

**Agenda for consultative meeting of the  
Sidmouth and East Beach BMP Project  
Advisory Group  
Monday, 25th October, 2021, 9.30 am**



**Members of Sidmouth and East Beach  
BMP Project Advisory Group**

East Devon District Council  
Blackdown House  
Border Road  
Heathpark Industrial Estate  
Honiton  
EX14 1EJ

**Venue:** online via zoom

DX 48808 HONITON

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(or group number 01395 517546)  
13 October 2021

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Between 27<sup>th</sup> July 2021 to 17<sup>th</sup> January 2022, the Council has delegated much of the decision making to officers. Any officer decisions arising from recommendations from this consultative meeting will be published on the webpage for this meeting in due course. All meetings held can be found via the [Browse Meetings](#) webpage.

- 1 Welcome and apologies
- 2 Notes from the previous meeting held on 25 February 2021 (Pages 3 - 8)
- 3 Notes from informal briefing held on 15 July 2021 (Pages 9 - 24)  
Included with the notes are letters from Natural England and Jurassic Coast in response to their viewing of the informal briefing; and the subsequent response from EDDC.
- 4 East Beach - why is it so important
- 5 Current scheme proposal at East Beach
- 6 Update on the pause process (Pages 25 - 40)
- 7 Outlining the current alternative option (B)
- 8 Reminder of the preferred option

- 9 What would no decision mean
- 10 Update on EA funding
- 11 Vote on advice of which option to take - A,B or C

[Decision making and equalities](#)

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**EAST DEVON DISTRICT COUNCIL****Minutes of the meeting of Sidmouth and East Beach BMP Project Advisory Group held online via Zoom on 25 February 2021****Attendance list at end of document**

The meeting started at 9.32am and ended at 12.22pm

**14 Welcome from the Chair**

The Chair welcomed Advisory Group members to the first public meeting of the group.

**15 Public speaking**

There were no members of the public registered to speak.

**16 Notes from the previous meeting and release of past notes**

The notes from the previous meeting held on the 3 December 2020 were agreed, subject to further discussion by the Sub Group on the clarification and update of Aim 1 of the Group, currently listed as “maintain the 1990’s Sidmouth Coastal Defence Standard of Service”.

The Sub Group needed to explore further the suggested amendment of that Aim, with the proposed revised wording being “a) maintain the 50 year coast protection standard of service of the existing scheme, taking into account climate change, and b) modify the existing coast protection scheme to provide a 200 year standard of service against coastal flooding, taking climate change into account.”

The “200 year standard” was explained as an industry standard term, which was explained as the probability in anyone year of 1 in 200 (or 0.5%) that the flood level is exceeded. This is the standard metric used for all coastal defence schemes, used for determination of design and economic delivery of a scheme.

**17 Project aims and objectives refresh**

The Chair deferred further discussion on amending Aim 1 of the project aims, to a meeting of the Sub Group at a later date.

**18 Preferred option Economics review (new funding calculator)**

The Engineering Projects Manager set out to the Advisory Group the options before them following a review of the funding of the project, referred to as the economics of the project. The updated economics were key to reflect change to previously underfunded scheme. The update was that the project was between 111% and 133% funded, following the reapplication of the PF calculator, as well as work uncovering missed benefits.

The benefits of reviewing the Beach Management Plan (BMP) options were:

- Potential to investigate other options that were previously dismissed because they were too expensive under the terms of the previous fund limit; providing that those options deliver the same benefit and therefore provide the same funding eligibility;

- Review if there is the potential for a more sustainable options;
- Review if the splash wall requirement could be reduced;
- Review for a better East Beach option.

The negatives to revisiting the BMP were:

- Expected minimum delay of six months
- This would then move construction on site from year 2 to year 4 of the project
- Risk in that the alternative option selected may still be unaffordable, or may not offer the benefits required;
- Other options not recently tested for public acceptance.

If the BMP was revisited again, there would still be the requirement for Cabinet to agree before that work could begin. If no better option was found to be available after such a review, the project would have to revert back to the current working draft option.

Discussion from the Advisory Group included:

- Concern about testing the splash wall, as it was felt that comparison with the solution at Teignmouth was not a fair comparison. The design stage would cover the testing of a wall solution;
- Questioning the potential delay if the scheme is reviewed, and what could be undertaken to speed that up; The Chair confirmed that combining lead times for the work would lead to considerable delay, including factoring in consultation;
- Any scheme should be subject to constant review, and that the working option wouldn't get planning permission or be accepted by the Sidmouth population. In response, the current working option was re-iterated as likely to receive planning permission and the design stage would bring forward an attractive and effective wall solution;
- Concern that, whilst a review was welcomed to factor in the uplift in funding, any delay was of grave concern to the residents of Cliff Road, and that some form of interim works to support East Beach should be considered. In response, the Group were reminded that any permanent rock revetment at East Beach was not acceptable; however, investigation could be made into a temporary solution, whereby the rock used could then be relocated into the final scheme as an exit strategy for the temporary solution;
- The history of the scheme extended back many years, and any review would only delay yet again whilst erosion still continued, particularly at Pennington Point, and that now that the working option was fully funded, work should commence;
- Any temporary solution would have to be run past the Environment Agency assessors; using an adaptive pathway approach to include a temporary solution that then can be fully utilised in the final scheme;
- Geotube solution for under the cliff (and therefore visible) was not a viable option because of the risk of vandalism and the solution failing; however such a solution could be modelled for other areas of the scheme as an immersed solution;
- OBC needs to be updated to reflect climate change impact on beach levels.

