

Robin Hood's Bay Seawall Capital Maintenance Scheme Project


Scarborough Borough Council Short Form Outline Business Case



***Date: October 2017
Version - FINAL***

F/1718/0538

BUSINESS CASE APPROVAL SHEET

1 Review & Technical Approval				
Project title	Robin Hood's Bay Seawall Capital Maintenance Scheme			
Authority project reference	SBC56	EA reference		
Lead authority	Scarborough Borough Council	Date of submission	June 2017	
Consultant	Mott MacDonald			
'I confirm that this project meets our quality assurance requirements, environmental obligations and Defra investment appraisal conditions, that all internal approvals, including member approval, have been completed and recommend we apply to the Environment Agency for capital grant and local levy in the sum of £ 507.5k				
Job title	Name	Signature	Date	
Authority Project Executive	Chris Bourne		22/6/2017	
'I have reviewed this document and confirm that it meets the current business case guidelines for local authority and Internal Drainage Board applications.'				
OBC reviewer				
'I confirm that the project is ready for assurance and that I have consulted with the Director of Business Finance'				
Area Flood & Coastal Risk Manager				
Assurance sign off - (Tick the appropriate box)				
AFCRM Assurance <input type="checkbox"/> Projects < £100k Or Projects < £1m (if GiA & Levy <£100k)		NPAS Assurance <input type="checkbox"/> Projects £100k - £2m		
Recommendation for approval				Date
AFCRM or NPAS Chair	Lesley Newport	Lead Assurer RG8 See approval below	20/10/2017	
Project total as approved (£k)		Version Number		
Project total made up of :	Capital Grant (£k)			
	Levy (£k)			
	Other Contributions (£k)			
2 Project Financial approval				
Financial scheme of approval	Project total	Name	Signature	Date
Area Flood & Coastal Risk Manager	<£100k or <£1m (if GiA & Levy <£100k)			
Director of Business Finance	All projects >£100k			
Plus:				
Area Manager	£100k- £1m	Mark Scott	See email approval	24/10/2017
Director of Operations	£1m -£10m			
3 Further approvals (if applicable)				
Date sent (or N/A)		Version number (if different)		
Date approved (or N/A)				
Final Comments				

For FSoD Coordinator use only:

Final Recommendation	Green - No or minor issues to resolve
-----------------------------	---------------------------------------

Specific points to note on signing

- | | |
|---|--|
| 1 | Excellent work by Edward Hinton working with Scarborough Borough Council to get the issues |
| 2 | resolved and case resubmitted. |

From: Newport, Lesley

Sent: 20 October 2017 09:41

To: National Project Assurance Service <NPAS@environment-agency.gov.uk>

Cc: Newton, Sarah <sarah.newton@environment-agency.gov.uk>

Subject: RE: Reminder - Please give recommendation on response to further question 24 - SN00635 Robin Hoods Bay Seawall Capital Maintenance Scheme

Hi

The review is complete now.

Thanks

Lesley

F/1718/0538

From: Scott, Mark

Sent: 24 October 2017 15:36

To: National Project Assurance Service <NPAS@environment-agency.gov.uk>

Subject: RE: For FSoD approval - GREEN - Robin Hoods Bay Seawall Capital Maintenance Scheme (F/1718/0538)

Dear Sarah

I confirm I am happy to approve this request

Regards

Mark

Mark Scott

Area Director - Yorkshire

Table of Contents

BUSINESS CASE..... 5

1. INTRODUCTION 5

2. STRATEGIC CASE..... 5

3. ECONOMIC CASE 9

4. COMMERCIAL CASE 14

5. FINANCIAL CASE 15

6. MANAGEMENT CASE..... 17

7. RECOMMENDATION 20

Business Case

1. Introduction

This Outline Business Case (OBC) presents an application for Flood and Coastal Erosion Risk Management Grant in Aid (FCERM GiA) funding to undertake capital works to maintain Robin Hood's Bay seawall for the next 100 years. This OBC has been carried out in accordance with the Flood and Coastal Erosion Risk Management Appraisal Guidance (FCERM-AG) and associated Environment Agency (EA) policies and procedures.

Further to discussions with the EA a reduced 50 year scheme has been appraised to extend the existing structure, without replacement after 50 years. The preferred option consists of 4 phases of works and investment over 50 years to extend the residual life of the existing structure, with an overall £1,579k whole-life cost. This OBC is seeking approval for the first phase of the Robin Hood's Bay Seawall Capital Maintenance for the sum of **£659k. This consists of £573k GiA and £86k secured contributions** and the GiA will be sought by the completion of a CPA2.

2. Strategic case

Strategic context

Robin Hood's Bay is a small fishing village on the North Yorkshire coast between Whitby and Scarborough. The village is very popular with tourists due to the historical (smuggling and fishing) and cultural attractions of the village in addition to the picturesque cobbled streets, wide sweeping beach, and being at the end of the famous Wainwright's Coast to Coast walk.

The SMP2 which was formally approved by the EA in 2009 recommended a management option of Hold the Line for the next 100 years for the coastline covered by the Robin Hood's Bay seawall. The SMP2 states that it is important to sustain the existing coastal community at Robin Hood's Bay; as it is the largest within its SMP2 Management area.

A Strategy Appraisal Report, Robin Hood's Bay Coastal Strategy Study, was produced based on the recommendations within the SMP2 and approved by LPRG in December 2012. In which a capital project was proposed for Robin Hood's Bay.

Scarborough Borough Council plan to implement the recommended capital works arising from the OBC using our permissive powers under the Coast Protection Act (1949).

No legal liabilities are required based on the environmental requirements as the proposed development does not fall within the criteria set out in the Planning Practice Guidance (2014). Therefore the scheme does not require a statutory full EIA. The WFD assessment concluded that there are no significant impacts due to the works being undertaken over a short time scale on a small scale.

