Water service diversion	0	0	193	193	193
Optimism bias adjustment	0	46	357	542	556
PV contributions (Private residential + YW contributions offered)	0	0	348	348	348
Total PV Costs £k excluding contributions	0	201	1,549	2,347	2,409
Total PV Costs £k taking contributions into account	0	201	1,201	2,000	2,061
BENEFITS:					
PV monetised flood damages	0	0	0	0	0
PV monetised flood damages avoided		0	0	0	0
PV monetised erosion damages	19,493	9,771	720	720	720
PV monetised erosion damages avoided (protected)		9,722	18,773	18,773	18,773
Total monetised PV damages £k	19,493	9,771	720	720	720
Total monetised PV benefits £k		9,722	18,773	18,773	18,773
PV recreational damages	2,319	1,650	0	0	0
PV damages avoided/benefits (from amenity damage estimates)					
PV benefits from ecosystem services					
Total PV damages £k	21,812	11,421	720	720	720
Total PV benefits £k		10,391	21,092	21,092	21,092
DECISION-MAKING CRITERIA:					
excluding contributions					
Based on total PV benefits (includes benefits from scoring and weighting and ecosystem services)					
Net Present Value NPV		10,189	19,544	18,745	18,683
Average benefit/cost ratio BCR		51.6	13.6	9.0	8.8
Incremental benefit/cost ratio IBCR			7.9	0.0	0.0
		Highest bcr			
			IBCR>1		
Based on monetised PV benefits (excludes benefits from scoring and weighting and ecosystem services)					
Net Present Value NPV		9,521	17,224	16,426	16,364
Average benefit/cost ratio BCR		48.3	12.1	8.0	7.8
Incremental benefit/cost ratio IBCR			6.7	0.0	0.0
		Highest bcr			
			IBCR>1		
including contributions					
Taking account of contributions (includes benefits from scoring and weighting and ecosystem services)					
Net Present Value NPV		10,189	19,891	19,093	19,031
Average benefit/cost ratio BCR		51.6	17.6	10.5	10.2
Incremental benefit/cost ratio IBCR			10.7	0.0	0.0
		Highest bcr			
			IBCR>1		
Based on monetised PV benefits (excludes benefits from scoring and weighting and ecosystem services)					
Net Present Value NPV		9,521	17,572	16,773	16,712
Average benefit/cost ratio BCR		48.3	15.6	9.4	9.1
Incremental benefit/cost ratio IBCR			9.1	-	-
		Highest bcr			
			IBCR>1		
Best practicable environmental option (WFD)					
Brief description of options:					
Option 1	Do-nothing				
Option 2	Do Minimum (20 years)				
Option 3	Rock armour apron at seawall				
Option 6	Rock armour fillet to seawall				
Options 7&8	Rock groyne at Cobble Dump with reduced length rock apron fillet at seawall (combined)				

4. CONTRIBUTION ASSESSMENT

4.1 Flood and Coastal Erosion Risk Management Grant in Aid

4.1.1 FCRM GiA calculator

Having identified a set of short listed costs and benefits, the next stage is to determine the Flood and Coastal Erosion Risk Management Grant in Aid (FCRM GiA) calculation. The calculation sheets are contained in Annex C. The benefit to cost ratios, raw partnership funding scores and external contributions are summarized in Table 4.1. For further information on the FCRM GiA funding calculator, refer to the Environment Agency publication 'LIT 7482 / 1043_08_SD04'.

The table firstly shows the raw partnership funding scores for each option assuming no external contributions. As discussed in section 3.8 the Runswick Bay Residents Association indicated that £100,000 contribution could be made available towards a capital scheme option. This equates to £94,000 PV contribution. Yorkshire Water have also been approached for a pro-rata contribution equivalent to £260,000, equating to £254,000 PV.

Entering the contribution in the calculator gives the adjusted score. If the adjusted score is greater than 100%, then the calculator displays that no further contributions are required. But if an option scores less than 100%, an additional contribution will be necessary. However as schemes throughout the country adopt the calculator; it will become evident that priority will be given to schemes that provide the highest scores. This will effectively mean that score thresholds will rise in coming years, possibly to levels of 200% or more. The table also gives an indication of what external contributions may be required to achieve higher score thresholds of 150, 200 and 250%.

It should be noted that the national economic benefits included in the Partnership Funding calculations presented in Table 4.1 do not include the recreational / amenity benefits (note: both benefit / cost ratios are shown), as the guidance is not clear if these can be included or not. This can be clarified with the Environment Agency at scheme PAR stage and if they can be included there will be a small increase in the partnership funding score (equivalent to a 9% increase for option 6).

Table 4.1: Sensitivity check of FCRM GiA funding summary

	Sensitivity Check	PV Benefits	PV Costs Approval incl. contributions	PV Contributions	PV Costs excl. contributions	No. Props better protected		Partnership Funding Score	
		£k	£k	£k	£k	Long term	Med. term	Raw	Adjusted
	Base Case	21,092	1223	348	1571	4	92	206%	235%
1	Overall reduction in no. residential properties at risk (all damages reduce)	15,678	1223	348	1571	4	75	163%	192%
2	Options 3, 6, 7&8 - increase in cost of armour rock + 50%, underlayer + 30%	21,092	1365	348	1713	4	92	189%	214%
3	Option 6 - increase in scale of rock required (25% overall option cost increase)	21,092	1519	348	1867	4	92	173%	196%
4	Option 6 - maint. cost increase 200% to cover higher than anticipated repair works costs	21,092	1292	348	1640	4	92	197%	226%
5	Option 6 - increased damages resulting from reduced delay for property loss (75 years)	20,259	1223	348	1571	4	92	198%	227%
6	No contributions (currently estimated at PV £338K)	21,092	1571	0	1571	4	92	206%	206%
7	No contributions & monetised benefits only	18,773	1571	0	1571	4	92	198%	198%

4.1.2 Indices of deprivation

The FCRM GiA scores are sensitive to numbers of residential properties within deprivation zones (ranked from 1 to 32,482), hence it is essential to identify the number of households within each deprivation category 0-20% most deprived, 21-40% and 40%+, as identified from the Super Output Areas using the

Indices of Multiple Deprivation provided by the Office of National Statistics. According to Maps of deprivation for Yorkshire and Humber districts 2010, Runswick Bay sits in 30 - 40 % most deprived areas (refer to Figure 4.1). This implies that out 128 residential properties in postal code TS13, 92 properties are assessed as medium term loss (20 years) and 36 are assessed as long term (50 years) loss. Table 4.1 includes this assessment.

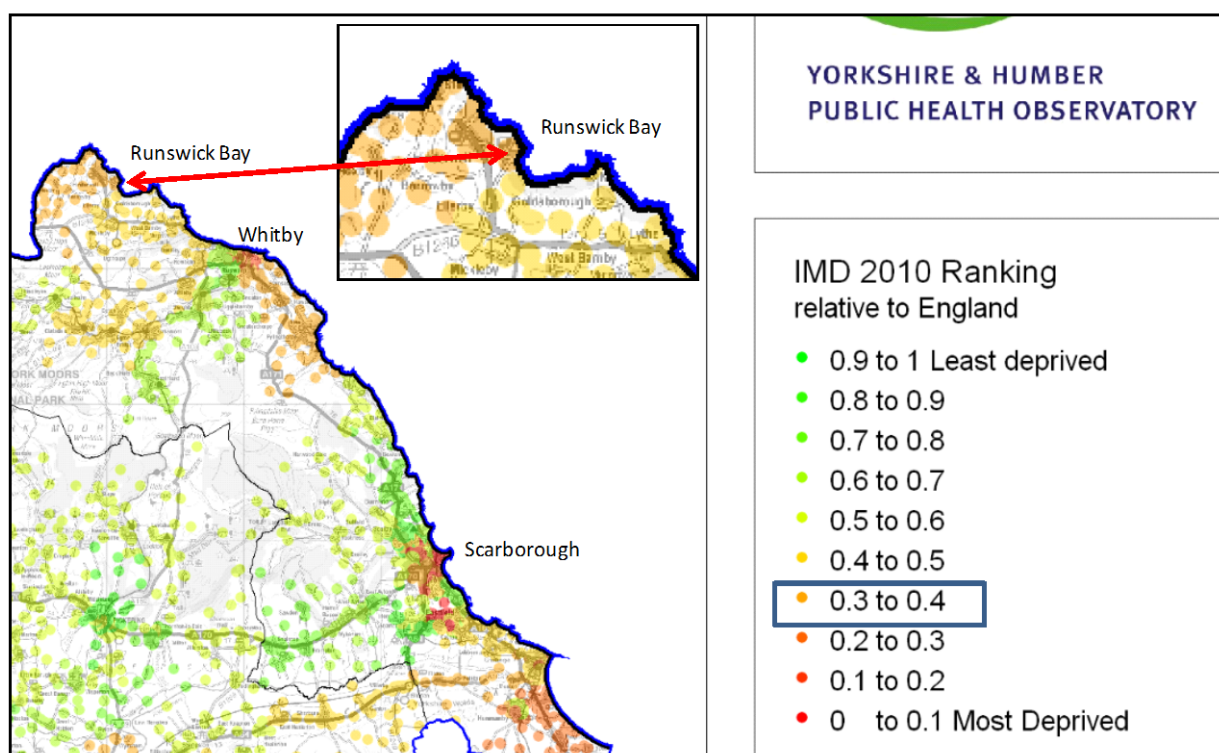


Figure 4.1: Map of deprivation for North Yorkshire district 2010

4.1.3 Summary of FCRM GiA calculation

The adjusted score needs to exceed 100% before a project can proceed. Table 4.1 highlights that Options 6, 7&8 and 3 are viable with raw scores well in excess of 100%. These schemes are therefore the leading options in terms of economic appraisal and value for money.

Options 7&8 (combined) and Option 3 scores are quite similar and therefore in economic terms there is very little to choose between these options. The choice between these options is therefore more down to technical performance, environmental sensitivity and consultation preference. It is worthy of note however that should the thresholds for score rise, more contributions will be required to compete with other schemes around the country applying for grant in aid.

The clear leading option in economic terms is **Option 6 - rock fillet** with total PV costs of £1,200,000 including contributions and future maintenance of the existing southern seawall. The contribution scoring is sufficiently high to be immune from rises in threshold levels up to 200%. Whilst this option has a lesser technical performance, compared to the other short listed do-something options, it has the scope to develop further in profile during detailed design. For example to provide better protection against seawall overtopping, which was a major issue during the storm surge event of 5th December 2013, the rock fillet could be raised to a higher elevation in front of the more exposed Upgarth Hill seawall. A simple reverse calculation implies that to achieve a minimum threshold score of 200%, the maximum PV costs could be as high as £1,670,000, which is an increase of over £450,000 in year 1 PV costs.

Annex A: Short listed options - costs and benefits calculation sheets

Cost Estimates

1. Option 2 estimate of costs (taken from StAR, and adjusted at PAR stage below).
2. Option 3 estimate of costs (taken from StAR, and adjusted at PAR stage below).
3. Option 6 estimate of costs (taken from StAR, and adjusted at PAR stage below).
4. Options 7&8 estimate of costs (taken from StAR, and adjusted at PAR stage below).
5. Estimate of costs for maintenance to existing defences not included in capital scheme options above (taken from StAR, and adjusted at PAR stage below).

PAR Estimates - Based on contractor queried rates and reduction of optimism bias from 60% to 30%.

6. Comparison of StAR to PAR.
7. PAR Option Costs.
8. Southern Defence maintenance and other items.

Damage Estimates

9. Maps of postal code areas in Runswick Bay.
(property valuations based on <http://houseprices.landregistry.gov.uk/price-calculator>)
Residential and commercial loss calculation (D-Nothing, Do-Minimum and Do-Something).
Amenity loss calculation – Do-Nothing.
Amenity loss calculation – Do-Minimum.