## 19 **Revised preferred option proposal (Option A)**

The revised preferred option proposal (currently the working draft option) was re-iterated to the Group. It involved limited revisions, which fit within the scope of the original proposed option; therefore only required minor changes before the business case needed to be submitted.

The minor revisions had come about in response to the feedback from the local community, recognising the dislike of a 1m high permanent wall, as well as the drive to get the project to fruition.

The revisions included:

An extreme temporary top up wall, which was adaptive enough to be raised in certain sections as required and would require community co-operation to operate when required.

Concerns over this type of wall were that the operation of flood boards would be labour intensive, and unattractive when in place.

Comments from the Group included:

- If the existing foundations of the current small wall in place would be sufficient for the installation proposed in this option; in response, past experience evidenced a different and often poorer standard of foundation, so it was likely that the existing wall was not up to current constructions standards;
- Capital should be spent on installing the best scheme possible that requires less maintenance, rather than diverting an element of it to revenue costs, as that scheme would be more successful.

## 20 **Managed adaptive approach option (Option B)**

Managed adaptive approach option B means rebuilding the splash wall slightly higher with structural means to raise to 1m if and when required. This option mitigated the concern about raising the wall to 1m in height and was also adaptive so that it could be raised as required. Previously this option had been too expensive under the existing funding calculator.

Concerns about this option were that it was less effective than option A from day one of the project; and may only be able to afford to include a bare concrete wall with no attractive cladding.

If chosen, some re-modelling would be required that may reveal that further work was required in later years.

This option was not considered worth pursuing.

## 21 **Analysis of the Sidmouth Beach Management Plan's Aims & Objectives - A framework compiled by the Vision Group for Sidmouth**

Mary Walden-Till presented her detailed report on behalf of the Vision Group for Sidmouth. She outlined that the report put forward information to help inform debate, including the risks if planning permission is not achieved.

The Chair thanked Mary and the VGS for the report, which he felt was a useful resource for the historical context of the project.

The Group noted the report.

## 22 **Advisory Group recommendation on proceeding**

A suggestion was made to amend the recommendation beyond that set out in the agenda papers.

The Group were offered the following choices:

- Pause the project to explore other options, which will include investigating and delivering as appropriate temporary protection for East Beach; should the pause delay delivering protection at East Beach past the current 2 year time scale envisaged
- Pause the project to explore other options, which will include investigating and delivering as appropriate temporary protection for East Beach; should the pause delay delivering protection at East Beach past the current 2 year time scale envisaged
- Abstain

The majority of the Group chose to pause the project (12).

A suggestion was also made, following the poll of the group, to look to prepare a planning application for a temporary rock revetment at East Beach now, in order to help reduce lead in times.

**ACTION** The Engineering Projects Manager to prepare a report to Cabinet on steps to review the BMP, including the feedback from the Advisory Group.

The Chair gave this thanks for the fantastic work by the Engineering Projects Manager in helping move forward the scheme.

## 23 **What happens next**

The next steps, following the advice from the Group on proceeding, would now be:

- Report to Cabinet for approval;
- Subject to approval, consultant to work on modelling options;
- Sub group to assist in scoping and check as required;
- Results of modelling back to Advisory Group;
- Advice taken to proceed with a new option or revert back to Option A.

The sub group was required to help move quickly with the consultants, with an expected size of 4 – 5 members. Membership of this sub group would include representation from Sidmouth Town Council, the Sidmouth Chamber of Commerce, Cliff Road residents and Mr Burch for his expertise. Creation of this sub group would first need Cabinet approval.

The Group were reminded that all work at this stage must keep sight of the fund limit in order to meet assurance requirements for delivery.

## 24 **Update on Seaton and Sidmouth seafront recent storm flooding**

The Group were shown images and video of recent storm impact at both Seaton and Sidmouth.

The images of Seaton proved that storm events could overtop walls, even with floodgates closed; and that wave action had caused the beach levels to build up a ramp to the height of the wall at Seaton that then led to overtopping. This event had not been preceded by a flood warning; only a flood alert.

The same event had considerably less impact on the Sidmouth seafront.

The Group noted the evidence of recent storm impact.

25 **Project Board roles and responsibilities**

The Group considered a report outlining the role and responsibilities of the Project Board, who would deliver the scheme. The Project Board was subject to Cabinet approval.

The Board setup was modelled around the Environment Agency model for a project board; however Cabinet would need to approve the level of delegation that the Project Board will have. The roles and responsibilities of the Project Board would be put to Cabinet at the earliest opportunity to consider.