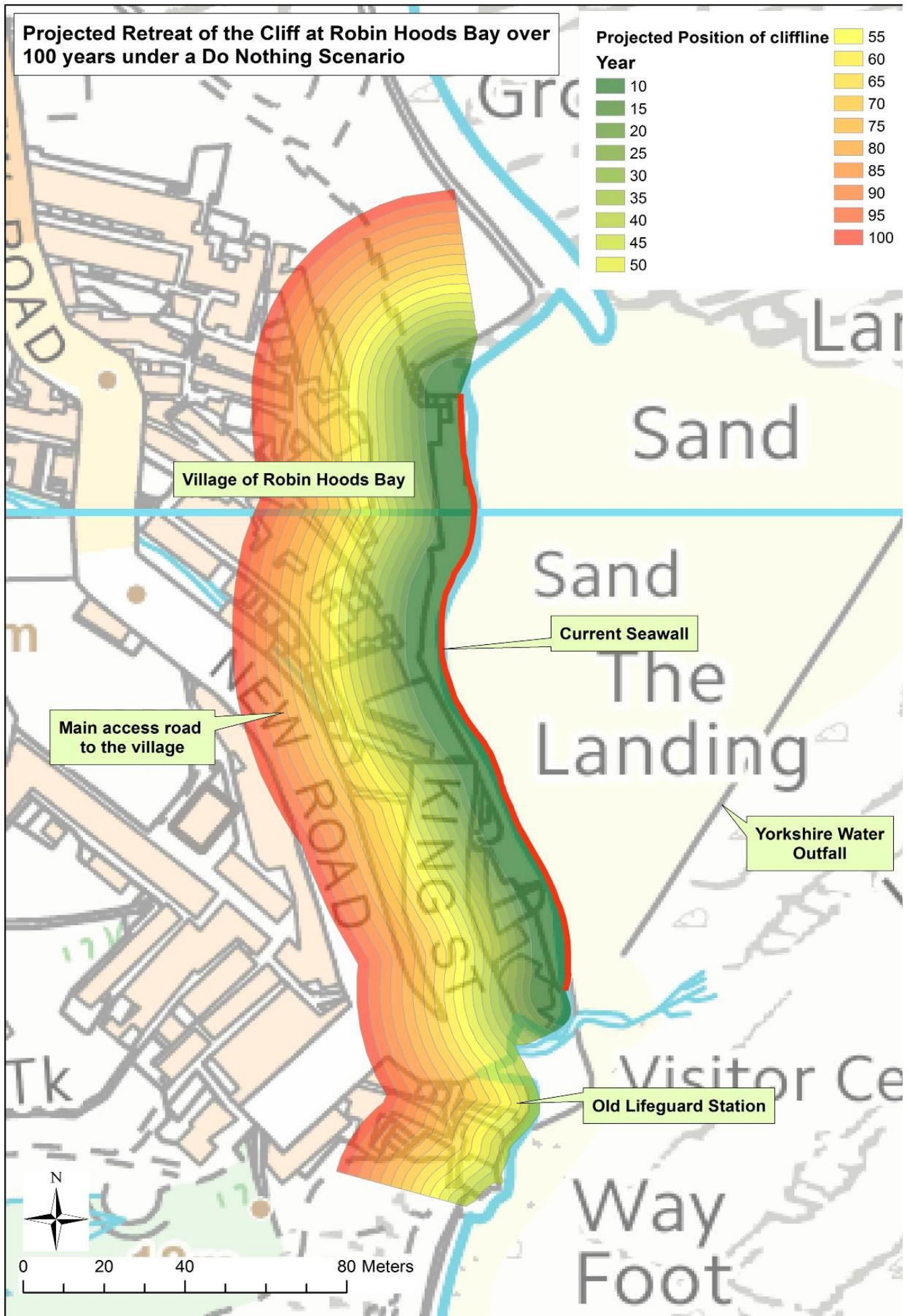
The main seawall at Robin Hoods Bay was constructed in front and adjacent to to the designated Maw Wyke to Beast Cliff site of Specific Scientific Interest (SSSI). The SSSI is designated for five distinct areas of geological interest. The proposed development will not have any significant impacts on the designated features of the SSSI as it will not materially harm the features either during construction or operation.

The case for change

In 1780, prior to the installation of coastal defences, a large landslide caused by erosion at the base of the cliff destroyed much of the road into the original village. Between 1780 and circa 1974, when the seawall was built, further coastal erosion and instabilities led to the loss of over 200 properties to the sea. Since its construction the seawall has halted any further coastal erosion at this section and protected the village from loss to the sea.

The main defence for the southern section of Robin Hood's Bay is a large concrete seawall, approximately 160m long and 12-14m high. It is comprised of a reinforced concrete face (columns and panels) backed by mass concrete fill which is possibly anchored back into the cliff. There is a promenade on top of the wall fronted by a parapet wall. The original drainage for the promenade was through rubble drains located along

the rear of the main wall and out through low level outlets. Due to water logging of the promenade caused by the blocking of the drains, this has been adapted to drain through higher level outlets, avoiding the rubble drains.



The seawall is currently in a poor condition with a residual life of 10 years. There is significant corrosion, cracking, and spalling of the concrete which in the short term poses a significant health and safety risk to users of the beach; from spalling concrete falling from the wall surface. Given the age and exposure of the wall, the concrete exhibits very high chloride content therefore corrosion will continue. Spalling also risks exposing the underlying mass concrete, which is assumed to be the main structural element. Damage to this or the rock anchors (if present) could risk structural failure of the wall and erosion of the underlying cliff face. The condition of the parapet wall is also deteriorating through corrosion. Failure of the parapet wall would result in the promenade becoming unsafe to use and currently represents an increasing Health and Safety risk.

Current maintenance of the wall is minimal consisting of patch repairs where the seawall meets the cliff and occasional patching of the main face of the seawall in reaction to areas failing. The residual life can be extended with a capital maintenance scheme. Without any remedial works the risk of failure will increase in the future as a result of ongoing corrosion and the additional pressures of climate change through sea level rise and increased frequency in storms.

If the seawall at Robin Hood's Bay were to fail the toe of the cliff would be exposed to coastal erosion. Should the wall fail it is assumed that erosion will recommence at a rate similar to the adjacent unprotected cliff, 0.3m/year, as shown in Figure 1 above. This is a conservative assumption given that relict landslips could become active. At this rate 186 properties could become at risk from coastal erosion over the next 100 years. 40 of those properties are at risk under the revised appraisal period of 50 years.

Number of Properties at Risk					
Year 0-20		Year 21-50		Year 51-100	
Residential	Commercial	Residential	Commercial	Residential	Commercial
8	3	27	2	135	11

Failure of the seawall and onset of coastal erosion would also impact on tourism through a reduction in the value of enjoyment visitors would obtain from visiting Robin Hood's Bay after the loss of the promenade, beach access and the historic village which is the final destination in the famous Coast to Coast walk of author Wainwright.

Objectives

The aim of the StAR was to manage the risks to people and the developed, natural and historic environments from coastal erosion and coastal slope instability over the next 100 years in a sustainable manner. In pursuance of this aim, the project specific objectives are:

- To ensure that the risks from coastal erosion and coastal slope instability are identified and understood over the next 100 years. [There are no risks from sea flooding].
- To ensure that a full range of management options have been considered, at appropriate levels of detail, to address these risks, taking on board latest guidance and advice on appraisal and selection of options.
- To ensure that the preferred management options are technically feasible, environmentally and socially acceptable, and economically viable and represent a robust and sustainable investment strategy for the study area.
- To ensure that there is appropriate organisational and public consultation on the findings and recommendations of the Strategy and that feedback is appropriately considered.
- To ensure that, where possible, opportunities for environmental and economic enhancement have been considered. Funding has recently been applied for from the coastal communities fund to develop a mosaic on the parapet wall along the promenade. Therefore the proposed capital maintenance works will be undertaken in conjunction with this scheme.