1. Option 2 estimate of costs (taken from StAR, and adjusted at PAR stage below).

Calculation title: Runswick Bay				Created by: IPB	Project code: 0
				Date: 28/10/2013	Serial no: 0
Subject: Whole life cost estimation				Verified by: MC	Sheet no:
				Date: 21/03/2014	Revision: 0
Note: costs increased following actual costs incurred following Dec 5th 2013 storm					
Approx £17k spent on patch repairs by SBC (original estimate £9,153.86 + 60% OB					
Item description	Rate	Unit	Quantity	Cost	Frequency
Monitoring programme					
Site visit	800	nr	1	800.00	1
Concrete Patch repairs					
Concrete Patch repair	25.40	nr	460.00	11,683.85	
Preliminaries	30.00	%	11,683.85	3,505.15	
Insurance	3.50	nr	11,683.85	408.93	
Subtotal				15,597.94	
Contractor's Fee	7.50	%	15,597.94	1,169.85	
Contractor's Risk budget	3.00	%	15,597.94	467.94	
Licence	536.00	nr	1.00	536.00	
Total				17,771.72	
Total with Optimism Bias	60.00	%		28,434.75	10

to summary CV PV

to summary CV PV

2. Option 3 estimate of costs (taken from StAR, and adjusted at PAR stage below).

Calculation title:	Runswick Bay	Created by:	IPB	Project code:	0
		Date:	28/10/2013	Serial no:	0
Subject:	Whole life cost estimation	Verified by:	MC	Sheet no:	
		Date:	24/03/2014	Revision:	0

Capital works					
Item description	Rate	Unit	Quantity	Cost	Comments
Excavation for toe protection					
Excavation for toe protection	4.70	m ³	545.07	2,564	
Disposal of excavated beach	48.85	m ³	545.07	26,627	
Primary rock armour					
Primary rock material and pla	110.66	m ³	4,329.46	479,112	references i
Rock underlayer					
Rock underlayer material and	86.03	m ³	2,468.13	212,328	
Compaction of fill material	0.72	m ³	2,468.13	1,769	
Subtotal				722,400	
Preliminaries	20.00	%	722,400	144,480	
Insurances	3.50	%	722,400	25,284	
Subtotal				892,164	
Contractor's Fee	7.50	%	892,164	66,912	
Contractor's Risk budget	3.00	%	892,164	26,765	
Licences	2,351.00	nr	1.00	2,351	
Total				988,192	
Total with Optimism Bias	60.00	%	988,192	1,581,108	

Maintenance works					
Item description	Rate	Unit	Quantity	Cost	Frequency
Annual survey	800.00	nr	1	800	1
Patch repairs					
Concrete Patch repair	12.70	m	230.00	2,921	
Rock armour reprofiling	8,141.67	nr	1.00	8,142	
Preliminaries	30.00	%	11,062.63	3,319	
Insurance	3.50	nr	11,062.63	387	
Sub total				14,769	
Contractor's Fee	7.50	%	14,768.61	1,108	
Contractor's Risk budget	3.00	%	14,768.61	443	
Licence	536.00	nr	1.00	536	
Total				16,855	20
Total with Optimism Bias	60.00	%		26,969	10

3. Option 6 estimate of costs (taken from StAR, and adjusted at PAR stage below).

Calculation title:	Runswick Bay	Created by:	IPB	Project code:	0
		Date:	28/10/2013	Serial no:	0
Subject:	Whole life cost estimation	Verified by:	MC	Sheet no:	
		Date:	24/03/2014	Revision:	0

Maintenance works					
Item description	Rate	Unit	Quantity	Cost	Frequency
Annual survey	800.00	nr	1	800	1
Patch repairs					
Concrete Patch repair	38.10	m	230.00	8,763	
Rock armour reprofiling	8,141.67	nr	1.00	8,142	
Preliminaries	30.00	%	16,904.56	5,071	
Insurance	3.50	nr	16,904.56	592	
Subtotal				22,568	
Contractor's Fee	7.50	%	22,567.58	1,693	
Contractor's Risk budget	3.00	%	22,567.58	677	
Licence	741.00	nr	1.00	741	
Total				25,678	20
Total with Optimism Bias	60.00	%		41,085	10

to summary CV PV

Capital works					
Item description	Rate	Unit	Quantity	Cost	Comments
Excavation for toe protection					
Excavation for toe protection	4.70	m ³	288.66	1,358	
Disposal of excavated beach	48.85	m ³	288.66	14,101	
Rock fillet defences					
Primary rock material and pla	110.66	m ³	2,908.03	321,812	defences i
Subtotal				337,271	
Preliminaries	20.00	%	337,271	67,454	
Insurances	3.50	%	337,271	11,804	
Subtotal				416,529	
Contractor's Fee	7.50	%	416,529	31,240	
Contractor's Risk budget	3.00	%	416,529	12,496	
Licences	2,024.00	nr	1.00	2,024	
Total				462,289	
Total with Optimism Bias	60.00	%		462,289	739,662

to summary CV PV

4. Options 7&8 estimate of costs (taken from StAR, and adjusted at PAR stage below).

Calculation title:	0	Created by:	0	Project code:	0
		Date:	00/01/1900	Serial no:	0
Subject:	0	Verified by:	0	Sheet no:	
		Date:	00/01/1900	Revision:	0

Rock fillet defences					
The rock fillet defence was a defence considered in Option 6, therefore cost details are extracted directly from this option, accounting for the shortened length (less ~30m).					
Capital works					
Item description	Rate	Unit	Quantity	Cost	Comments
Excavation for toe protection					
Excavation for fillet toe protection	4.70	m ³	248.93	1,171	
Disposal of excavated beach	48.85	m ³	248.93	12,160	
Excavation for groyne toe protection	4.70	m ³	360.20	1,694	
Disposal of excavated beach	48.85	m ³	360.20	17,596	
Rock fillet defences					
Primary rock material and placement	110.66	m ³	2,288.63	253,268	Defences is
Rock groyne					
Primary armour material and placement	110.66	m ³	2,719.27	300,923	ming 80m. l
Placement of recovered core material	19.74	m ³	2,907.68	57,401	
Subtotal					
				644,213	
Preliminaries	20.00	%	644,213	128,843	
Insurances	3.50	%	644,213	22,547	
Subtotal					
				795,603	
Contractor's Fee	7.50	%	795,603	59,670	
Contractor's Risk budget	3.00	%	795,603	23,868	
Licences	2,351.00	nr	1.00	2,351	
Total					
				881,492	
Total with Optimism Bias	60.00	%	881,492	1,410,387	

to summary CV PV

Maintenance works					
Item description	Rate	Unit	Quantity	Cost	Frequency
Annual survey	800.00	nr	1	800	1
Patch repairs					
Concrete Patch repair	12.70	m	200.00	2,540	
Rock fillet reprofiling	8,141.67	nr	1.00	8,142	
Rock armour reprofiling	32,566.68	nr	1.00	32,567	
Preliminaries	30.00	%	43,248.32	12,974	
Insurance	3.50	nr	43,248.32	1,514	
Subtotal					
				57,737	
Contractor's Fee	7.50	%	57,736.51	4,330	
Contractor's Risk budget	3.00	%	57,736.51	1,732	
Licence	1,411.00	nr	1.00	1,411	
Total					
				65,210	20
Total with Optimism Bias	60.00	%		104,336	10

to summary CV PV

5. Estimate of costs for maintenance to existing defences not included in capital scheme options above (taken from StAR, and adjusted at PAR stage below).

<i>Maintenance costs for existing defences to south of YW Pumping station</i>					
Item description	Rate	Unit	Quantity	Cost	Frequency
Annual survey	800	nr	1	800	1
Rock armour reprofiling	32566.68	nr	1	32,567	
Drainage works	25000.00	nr	1	25,000	
Shear key piling	50000.00	nr	1	50,000	
Concrete Patch repair	25.40	m	75	1,905	
Preliminaries	25.00	%	109,471.66	27,368	
Insurance	3.50	%	109471.66	3,832	
Subtotal				140,671	
Contractor's Fee	7.50	%	140,671	10,550.33	
Contractor's Risk budget	3.00	%	140,671	4,220.13	
Licence	741.00	nr	1	741	
Total				156,183	20
Total with Optimism Bias	60	%		249,892.07	20

PAR Estimates - Based on contractor queried rates and reduction of optimism bias from 60% to 30%.

6. Comparison of StAR to PAR

Runswick Bay Cost Comparison - Strategy to PAR					
Assumed rock rate:		110.66			
Item	Strategy		PAR		Comments
Rock Armour					
SW sect. defence length	m	120	m	100	Reduced length
SW x sect area	m2	11.72	m2	11.72	
Volume	m3	1406	m3	1172	
NE sect. defence length	m	110	m	110	Same length
NE x sect area	m2	11.02	m2	11.02	
Volume	m3	1212	m3	1212	
Excavated toe volume	m3	289	m3	264	Reduced length
Rate	£/m3	110.66	£/m3	110.66	
Net cost supply & place	£	321,755	£	293,035	
Excavation for Toe Protection					
Volume	m3	289	m3	264	Reduced length
Rate	£/m3	4.7	£/m3	4.7	
Net cost	£	1,358	£	1,240	
Disposal volume	m3	289	m3	264	Reduced length
Rate	£/m3	48.85	£/m3	48.85	
Net cost	£	14,118	£	12,890	
Access Steps to beach (1 no.)	£	0	£	30,000	Not in strategy - upped to £30k from 20?
Sub-total		337,231		337,166	
Preliminaries	20%	67,446	25%	84,291	
Insurances	3.50%	11,803	3.50%	11,801	
Sub-total		416,480		433,258	
Contractor's Fee	7.50%	31,236	7.50%	32,494	
Contractor's Risk budget	3.00%	12,494	7.50%	32,494	
Licences	Item	2,024	Item	2,024	
Total construction cost		462,235		500,270	Net of env. mitigation costs, fees etc. (17%)
Optimism Bias	60%	739,575	30%	650,352	~ £90k reduction in cost cf. strategy
Strategy (Index Factor Applied)	4%	480,724			

Construction Cost Indices

Data Source:

Office for National Statistics

<http://www.ons.gov.uk/ons/datasets-and-tables/index.html?pageSize=50&sortBy=none&sortDirection=none&newquery=construction+cost+indices+2014>

Table 9a: Implied output price indicator, non-seasonally adjusted (2011 = 100)

Other New Work Excluding Infrastructure (not housing) - Public

Aug-13	108.6
Jan-14	110.4
Oct-14	114.9

%age increase Jan14 to Oct 14 = 4.1

%age increase Aug 13 to Jan 14 = 1.7

Interim Construction Output Price Indices 2015 Qtr 1 (2005 = 100)

New work - Public other than housing

Jan-14	119.9
Oct-14	119.8
Mar-15	122.2

%age increase Jan14 to Oct 14 = 2.0

Take cost factor from Aug 2013 to March 2015 as 1.7 + 2.0 = 3.7%, say 4%

Property Damages

Damages uplift factor Aug 2013 to Nov. 2014 was estimated at 4%. Land Registry suggests negligible change in property prices from Nov. 2014 to March 2015.

Take damage (property value) factor from Aug 2013 to March 2015 as 4%

7. PAR Option Costs

1. The 2013 rates and quantities are taken from "Runswick Bay Costs v6 (use for YW contribution calc).xls". Note there is no automatic link.
2. The Rates for PAR are current best estimates based upon Aug. 2013 rate indexed to March 2015, or more recent data if available.