26 **Any other business - date of next meeting**

The date of the next meeting of the Advisory Group is scheduled for 9.30am on 4 May 2021.

The Chair thanked everyone for their contributions.

**Attendance List: Advisory Group Members**

Councillor Geoff Jung – Chair, EDDC

Councillor E Rylance, EDDC

Councillor J Loudoun, EDDC

Councillor M Rixson, EDDC

Councillor S Hughes, EDDC

Councillor D Bickley, EDDC

Councillor I Barlow, Sidmouth Town Council

Councillor C Lockyear, Sidmouth Town Council

J Radford, Cliff Road Residents Association

Paul Griew, Cliff Road Residents Association

Sara Hook, representing Sidmouth Hotels

Tony Burch, by invitation of the Chair

Ed Harrison, Sid Vale Association

Martin Davies, Environment Agency

Mary Walden-Till, VGS

Thomas Aldridge, DCC

Richard Eley, representing Sidmouth Chamber of Commerce

Tom Buxton-Smith, EDDC

Andrew Hancock, EDDC

Darren Roberts, EDDC

John Golding, EDDC

Peter Blyth, EDDC

**Apologies**

Nick Jennings, DCC  
Sam Scriven, Jurassic Coast  
Chris Woodruff, AONB  
Phil Sheppard, Sidmouth Lifeboat

## **Informal briefing for Sidmouth & East Beach BMP Project Advisory Group held on 15 July 2021.**

Attending were:

Clrs Jung; Rylance; Loudound; Rixson and Hughes  
Ian Barlow, Chris Lockyear, Sidmouth Town Council  
John Radford CRAG  
Paul Griew CRAG  
Sarah Hook, Sidmouth Hoteliers  
Tony Burch  
Martin Davies, EA  
Nick Jennings DCC  
Mary Walden-Hill VGS  
Richard Eley, Sidmouth Chamber of Commerce

Tom Buxton-Smith  
Andrew Hancock  
John Golding  
Debbie Meakin

Questions/clarity/discussion included:

- How relevant direction of waves were on the effectiveness of any tombola installations, and the depth of beach needed to officer the protection required;
- Care of any tombola placement to avoid rip tides; careful signage needed to make public aware of risks;
- Understanding that the immediate benefit of tombolas would mean that an extensive recharge of beach wasn't required, and that beach depth and size could gradually build over time to add further protection;
- Preference to reuse materials of existing groynes if they were deemed to be redundant in future years, including sale or reuse at other sites;
- Careful management of any beach at East Beach because of the risks of cliff fall and cut off from the main beach – the group were reminded that developing east beach as an amenity space was outside of the remit;
- There was no further information at the time of the briefing in respect of the height of the tombolas. The group discussed the risks relating to rock islands that may be submerged at high tide despite having markers in place; the solution of a platform on each island was suggested;
- Cost of temporary rock revetment anticipated between £200k and £300k; reminder from resident that to cover Cliff Road, the length was just over 200 metres;
- Drainage at top of cliff was not part of scope and would have to be referred elsewhere;
- Existing seagrass beds would be taken into account. Generally marine life increased around structures in the water, such as rock islands, so hopefully any installation would at least keep habitat levels the same if not increase;
- A suggestion was made to see if additional seagrass planting could be incorporated into the scheme; whilst not directly related to flood protection, the environmental benefits would increase;
- Concern that the temporary rock reventment permission would be difficult to secure because of the potential objection from Jurassic Coast Trust and Natural England;
- MP involvement had already taken place and may continue going forward;
- Updates emailed out to the Group would be welcomed, with meetings held as and when the Project Board needed advice from the Group. Any update should also include progress on the formation of the Project Board.

Sam Scriven  
Head of Heritage and Conservation  
Jurassic Coast Trust  
Mountfield  
Bridport  
DT3 JP

Email: [sam.scriven@jurassiccoast.org](mailto:sam.scriven@jurassiccoast.org)  
Tel: 01308 807000

6<sup>th</sup> August 2021

Councillor Geoff Jung (Chair of Advisory Group) and  
Mr Tom Buxton-Smith (EDDC's Engineer)  
East Devon District Council  
Blackdown House  
Border Road  
Heathpark Industrial Estate  
Honiton  
EX14 1EJ

**Re: Briefing for Sidmouth & East Beach BMP Advisory Group 15 July 2021**

Dear Cllr. Jung and Mr Buxton-Smith

We understand that EDDC have secured additional funding for a beach management scheme at Sidmouth and East Beach, and we welcome the opportunity that these funds present to the Council to reconsider their assessment of the short-list options previously presented and those that were rejected on financial feasibility grounds. The Jurassic Coast Trust remain committed to working with EDDC and other stakeholders through the BMP process in order to agree a scheme that is viable, affordable and environmentally acceptable.