3. Economic case

Options considered

A long list of options was identified by the project team, as outlined in the table below; the table includes information and reasons for the feasibility of the options. Only feasible items were taken forward for detailed appraisal.

Option	Description	Feasibility
Seawall		
Do Nothing	No active intervention. Deterioration will still be allowed to continue at present or increased rate. The risk to beach users will increase overtime as the wall deteriorates.	No – does not address the corrosion and spalling of the concrete, or improve the stability of the wall. Will provide an economic baseline.
Do Nothing H+S	No active intervention but with regular inspection and removal of loose concrete to prevent injury from spalling concrete.	No – does not address the corrosion and spalling of the concrete, or improve the condition of the wall.
Do Minimum	Same as 'Do Nothing H+S' with additional regular repairs to major cracks and spalled areas of concrete. Using proprietary concrete repair materials.	Possibly – is feasible to be taken forward however needs to be in conjunction with other works as it will not substantially improve the condition of the wall
Sealing Wall	As 'Do Minimum' but with a capital programme to clean the wall, reseal joints and coat the wall with a clear waterproof sealant to seal cracks and minimise further corrosion.	No – will not address the existing corrosion of the wall, nor the high chloride content which is one of the main causes of the continued deterioration of the concrete. The reinforcement will continue to corrode, causing concrete spalling and lead to the breakdown of the sealant
Patch Repairs and Installation of Galvanised Anodes	Undertaking patch repairs and installation of galvanised anodes at the junction of new and old concrete to slow corrosion of the patch repair.	Yes – Will increase the residual life of the wall but won't reduce corrosion completely. Would need to be combined with a further drainage scheme
Install new rock anchors	Install new rock anchors by coring through the existing structure, anchored into the cliff behind the wall. Anchors will be connected to the current seawall face.	No – Will increase the wall stability but does not address the residual life of the concrete structure of the wall. There is a risk of causing damage to existing rock anchors ~ (if they exist) when coring the wall. Will not address the health and safety problem of spalling concrete so the face of the wall will become more degraded overtime.
Concrete wailing beams and install new anchors	Construct horizontal precast or cast in situ concrete wailing beams to prevent deformation of the wall. Cast panels between the wailing beams to protect the underlying structure. Install new rock anchors by coring through the existing structure, anchored into the cliff behind the wall. Anchors will be connected to the wailing beams.	No- currently there is no evidence of wall movement. This option would need to be carried out in conjunction with a full rehabilitation of concrete panels. Other options address these issues with less visual disruption
Replace individual face panels and install galvanised anodes	Breakout existing face panels and install new reinforced face panels. Install galvanised anodes around the panel to delay the onset of corrosion in the panel.	Yes – Will increase the residual life of the wall. Damage could be caused to the existing wall structure when removing the face panels. Would need to be installed in conjunction with a drainage scheme.
Replace all the concrete shuttering panels	Remove and replace all the concrete panels and columns. The mass concrete fill behind the concrete panels will remain in place. When the new panels are installed, new rock anchors will be installed.	Yes –. Will increase the residual life of the wall but there is a risk of causing damage to existing rock anchors when coring the wall.
Install rock revetment at toe	Install a rock revetment at the toe of the seawall to reduce the impact of wave action on the wall. This will also increase the load on the toe which will increase the stability of the wall and resist overturning or sliding. Assuming the panels do not add to the stability of the wall they could be allowed to fail. As this ties in visually with rock armour further along the coast it is more likely to be acceptable than other forms of concrete armour revetment	No – environmentally unacceptable owing to the substantial footprint of the revetment structure.

Stepped concrete revetment at toe	Install a stepped concrete revetment at the toe of the seawall to reduce the impact of wave action on the wall. This will also increase the load on the toe which will increase the stability of the wall and resist overturning or sliding. The revetment could be designed as a feature to provide seating.	No – environmentally unacceptable owing to the substantial footprint of the revetment structure.
Sheet pile wall in front of existing structure	Construct a sheet pile wall in front of the seawall and backfill to the current seawall. Due to the height of the wall it is likely that rock anchors would still need to be connected to the sheet piles through the current seawall	Possible - will increase the footprint of the current structure so unlikely to be environmentally acceptable. The ground conditions are unknown, so may not be technically feasible to drive sheet piles to sufficient depth.
Breakout and replace the whole wall	Remove the entire current wall and replace with a new wall.	No - the risk of removing the current wall is significant – could destabilise the cliff and lead to failures.
Offshore Breakwater	Extend rock armour from the north of the site along the same line to create an offshore breakwater to reduce wave impact acting on the structure.	No – Does not address the condition or stability of the wall or improve the drainage. Will also increase the footprint of the coastal defences as they encroach onto the foreshore area, which is unlikely to be acceptable.
Beach Recharge	Add new material to the beach to raise the beach levels.	No – Does not address the condition or stability of the wall or improve the drainage. No significant protection gained for the high level cost of installation and will require ongoing implementation following storms.
<u>Drainage</u>		
Do Nothing	No active intervention. Provides an economic baseline	No – does not address the problems of water build up behind the wall and on the promenade. Will provide an economic baseline
Repair and isolate promenade level drainage	Clean and repair promenade level drainage and isolate from rubble drains. This will prevent surface water from the promenade running behind the wall.	Yes – would improve the surface level drainage of the wall. Will not prevent groundwater from building up behind the cliff. Will need to be developed in conjunction with a scheme to improve the condition of the wall face.
New weep holes	As 'Repair and isolate promenade level drainage' but with additional weep holes created at the base of the wall by coring through the existing structure at intermediate vertical intervals and lining holes with perforated pipes to allow ground water to drain through the structure	Yes – would improve the drainage on the promenade and help reduce the build-up of water behind the wall, which could improve stability. Will need to be developed in conjunction with a scheme to improve the condition of the wall face.
Replace Rubble drains	As 'Repair and isolate promenade level drainage' but locate, drill out and replace original vertical rubble drains. Combining with 'Repair and Isolate promenade level drainage' will reduce the chance of the rubble drains blocking	Possibly – Will improve the promenade drainage and drainage within the wall. But very costly and may cause significant damage to the current wall.
<u>Cliff Interface</u>		
Do Nothing	No active intervention. Provides an economic baseline	No – likely to be outflanking of the seawall and potential destabilisation.
Reactive Concrete Repairs	Continue to reactively repair outflanking of the wall with concrete patches.	Yes – cost effective and reduced impact on the SSSI. Will help stabilise the wall by reducing outflanking.
Rock Revetment at interface	Extend Rock armour from the north of the site along the cliff face to reduce wave impact and reduce erosion of the cliff.	No- will cause unacceptable impact on SSSI
Extend seawall to cover cliff	Extend current wall along the whole length of cliff.	No- will cause unacceptable impact on SSSI

The options that have been taken forward are a combination of the options outlined in the table above. A combination of options was required in order to address all defects and risks. Many different combinations were considered to develop the most robust suite of options that can be taken forwards. The short list of options includes those options deemed technically, economically and socially advantageous. The Do Nothing option is not considered viable but has been included as it will provide an economic baseline against which the other options can be compared.