Changing these values updates the spreadsheet

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Rock rate primary armour £	110.66	(Contractor rate May 2015 £105.59)
Rock Rate underlayer £	97.00	(Contractor rate May 2015 £92.55)
Factor for reduction in armour length at southern end Ops. 3 & 6 (210/230)	0.913	
Factor for reduction in armour length at southern end Ops. 7&8 only (170/190)	0.895	
Cost index Aug 2013 to March 2015	4.0%	

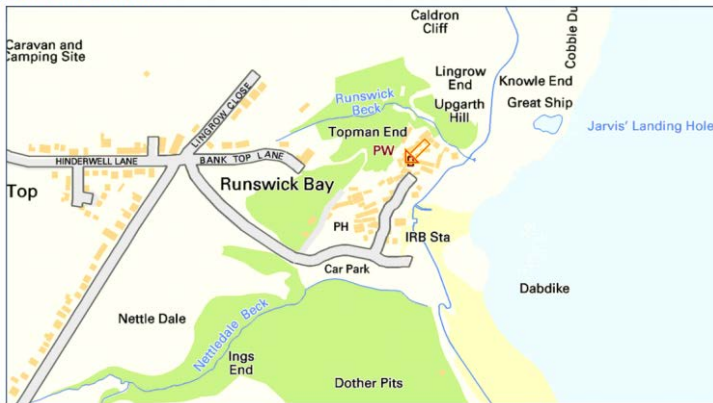
Item	2013 Rate	Rate for PAR	Unit	Option 3 Qty.	Option 3 Cost £k	Option 6 Qty.	Option 6 Cost £k	Option 7&8 Qty.	Option 7&8 Cost £k
CAPITAL WORKS									
<i>Excavation for toe protection</i>									
Excavation for toe protection	4.70	4.89	m3	498	2,432	264	1,290	223	1,089
Disposal of excavated beach	48.85	50.80	m3	498	25,281	264	13,406	223	11,319
Excavation for toe protection - groyne	4.70	4.89	m3					360	1,760
Disposal of excavated beach - groyne	48.85	50.80	m3					360	18,289
<i>Primary rock armour</i>									
Primary rock material and placement	110.66	110.66	m3	3,953	437,391	2,655	293,817	2,048	226,638
Primary rock material and placement - groyne	110.66	110.66	m3					2,719	300,885
Placement recovered core material	19.74	20.53	m3					2,908	59,700
<i>Rock underlayer</i>									
Rock underlayer material and placement	86.03	97.00	m3	2,253	218,579				
Compaction of fill material	0.72	0.75	m3	2,253	1,680				
Access steps thro' rock to beach	n/a	30,000	nr.	1	30,000	1	30,000	1	30,000
Subtotal					715,362		338,512		649,679
Preliminaries	20	25	%	715,362	178,841	338,512	84,628	649,679	162,420
Insurances	3.5	3.5	%	715,362	25,038	338,512	11,848	649,679	22,739
Subtotal					919,241		434,988		834,837
Contractor's Fee	7.5	7.5	%	919,241	68,943	434,988	32,624	834,837	62,613
Contractor's Risk budget	3	7.5	%	919,241	68,943	434,988	32,624	834,837	62,613
Licences	2351	2351	nr.	1	2,351	1	2,351	1	2,351
Total Capital					1,059,478		502,587		962,414
Item	2013 Rate	Rate for PAR	Unit	Option 3 Qty.	Option 3 Cost £k	Option 6 Qty.	Option 6 Cost £k	Option 7&8 Qty.	Option 7&8 Cost £k
MAINTENANCE WORKS									
Annual survey	800.00	832.00	nr	1	832	1	832	1	832
<i>Patch repairs</i>									
Concrete Patch repair	12.70	13.21	m	210	2,774			179	2,364
Concrete Patch repair	38.10	39.62	m			210	8,321		
Rock armour reprofiling	8,142	10,500	nr	1	10,500	1	10,500	1	10,500
Rock armour reprofiling - groyne	32,567	33,870	nr					1	33,870
Preliminaries	30.00	30.00	%	13,274	3,982	18,821	5,646	46,733	14,020
Insurance	3.50	3.50	nr	13,274	465	18,821	659	46,733	1,636
Subtotal					17,720		25,126		62,389
Contractor's Fee	7.50	7.50	%	17,720	1,329	25,126	1,884	62,389	4,679
Contractor's Risk budget	3.00	3.00	%	17,720	532	25,126	754	62,389	1,872
Licence	536.00	536.00	nr	1	536	1	536	1	536
Total Maintenance					20,117		28,300		69,476

8. Southern Defence maintenance and other items.

Southern Defences						
Item description		Rate	Unit	Quantity	Cost	Frequency
Annual survey	800	832	nr	1	832	1
Rock armour reprofiling		32567	nr	1	32,567	
Drainage works		25000	nr	1	25,000	
Shear key piling		50000	nr	1	50,000	
Concrete Patch repair		25.40	m	75	1,905	
Preliminaries		25.00	%	109,472	27,368	
Insurance		3.50	%	109,472	3,832	
Subtotal					140,672	
Contractor's Fee		7.50	%	140,672	10,550	
Contractor's Risk budget		3.00	%	140,672	4,220	
Licence		741.00	nr	1	741	
Total					156,183	20
Total including cost indexing					162,430	20
Other Items						
	%age constr. cost	Cash Disc. facto	Yr 0 1.000	Yr 1 0.966	Yr 2 0.934	
PAR Preparation Fees Year 0 - estimate		22,000	22,000			
Yorkshire Water Diversion costs		200,000		193,200		
SBC staff costs £50,000 total)		50,000	25,000	24,150		
Consultants fees £55,000 total)			35,000	19,320		
Early Contractor Involvement (ECI)	Nil					
Cost consultant fees	Nil					
Site investigation & survey	10%					
Environmental mitigation	7.5%					
Environmental enhancement	incl. above					
Site supervision	7.5%					
Compensation	Nil					
Contributions (incl. 30% uplift on YW costs)		360,000		347,760		

9. Maps of postal code areas in Runswick Bay followed by damage calculations

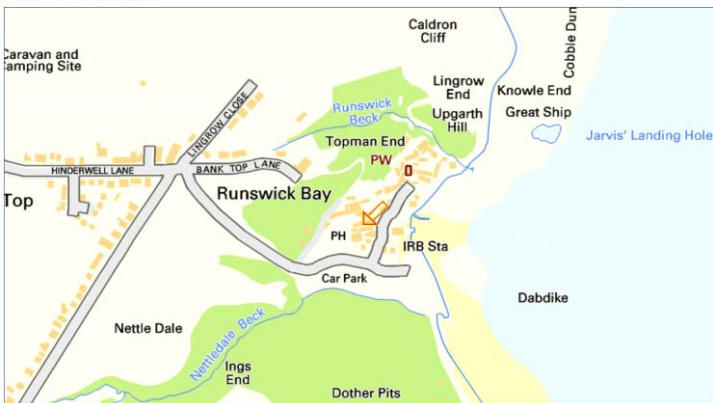
MAP OF TS13 5HU



Property Values based on sales

£341,530 Average

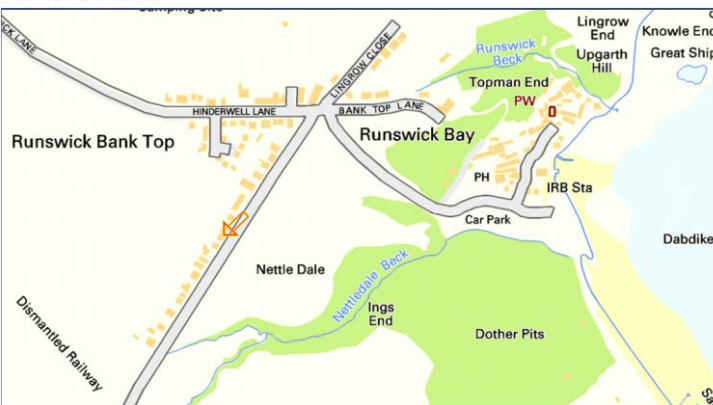
MAP OF TS13 5HT



Property Values based on sales

£281,401 Average

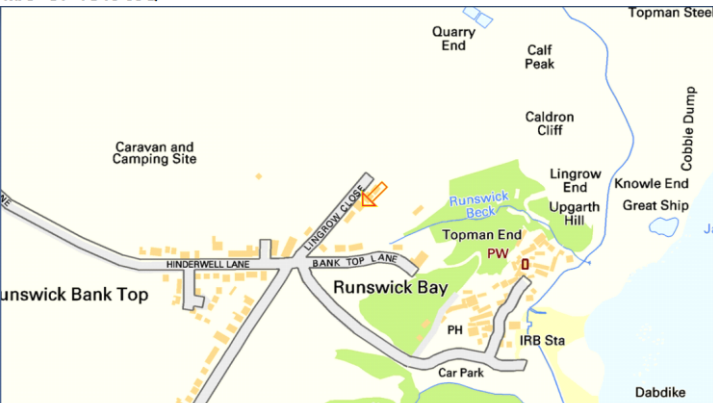
MAP OF TS13 5HS



Property Values based on sales

212,954 Average

MAP OF TS13 5JQ



Property Values based on sales

£276,148 Average

Erosion Loss Calculation Sheet with delay options						Sheet Nr. 2		
Client/Authority Scarborough Borough Council								
Project name Runswick Bay PAR - Amended Properties at Risk			Option: Do Minimum (20 year delay) Do something (100 year delay)		Delay (yrs) 20 100	Prepared (date) 31/03/2014 Printed 02/07/2014 Prepared by A Parsons Checked by M Cali Checked date 21/03/2014		
Project reference -								
Base date for estimates (year 0) Jan-2014								
Scaling factor (e.g. £m, £k, £) £k								
Discount rate 3.5%								
Ref	Asset Description	Risk free market value £k	Year when the asset is expected to be lost	Prob of loss in year	Expected value of asset losses £k			
					Do-nothing	Do Minimum (20 year delay)	Do something (100 year delay)	
0								
1	43 Residential properties in TS13 5HU	14679.47	3	0.25	3,310.01	1,663.50	191.16	
2	(previously 47)	14679.47	5	0.5	6,179.86	3,105.79	198.13	
3		14679.47	10	0.25	2,601.64	1,307.49	83.41	
4								
5								
6								
7								
8	36 Res Props in TS13 5HT	8538.61	10	0.2	1,210.64	608.42	38.81	
9	(previously 49)	8538.61	20	0.5	2,145.61	1,078.31	68.79	
10		8538.61	50	0.2	336.87	153.67	9.80	
11								
12								
13								
14								
15	25 Res Prop in TS13 5HS	4649.07	70	0.01	5.08	2.10	0.13	
16	(previously 27)	4649.07	80	0.01	3.87	1.49	0.10	
17		4649.07	90	0.01	3.02	1.06	0.07	
18		4649.07	100	0.01	2.42	0.75	0.05	
19								
20								
21	12 Res Prop in TS13 5JQ & 5JF	2930.40	60	0.001	0.43	0.19	0.01	
22	(Previously 5 in JQ only; props. in JF added as similar location)	2930.40	80	0.001	0.24	0.09	0.01	
23								
24								
25	11 non- res prop in TS13 5HU	547.80	5	0.25	115.31	57.95	3.70	
26		547.80	10	0.5	194.17	97.58	6.23	
27		547.80	15	0.25	81.74	41.08	2.62	
28								
29	6 non-res properties TS13 5HT	214.80	10	0.2	30.46	15.31	0.98	
30		214.80	20	0.5	53.98	27.13	1.73	
31		214.80	50	0.2	8.47	3.87	0.25	
32								
33	4 non-res in TS13 5HS and JF	169.50	50	0.001	0.03	0.02	0.00	
34								
35								
36	Nos. of residential properties at risk amended in line with SBC Council Tax property data (SBC e-mail 29/04/15 refers).							
37								
38								
39								
40								
41								
42								
43								
44								
45								
46								
47								
48								
49								
50								
Totals		62527.21			16283.85	8165.79	605.96	
Notes Make one entry in the description column for each property (or group of properties) as this determines subsequent calculation MV = risk free market value at base date for estimate - must be entered on each line when probability distribution is used Equivalent annual value = MV x discount rate (assumes infinite life) Year is year in which there is the probability of loss shown, years must be entered consecutively for each property or group If no distribution is used enter year of expected year of loss and enter 1.0 in probability column Columns G to K show expected values of asset losses with each option, assuming extensions of life entered above The loss is calculated using the formula $PV \text{ loss} = MV * \text{Prob of loss} * (1 - (1 - 1/((1+r)^{\text{Year of loss}}))) = MV * \text{Prob of loss} / ((1+r)^{\text{Year of loss}})$ Additional properties can be entered by inserting lines above line 62 and copying all formulae, including hidden calculation in column C								

Amenity Damage Cost Calculation Sheet - Do Nothing (Linear)

Sheet Nr. 3

Client/Authority

Scarborough Borough Council

Project name

Runswick Bay Strategy Review

Option:

Do-nothing

Project reference

Base date for estimates (year 0) Jan-2014

Scaling factor (e.g. £m, £k, £)

£k

Initial discount rate

3.5%

3.0%

2.5%

Prepared (date)

31/10/2013

Printed

22/10/2013

Prepared by

A Parsons

Checked by

M Cali

Checked date

21/03/2014

Year

<

0

10

50

>

99

Ave Annual Damage

(Recreation - do n

Breach pb

0.000

0.001

0.100

0.500

£k 220.00/yr

PV Total Damage

£k 2,230 (calculated below)