However, having reviewed the recording of the BMP Advisory Group briefing held on 15 July 2021 the Senior Leaders and Trustees of the Jurassic Coast Trust are left feeling extremely concerned. We wish to raise a number of points, which are summarised then discussed in more detail below. They are followed with information relating to some of the questions raised during the briefing.

## Summary of concerns

- The bias against environmental concerns that seemed apparent amongst stakeholders and EDDC representatives in the recent briefing was deeply troubling and has damaged our confidence that the BMP process will be able to deliver a balanced and environmentally acceptable scheme.
- Regarding a temporary rock revetment, the comparison with Branscombe is not appropriate because the environmental sensitivities at Branscombe are wholly different to those at East Beach, Sidmouth.
- Further, the comparison with Branscombe provides no confidence that a temporary revetment along East Beach at Sidmouth will indeed be temporary.
- Environmental objectives must be applied thoroughly at every step of the BMP process in order to avoid call-in procedures and/or referral to UNESCO as per paragraph 172 of the Operational Guidelines for the Implementation of the World Heritage Convention.
- The Jurassic Coast Trust currently remain committed to working with EDDC and the BMP stakeholders in order to identify a scheme that protects Sidmouth, is affordable and is environmentally acceptable.

## Points of information discussed below

- Processes relating to the WHS, Government and UNESCO
- Sensitivities of the WHS at East Beach
- Environmental objectives during the 'pause' desk study
- Use of Excavators on East Beach
- Cliff top draining

## Language and tone

During the recent briefing, a bias against environmental concerns seemed apparent amongst stakeholders and EDDC representatives based on the language and tone used and comments made relating to the natural environment and Natural England specifically. This was deeply troubling and has damaged our confidence that the BMP process will be able to deliver an environmentally acceptable scheme.

We feel it necessary to assert, once more, that World Heritage Status is literally the highest conservation designation possible and one that the UK government has committed to protecting through international convention administered by a specialist agency of the United Nations. The discussions at the briefing gave the impression that East Devon District Council and the rest of the stakeholder group regard the WHS as an inconvenience to be circumvented, rather than a very real asset to Dorset and East Devon that is worthy of care. The key Site management policy here, which East Devon District Council has adopted, is;

***Policy R2;** Any development resulting in a negative impact to the OUV of the WHS will only be acceptable if it is both essential and unavoidable. In these circumstances mitigation measures will be undertaken.*

The discussion relating to temporary rock armour specifically suggested a general attitude exists that views agreed policy and statutory considerations towards a SSSI that protects the WHS as a cause of unhelpful delay rather than the sole means to safeguard a vital natural asset.

The long history of attempts to get a rock revetment built along East Cliff are well known, as are the various reasons permission for it has been denied. The latest request for temporary revetment closely follows a request for an emergency rock revetment when funding for the current option was still uncertain. In the BMP process rock revetment on East Beach was discounted at the long list stage as it was not considered to be environmentally acceptable. This has not changed, and we have grave concerns about the suggestion of a temporary rock revetment there.

## Branscombe comparison

Branscombe rock revetment was highlighted as an example where temporary consent has been applied to coastal defences built within the WHS. This comparison is not appropriate because the environmental sensitivities at Branscombe are wholly different to those at East Beach, Sidmouth. In addition, the intention of the temporary consent at Branscombe was to allow an *unconsented* development (which was protecting temporary wooden chalets in an unsustainable location) to be brought under planning control. A condition was included for an 'exit strategy' for the wooden chalets as well as a plan to dismantle the revetment to be submitted by the applicant once the improvements were completed. We do not know whether or not the applicant complied with this condition and the temporary consent there has yet to be tested in terms of the removal of the revetment. In short, this comparison provides no confidence that a temporary revetment along East Beach at Sidmouth will indeed be temporary.

## Processes relating to the WHS, Government and UNESCO

Comments made by Amanda Newsome on behalf of Natural England were raised as a matter of concern by the Cliff Road residents. I wanted to take this opportunity to clarify what was referred to as ‘the nuclear option’.

As you know, the Jurassic Coast World Heritage Site is protected via the statutory designations, mainly SSSIs and the AONBs. Whilst the WHS has no statutory status, it is given the highest level of significance in NPPF and as previously stated, the UK government have committed to protecting WHSs within their territories via international convention.

*The NPPG states “Planning authorities are required to consult the Secretary of State for Communities and Local Government before approving any planning application to which Historic England maintains an objection and which would have an adverse impact on the Outstanding Universal Value, integrity, authenticity and significance of a World Heritage Site or its setting, including any buffer zone or its equivalent. The Secretary of State then has the discretion as to whether to call-in the application for his/her own determination.”*

The Jurassic Coast is currently in a unique position as the only natural World Heritage Site in England. Historic England does not have the remit or expertise to advise on impacts on a natural World Heritage Site, but can advise on UNESCO processes in relation to notification to the Department for Digital, Culture, Media and Sport (DCMS) and the World Heritage Committee. NPPG indicates that **Natural England should be consulted on proposals that might affect natural WHSs**, and in the context of call-in regulation their views should be taken into account in combination with those of Historic England. Therefore, Natural England have a key role here in partnership with the Jurassic Coast Trust.