The Do Something options were initially designed to provide protection from coastal erosion over the next 100 years. The options are all quite similar and ensure that the footprint of the current wall is not changed, but also that the same standard of protection provided by the current wall is sustained over the next 100

years. The options also take account of the importance to tourism of the promenade that runs along the wall, and have maintained this feature as a part of the defence.

It should be noted that due to trying to develop the most economically viable options, the options address the main issue of cliff erosion. Significant drainage works and works to the parapet wall have not been included in the short list of items. However, if additional funds were available it is highly recommended that works to the parapet wall and the drainage are included

The following options were taken forward for detailed consideration on the short list:

- **Option 1: Do Nothing** – provided an economic baseline;
- **Option 2: Patch Repairs with installation of Galvanised Anodes** – patch repairs and installation of galvanised anodes at the interface of patch repairs to the face of the wall and cleaning of the current safeticurb drainage along the promenade. A series of 3 iterations of capital maintenance works will be undertaken at Years 1, 10 and 25. These capital maintenance works will extend the residual life of the wall, but full replacement of the concrete wall casing will be required in Year 40;
- **Option 3: Replacement of Concrete Panels and Galvanised Anode Protection** – whole panels that form the face of the wall will be replaced (as opposed to just patched in Option 2); galvanised anodes installed around the joints of the new blocks and cleaning of the current safeticurb drainage along the promenade. A series of 4 iterations of capital maintenance works will be undertaken in Years 1, 10, 25 and 40. These capital maintenance works will extend the residual life of the wall prior to full replacement of the wall intended to be undertaken in Year 55;
- **Option 4: Full Replacement of concrete casing** – removal and full replacement of the concrete facing to the mass concrete wall in Year 3; capping of the current drainage and the re-drilling of the current weep holes at the base of the wall; cleaning of the current safeticurb drainage along the promenade; construction of a new parapet wall at the same time as the new wall. The mass concrete core of the wall will remain but the old concrete casing will be removed and a new casing applied and tied into the mass concrete with rock anchors. This whole replacement of the wall in Year 3 will increase the life of the wall and ensure the same standard of erosion protection is provided. It is expected patch repairs and the installation of galvanised anodes will be required from year 30 to extend the design life of the wall to 100 years.; and

-

Technical Issues

Option 4 proposed to undertake capital works to replace the wall in 2018. The option involved the full replacement of the concrete casing and subsequently maintenance works (patch and repairs with galvanised protection) to be undertaken every 10 years from year 2045 to ensure the 100 year design life.

Both Options 2 and 3 are designed to ensure the seawall provides 100 years of protection based on phased capital maintenance to extend the residual life of the wall as much as possible and then to include a full replacement at the end of the residual life (estimated as year 55). Options 2 and 3 only differ in the way in which the wall is being repaired either in patches or in panels. Both options allowed for future maintenance works are required owing to the existing condition of the wall. High chloride levels in the concrete mean the corrosion will continue and in particular will affect areas at the interface with repairs. Passive Galvanic Protection has been recommended to maximise the repair lifetime.

Option 3 was preferred technically as replacement of full panels would give more long-term certainty over the quality and durability of the repairs and in particular would control the interfaces between existing and repaired sections. This additional robustness meant that a reduced contingency of replacement could be considered. For Option 2 each phase of works would target to replace the worst 40% of patches (allowing a 60% contingency), while Option 3 would target the replacement of 30% of the panels during each phase (allowing a 20% contingency) along the wall. For details on the assumptions used in designs refer to Appendix E.

It is not envisaged that the capital maintenance works of all the schemes will require planning permission and are unlikely to be controversial in terms of their impact on the seafront as works will be planned to be undertaken outside of the main tourist season (June – September). Therefore there is little risk of delays, objections or changes to the design as a result of the licences, consents or application processes. The replacement of the wall may require more consultation with statutory stakeholders and the public due to the larger scale of the work and approval may be required from North York Moors National Park Planning Department, Natural England, Environment Agency and the MMO prior to commencement of works.

All of the options are in line with the objectives identified within the Strategy and the early implementation of capital maintenance works in Options 2 and 3 does not constrain the achievement of the wider strategy objectives, but helps to provide a more cost effective approach.

Environmental Assessment

An Environmental Impact Assessment Screening and a Water Framework Directive Assessment have been developed. The proposed development does not fall within the criteria requirements set out in the Planning Practice Guidance (2-14) and the indicative thresholds set out in Schedule 2 of the EIA Regulations indicate that the proposed development will not exceed the relevant site area threshold of 1ha. Therefore a full EIA is not required.

The proposed development is within the Robin Hood's Bay: Maw Wyke to Beast Cliff SSSI; however, the activities related to the construction and operation of the proposed development is not likely to materially harm the SSSI or have an adverse effect on the visual and recreational amenity of nearby residents or commercial operations. The Beast Cliff – Whitby Special area of conservation is located approximately 260m south of the site. However this is unlikely to be adversely impacted by the proposed development due to the localised nature of the proposed temporary works which will be limited to the seawall and a small area of beach.

Due to the localised nature of the works for the proposed development, and the work being carried out on an existing structure, it is considered that there will be no significant adverse impact on: the underlying geological formation from the Jurassic period; the local landscape character; the setting of the heritage coast; and features in the historic environment.

The proposed option at Robin Hood's Bay seawall are localised and planned to be carried out within a short time scale. Given the small scale of the works it is not envisaged that it will affect significantly any of the water bodies identified within the study area.