Year	Discount factor	Prob of a breach/failure	Prob that breach/failure: occurs in year	has not occurred	has occurred	Other damages	PV
						Damages 1 Damages 2 Damages 3	total damage
0	1.000	0.000	0.000	1.000	0.000		0.00
1	0.966	0.000	0.000	1.000	0.000		0.02
2	0.934	0.000	0.000	1.000	0.000		0.06
3	0.902	0.000	0.000	0.999	0.001		0.12
4	0.871	0.000	0.000	0.999	0.001		0.19
5	0.842	0.001	0.000	0.999	0.001		0.28
6	0.814	0.001	0.001	0.998	0.002		0.38
7	0.786	0.001	0.001	0.997	0.003		0.48
8	0.759	0.001	0.001	0.996	0.004		0.60
9	0.734	0.001	0.001	0.996	0.004		0.72
10	0.709	0.001	0.001	0.995	0.005		0.86
11	0.685	0.003	0.003	0.991	0.009		1.35
12	0.662	0.006	0.006	0.985	0.015		2.16
13	0.639	0.008	0.008	0.977	0.023		3.26
14	0.618	0.011	0.011	0.966	0.034		4.59
15	0.597	0.013	0.013	0.953	0.047		6.13
16	0.577	0.016	0.015	0.938	0.062		7.84
17	0.557	0.018	0.017	0.921	0.079		9.69
18	0.538	0.021	0.019	0.902	0.098		11.63
19	0.520	0.023	0.021	0.881	0.119		13.64
20	0.503	0.026	0.023	0.858	0.142		15.68
21	0.486	0.028	0.024	0.834	0.166		17.74
22	0.469	0.031	0.026	0.808	0.192		19.78
23	0.453	0.033	0.027	0.782	0.218		21.79
24	0.438	0.036	0.028	0.754	0.246		23.74
25	0.423	0.038	0.029	0.725	0.275		25.61
26	0.409	0.041	0.029	0.695	0.305		27.39
27	0.395	0.043	0.030	0.666	0.334		29.07
28	0.382	0.046	0.030	0.635	0.365		30.63
29	0.369	0.048	0.031	0.605	0.395		32.07
30	0.356	0.051	0.031	0.574	0.426		33.38
31	0.346	0.053	0.030	0.544	0.456		34.72
32	0.336	0.055	0.030	0.514	0.486		35.94
33	0.326	0.058	0.030	0.484	0.516		37.02
34	0.317	0.060	0.029	0.455	0.545		37.98
35	0.307	0.063	0.029	0.426	0.574		38.81
36	0.298	0.065	0.028	0.398	0.602		39.50
37	0.290	0.068	0.027	0.371	0.629		40.07
38	0.281	0.070	0.026	0.345	0.655		40.52
39	0.273	0.073	0.025	0.320	0.680		40.85
40	0.265	0.075	0.024	0.296	0.704		41.06
41	0.257	0.078	0.023	0.273	0.727		41.17
42	0.250	0.080	0.022	0.251	0.749		41.18
43	0.243	0.083	0.021	0.230	0.770		41.08
44	0.236	0.085	0.020	0.211	0.789		40.90
45	0.229	0.088	0.018	0.192	0.808		40.64
46	0.222	0.090	0.017	0.175	0.825		40.30
47	0.216	0.093	0.016	0.159	0.841		39.90
48	0.209	0.095	0.015	0.144	0.856		39.43
49	0.203	0.098	0.014	0.130	0.870		38.91
50	0.197	0.100	0.013	0.117	0.883		38.34
51	0.192	0.108	0.013	0.104	0.896		37.75
52	0.186	0.116	0.012	0.092	0.908		37.15
53	0.181	0.124	0.011	0.080	0.920		36.52
54	0.175	0.133	0.011	0.070	0.930		35.87
55	0.170	0.141	0.010	0.060	0.940		35.19
56	0.165	0.149	0.009	0.051	0.949		34.49
57	0.160	0.157	0.008	0.043	0.957		33.77
58	0.156	0.165	0.007	0.036	0.964		33.03
59	0.151	0.173	0.006	0.030	0.970		32.27
60	0.147	0.182	0.005	0.024	0.976		31.51
90	0.065	0.427	0.000	0.000	1.000		14.31
91	0.063	0.435	0.000	0.000	1.000		13.96
92	0.062	0.443	0.000	0.000	1.000		13.62
93	0.060	0.451	0.000	0.000	1.000		13.29
94	0.059	0.459	0.000	0.000	1.000		12.97
95	0.057	0.467	0.000	0.000	1.000		12.65
96	0.056	0.476	0.000	0.000	1.000		12.34
97	0.055	0.484	0.000	0.000	1.000		12.04
98	0.053	0.492	0.000	0.000	1.000		11.75
99	0.052	0.500	0.000	0.000	1.000		11.46
Total						2230.39 0.00	2,230

Notes





Complete one spreadsheet for the 'do nothing' option

The formulae assume that breach probability will be constant to the first year entered and after the last year with linear variation between

It is assumed that breaches are not repaired and that once breach damage has occurred it will not recur.

Amenity Damage Cost Calculation Sheet - Do Minimum (Linear)										Sheet Nr.	4
Client/Authority Scarborough Borough Council											
Project name Runswick Bay Strategy Review											
Option: Do Minimum (20 years)											
Project reference -											
Base date for estimates (year 0) Jan-2014											
Scaling factor (e.g. £m, £k, £) £k											
Initial discount rate 3.5% 3.0% 2.5%											
Year	0	20	60	99	Ave Annual Damage (Recreation - do n			Prepared (date) 31/10/2013			
Breach pb	0.000	0.001	0.100	0.500	PV Total Damage £k 220.00 /yr			Printed 22/10/2013			
							£k 1,588 (calculated below)			Prepared by A Parsons	
										Checked by M Cali	
										Checked date 21/03/2014	
Year	Discount factor	Prob of a breach/failure	Prob that breach/failure occurs in year	has not occurred	has not occurred		Other damages Damages 1 Damages 2 Damages 3			PV total damage	
0	1.000	0.000	0.000	1.000	0.000	0.00				0.00	
1	0.966	0.000	0.000	1.000	0.000	0.01				0.01	
2	0.934	0.000	0.000	1.000	0.000	0.03				0.03	
3	0.902	0.000	0.000	1.000	0.000	0.06				0.06	
4	0.871	0.000	0.000	1.000	0.000	0.10				0.10	
5	0.842	0.000	0.000	0.999	0.001	0.14				0.14	
6	0.814	0.000	0.000	0.999	0.001	0.19				0.19	
7	0.786	0.000	0.000	0.999	0.001	0.24				0.24	
8	0.759	0.000	0.000	0.998	0.002	0.30				0.30	
9	0.734	0.000	0.000	0.998	0.002	0.36				0.36	
10	0.709	0.001	0.000	0.997	0.003	0.43				0.43	
11	0.685	0.001	0.001	0.997	0.003	0.50				0.50	
12	0.662	0.001	0.001	0.996	0.004	0.57				0.57	
13	0.639	0.001	0.001	0.995	0.005	0.64				0.64	
14	0.618	0.001	0.001	0.995	0.005	0.71				0.71	
15	0.597	0.001	0.001	0.994	0.006	0.79				0.79	
16	0.577	0.001	0.001	0.993	0.007	0.86				0.86	
17	0.557	0.001	0.001	0.992	0.008	0.93				0.93	
18	0.538	0.001	0.001	0.991	0.009	1.01				1.01	
19	0.520	0.001	0.001	0.991	0.009	1.08				1.08	
20	0.503	0.001	0.001	0.990	0.010	1.16				1.16	
21	0.486	0.003	0.003	0.986	0.014	1.48				1.48	
22	0.469	0.006	0.006	0.980	0.020	2.04				2.04	
23	0.453	0.008	0.008	0.972	0.028	2.79				2.79	
24	0.438	0.011	0.011	0.961	0.039	3.72				3.72	
25	0.423	0.013	0.013	0.949	0.051	4.79				4.79	
26	0.409	0.016	0.015	0.933	0.067	5.98				5.98	
27	0.395	0.018	0.017	0.916	0.084	7.27				7.27	
28	0.382	0.021	0.019	0.897	0.103	8.62				8.62	
29	0.369	0.023	0.021	0.876	0.124	10.02				10.02	
30	0.356	0.026	0.023	0.854	0.146	11.45				11.45	
31	0.346	0.028	0.024	0.830	0.170	12.95				12.95	
32	0.336	0.031	0.025	0.804	0.196	14.46				14.46	
33	0.326	0.033	0.027	0.778	0.222	15.95				15.95	
34	0.317	0.036	0.028	0.750	0.250	17.42				17.42	
35	0.307	0.038	0.029	0.721	0.279	18.84				18.84	
36	0.298	0.041	0.029	0.692	0.308	20.22				20.22	
37	0.290	0.043	0.030	0.662	0.338	21.53				21.53	
38	0.281	0.046	0.030	0.632	0.368	22.77				22.77	
39	0.273	0.048	0.030	0.602	0.398	23.93				23.93	
40	0.265	0.051	0.030	0.571	0.429	25.00				25.00	
41	0.257	0.053	0.030	0.541	0.459	25.99				25.99	
42	0.250	0.055	0.030	0.511	0.489	26.88				26.88	
43	0.243	0.058	0.030	0.481	0.519	27.68				27.68	
44	0.236	0.060	0.029	0.452	0.548	28.38				28.38	
74	0.097	0.244	0.002	0.007	0.993	21.19				21.19	
75	0.094	0.254	0.002	0.006	0.994	20.61				20.61	
76	0.092	0.264	0.001	0.004	0.996	20.14				20.14	
77	0.090	0.274	0.001	0.003	0.997	19.67				19.67	
78	0.087	0.285	0.001	0.002	0.998	19.21				19.21	
79	0.085	0.295	0.001	0.002	0.998	18.75				18.75	
80	0.083	0.305	0.000	0.001	0.999	18.30				18.30	
81	0.081	0.315	0.000	0.001	0.999	17.86				17.86	
82	0.079	0.326	0.000	0.000	1.000	17.43				17.43	
83	0.077	0.336	0.000	0.000	1.000	17.01				17.01	
84	0.075	0.346	0.000	0.000	1.000	16.59				16.59	
85	0.074	0.356	0.000	0.000	1.000	16.19				16.19	
86	0.072	0.367	0.000	0.000	1.000	15.80				15.80	
87	0.070	0.377	0.000	0.000	1.000	15.41				15.41	
88	0.068	0.387	0.000	0.000	1.000	15.04				15.04	
89	0.067	0.397	0.000	0.000	1.000	14.67				14.67	
90	0.065	0.408	0.000	0.000	1.000	14.31				14.31	
91	0.063	0.418	0.000	0.000	1.000	13.96				13.96	
92	0.062	0.428	0.000	0.000	1.000	13.62				13.62	
93	0.060	0.438	0.000	0.000	1.000	13.29				13.29	
94	0.059	0.449	0.000	0.000	1.000	12.97				12.97	
95	0.057	0.459	0.000	0.000	1.000	12.65				12.65	
96	0.056	0.469	0.000	0.000	1.000	12.34				12.34	
97	0.055	0.479	0.000	0.000	1.000	12.04				12.04	
98	0.053	0.490	0.000	0.000	1.000	11.75				11.75	
99	0.052	0.500	0.000	0.000	1.000	11.46				11.46	
Total						1587.86	0.00			1,588	
Notes											
Complete one spreadsheet for the 'do nothing' option											
The formulae assume that breach probability will be constant to the first year entered and after the last year with linear variation between											
It is assumed that breaches are not repaired and that once breach damage has occurred it will not recur.											