In addition, a procedure by which issues affecting the WHS can be referred to government and UNESCO comes from paragraph 172 of the Operational Guidelines for the Implementation of the World Heritage Convention;

*“172. The World Heritage Committee invites the States Parties to the Convention to inform the Committee, through the Secretariat, of their intention to undertake or to authorize in an area protected under the Convention major restorations or new constructions which may affect the Outstanding Universal Value of the property. Notice should be given as soon as possible (for instance, before drafting basic documents for specific projects) and before making any decisions that would be difficult to reverse, so that the Committee may assist in seeking appropriate solutions to ensure that the Outstanding Universal Value of the property is fully preserved.”*

Threats to natural WHSs are interpreted based on impacts to their OUV and Integrity and advice on such matters is provided to UNESCO by the International Union for Nature Conservation.

Whilst we do not currently feel it necessary to act on paragraph 172 in relation to the Sidmouth BMP proposals, it is important to realise this is largely due to the good faith that remains for the BMP process. If that continues to be undermined, then we may be left with no choice but to use other options available to us to protect this shared natural asset.

The worst case scenario for any WHS is that damage is extensive enough to irreparably compromise the OUV of the Site. In that case WH status is lost wholesale, not just locally. For the Jurassic Coast that means a single damaging development in just one location can lead to all communities in Dorset and East Devon losing the benefits WH Status brings.

This is what amounts to ‘the nuclear option’ and I’m happy to say we are a long way from that. But I am sure you will agree that efforts that allow us all to avoid straying carelessly in that direction are perfectly reasonable. The consequences of not doing that, and making the wrong decisions, can be very real. On 21<sup>st</sup> July this year it was announced that the city of Liverpool was stripped of its WH status because its OUV had been irrevocably damaged by inappropriate development.

For reference, two cases on the Jurassic Coast have been referred to DCMS and UNESCO – Navitus Bay Wind Park near Swanage and a proposal to build a large Energy Reclamation Facility on Portland. The secretary of state denied permission to Navitus Bay partly on grounds of the damage it caused to the WHS. We are awaiting a response from DCMS about the Portland case.

### **Sensitivities of the WHS at East Beach**

The Jurassic Coast World Heritage Site will be permanently damaged by the works at East Beach, whichever of the current options being investigated eventually gets built. The details of the geological interests have been presented previously, so I will not repeat them here. I will only emphasise that due to the nature of this coastline the interests at East Beach are unique on the WHS. Therefore, the way the environmental considerations are dealt with within the BMP must be uniquely targeted. Drawing comparisons with works at other locations is not appropriate as the particular sensitivities in those cases will not be the same. In other words, what is acceptable on one part of the WHS will not be acceptable everywhere. This natural variability along the coast – its geodiversity – is central to the Site’s Integrity, which itself arguable the most sensitive part of coast’s World Heritage status.

### **Environmental objectives during the ‘pause’ desk study**

The current BMP option was designed to be environmentally acceptable. For this same objective to be secure during the ‘pause’ desk study and related investigations, the same level of consideration must be shown to the environmental designations now as it has been at previous stages. We strongly recommend that environmental objectives and sensitivities be factored into modelling during the desk study phase, and then again to an appropriate level of detail at every phase as things progress.

## Use of Excavators on East Beach

One of the key features of interest are the rock ledges that are exposed on East Beach during time when the beach is low. These could be damaged by inappropriate use of excavators. This should be mitigated against during construction methodologies e.g. by using rubber tired vehicles rather than tracked vehicles.

## Cliff top draining

The importance of cliff top draining in reducing erosion rates at East Cliff was discussed at the early stages of the BMP. However, we believe it was discounted as it would not contribute to protecting Sidmouth itself from flooding and therefore would not qualify for support within the funding calculations.

For any queries relating to the contents of this letter please contact me by email in the first instance, or the Jurassic Coast Trust on [info@jurassiccoast.org](mailto:info@jurassiccoast.org). We can also be reached by telephone, but please be aware that due to our working arrangements our office is often unattended.

Yours sincerely



Sam Scriven  
Head of Heritage and Conservation  
Jurassic Coast Trust

Date: 06 August 2021



Councillor Geoff Jung (Chair of Advisory Group) and  
Mr Tom Buxton-Smith (EDDC's Engineer)  
East Devon District Council  
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**BY EMAIL ONLY**

**Briefing for Sidmouth & East Beach BMP Advisory Group 15 July 2021**

Dear Cllr. Jung and Mr Buxton-Smith

Natural England have reviewed the recording of the above Advisory Group meeting and would like to make the following comments.

Natural England have engaged with East Devon District Council (EDDC) providing detailed advice on, inter alia, the protected landscapes, geodiversity and nature conservation interests in this area, to inform the decisions necessary throughout the formation of the Sidmouth & East Beach BMP to achieve a sustainable long term solution.