Key positive effects	Key negative effects	Mitigation or enhancement opportunity
Option 2 and 3– Phased repair schemes		
Capital Maintenance works are smaller, more localised works, with lower effects, due to shorter duration on the surrounding environment.	Repeated disturbance associated with the repair works extending over a period of 40/50 with replacement of the wall in Year 55.	Construction works should follow industry best practice (i.e. PPG and CIRIA).
A phased approach allows for the works to be more easily undertaken around sensitive tourism and bird periods.		Works should be undertaken outside of the peak tourism season.
Capital Maintenance works would extend the residual life of the wall, delaying the need to replace the wall by 50 years.		Production of a construction method statement will ensure suitable mitigation for construction works (e.g. materials to be used, timing of works, prevention of pollution etc.).
		A SWMP will be produced and implemented prior to the commencement of works.
		Avoid sensitive bird season (breeding/migratory/over-wintering)
Option 4 – Full replacement of the wall		

Key positive effects	Key negative effects	Mitigation or enhancement opportunity
Lowest disturbance to the surrounding environment as reduced repair works required.	Residual life of defences not extended to their full potential, thus reducing the period for when capital works will be required in the future.	Construction works should follow industry best practice (i.e. PPG and CIRIA).
Risk of wall failure and resultant coastal erosion addressed sooner.	Potential for assets requiring emergency works prior to replacement, leading to significant health and safety dangers to the public using the promenade and beach.	Works should be undertaken outside of the peak tourism season.
		Production of a construction method statement will ensure suitable mitigation for construction works (e.g. materials to be used, timing of works, prevention of pollution etc.).
		A SWMP will be produced and implemented prior to the commencement of works.

Key findings

Under a Do Nothing scenario approximately 186 properties could become at risk from coastal erosion over the next 100 years, 40 of which would be lost over the next 50 years. The benefits associated with protecting these properties, alongside benefits associated with tourism and protection to key infrastructure, results in PV benefits of £20,684k over 100 years. .

Tourism values used in this OBC are based on the methodology described in the Multi-Coloured Manual and Data from Scarborough Borough Council and the North York Moors National Park. The total number of visitors to Robin Hood's Bay is based on the number of transactions in the SBC car parks; it was assumed that there are two people per car; and the number of walkers past the Rocket Field Post Counter just outside Robin Hood's Bay. Under a Do Nothing Scenario it is assumed that tourist numbers will decline as the village is eroded. Only 50% of the calculated tourism benefit has been taken as a conservative estimate. More information is available in Appendix G.

Infrastructure losses include the potential loss and damage to the Yorkshire Water sewer and drainage network and the main sea outfall for the area causing damages worth £1,100k. Key tourist assets including the Old Coastguard Station, a National Trust building, is at risk with damages of £1,900k

Option	Present Value costs (£'000)	Present Value damages (£'000)	Present Value benefits (£'000)	Average benefit: cost ratio (BCR)	Incremental benefit: cost ratio (IBCR)	Option for incremental calculation
Do Nothing	£0	£20,684	£0	-	N/A	N/A
Option 2	£3,402	£0	£20,684	6.1	N/A	N/A
Option 3	£3,178	£0	£20,684	6.5	N/A	N/A
Option 4	£8,685	£0	£20,684	2.4	N/A	N/A

Preferred way forward

The preferred option has been selected based on the results of the Benefit:Cost Ratio. Technically all Options are suitable for achieving the OBC and Strategy objectives. The Options have been designed to provide the same function and level of protection and therefore each of these options are directly comparable. There are similarities between all options, in terms of their potential environmental effects, as such that selecting the preferred option on the economic grounds alone is considered appropriate. The principal positive effect of the repair options is the extension of the residual life of the existing structure to year 50 or beyond, thus delaying the requirement for the full extent of the capital works.

The benefit cost analysis has demonstrated that Option 3 offers the highest benefit cost ratio of 6.5, showing that undertaking short term capital maintenance works to extend the residual life of the existing structure until a full replacement of the wall is the most viable economic option. This was therefore selected as the preferred way forward.

Following discussion with the EA a revised option was assessed which did not commit to the replacement of the wall in Year 55 and reduced the appraisal period to 50 years to reflect the current maximum life expectancy of the existing asset. Option 5: 50 Year Appraisal: Replacement of Concrete Panels and Galvanised Anode Protection - provides the same technical solution as Option 3 but with a reduced appraisal period to 50 Years to exclude the future work to replace the wall.

The refined preferred option (Option 5) has a 50 year scheme life (reduced from the initial 100 year proposal as this OBC only looks for approval of works to extend the residual life of the existing structure) and therefore will provide protection against the losses associated with the Do Nothing Scenario over 50 years. For the 50 Year appraisal of Option 5 the Do Nothing PV damages drop to £14,867k, which includes PV damages from the cessation of tourism over the 50 years at £10,809k. The benefit-cost analysis for Option 5 shows a BCR of 9.4. The

Option 5 consists of the phased replacement of the wall panels and installation of galvanised anodes to extend the residual life of the current seawall to Year 50 when the wall is predicted to be life expired and further appraisal will be required to determine the future management of the area. The wall panels will be replaced in year 1, 10, 25 and 40. This schedule has been determined using sensitivity testing and taking into account the longevity of the galvanised anodes to determine the optimum phasing approach.

Sensitivity testing has been undertaken to ensure that Option 5 is the most economically viable, based on the phased works not being able to delay the need for the capital scheme until after the end of the appraisal period. If failure were to occur in Year 40 (assumed to occur after the repairs carried out in Year 40 so that these are not excluded) then the PV Benefits would decrease as the first 10 years of erosion would occur within the appraisal period. Therefore 10 years' worth of tourism benefits would be lost and the total PV Benefits would become £9,376k and the benefit cost ratio would reduce to 5.9. Should failure occur in year 26 (just after the 3rd phase of works) PV Benefits would reduce to £6,341k, costs would reduce marginally as Phase 4 works would not be completed and thus the benefit cost ratio would remain at 4.5. This sensitivity demonstrates that the proposed phased solution is economically robust even in the event of early failure of the wall.

4. Commercial case

Procurement strategy

Three options for procurement of the Detailed Design Consultant and Contractor for the Robin Hood's Bay Seawall works have been identified these are:

1. OJEU (Official Journal of the European Union);
2. EA WEM (Environment Agency Water and Environmental Management) Framework; and,
3. YORConsult (Construction framework for the Yorkshire and Humber).

A review of the procurement routes on the basis of the proposed works was undertaken and the following observations were made:

The OJEU process would open the tender out to a wide range of Contractors and should offer a competitive tender process. However the strict OJEU procurement rules and timings mean that it would take 4 to 6 months to procure a contract.

The EA WEM Framework would not require a Pre-Qualification stage as the Framework is already operational. However, the framework is limited to the 5 Contractors selected by the Environment Agency. Whilst these are all Contractors that should be capable of undertaking the works the short list and small size

of the works may make the work less attractive to the large Contractors and therefore may reduce the competitiveness of the tenders.

The YORConsult YorCivils framework has more prequalified Contractors than the EA WEM framework and therefore should allow a more competitive process. Like the WEM Framework the suppliers are all pre-qualified so should expedite the procurement process. Some of the Contractors on the EA WEM framework are also contained on the YorCivils framework.

It is therefore recommended that a procurement route through the YorCivils is progressed.

The YorCivils Framework is based on the use of the NEC3 Contracts. For ECC (Construction) Contracts the main pricing options included are lump sum and target cost, although other forms of contract are permitted to allow the Council flexibility in how it commissions its services. For each scheme under the Framework, a mini tender competition is held between the Framework Consultants for the provision of services for the full delivery of the coastal schemes, including design, procurement, project management and supervision.