Annex B: Appraisal Summary Table for Short Listed Options

Option number	Option 1	Option 2	Option 3	Option 6	Option 7 / 8
Option name	Do Nothing	Do Minimum	Rock armour apron	Rock fillet	Rock groyne (option 7) with reduced rock fillet (Option 8)
					
Short Description	No repair or maintenance works would be undertaken. Baseline option to compare benefits of other options.	Patch and repair works to the seawalls as at present. No large scale repair works and consequently limited design life.	Rock armour structure in front of the toe, similar to existing rock armouring. Rock expected to be brought to site by sea.	Smaller scale rock armour solution.	Small rock groyne at Cobble Dump headland. Rock armour along defences as option 6 but reduced length.
Technical Issues	Would not protect the village.	Would only protect village until storm event causes major damage to wall. Does not provide long term protection.	Provides long term protection. Rock armour good at reducing wave reflection and overtopping. Flexible and less susceptible to scour.	Reduced performance compared to option 3. Would require greater maintenance to existing upper walls.	Length of groyne required would need optimisation. Although groyne may reduce wave action from the north it will also reduce potential for sediment supply from the north.
Environmental Issues	Potential to revert to a more natural coast in long term. Short term pollution due to erosion damage to sewerage infrastructure and properties. Smothering of seabed habitats with debris from	Delay to do-nothing issues, which will be the same but occur later.	Do - nothing issues removed.	As option 3, but less impact as smaller scale.	Similar to option 6, but groyne may cause positive or negative impacts on the wider bay.
Social issues	Loss of up to 128 residential properties in long term would cause major stress and disruption to the community	Loss of properties is only delayed, but this allows community time to adapt to the eventual need to relocate / abandon village.	Long term future of coastal defences assured. Risk of loss of village due to erosion delayed by up to 100 years. Reduced stress to community. Rock armour covers foreshore and limits access.	Similar to option 3. Possible H&S risks related to people climbing on rocks.	Similar to option 6.
Carbon Footprint from construction: (Tonnes Fossil CO2e)	N/A		8,770	3,760	6,460
Initial estimate of total costs in today's prices (£)	0	396,000	2,090,000	1,280,000	2,510,000
Initial Estimate of Present Value Cost (£)	N/A	94,700	1,710,000	889,000	1,640,000
Initial Estimate of Present Value Benefits (£)	N/A	9,350,000	20,200,000	20,200,000	20,200,000
Benefit Cost Ratio (BCR)	N/A	99.0	12.0	23.0	12.0
Recommendations	Needs to be considered as baseline option.	Does not meet project objectives beyond short term but needs to be considered as alternative baseline option.	It is recommended that this option is taken forward for further appraisal. Rock is a very effective form of defence and it can be readily scaled according to need. In addition it has already been used successfully in the bay.	Less effective than option 3 but significantly lower costs. It is recommended that this option is taken forward for further appraisal. If selected for further detailed appraisal, this option could be fine tuned in the future at relatively low cost, i.e. in response to overtopping calculations.	Similar or slightly enhanced protection to Option 6, but almost twice the costs. Recommended for more detailed consideration.

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

Only consider Option 6 – Rock fillet to seawall at this stage with various sensitivities added.

Notes:

1. Calculation Version 8 January 2014.
2. PV whole-life benefits currently include residential, commercial and agricultural benefits only, i.e. excludes amenity benefits (to be confirmed).
3. PV Private Contributions secured to date (Runswick Bay residents £100,000 PV in 2 years, Yorkshire Water £260,000 PV in 2 years, pending confirmation). Total PV contributions £347,760.
4. FCRM Partnership Funding Calculator for Flood and Coastal Erosion Risk Management Grant in Aid (FCRM GiA) – Calculation sheets follow for the following base case and sensitivities.

	Sensitivity Check
	Base Case
1	Overall reduction in no. residential properties at risk (all damages reduce)
2	Options 3, 6, 7&8 - increase in cost of armour rock + 50%, underlayer + 30%
3	Option 6 - increase in scale of rock required (25% overall option cost increase)
4	Option 6 - maint. cost increase 200% to cover higher than anticipated repair works costs
5	Option 6 - increased damages resulting from reduced delay for property loss (75 years) – included as Base Case Test 5.
6	No contributions (currently estimated at PV £338K)
7	No contributions & monetised benefits only

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

Version 8 January 2014

Project Name	Runswick Bay Strategy
Unique Project Number	PAR Option 6 Rock Armour Fillet - Baseline Case

Key	Input cells
	Calculated cells

All figures are in £'s

Figures in Blue to be entered onto Medium Term Plan

SUMMARY: prospect of FCRM GiA funding

Raw Partnership Funding Score	206% (1)	Scheme Benefit to Cost Ratio: 13.43 to 1
External Contribution or saving required to achieve an Adjusted Score of 100%	0 (2)	Effective return to taxpayer: 24.50 to 1
Adjusted Partnership Funding Score (PF)	235% (3)	Effective return on contributions: 60.65 to 1
PV FCRM GiA towards the up-front costs of this scheme (PV Cost for Approval)	860,825 (4)	

Cell (2) shows the minimum amount of contributions and/or reductions in scheme cost that are required to raise the Adjusted PF Score to at least 100%. Further increases on this will improve this scheme's chances of an FCRM GiA allocation in the desired year. Planned savings and contributions should be entered into cells(9,10,12) and cells(14-17). See NOTE below.

1. Scheme details

Risk Management Authority type of asset maintainer	LA (5)	Yes (6)
Duration of Benefits (years)	100 (7)	Is evidence available that a Strategic Approach has been taken, and that double counting of benefits has been avoided ?
PV Whole-Life Benefits:	21,092,000 (8)	
PV Costs		All costs and benefits must be on a Present Value (PV) Whole-Life basis over the Duration of Benefits period. Where Contributions are identified these should also be on a Present Value basis.
PV Appraisal Costs	22,000 (9)	
PV design & Construction Costs	1,186,585 (10)	
Sub Total - PV Cost for Approval (appraisal,design,construction)	1,208,585 (11)	
PV Post-Construction Costs	362,004 (12)	
PV Whole-Life Costs:	1,570,589 (13)	
PV Contributions secured to date		
PV Local Levy secured to date	0 (14)	
PV Public Contributions secured to date	0 (15)	
PV Private Contributions secured to date	347,760 (16)	
PV Funding from other Environment Agency functions/sources secured to date	0 (17)	
PV Total Contributions secured to date	347,760 (18)	

The total value of any necessary contributions will depend on whether maintenance (ongoing costs) is funded through revenue FCRM GiA, or by other means.

NOTE: This scheme is to be maintained by an RMA other than the EA (ref cell 5). Capital FCRM GiA will fund the appropriate share of the up-front costs (cell 11) with any shortfall needing to be paid for via contributions identified in cells(14-17). Future ongoing costs (cell 12) and any contributions towards them are a matter for local agreement by the RMA and should NOT be included in cells(14-17). It is recommended that the RMA takes the opportunities created during scheme development to separately secure contributions towards future ongoing costs (cell12).

2. Qualifying benefits under Outcome Measure 2: households better protected against flood risk

Number of households in:	Before	After	Change due to scheme
20% most deprived areas			0 0 0
21-40% most deprived areas			0 0 0
60% least deprived areas			0 0 0
At: Moderate risk Significant risk Very significant risk		Moderate risk Significant risk Very significant risk	Moderate risk Significant risk Very significant risk
Annual damages avoided (£), compared with a household at low risk			150 600 1,350
Change in household damages, in:	Per year	Over lifetime of scheme	Qual. benefits (discounted)
20% most deprived areas	£ -	£ -	OM2 (20%) £ -
21-40% most deprived areas	£ -	£ -	OM2 (21-40%) £ -
60% least deprived areas	£ -	£ -	OM2 (60%) £ -

3. Qualifying benefits under Outcome Measure 3: households better protected against coastal erosion

Number of households in:	Before	After	Change due to scheme
20% most deprived areas	4	92	£ 6,000 £ 6,000
21-40% most deprived areas			£ 50 £ 20
60% least deprived areas			£ 1,184 £ 3,015
Long-term loss Medium-term loss			Long-term loss Medium-term loss
Change in household damages, in:	Year 1 loss avoided:	Over lifetime of scheme:	Qual. benefits (discounted):
20% most deprived areas	£ -	£ -	OM3 (20%) £ -
21-40% most deprived areas	£ 282,151	£ 28,215,067	OM3 (21-40%) £ 8,425,968
60% least deprived areas	£ -	£ -	OM3 (60%) £ -

4. Qualifying benefits under Outcome Measure 4: statutory environmental obligations met

Payments under:	Assumed benefits per unit:	Qual. benefits (discounted):
OM4a Hectares of net water-dependent habitat created	£ 15,000	OM4a £ -
OM4b Hectares of net intertidal habitat created	£ 50,000	OM4b £ -
OM4c Kilometres of protected river improved	£ 80,000	OM4c £ -
		OM4 £ -

5. Qualifying benefits arising from the overall scheme, for entry into the Medium-Term Plan

OM, deprivation:	Qual. benefits:	Payment rate:	FCRM GiA contribution:
OM1	£ 12,666,032	5.56 p in the £1	£ 703,668
OM2	£ -		£ -
20% most	£ -		£ -
21-40%	£ -		£ -
Least 60%	£ -		£ -
OM3	£ -		£ -
20% most	£ 8,425,968		£ 2,527,790
21-40%	£ -		£ -
Least 60%	£ -		£ -
OM4	£ -		£ -
Total	£ 21,092,000		£ 3,231,459

Maximum for Outcomes delivered. The actual value any scheme is eligible for may be less.

Sensitivity Testing. It is important that users of this calculator appreciate the implications on funding from changes to input data which may become necessary as the project develops and better information is available. Five typical tests are provided below. Users should consider how appropriate these are to their project, what other tests may be appropriate and how best to use the information with all those that may be involved in the project.

Raw Score	Contribution for 100% Score (£k)
206%	0
74%	391,742
206%	-
167%	-
#N/A	#N/A
198%	-

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%

Sensitivity 5 - Reduce Duration of Benefits by 25%

END OF WORKSHEET

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

Version 8 January 2014

Project Name	Runswick Bay Strategy
Unique Project Number	PAR Option 6 Rock Fillet - Sensitivity 1 Reduced Properties

All figures are in £'s

Figures in Blue to be entered onto Medium Term Plan

Key	Input cells
	Calculated cells

SUMMARY: prospect of FCRM GiA funding

Raw Partnership Funding Score

163% (1)

External Contribution or saving required to achieve an Adjusted Score of 100%

0 (2)

Adjusted Partnership Funding Score (PF)

192% (3)

PV FCRM GiA towards the up-front costs of this scheme (PV Cost for Approval)

860,825 (4)

Scheme Benefit to Cost Ratio:	9.98 to 1
Effective return to taxpayer:	18.21 to 1
Effective return on contributions:	45.08 to 1

Cell (2) shows the minimum amount of contributions and/or reductions in scheme cost that are required to raise the Adjusted PF Score to at least 100%. Further increases on this will improve this scheme's chances of an FCRM GiA allocation in the desired year. Planned savings and contributions should be entered into cells(9,10,12) and cells(14-17). See NOTE below.

1. Scheme details

Risk Management Authority type of asset maintainer

LA (5)

Yes (6)

Is evidence available that a Strategic Approach has been taken, and that double counting of benefits has been avoided?

Duration of Benefits (years)

100 (7)

PV Whole-Life Benefits:

15,678,000 (8)

PV Costs

PV Appraisal Costs

22,000 (9)

PV design & Construction Costs

1,186,585 (10)

Sub Total - PV Cost for Approval (appraisal,design,construction)

1,208,585 (11)

PV Post-Construction Costs

362,004 (12)

PV Whole-Life Costs:

1,570,589 (13)

All costs and benefits must be on a Present Value (PV) Whole-Life basis over the Duration of Benefits period. Where Contributions are identified these should also be on a Present Value basis.

The total value of any necessary contributions will depend on whether maintenance (ongoing costs) is funded through revenue FCRM GiA, or by other means.

NOTE: This scheme is to be maintained by an RMA other than the EA (ref cell 5). Capital FCRM GiA will fund the appropriate share of the up-front costs (cell 11) with any shortfall needing to be paid for via contributions identified in cells(14-17). Future ongoing costs (cell 12) and any contributions towards them are a matter for local agreement by the RMA and should NOT be included in cells(14-17). It is recommended that the RMA takes the opportunities created during scheme development to separately secure contributions towards future ongoing costs (cell12).