We appreciate that any agreed preferred option will be the result of environmental, technical, and financial feasibility. We understand that EDDC have secured additional funding, and we welcome the opportunity that these funds present to the Council in terms of reconsidering their assessment of the short-list options previously presented and those that were rejected on financial feasibility grounds, and the ability to look for alternative options.

Natural England would like to take this opportunity to reiterate our position on the BMP and short-list options and also reaffirm our commitment to work with EDDC on the formation of sustainable solutions. As we have previously detailed in our response to the Short-list Options Appraisal 14 July 2016 (Annex A), none of the options presented is likely to be impact-free on the protected landscapes and the designated sites around Sidmouth, and below is a broad summary of our advice on the options to date.

**Groyne Options/Town Based Supergroyne Option**

As detailed in our previous responses to consultations, Natural England have advised against options to construct groynes on East Beach as they are likely to result in direct impacts upon the designated geodiversity, landscape and nature conservation interests in that area.

There is also a risk that groynes on East Beach would also affect sediment supply to Pennington Point. Evidence suggests that this frontage relies upon sediment movement from the east during phases of dominant easterly and south-easterly waves to create and retain a healthy beach. A groyne would trap much of this material, preventing the east-west movement of sediment to this frontage.

As a member of the Project Group Natural England accepted the 'preferred option' of groynes at that time, as a compromise solution given the limitation to finances. Changes to the EA funding mechanisms and with the EDDC additional funding secured, now allows for this option to be reviewed.

### **Offshore Option/Breakwaters**

These interventions do not always behave as expected once in place and this has the greatest uncertainty associated with it however, as previously stated we regard this type of intervention as offering the 'least worst' solution with regard to the natural environment, depending upon the detailed design, and this is likely to provide the most acceptable option.

Further assessment of the option for breakwaters will be needed to confidently predict the impacts which might result from their installation. Assessment and numerical modelling will be required to demonstrate that a suitable solution can be achieved and to provide the detailed design of such an option, giving consideration to the impact on coastal processes and near-shore sediment dynamics.

### **Rock Armour (against the cliff toe)**

We have expressed serious concerns with rock armour due to the environmental acceptability with impacts to the foreshore, designated sites, and cliff geology. Other issues include its damage to the outstanding universal value (OUV) for which the Dorset and East Devon World Heritage Site (WHS) is inscribed and the associated Geological Conservation Review interests, adverse impact on the setting of the Dorset and East Devon WHS, and adverse impacts on the landscape of the East Devon AONB/Heritage Coast.

A rock revetment at the toe of the cliff will not halt recession of the cliff, erosion would continue until a stable profile is found. Whilst a small rock revetment may slow erosion and therefore recession of the cliff, it will not halt erosion. Erosion would likely continue at the top of the cliff due to subaerial processes.

Due to some of the comments made during this advisory group meeting we do not have confidence that any rock revetment would be removed once in place and would therefore be 'temporary' in nature.

### **Jurassic Coast World Heritage Site**

World Heritage Status the highest conservation designation possible and one that the UK government has committed to protecting through an international convention administered by a specialist agency of the United Nations, as these sites are considered to be of outstanding value to humanity.

The World Heritage Site (WHS) is protected via the statutory designations, mainly the SSSI and the AONB, and it is given the highest level of significance in the NPPF. It adds value to the economies of Dorset and East Devon and any development resulting in a negative impact to the OUV of the WHS will only be acceptable if it is both essential and unavoidable. In these circumstances mitigation measures must be undertaken, and if any damage was extensive enough to compromise the integrity of the site the risk here is that the World Heritage Site status is lost in entirety for the Jurassic Coast.

We also found the rhetoric in the advisory group meeting regarding the natural environment and World Heritage Site disappointing, and give our full support to the comments and issues raised by The Jurassic Coast Trust and the value of the WHS in their response letter.

Natural England are committed to working with EDDC on the formation of a sustainable Sidmouth & East Beach BMP, and if you feel that our engagement with this process would be useful at this time we would recommend inviting us to be part of any project board with the relevant decision making authority.

Yours Sincerely,

Gareth

Gareth Townsend  
Lead Adviser (Sustainable Development)  
Devon, Cornwall and Isles of Scilly

## Annex A

14 July 2016



David Turner  
East Devon District Council  
Knowle  
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Customer Services  
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**BY EMAIL ONLY**

T 0300 060 3900

Dear Dave

### **Sidmouth and East Beach Management Plan: Short-list Options Appraisal**

Thank you for your consultation on the above dated 10 June 2016 which was received by Natural England on the same day

Natural England recognises the problems for the local community posed by coastal erosion at Sidmouth and East Beach. We are committed to working with your Authority, through the Beach Management Plan (BMP) steering group, to identify a solution which provides the required Flood and Coastal Erosion Risk Management (FCERM) benefits whilst avoiding impacts upon the designated interest features at East Beach and beyond.

Our role is to provide advice to your authority regarding protected landscapes, geodiversity and nature conservation interests in this area, so that you can make the necessary decisions to achieve a sustainable long term solution.