Key contractual terms and risk allocation

Of the NEC3 forms of contract the two main pricing options for consideration on this commission are:

- Option A: Lump Sum – this form of contract is useful when the scope elements are well described, and there is limited scope for changes. This contract places a greater level of risk on the Contractor. The additional risk may be reflected in marginally higher tender prices, however overall this type of Contract should ensure a greater cost certainty on the project budget at the Contract stage.
- Option C: Target Cost – this form of Contract incentivises the Contractor performance through a pain/gain share based on the performance. This form of Contract shares risk more evenly between both the Client and the Contractor.

In terms of the Form of Contract for this project it has been recommended that to provide greater cost certainty at the Tender Stage that the Option A Contract is used.

Efficiencies and commercial arrangements

Throughout the life cycle of the project efficiencies will be sought as good practice and recorded in order to help the Environment Agency meet its efficiency targets set by Defra. A project efficiency register will be kept and made available to interested parties following scheme completion. Opportunities to promote the works within the local area will be taken to increase the already strong buy-in and support of the local community and businesses. Delivery of a successful partnership project will encourage future opportunities of local support both financial and non-financial in nature.

5. Financial case

Summary of financial appraisal

The costs for the preferred option are based on contractors quotes, and costs from previous projects uplifted to February 2017 values. Within the construction costs uplifts of 30% have been applied to the works estimates to account for tidal working and then a further 15% uplift has been added to the whole construction costs to account for the small nature of the project and restricted access to the site.

An Optimism Bias of 30% was included, in line with FDGiA to account for the uncertainty within the prices and provide a risk budget.

It is assumed that limited environmental enhancement will be able to be undertaken as the works will repair the existing assets to the same appearance and form, but it is important that best working practices are undertaken to ensure that the construction phase does not impact negatively upon the environment.

During the phased capital maintenance surveying of the wall will be undertaken to ensure that the wall is not deteriorating quicker than expected and that the structure remains structurally sound and continues to protect against coastal erosion. The cost of the surveys are £4,000 (cash cost) and will be undertaken every 2 years for the first decade and then every 5 years subsequently when there is a more confidence in the dataset and any changes can be easily identified.

Due to the type of works involved in the capital maintenance works in Options 2 and 3, patch repairs and installation of galvanised anodes, it is not anticipated that significant site investigation or extensive further surveys will be required. Repairs only need to be targeted in the worst condition areas which are visibly identifiable (spalling concrete and corrosion) and have had testing previously undertaken.

Compensation will not be required for the repair works as the assets are owned by SBC and no privately owned land or assets will be affected. The work will be carried outside of the tourist season therefore there will be minimal impact on the tourism trade in Robin Hood's Bay.

A full breakdown of the costs is presented in Appendix H and the Monte Carlo risk assessment is provided in Appendix L.

	Cost for economic appraisal (PV)**	Whole-life cash cost**	Total Project cost (approval)
Costs up to OBC	N/a – sunk costs	30	Exc. previous app
<u>Costs after OBC</u>			
Existing SBC costs	12	20	5
Further staff costs	0	0	0
Consultants' fees	54	85	25
Contractors' fees	In Construction Cost	In Construction Cost	In Construction Cost
Cost consultants' fees	0	0	0
Site investigation and survey	31	52	20
Construction*	1,071	1,812	453
Site supervision	24	40	10
Environmental mitigation	0	0	0
Environmental enhancement	0		0
Land purchase & compensation	0	0	0
Other			
<u>Risk Contingency</u>			
Optimism Bias			
Risk - Monte Carlo 95%ile or similar	N/a	N/a	146
30% Optimism Bias (excludes cost to OBC)	358	603	N/a
Inflation	N/a	N/a	0
Future costs (construction + maintenance)	(PV)	(Cash)	
Optimism Bias on future costs			N/a
Contributions	N/a	N/a	86
Project total cost	1,579	2,642	573***

*Note: The construction cost includes all the costs for the Contractors Costs.

** Note 2: The costs are based on the total of all 4 phases of the works combined.

*** Note 3: This figure is based on the project costs minus £86k cash contributions from the Parish Council and SBC for the first phase.

Funding sources

The economic assessment of the preferred option is based on a 50 year appraisal which reflects the residual life of the existing structure. Funding and contributions will be delivered on a phase by phase basis with FDGiA approvals sought for each phase. The assumed funding and contributions required for each phase are outlined below:

- Phase 1 – Total Cash Cost - £659k. FDGiA Funding of £573k, external contributions of £86k.
- Future Phases – Cash Cost per Phase £654k (reduction due to delivery efficiencies). FDGiA Funding of £573k with external contributions of £81k.

The scheme will be funded under the Partnership funding approach, with a combination of Flood Defence Grant in Aid (FDGiA) funding and a contribution from the local Parish Council through increase to the parish precept and SBC as asset owners and Coast Protection Authority. It is envisaged that funding from the FDGiA will be drawn first and contributions from SBC will cover the risk contingency. The funding for the first phase of the preferred option is set out in the table below; this is the funding which this OBC is seeking approval for.

	%	Description	Total £k
Raw Partnership Funding score	88		
Funding:			
Contributions		Scarborough Borough Council Parish Council precept	86
Other: (list)			
Local Levy			
Non GiA contributions			86
Adjusted Partnership Funding score	100		
Grant in Aid			573
Project total cost (approval)			659

Overall affordability

It is envisaged that funding from the FDGiA will be drawn first and contributions from SBC will cover the risk contingency. The annualised spend profile (in PV costs) is shown in table below.

Annualised spend profile (£k PV)	Yr 0 2017	Yr 1 2018	Yr 2 2019	Yr 3 2020	Yr 4+	Total
Staff costs	5				7	12
Construction & other costs	508			4	701	1,209
Optimism bias & risk contingency	146				212	358
Inflation						
Project total cost						
Less: Costs not eligible						
Less: Contributions	86			4	110	200
Less: Local Levy being claimed						
Capital grant claim	573				810	1,383
Grant rate	88%				88%	88%

6. Management case

Project management

The project will be managed in line with Prince2 best practise. An approved Prince2 project manager within Scarborough Borough Council will given the responsibility of delivering the project. The Council has a coastal

projects board in place on which sits the project executive, senior User and senior supplier. The board also includes an Environment Agency employee from the Yorkshire regional office and the Councils Cabinet portfolio holder for projects. Communication from the board to the project manager and vice-versa occurs regularly throughout the project life cycle. The board meets monthly but should the need arise more regular meetings are arranged. Project Assurance is delivered by the senior user working closely with the project manager and board.