2. Qualifying benefits under Outcome Measure 2: households better protected against flood risk

Number of households in:

20% most deprived areas

21-40% most deprived areas

60% least deprived areas

Before			
At:	Moderate risk	Significant risk	Very significant risk

After		
	Moderate risk	Significant risk

Change due to scheme		
	Moderate risk	Significant risk

Annual damages avoided (£), compared with a household 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	
£	-
£	-
£	-

Over lifetime of scheme	
£	-
£	-
£	-

Qual. benefits (discounted)	
OM2 (20%)	£ -
OM2 (21-40%)	£ -
OM2 (60%)	£ -

3. Qualifying benefits under Outcome Measure 3: households better protected against coastal erosion

Number of households in:

20% most deprived areas

21-40% most deprived areas

60% least deprived areas

Before	
4	75
Long-term loss	Medium-term loss

Damages per household avoided:

Annual damages avoided

Loss expected in

Present value of Year 1 loss (i.e. first year damages, discounted based on when loss is expected)

£ 6,000	£ 6,000
50	20 years
£ 1,184	£ 3,015
Long-term loss	Medium-term loss

Change in household damages, in:

20% most deprived areas

21-40% most deprived areas

60% least deprived areas

Year 1 loss avoided:	
£	-
-£	230,889
£	-

Over lifetime of scheme:

£ -

-£ 23,088,895

£ -

Qual. benefits (discounted):	
OM3 (20%)	£ -
OM3 (21-40%)	£ 6,895,121
OM3 (60%)	£ -

4. Qualifying benefits under Outcome Measure 4: statutory environmental obligations met

Payments under:

OM4a

Hectares of net water-dependent habitat created

OM4b

Hectares of net intertidal habitat created

OM4c

Kilometres of protected river improved

Assumed benefits per unit:

£ 15,000

£ 50,000

£ 80,000

Qual. benefits (discounted):

OM4a £ -

OM4b £ -

OM4c £ -

OM4 £ -

5. Qualifying benefits arising from the overall scheme, for entry into the Medium-Term Plan

OM, deprivation:	Qual. benefits:	Payment rate:	p in the £1
OM1	£ 8,782,879	5.56	
OM2	£ -	45.0	
	£ -	30.0	
	£ -	20.0	
OM3	£ -	45.0	
	£ 6,895,121	30.0	
	£ -	20.0	
OM4	£ -	100.0	
Total	£ 15,678,000		

FCRM GiA contribution:

£ 487,938

£ -

£ -

£ -

£ -

£ 2,068,536

£ -

£ -

£ 2,556,474

Maximum for Outcomes delivered. The actual value any scheme is eligible for may be less.

Sensitivity Testing. It is important that users of this calculator appreciate the implications on funding from changes to input data which may become necessary as the project develops and better information is available. Five typical tests are provided below. Users should consider how appropriate these are to their project, what other tests may be appropriate and how best to use the information with all those that may 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 4 - Increase Duration of Benefits by 25%

Sensitivity 5 - Reduce Duration of Benefits by 25%

Raw Score	Contribution for 100% Score (£k)
163%	0
59%	625,476
163%	-
131%	-
#N/A	#N/A
157%	-

END OF WORKSHEET

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

Version 8 January 2014

Project Name	Runswick Bay Strategy
Unique Project Number	PAR Option 6 Rock Armour Fillet - Sensitivity 2 Rock & Underlayer Rate Increases

All figures are in £'s

Figures in Blue to be entered onto Medium Term Plan

Key	Input cells
	Calculated cells

SUMMARY: prospect of FCRM GiA funding

Raw Partnership Funding Score	189% (1)	Scheme Benefit to Cost Ratio: 12.32 to 1
External Contribution or saving required to achieve an Adjusted Score of 100%	0 (2)	Effective return to taxpayer: 21.03 to 1
Adjusted Partnership Funding Score (PF)	214% (3)	Effective return on contributions: 60.65 to 1
PV FCRM GiA towards the up-front costs of this scheme (PV Cost for Approval)	1,002,738 (4)	

Cell (2) shows the minimum amount of contributions and/or reductions in scheme cost that are required to raise the Adjusted PF Score to at least 100%. Further increases on this will improve this scheme's chances of an FCRM GiA allocation in the desired year. Planned savings and contributions should be entered into cells(9,10,12) and cells(14-17). See NOTE below.

1. Scheme details

Risk Management Authority type of asset maintainer	LA (5)	Yes (6)
Duration of Benefits (years)	100 (7)	Is evidence available that a Strategic Approach has been taken, and that double counting of benefits has been avoided?
PV Whole-Life Benefits:	21,092,000 (8)	
PV Costs		All costs and benefits must be on a Present Value (PV) Whole-Life basis over the Duration of Benefits period. Where Contributions are identified these should also be on a Present Value basis.
PV Appraisal Costs	22,000 (9)	
PV design & Construction Costs	1,328,498 (10)	
Sub Total - PV Cost for Approval (appraisal,design,construction)	1,350,498 (11)	
PV Post-Construction Costs	362,004 (12)	
PV Whole-Life Costs:	1,712,502 (13)	
PV Contributions secured to date		
PV Local Levy secured to date	0 (14)	
PV Public Contributions secured to date	0 (15)	
PV Private Contributions secured to date	347,760 (16)	
PV Funding from other Environment Agency functions/sources secured to date	347,760 (17)	
PV Total Contributions secured to date	347,760 (18)	

The total value of any necessary contributions will depend on whether maintenance (ongoing costs) is funded through revenue FCRM GiA, or by other means.
NOTE: This scheme is to be maintained by an RMA other than the EA (ref cell 5). Capital FCRM GiA will fund the appropriate share of the up-front costs (cell 11) with any shortfall needing to be paid for via contributions identified in cells(14-17). Future ongoing costs (cell 12) and any contributions towards them are a matter for local agreement by the RMA and should NOT be included in cells(14-17). It is recommended that the RMA takes the opportunities created during scheme development to separately secure contributions towards future ongoing costs (cell12).

2. Qualifying benefits under Outcome Measure 2: households better protected against flood risk

Number of households in:	Before	After	Change due to scheme
20% most deprived areas			0 0 0
21-40% most deprived areas			0 0 0
60% least deprived areas			0 0 0
At: Moderate risk Significant risk Very significant risk			
Annual damages avoided (£), compared with a household at low risk			150 600 1,350
Change in household damages, in:	Per year	Over lifetime of scheme	Qual. benefits (discounted)
20% most deprived areas	£ -	£ -	OM2 (20%) £ -
21-40% most deprived areas	£ -	£ -	OM2 (21-40%) £ -
60% least deprived areas	£ -	£ -	OM2 (60%) £ -

3. Qualifying benefits under Outcome Measure 3: households better protected against coastal erosion

Number of households in:	Before	Damages per household avoided:	
20% most deprived areas		Annual damages avoided	£ 6,000 £ 6,000
21-40% most deprived areas	4	Loss expected in	£ 50 £ 20 years
60% least deprived areas	92	Present value of Year 1 loss (i.e. first year damages, discounted based on when loss is expected)	£ 1,184 £ 3,015
Long-term loss Medium-term loss		Long-term loss Medium-term loss	
Change in household damages, in:	Year 1 loss avoided:	Over lifetime of scheme:	Qual. benefits (discounted):
20% most deprived areas	£ -	£ -	OM3 (20%) £ -
21-40% most deprived areas	£ 282,151	£ 28,215,067	OM3 (21-40%) £ 8,425,968
60% least deprived areas	£ -	£ -	OM3 (60%) £ -

4. Qualifying benefits under Outcome Measure 4: statutory environmental obligations met

Payments under:	Assumed benefits per unit:	Qual. benefits (discounted):
OM4a Hectares of net water-dependent habitat created	£ 15,000	OM4a £ -
OM4b Hectares of net intertidal habitat created	£ 50,000	OM4b £ -
OM4c Kilometres of protected river improved	£ 80,000	OM4c £ -
		OM4 £ -

5. Qualifying benefits arising from the overall scheme, for entry into the Medium-Term Plan

OM, deprivation:	Qual. benefits:	Payment rate:	FCRM GiA contribution:
OM1	£ 12,666,032	£ 5.56 p in the £1	£ 703,668
OM2	£ -	£ 45.0	£ -
20% most	£ -	£ 30.0	£ -
21-40%	£ -	£ 20.0	£ -
Least 60%	£ -	£ 45.0	£ -
OM3	£ 8,425,968	£ 30.0	£ 2,527,790
20% most	£ -	£ 20.0	£ -
21-40%	£ -	£ 100.0	£ -
Least 60%	£ -		
OM4	£ -		
Total	£ 21,092,000		£ 3,231,459

Maximum for Outcomes delivered. The actual value any scheme is eligible for may be less.

Sensitivity Testing. It is important that users of this calculator appreciate the implications on funding from changes to input data which may become necessary as the project develops and better information is available. Five typical tests are provided below. Users should consider how appropriate these are to their project, what other tests may be appropriate and how best to use the information with all those that may 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 4 - Increase Duration of Benefits by 25%
Sensitivity 5 - Reduce Duration of Benefits by 25%

Raw Score	Contribution for 100% Score (£k)
189%	0
68%	541,359
189%	-
153%	-
#N/A	#N/A
182%	-

END OF WORKSHEET

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

Version 8 January 2014

Project Name	Runswick Bay Strategy
Unique Project Number	PAR Option 6 Rock Armour Fillet - Sensitivity 3 Increase overall Costs by 25%

All figures are in £'s

Figures in Blue to be entered onto Medium Term Plan

Key	Input cells
	Calculated cells

SUMMARY: prospect of FCRM GiA funding

Raw Partnership Funding Score	173% (1)	Scheme Benefit to Cost Ratio: 11.30 to 1
External Contribution or saving required to achieve an Adjusted Score of 100%	0 (2)	Effective return to taxpayer: 18.22 to 1
Adjusted Partnership Funding Score (PF)	196% (3)	Effective return on contributions: 60.65 to 1
PV FCERM GiA towards the up-front costs of this scheme (PV Cost for Approval)	1,157,471 (4)	

Cell (2) shows the minimum amount of contributions and/or reductions in scheme cost that are required to raise the Adjusted PF Score to at least 100%. Further increases on this will improve this scheme's chances of an FCRM GiA allocation in the desired year. Planned savings and contributions towards them are a matter for local agreement by the RMA and should NOT be included in cells(14-17). It is recommended that the RMA takes the opportunities created during scheme development to separately secure contributions towards future ongoing costs (cell12).

1. Scheme details

Risk Management Authority type of asset maintainer	LA (5)	Yes (6)	Is evidence available that a Strategic Approach has been taken, and that double counting of benefits has been avoided ?
Duration of Benefits (years)	100 (7)		
PV Whole-Life Benefits:	21,092,000 (8)		
PV Costs			All costs and benefits must be on a Present Value (PV) Whole-Life basis over the Duration of Benefits period. Where Contributions are identified these should also be on a Present Value basis.
PV Appraisal Costs	22,000 (9)		
PV design & Construction Costs	1,483,231 (10)		
Sub Total - PV Cost for Approval (appraisal,design,construction)	1,505,231 (11)		
PV Post-Construction Costs	362,004 (12)		
PV Whole-Life Costs:	1,867,235 (13)		
PV Contributions secured to date			
PV Local Levy secured to date	0 (14)		
PV Public Contributions secured to date	0 (15)		
PV Private Contributions secured to date	347,760 (16)		
PV Funding from other Environment Agency functions/sources secured to date	0 (17)		
PV Total Contributions secured to date	347,760 (18)		

The total value of any necessary contributions will depend on whether maintenance (ongoing costs) is funded through revenue FCRM GiA, or by other means.

NOTE: This scheme is to be maintained by an RMA other than the EA (ref cell 5). Capital FCRM GiA will fund the appropriate share of the up-front costs (cell 11) with any shortfall needing to be paid for via contributions identified in cells(14-17). Future ongoing costs (cell 12) and any contributions towards them are a matter for local agreement by the RMA and should NOT be included in cells(14-17). It is recommended that the RMA takes the opportunities created during scheme development to separately secure contributions towards future ongoing costs (cell12).

2. Qualifying benefits under Outcome Measure 2: households better protected against flood risk

Number of households in:	Before	After	Change due to scheme
20% most deprived areas			0
21-40% most deprived areas			0
60% least deprived areas			0
At: Moderate risk		Moderate risk	
Significant risk		Significant risk	
Very significant risk		Very significant risk	
Annual damages avoided (£), compared with a household at low risk			150 600 1,350
Change in household damages, in:	Per year	Over lifetime of scheme	Qual. benefits (discounted)
20% most deprived areas	£ -	£ -	OM2 (20%) £ -
21-40% most deprived areas	£ -	£ -	OM2 (21-40%) £ -
60% least deprived areas	£ -	£ -	OM2 (60%) £ -

3. Qualifying benefits under Outcome Measure 3: households better protected against coastal erosion

Number of households in:	Before	Damages per household avoided:	
20% most deprived areas		Annual damages avoided	£ 6,000 £ 6,000
21-40% most deprived areas	4	Loss expected in	£ 50 £ 20 years
60% least deprived areas	92	Present value of Year 1 loss (i.e. first year damages, discounted based on when loss is expected)	£ 1,184 £ 3,015
Long-term loss		Long-term loss	
Medium-term loss		Medium-term loss	
Change in household damages, in:	Year 1 loss avoided:	Over lifetime of scheme:	Qual. benefits (discounted):
20% most deprived areas	£ -	£ -	OM3 (20%) £ -
21-40% most deprived areas	-£ 282,151	-£ 28,215,067	OM3 (21-40%) £ 8,425,968
60% least deprived areas	£ -	£ -	OM3 (60%) £ -

4. Qualifying benefits under Outcome Measure 4: statutory environmental obligations met

Payments under:		Assumed benefits per unit:	Qual. benefits (discounted):
OM4a	Hectares of net water-dependent habitat created	£ 15,000	OM4a £ -
OM4b	Hectares of net intertidal habitat created	£ 50,000	OM4b £ -
OM4c	Kilometres of protected river improved	£ 80,000	OM4c £ -
			OM4 £ -

5. Qualifying benefits arising from the overall scheme, for entry into the Medium-Term Plan

OM, deprivation:	Qual. benefits:	Payment rate:	FCRM GiA contribution:
OM1	£ 12,666,032	5.56 p in the £1	£ 703,668
OM2	£ -	45.0	£ -
20% most	£ -	30.0	£ -
21-40%	£ -	20.0	£ -
Least 60%	£ -	45.0	£ -
OM3	£ 8,425,968	30.0	£ 2,527,790
20% most	£ -	20.0	£ -
21-40%	£ -	100.0	£ -
Least 60%	£ -		£ -
OM4	£ -		£ -
Total	£ 21,092,000		£ 3,231,459

Maximum for Outcomes delivered. The actual value any scheme is eligible for may be less.