We have considered the assessment of short-list option presented in the appraisals document. None of these options is likely to be impact-free on the protected landscapes and designated sites around Sidmouth and our experience from around the country shows that such interventions do not always behave as expected once in place. However, our advice on the relative impact of each option is below:

#### **Options S1 – S3 – “Groyne” Options**

Natural England would advise against options to construct groynes on East Beach as these are likely to result in direct impacts upon the designated geodiversity, landscape and nature conservation interests in that area. It therefore follows that two groynes would have a greater impact than a single terminal groyne.

There is also a risk that groynes on East Beach would also affect sediment supply to Pennington

Point. Evidence suggests that this frontage relies upon sediment movement from the east during phases of dominant easterly and south-easterly waves to create and retain a healthy beach. A groyne would trap much of this material, preventing the east-west movement of sediment to this frontage.

Shortening of the River Training Wall (RTW) and/or East Pier Groyne (EPG) would promote greater sediment connectivity between the town frontage and East Beach which could partially offset the effects of a terminal groyne on East Beach. However, T-head groynes (options S2 and S3) would have a greater trapping efficiency than the current linear groynes so, whilst being more efficient at retaining a beach along the town frontage, they would offset the enhanced connectivity benefits derived from modifying the RTW or EPG by significantly reducing W-E sediment supply to East Beach.

It would be necessary to conduct more detailed assessment before a conclusion could be reached regarding the performance of these options and the extent of predicted impacts upon the interest features of the designated sites.

### **Option S4 (including sensitivity test 5)**

This option has the greatest uncertainty associated with it but may potentially offer the “least worst” solution with regard to the natural environment, depending upon the detailed design. It is not possible, at this stage, to confidently predict the impacts which might result from the installation of additional breakwaters. We therefore consider that further assessment, including numerical modelling, is required to demonstrate that a suitable solution can be achieved and to provide the detailed design of such an option.

Issues for consideration:

- Impact on coastal processes and near-shore sediment dynamics – Subject to detailed design (number, height, size, orientation, position) breakwaters should have a lesser impact on longshore sediment transport than groynes. A more detailed assessment of near-shore sediment dynamics would provide greater certainty regarding its significance to the supply of sediment to the beaches and the implications of disrupting it.
- Cumulative impact – a greater number of breakwaters will result in a greater magnitude of impact on coastal processes, terminal erosion, diffraction of near-shore waves and hence the beach and tombolos in their lee, regardless of the fact that they are reducing in size.
- Impact on protected sites - Reefs 3 and 4 have the potential to negatively impact the designated site interests on East Beach depending on the degree to which they modify or obstruct sediment movement. In the extreme they could result in an increase in beach volume to such an extent that cliff erosion was halted, with resulting impacts upon WHS and SSSI geological exposures and SAC/SSSI vegetation communities. The objective of the BMP is to slow the rate of erosion not to prevent it.

### **In summary:**

Based on the information presented in the Short-list options appraisal Natural England considers that a variant of Option S4 is likely to provide the most acceptable option. However, this is subject to detailed assessment, including numerical modelling, to provide greater certainty regarding predicted impacts upon coastal processes and the features of the landscape and designated site interest features at East Beach.

In their response the World Heritage Site team has raised the question of whether a terminal groyne

would be required on East Beach regardless of which option were to be selected as the preferred option. If it is determined that a terminal groyne will be required as part of a preferred option, in addition to additional breakwaters, we would wish to revise our advice.

For any queries relating to the specific advice in this letter only please contact me on the email or telephone number below. For any new consultations, or to provide further information on this consultation please send your correspondence to [consultations@naturalengland.org.uk](mailto:consultations@naturalengland.org.uk).

Yours sincerely

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Our ref: SEBBMPAUG01



Mr Scriven  
Jurassic Coast Trust  
Mountfield  
Bridport  
DT3 JP

Mr Townsend  
Hornbeam House  
Crewe Business Park Electra Way  
Crewe  
Cheshire  
CW1 6GJ

Dear Mr Scriven and Mr Townsend

### **Reply to Letter Dated 6<sup>th</sup> August**

Thank you for both your emails with attached letters dated 6<sup>th</sup> August.

As we were all copied in on each letter from you both, I have penned the following joint reply to both letters. Apologies for the delay, but I have only recently been able to access the recording of the meeting and wanted to listen through again.

The letters are a very timely reminder that we must not forget the non-built environment whilst trying to reduce flood and erosion risk to the built environment.

### **Jurassic Coast and Natural England.**

On behalf of East Devon District Council, I wanted to reassure both the Jurassic Coast Trust, and Natural England that we are very aware of the important environmental designations on the East Cliff site. However, we also need to listen to the concerns of local people at risk of losing their homes and businesses from

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We invest in people Platinum

---

Blackdown House, Border Road, Phone: 01404 515616  
Heathpark Industrial Estate, Email: [csc@eastdevon.gov.uk](mailto:csc@eastdevon.gov.uk)  
Honiton, EX14 1EJ [eastdevon.gov.uk](http://eastdevon.gov.uk)  
DX 48808 Honiton [@eastdevon](https://www.facebook.com/eastdevon)

Download the free East Devon App  
to access council services at  
[eastdevon.gov.uk/app](http://eastdevon.gov.uk/app)

flooding and erosion. That is why we are looking at all available options to us, including ones that may go against previous advice, as time has passed, and the cliff erosion continues at an unnatural rate which threatens people homes from coastal erosion and serious flooding.