A project steering group lead by the project manager will also be set up in order to engage with local stakeholders and project partners. It is envisaged at this stage that the steering group will consist of representatives from the Parish Council, Environment Agency, National Park Authority, National Trust, local Borough and County Councillors. Further Communication about the works to residents will be via the steering group members and the local Bayfair magazine.

This scheme has the support of both the local Councillor and the Parish Council, as they are keen to ensure the village of Robin Hood's Bay continues to be protected against coastal erosion as the benefits to the local area from tourism at Robin Hood's Bay are significant.

The preferred option will be delivered in 4 phases. Phase 1-4 are capital maintenance works to be carried out in Years 1, 10, 25 and 40. Phase 1 capital maintenance works is the phase for which funding is being requested by this OBC. Works will be undertaken over a 3 month period between September to November 2017 depending on procurement. The construction programme is constrained by having to avoid the winter months due to adverse weather conditions and key summer months due to peak tourist season. The construction will also be constrained by tidal working as high tide reaches the seawall.

The work will be undertaken on a panel by panel basis with the old panel being removed and then a new precast panel installed and tied in with dowels into the mass concrete behind and the panel to either side. At the same time galvanised anodes will be installed around the edge of the panel.

Financial approval of the sum of **£659.1k which consists of £573k GIA and £86k** for the design and construction of the first phase of the capital maintenance works only.

Activity	Date (DD/MM/YY Y)	Comment
Works information finalised	30/05/2017	
Construction Contract Awarded	01/08/2017	
Planning permission received		Not required for capital maintenance works
Target Price agreed	15/08/2017	
Work started on site	01/09/2017	
Work substantially completed by	15/11/2017	

Benefits realisation

The present value whole-life benefits of the scheme are £14,867,000 and the present value whole life costs of the scheme are £1,579,100, giving a benefit cost ratio of 9.4. The outcome measures (OM) under the FDGiA Partnership Funding system are shown in the table below, which is based on the benefits and costs for the first 10 year phase of the scheme only. The scheme currently has a raw PF score of 88% with an adjusted PF score of 100% when considering contributions.

Contributions to outcome measures	
Outcome 1 – Ratio of whole-life benefits to costs	
Present value benefits (£k)	£1,529k
Present value costs (£k)	£689k
Benefit: cost ratio	2.22

Contributions to outcome measures	
Outcome 2 – Households at reduced risk	
2a – Households moved to a lower risk category (number – nr)	0
2b – Households moved from very significant or significant risk to moderate or low risk (nr)	0
2c – Proportion of households in 2b that are in the 20% most deprived areas (nr)	0
Outcome 3 – Households with reduced risk of erosion	
3a – Households with reduced risk of erosion (nr)	170
3b – Proportion of those in 3 protected from loss within 20 years (nr)	8
3c – Proportion of households in 3b that are in the 20% most deprived areas (nr)	0
Outcome 4 – Water framework directive	
4a – Hectares of water-dependent habitat created or improved (ha)	0
4b – Hectares of intertidal habitat created (ha)	0
4c – Kilometres of river protected (km)	0

Risk management

The key delivery risks are outlined in the table below. A more detailed high level risk register is presented in Appendix L.

Key delivery risk	Mitigation
<p>Rock anchors not addressed.</p> <p>During the PAR it has been impractical to confirm the presence of the Rock Anchors which are shown on the original design drawings as being embedded within the structure of the wall. However, it is known that a Contractor's alternative design was eventually built and this may have omitted the anchors. Without a significant intrusive investigation, which would require demolition and replacement of a significant portion of the wall the presence and condition cannot be confirmed.</p>	<p>An initial laser survey of the wall was undertaken during the PAR. This was used to determine the current verticality of the wall and provides a baseline for future surveys. All the proposed options recommend that further laser scans can be undertaken periodically, and potentially other monitoring techniques to detect any movement in the wall structure.</p>
<p>Failure of defences before completion of Works may lead to rapid erosion</p>	<p>Continued visual monitoring of the defence condition will be carried out by SBC and emergency works will be implemented if necessary.</p>
<p>Complaints/objections during the works from stakeholders may lead to delay in the programme</p>	<p>Continued local engagement prior to and during construction process, particularly given the difficult access and the importance of tourism in the area, will be required. The Contractor should consider the impact from working measures such as programmes, access, working hours and noise levels.</p>
<p>The drainage of groundwater behind the wall is not addressed.</p> <p>It is impractical/ uneconomic to replace the drainage material at the rear of the wall as it is inaccessible unless the wall is removed or the entire promenade is stripped.</p>	<p>Provision is made in the preferred option to carry out capital maintenance works to the existing promenade drainage which is currently not fully functioning. This will help to minimise some groundwater pressures on the back of the wall. As with the rock anchors, monitoring will also be provided and future consideration to coring the wall to provide additional weep holes may be considered.</p>
<p>Funding of future phases</p>	<p>Funding of future phasing needs to be clearly identified in future funding strategies (e.g. MTP) and money set-aside by other contributors e.g. Parish Precept/ SBC.</p>

Assurance, approval & post project evaluation

Monthly project board meetings will be held that will insure that the project is being delivered as required in an appropriate manner in line with the project plan and budget. Independent assurance is achieved by having an Environment Agency member as part of the board. A post project evaluation will be completed in order to aid the delivery of future phases of the capital programme. Key lessons learnt will be recorded and used alongside the post project evaluation.

At this stage (Outline Business Case) it is envisaged that this document will be reviewed independently by the Environment Agencies NPAS group. Time has been allocated within the programme for this review to take place before planned works towards the end of 2017.

7. Recommendation

We recommend that the Environment Agency gives approval to phase 1 of the Robin Hood's Bay Seawall Capital Maintenance Scheme. We intend to deliver preferred option in 4 phases of capital maintenance works to be carried out in Years 1, 10, 25 and 40. which phases works and investment over a 50 year appraisal period to extend the residual life of the structure, with an overall cost of £1,579k whole-life cost (PV).

We seek the financial approval of the sum of £659k which consists of **£573k GIA** and £86k contributions for the design and construction of the first phase of the capital maintenance works for the preferred option (which has a cost of the £1,579k PV whole-life cost for all phases). The future three phases of capital maintenance will require new OBC's to be submitted and CPA2's for their financial approval in years 10, 25 and 40.

Flood risk management scheme – application for grant funding

Risk management authority (RMA)



Please read through this form and the guidance notes that came with it. Please write clearly in the answer spaces.

Please send a signed copy of this form (unless it already forms part of the project appraisal report (PAR)) to the Area Flood and Coastal Risk Manager for approval.

Their contact details are on previous letters we have sent you.

- Our general conditions for grants are set out in our grant memorandum. The grant process does not make or form part of the contract between you and us.

- We will not pay a grant for work you begin without our approval. We do not pay a grant for the cost of maintenance.