Sensitivity Testing. It is important that users of this calculator appreciate the implications on funding from changes to input data which may become necessary as the project develops and better information is available. Five typical tests are provided below. Users should consider how appropriate these are to their project, what other tests may be appropriate and how best to use the information with all those that may 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 4 - Increase Duration of Benefits by 25%

Sensitivity 5 - Reduce Duration of Benefits by 25%

Raw Score	Contribution for 100% Score (£k)
173%	0
62%	709,302
173%	-
140%	-
#N/A	#N/A
167%	-

END OF WORKSHEET

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

Version 8 January 2014

Project Name	Runswick Bay Strategy
Unique Project Number	PAR Option 6 Rock Armour Fillet - Sensitivity 4 Increase Maintenance costs by 200%

All figures are in £'s

Figures in Blue to be entered onto Medium Term Plan

Key	Input cells
	Calculated cells

SUMMARY: prospect of FCRM GiA funding

Raw Partnership Funding Score	197% (1)	Scheme Benefit to Cost Ratio: 12.86 to 1
External Contribution or saving required to achieve an Adjusted Score of 100%	0 (2)	Effective return to taxpayer: 24.50 to 1
Adjusted Partnership Funding Score (PF)	226% (3)	Effective return on contributions: 60.65 to 1
PV FCRM GiA towards the up-front costs of this scheme (PV Cost for Approval)	860,825 (4)	

Cell (2) shows the minimum amount of contributions and/or reductions in scheme cost that are required to raise the Adjusted PF Score to at least 100%. Further increases on this will improve this scheme's chances of an FCRM GiA allocation in the desired year. Planned savings and contributions should be entered into cells(9,10,12) and cells(14-17). See NOTE below.

1. Scheme details

Risk Management Authority type of asset maintainer	LA (5)	Yes (6)	<p>Is evidence available that a Strategic Approach has been taken, and that double counting of benefits has been avoided ?</p> <div><p>All costs and benefits must be on a Present Value (PV) Whole-Life basis over the Duration of Benefits period. Where Contributions are identified these should also be on a Present Value basis.</p></div> <p><i>The total value of any necessary contributions will depend on whether maintenance (ongoing costs) is funded through revenue FCRM GiA, or by other means.</i></p> <p>NOTE: This scheme is to be maintained by an RMA other than the EA (ref cell 5). Capital FCRM GiA will fund the appropriate share of the up-front costs (cell 11) with any shortfall needing to be paid for via contributions identified in cells(14-17). Future ongoing costs (cell 12) and any contributions towards them are a matter for local agreement by the RMA and should NOT be included in cells(14-17). It is recommended that the RMA takes the opportunities created during scheme development to separately secure contributions towards future ongoing costs (cell12).</p>
Duration of Benefits (years)	100 (7)		
PV Whole-Life Benefits:	21,092,000 (8)		
PV Costs			
PV Appraisal Costs	22,000 (9)		
PV design & Construction Costs	1,186,585 (10)		
Sub Total - PV Cost for Approval (appraisal,design,construction)	1,208,585 (11)		
PV Post-Construction Costs	431,438 (12)		
PV Whole-Life Costs:	1,640,023 (13)		
PV Contributions secured to date			
PV Local Levy secured to date	0 (14)		
PV Public Contributions secured to date	0 (15)		
PV Private Contributions secured to date	347,760 (16)		
PV Funding from other Environment Agency functions/sources secured to date	(17)		
PV Total Contributions secured to date	347,760 (18)		

2. Qualifying benefits under Outcome Measure 2: households better protected against flood risk

Number of households in:	Before	After	Change due to scheme
20% most deprived areas			0 0 0
21-40% most deprived areas			0 0 0
60% least deprived areas			0 0 0
At: Moderate risk Significant risk Very significant risk		Moderate risk Significant risk Very significant risk	Moderate risk Significant risk Very significant risk
Annual damages avoided (£), compared with a household at low risk			150 600 1,350
Change in household damages, in:	Per year	Over lifetime of scheme	Qual. benefits (discounted)
20% most deprived areas	£ -	£ -	OM2 (20%) £ -
21-40% most deprived areas	£ -	£ -	OM2 (21-40%) £ -
60% least deprived areas	£ -	£ -	OM2 (60%) £ -

3. Qualifying benefits under Outcome Measure 3: households better protected against coastal erosion

Number of households in:	Before	Damages per household avoided:	
20% most deprived areas		Annual damages avoided	£ 6,000 £ 6,000
21-40% most deprived areas	4	Loss expected in	£ 50 £ 20 years
60% least deprived areas	92	Present value of Year 1 loss (i.e. first year damages, discounted based on when loss is expected)	£ 1,184 £ 3,015
Long-term loss Medium-term loss		Long-term loss Medium-term loss	
Change in household damages, in:	Year 1 loss avoided:	Over lifetime of scheme:	Qual. benefits (discounted):
20% most deprived areas	£ -	£ -	OM3 (20%) £ -
21-40% most deprived areas	£ -282,151	£ -28,215,067	OM3 (21-40%) £ 8,425,968
60% least deprived areas	£ -	£ -	OM3 (60%) £ -

4. Qualifying benefits under Outcome Measure 4: statutory environmental obligations met

Payments under:		Assumed benefits per unit:	Qual. benefits (discounted):
OM4a	Hectares of net water-dependent habitat created	£ 15,000	OM4a £ -
OM4b	Hectares of net intertidal habitat created	£ 50,000	OM4b £ -
OM4c	Kilometres of protected river improved	£ 80,000	OM4c £ -
			OM4 £ -

5. Qualifying benefits arising from the overall scheme, for entry into the Medium-Term Plan

OM, deprivation:	Qual. benefits:	Payment rate:	FCRM GiA contribution:
OM1	£ 12,666,032	£ 5.56 p in the £1	£ 703,668
OM2	20% most £ -		£ -
	21-40% £ -		£ -
	Least 60% £ -		£ -
OM3	20% most £ -		£ -
	21-40% £ 8,425,968		£ 2,527,790
	Least 60% £ -		£ -
OM4	£ -		£ -
Total	£ 21,092,000		£ 3,231,459

Maximum for Outcomes delivered. The actual value any scheme is eligible for may be less.

Sensitivity Testing. It is important that users of this calculator appreciate the implications on funding from changes to input data which may become necessary as the project develops and better information is available. Five typical tests are provided below. Users should consider how appropriate these are to their project, what other tests may be appropriate and how best to use the information with all those that may 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 4 - Increase Duration of Benefits by 25%
 Sensitivity 5 - Reduce Duration of Benefits by 25%

Raw Score	Contribution for 100% Score (£k)
197%	0
71%	439,117
197%	-
160%	-
#N/A	#N/A
190%	-

END OF WORKSHEET

FCRM Partnership Funding Calculator for Flood Defence Grant in Aid (FDGiA)

Version 8 January 2014

Project Name Runswick Bay Strategy
Unique Project Reference Test 5 - Reduce Duration of Benefits by 25%

Key Auto populated cells
 Calculated cells

All figures are in £'s

Figures in Blue to be entered onto MTP

SUMMARY: prospect of FDGiA funding

Raw Partnership Funding Score 198% (1)
External Contribution or saving required to achieve an Adjusted Score of 100% 0 (2)
Adjusted Partnership Funding Score (PF) 227% (3)
PV FCRM GiA towards the up-front costs of this scheme (PV Cost for Approval) 860,825 (4)

Scheme Benefit to Cost Ratio: 13.43 to 1
 Effective return to taxpayer: 24.50 to 1
 Effective return to area: 60.65 to 1

Cell (2) shows the minimum amount of contributions and/or reductions in scheme cost that are required to raise the Adjusted PF Score to at least 100%. Further increases on this will improve this schemes chances of an FDGiA allocation in the desired year. Savings and contributions should be entered into cells(9,10,12) and cells(14-17).

1. Scheme details

Risk Management Authority type of asset maintainer LA (5)

Yes (6)

Is evidence available that a Strategic Approach has been taken, and that double counting of benefits has been avoided ?

Duration of Benefits (years) 75 (7)

PV Whole-Life Benefits: 21092000 (8)

PV Costs

PV Appraisal Costs 22000 (9)

PV design & Construction Costs 1186585 (10)

Sub Total - PV Cost for Approval (appraisal,design,construction) 1,208,585 (11)

PV Post-Construction Costs 362004 (12)

PV Whole-Life Costs: 1,570,589 (13)

All costs and benefits must be on a Present Value (PV) Whole-Life basis over the Duration of Benefits period. Where Contributions are identified these should also be on a Present Values.

The total value of any necessary contributions will depend on whether maintenance (ongoing costs) is funded through revenue FCRM GiA, or by other means.

PV Contributions secured to date

PV Local Levy secured to date 0 (14)

PV Public Contributions secured to date 0 (15)

PV Private Contributions secured to date 347760 (16)

PV Funding from other Environment Agency functions/sources secured to date 0 (17)

PV Total Contributions secured to date 347,760 (18)

NOTE: This scheme is to be maintained by an RMA other than the EA (ref cell 5). Capital FCRM GiA will fund the appropriate share of the up-front costs (cell 11) with any shortfall needing to be paid for via contributions identified in cells(14-17). Future ongoing costs (cell 12) and any contributions towards them are a matter for local agreement by the RMA and should NOT be included in cells(14-17). It is recommended that the RMA takes the opportunities created during scheme development to separately secure contributions towards future ongoing costs (cell12).

2. Qualifying benefits under Outcome Measure 2: households better protected against flood risk

Number of households in:

20% most deprived areas

21-40% most deprived areas

60% least deprived areas

At:	Before			After		
	Moderate risk	Significant risk	Very significant risk	Moderate risk	Significant risk	Very significant risk
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-

Change due to scheme		
0	0	0
0	0	0
0	0	0

Annual damages avoided (£), compared with a household 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		Over lifetime of scheme	
£	-	£	-
£	-	£	-
£	-	£	-

Qual. benefits (discounted)	
OM2 (20%)	£ -
OM2 (21-40%)	£ -
OM2 (60%)	£ -

3. Qualifying benefits under Outcome Measure 3: households better protected against coastal erosion

Number of households in:

20% most deprived areas

21-40% most deprived areas

60% least deprived areas

Before	
-	-
4	92
-	-
Long-term loss	Medium-term loss

Damages per household avoided:

Annual damages avoided

Loss expected in

Present value of Year 1 loss (i.e. first year damages, discounted based on when loss is expected)

£ 6,000	£ 6,000
50	20
£ 1,184	£ 3,015
Long-term loss	Medium-term loss

Change in household damages, in:

20% most deprived areas

21-40% most deprived areas

60% least deprived areas

Year 1 loss avoided:		Over lifetime of scheme:	
£	-	£	-
-£	282,151	-£	21,161,301
£	-	£	-

Qual. benefits (discounted):	
OM3 (20%)	£ -
OM3 (21-40%)	£ 7,936,202
OM3 (60%)	£ -

4. Qualifying benefits under Outcome Measure 4: statutory environmental obligations met

Payments under:

OM4a 0.00 Hectares of net water-dependent habitat created

OM4b 0.00 Hectares of net intertidal habitat created

OM4c 0.00 Kilometres of protected river improved

Assumed benefits per unit:

£ 15,000

£ 50,000

£ 80,000

Qual. benefits (discounted):

OM4a £ -

OM4b £ -

OM4c £ -

OM4 £ -

5. Qualifying benefits arising from the overall scheme, for entry into the Medium-Term Plan

OM, deprivation:	Qual. benefits:	Payment rate:	p in the £1
OM1	£ 13,155,798	5.56	
OM2	20% most	£ -	45.0
	21-40%	£ -	30.0
	Least 60%	£ -	20.0
OM3	20% most	£ -	45.0
	21-40%	£ 7,936,202	30.0
	Least 60%	£ -	20.0
OM4	£ -	100.0	
Total	£ 21,092,000		

FDGiA contribution:
£ 730,878
£ -
£ -
£ -
£ -
£ 2,380,861
£ -
£ -
£ 3,111,738

Maximum for Outcomes delivered. The actual value any scheme is eligible for may be less.