Contents

Part A Scheme details
Part B Certificate of the authority
Part C The Data Protection Act 1998
Part D Declaration
Part E Contact us

Part A Scheme details

A1 Name and address of your authority

Name

Scarborough Borough Council

Address

Town Hall

St Nicholas Street

Scarborough

North Yorkshire

Postcode

YO11 2HG

A2 National project number (medium-term plan reference number)

A3 Name of the scheme and its location

Name

Robin Hood's Bay Seawall Capital Maintenance Scheme

Location

Robin Hood's Bay, Yorkshire

Part A Scheme details, continued

A4 Is this a private scheme to be carried out on a main river not maintained by an Internal Drainage Board or local authority?

Yes ☐ Please give details below

No ☒

A5 If you've answered no in question A4, how is the project being funded?

Type	Amount (£ thousands)	Percentage (%)
Flood Defence Grant in Aid (FCERM GiA)	573.3	88%
Local levy		
Own revenue		
External contribution	85.7	12%
Total contribution	659.0k	100%

Part A Scheme details, continued

If external contribution, please give details.

The proposed values of the contributions to the £659,000 scheme, for the first phase of works, are outlined below:

Environment Agency Partnership Funding contribution - £573,330

Local Parish Council Contribution (raised through an increase to the parish precept) - £50,000

Scarborough Borough Council Contribution - £35,670

It is envisaged that the partnership funding contribution will be spent first, followed by local parish contributions and the Scarborough Borough Council contributions (which will most likely cover the contingency within the project).

Parish precept increase will continue over the appraisal period in order to generate funding for future phases of the works to help deliver partnership funding demonstrating local support and buy-in.

Internal Drainage Boards only

If funded by a loan:

Over what period do you need the loan?

Have you enclosed a formal application for a loan approval from Defra?

Yes ☐No ☐**A6 Estimated project costs (taken from your PAR) and grant applied for (not including maintenance)**

		Project costs (£ thousands)	Grant applied for (include local levy) (£ thousands)
(a)	Preliminary investigations	25000	
(b)	Instrumentation and machinery		
(c)	Construction work		
(d)	Land purchase		
(e)	Compensation		
(f)	Staff salaries and costs		
(g)	Professionals' and consultants' fees		
(h)	Other costs		
(i)	Contingencies (please specify)		
(j)	Total estimated costs		
(k)	Total grant applied for		

Note: the total grant applied for (box k) should be equal to the amount of FCERM GiA plus the local levy contribution in table A5.

(Contingency funds are noted for management purposes – see section 12 of the grant memorandum.)

A7 Other information, such as the latest partnership funding score percentage (this is often more than 100%)

Partnership Funding score for the project is 100% (including local contributions)

A8 Who will the work be done by?Direct labour ☐Contract ☒Both ☐

Please give details of who is doing the work.

The detailed design and construction phase of the works will be let under the YORConsult/YORCivils framework.

Part C The Data Protection Act 1998

We, the Environment Agency, will process the information you provide so that we can deal with your application, make sure you keep to the conditions of the licence, permit or registration, and process renewals.

We may also process or release the information to:

- offer you documents or services relating to environmental matters;
- consult the public, public organisations and other organisations (for example, the Health and Safety Executive, local authorities, the emergency services, the Department for Environment, Food and Rural Affairs) on environmental issues;
- carry out research and development work on environmental issues;
- provide information from the public register to anyone who asks;
- prevent anyone from breaking environmental law, investigate cases where environmental law may have been broken, and take any action that is needed;
- assess whether customers are satisfied with our service, and to improve our service; and
- respond to requests for information under the Freedom of Information Act 2000 and the Environmental Information Regulations 2004 (if the Data Protection Act allows).

We may pass the information on to our agents or representatives to do these things for us.

Part D Declaration

D1 I have met the responsibilities set out in the following regulations.

SI 1999 number 1783 Land Drainage Environmental Impact Assessment (Land Drainage Improvement Works) Regulations 1999, as amended to date.

☐ Y

D2 I confirm the following:

This application is for the scheme set out in the project appraisal report (PAR)

dated (DD/MM/YYYY)

11/07/2017

☐ Y

This application is made to the Environment Agency, for grant funding under the Flood Management Act 2010.

☐ Y

I accept the conditions set out in the grant memorandum.

I also accept that the Environment Agency do not accept legal liability or agree to take on any of the risk management authority's obligations.

☐ Y

I have attached all necessary supporting documents to this form and we meet the conditions of the grant memorandum.

☐ Y

Our board or cabinet have agreed the work will start on date (DD/MM/YYYY)

01/09/2017

☐ Y

As far as I know, the details that I have given on this form are true and complete.

☐ Y

Part D Declaration, continued

Warning

If you make a false or inaccurate statement you may lose your entitlement to grant funding.

Chief Executive Officer's signature

C. Bourne

Date (DD/MM/YYYY)

11/07/2017

Name

Title (Mr, Mrs, Miss, Other) Mr

First name Chris

Last name Bourne

Job title

Projects Manager

Contact numbers, including the area code

Phone

Fax

Mobile 07814673005

Email chris.bourne@scarborough.gov.uk

Contact name (for queries)

Robin Siddle

Phone number

01723 232448 (robin.siddle@scarborough.gov.uk)

Part E Contact us

If you need help filling in this form, please contact the person who sent you it or contact us as shown below.

Grant Administration Team
Environment Agency
Manley House
Kestrel Way
Exeter
EX2 7LQ

Telephone: 01392 352300

Email: laidbfinance@environment-agency.gov.uk

Website: www.environment-agency.gov.uk

Please tell us if you need information in a different language or format (for example, in large print) so we can keep in touch with you more easily.



For Environment Agency use only

Note for AFCRM: Please send this FCERM2, together with the PAR, to the grant administration team for approval, if there is not an FCERM2 already included in the PAR.

This scheme, with a total estimated cost of

£ _____ (box (j), section A6),

is approved on behalf of the Environment Agency for grant funding of

£ _____ (box (k), section A6)

Name of Area Flood and Coastal Risk Manager

Job title

Signature

Date (DD/MM/YYYY)

Name of chair of Project Approval Board or Large Project Review Group

Signature

Date (DD/MM/YYYY)

Appendix A: Partnership funding calculator

Appendix B: List of reports produced

Appendix C: Photos

Appendix D: Figures

Appendix E: Details of the proposed works

Appendix F: Indicative Plans

Appendix G: Economic Appraisal

Appendix H: Cost Breakdown

Appendix I: Expenditure Profile

Appendix J: Project Programme

Appendix K: Technical Reports

Appendix L: Risk Register

Appendix M: Stakeholder Report

Appendix N: Environmental Reports

Appendix O: Letters of Support

Appendix P: Site Waste Management Plan

Appendix R: Procurement Strategy