END OF WORKSHEET

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

Version 8 January 2014

Project Name	Runswick Bay Strategy
Unique Project Number	PAR Option 6 Rock Armour Fillet - Sensitivity 6 No contributions

All figures are in £'s

Figures in Blue to be entered onto Medium Term Plan

Key	Input cells
	Calculated cells

SUMMARY: prospect of FCRM GiA funding

Raw Partnership Funding Score	206% (1)	Scheme Benefit to Cost Ratio: 13.43 to 1
External Contribution or saving required to achieve an Adjusted Score of 100%	0 (2)	Effective return to taxpayer: 17.45 to 1
Adjusted Partnership Funding Score (PF)	206% (3)	Effective return on contributions: n/a to 1
PV FCRM GiA towards the up-front costs of this scheme (PV Cost for Approval)	1,208,585 (4)	

1. Scheme details

Risk Management Authority type of asset maintainer	LA (5)	Yes (6)	All costs and benefits must be on a Present Value (PV) Whole-Life basis over the Duration of Benefits period. Where Contributions are identified these should also be on a Present Value basis.
Duration of Benefits (years)	100 (7)		
PV Whole-Life Benefits:	21,092,000 (8)		
PV Costs			
PV Appraisal Costs	22,000 (9)		
PV design & Construction Costs	1,186,585 (10)		
Sub Total - PV Cost for Approval (appraisal, design, construction)	1,208,585 (11)		
PV Post-Construction Costs	362,004 (12)		
PV Whole-Life Costs:	1,570,589 (13)		
PV Contributions secured to date			
PV Local Levy secured to date	0 (14)		
PV Public Contributions secured to date	0 (15)		
PV Private Contributions secured to date	0 (16)		
PV Funding from other Environment Agency functions/sources secured to date	0 (17)		
PV Total Contributions secured to date	0 (18)		

The total value of any necessary contributions will depend on whether maintenance (ongoing costs) is funded through revenue FCRM GiA, or by other means.

NOTE: This scheme is to be maintained by an RMA other than the EA (ref cell 5). Capital FCRM GiA will fund the appropriate share of the up-front costs (cell 11) with any shortfall needing to be paid for via contributions identified in cells(14-17). Future ongoing costs (cell 12) and any contributions towards them are a matter for local agreement by the RMA and should NOT be included in cells(14-17). It is recommended that the RMA takes the opportunities created during scheme development to separately secure contributions towards future ongoing costs (cell 12).

2. Qualifying benefits under Outcome Measure 2: households better protected against flood risk

Number of households in:	Before	After	Change due to scheme
20% most deprived areas			0 0 0
21-40% most deprived areas			0 0 0
60% least deprived areas			0 0 0
At: Moderate risk Significant risk Very significant risk			
Annual damages avoided (£), compared with a household at low risk			150 600 1,350
Change in household damages, in:	Per year	Over lifetime of scheme	Qual. benefits (discounted)
20% most deprived areas	£ -	£ -	OM2 (20%) £ -
21-40% most deprived areas	£ -	£ -	OM2 (21-40%) £ -
60% least deprived areas	£ -	£ -	OM2 (60%) £ -

3. Qualifying benefits under Outcome Measure 3: households better protected against coastal erosion

Number of households in:	Before	Damages per household avoided:	
20% most deprived areas		Annual damages avoided	£ 6,000 £ 6,000
21-40% most deprived areas	4 92	Loss expected in	£ 50 £ 20 years
60% least deprived areas		Present value of Year 1 loss (i.e. first year damages, discounted based on when loss is expected)	£ 1,184 £ 3,015
Long-term loss Medium-term loss			
Change in household damages, in:	Year 1 loss avoided:	Over lifetime of scheme:	Qual. benefits (discounted):
20% most deprived areas	£ -	£ -	OM3 (20%) £ -
21-40% most deprived areas	£ 282,151	£ 28,215,067	OM3 (21-40%) £ 8,425,968
60% least deprived areas	£ -	£ -	OM3 (60%) £ -

4. Qualifying benefits under Outcome Measure 4: statutory environmental obligations met

Payments under:	Assumed benefits per unit:	Qual. benefits (discounted):
OM4a Hectares of net water-dependent habitat created	£ 15,000	OM4a £ -
OM4b Hectares of net intertidal habitat created	£ 50,000	OM4b £ -
OM4c Kilometres of protected river improved	£ 80,000	OM4c £ -
		OM4 £ -

5. Qualifying benefits arising from the overall scheme, for entry into the Medium-Term Plan

OM, deprivation:	Qual. benefits:	Payment rate:	FCRM GiA contribution:
OM1	£ 12,666,032	5.56 p in the £1	£ 703,668
OM2	£ -	45.0	£ -
20% most	£ -	30.0	£ -
21-40%	£ -	20.0	£ -
Least 60%	£ -	45.0	£ -
OM3	£ 8,425,968	30.0	£ 2,527,790
20% most	£ -	20.0	£ -
21-40%	£ -	100.0	£ -
Least 60%	£ -		£ -
OM4	£ 21,092,000		£ 3,231,459
Total			

Maximum for Outcomes delivered. The actual value any scheme is eligible for may be less.

Sensitivity Testing. It is important that users of this calculator appreciate the implications on funding from changes to input data which may become necessary as the project develops and better information is available. Five typical tests are provided below. Users should consider how appropriate these are to their project, what other tests may be appropriate and how best to use the information with all those that may be involved in the project.

Raw Score	Contribution for 100% Score (£k)
206%	0
74%	391,742
206%	-
167%	-
#N/A	#N/A
198%	-

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%

Sensitivity 5 - Reduce Duration of Benefits by 25%

END OF WORKSHEET

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

Version 8 January 2014

Project Name	Runswick Bay Strategy
Unique Project Number	PAR Option 6 Rock Armour Fillet - Sensitivity 7 No contributions and monetised benefits only

All figures are in £'s

Figures in Blue to be entered onto Medium Term Plan

Key

Input cells
Calculated cells

SUMMARY: prospect of FCRM GiA funding

Raw Partnership Funding Score

198% (1)

External Contribution or saving required to achieve an Adjusted Score of 100%

0 (2)

Adjusted Partnership Funding Score (PF)

198% (3)

PV FCRM GiA towards the up-front costs of this scheme (PV Cost for Approval)

1,208,585 (4)

Scheme Benefit to Cost Ratio:

11.95 to 1

Effective return to taxpayer:

15.53 to 1

Effective return on contributions:

n/a to 1

Cell (2) shows the minimum amount of contributions and/or reductions in scheme cost that are required to raise the Adjusted PF Score to at least 100%. Further increases on this will improve this scheme's chances of an FCRM GiA allocation in the desired year. Planned savings and contributions should be entered into cells(9,10,12) and cells(14-17). See NOTE below.

1. Scheme details

Risk Management Authority type of asset maintainer

LA (5)

Yes (6)

Duration of Benefits (years)

100 (7)

PV Whole-Life Benefits:

18,773,000 (8)

PV Costs

PV Appraisal Costs

22,000 (9)

PV design & Construction Costs

1,186,585 (10)

Sub Total - PV Cost for Approval (appraisal,design,construction)

1,208,585 (11)

PV Post-Construction Costs

362,004 (12)

PV Whole-Life Costs:

1,570,589 (13)

All costs and benefits must be on a Present Value (PV) Whole-Life basis over the Duration of Benefits period. Where Contributions are identified these should also be on a Present Value basis.

PV Contributions secured to date

PV Local Levy secured to date

0 (14)

PV Public Contributions secured to date

0 (15)

PV Private Contributions secured to date

0 (16)

PV Funding from other Environment Agency functions/sources secured to date

0 (17)

PV Total Contributions secured to date

0 (18)

The total value of any necessary contributions will depend on whether maintenance (ongoing costs) is funded through revenue FCRM GiA, or by other means.

NOTE: This scheme is to be maintained by an RMA other than the EA (ref cell 5). Capital FCRM GiA will fund the appropriate share of the up-front costs (cell 11) with any shortfall needing to be paid for via contributions identified in cells(14-17). Future ongoing costs (cell 12) and any contributions towards them are a matter for local agreement by the RMA and should NOT be included in cells(14-17). It is recommended that the RMA takes the opportunities created during scheme development to separately secure contributions towards future ongoing costs (cell12).

2. Qualifying benefits under Outcome Measure 2: households better protected against flood risk

Number of households in:

20% most deprived areas

21-40% most deprived areas

60% least deprived areas

Before		
At:	Moderate risk	Significant risk
		Very significant risk

After		
	Moderate risk	Significant risk
		Very significant risk

Change due to scheme		
	Moderate risk	Significant risk
		Very significant risk

Annual damages avoided (£), compared with a household 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	
£	-
£	-
£	-

Over lifetime of scheme	
£	-
£	-
£	-

Qual. benefits (discounted)	
OM2 (20%)	£ -
OM2 (21-40%)	£ -
OM2 (60%)	£ -

3. Qualifying benefits under Outcome Measure 3: households better protected against coastal erosion

Number of households in:

20% most deprived areas

21-40% most deprived areas

60% least deprived areas

Before	
	4
	92
Long-term loss	Medium-term loss

Damages per household avoided:

Annual damages avoided

Loss expected in

Present value of Year 1 loss (i.e. first year damages, discounted based on when loss is expected)

£	6,000	£	6,000	years
	50		20	
£	1,184	£	3,015	
Long-term		Medium-term		

Change in household damages, in:

20% most deprived areas

21-40% most deprived areas

60% least deprived areas

Year 1 loss avoided:	
£	-
£	282,151
£	-

Over lifetime of scheme:	
£	-
£	28,215,067
£	-

Qual. benefits (discounted):	
OM3 (20%)	£ -
OM3 (21-40%)	£ 8,425,968
OM3 (60%)	£ -

4. Qualifying benefits under Outcome Measure 4: statutory environmental obligations met

Payments under:

OM4a

OM4b

OM4c

Hectares of net water-dependent habitat created
Hectares of net intertidal habitat created
Kilometres of protected river improved

Assumed benefits per unit:

£	15,000
£	50,000
£	80,000

Qual. benefits (discounted):

OM4a	£ -
OM4b	£ -
OM4c	£ -
OM4	£ -

5. Qualifying benefits arising from the overall scheme, for entry into the Medium-Term Plan

OM, deprivation:	Qual. benefits:	Payment rate:
OM1	£ 10,347,032	5.56 p in the £1
OM2	20% most	£ - 45.0
	21-40%	£ - 30.0
	Least 60%	£ - 20.0
OM3	20% most	£ - 45.0
	21-40%	£ 8,425,968 30.0
	Least 60%	£ - 20.0
OM4	£ -	100.0
Total	£ 18,773,000	

FCRM GiA contribution:	
£	574,835
£	-
£	-
£	-
£	-
£	2,527,790
£	-
£	-
£	3,102,626

Maximum for Outcomes delivered. The actual value any scheme is eligible for may be less.

Sensitivity Testing. It is important that users of this calculator appreciate the implications on funding from changes to input data which may become necessary as the project develops and better information is available. Five typical tests are provided below. Users should consider how appropriate these are to their project, what other tests may be appropriate and how best to use the information with all those that may 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 4 - Increase Duration of Benefits by 25%

Sensitivity 5 - Reduce Duration of Benefits by 25%

Raw Score	Contribution for 100% Score (£k)
198%	0
71%	436,355
198%	-
158%	-
#N/A	#N/A
190%	-

END OF WORKSHEET