I have now had chance to listen to the whole recording and accept there were instances where it appeared people within the group appeared negative against statutory consultees. However, to balance this, during the meeting it was frequently stated that further consultation with Natural England would be required should we deviate from the preferred option.

Again, listening back, I note we were facing many questions from group members about Natural England and Jurassic Trust Coast. We tried to answer them, perhaps not correctly, and in hindsight should not have attempted to answer them on behalf of Natural England and the Jurassic Coast Trust. Listening back, one point was repeated. For clarity are Jurassic Coast Trust and Natural England able to state formal approval for a project outside of the planning process?

### **Stakeholders' views**

Many of the views were from Sidmouth residents, so they are free to voice their opinion on what they believe to be most important to them. I am a civil engineer by profession, so confident within the engineering aspects, but less so on environmental issues and designations so I apologise if I let statements stand uncorrected.

At EDDC we do not have any one with the experience and knowledge of the designated areas, so we would welcome both Natural England and Jurassic Coast Trust's attendance at future meetings. Although we have a project board, given the current drive for openness and transparency, it is likely that most meetings will occur in the public realm, rather than a non-public project board.

We are planning the next advisory group meeting during the week commencing 27<sup>th</sup> September. I was wondering if either NE or JCT are able to do a short presentation to the group, regarding the details of the designations, to further highlight the site's importance to the wider group.

Within our 'pause scope', we have an activity allowance for the environment and designation investigation and consultation, however we have delayed this until we find a possible alternative that both better technical and but also affordable. One possible concept is looking most promising, so we will shortly be looking at the environmental considerations on this and requiring both your inputs.

## **Branscombe Beach**

It is accepted that Branscombe beach environmental sensitivities are different to East Beach, so it's not a true like for like representation, however the principle that a new temporary installation has been granted within the World Heritage Site is well known to the local stakeholders. Away from East Devon there are examples of other coastal protection schemes which have been implemented without support from bodies representing their designated status. This is not a route EDDC wants to go down, however we need a balance between protecting people and the natural environment. The Environment Agency is introducing its `adaptive pathways` policy, which although early days, is an attempt to look at the long-term issues, and where appropriate use short term temporary measures to delay the transition to a more long-term changes if it provides net benefits to people and place.

Although this is currently hypothetical, should we apply and have temporary planning permission granted, we as the local planning authority, would be risking bringing the council into disrepute should we breach one of our own planning conditions (by not removing the rock). Should we apply, we would have a strong exit strategy, which would be for a maximum 5-10 year temporary revetment, or once the BMP is completed, whichever occurs first. The rock will be required for any of the possible BMP options, so it will be recycled into any new structure.

## **Paragraph 172**

The council administration are supporting open and transparent meetings, we have to discuss this option publically. If we settle on an alternative scheme, which delays the BMP further, we would employ a consultant to initiate the planning process and should the council then decide to apply for temporary permission, we would engage with yourselves prior to and during any application being developed and submitted.

We are acutely aware that UNESCO has removed Liverpool's World Heritage Site status, and do not want this replicated in Devon on the Jurassic Coast.

## **Cliff Road Housing Drainage**

I have been unable to find the reason why it was dropped, but I believe it to be due to the following reasons. Cliff top erosion occurs from both the base, and top down. You can do works to reduce top down erosion, but these won't be effective until the base erosion has been slowed, therefore tackling the base erosion is needed first, and more cost effective. The top down erosion can be slowed, but it won't have as big an effect as slowing the erosion rate. As the original 'preferred' option had a funding gap of £1.5m, I would imagine cliff top drainage was probably dropped from the scope as it was unaffordable. However, given the funding

envelope has increased, cliff top drainage could be considered in the detailed design stage.

### **Advisory Group meetings**

I am pleased that both the Jurassic Coast and NE are committed to working with EDDC and the BMP Advisory Group, to develop an affordable and environmentally acceptable solution. EDDC are keen to work with both the Jurassic Coast and Natural England. As you are aware we have a fully funded 'preferred' option, however it has compromises on three fronts. Environmental impact at East Beach, Visual and Economic Impact in the built environment, and sustainability/financial concerns regarding ongoing recharge and recycling of the beach. We believe there is an alternative option that will reduce the compromises with the preferred option or alternatively with the benefit if the extra funding contributes to offset the effects of any compromise with the preferred option.

Thank you both for your advice, and I can assure you that we welcome the engagement of the Jurassic Coast Trust and Natural England and happy to discuss the various options, their implications, and the effects they will have on this very important designated site.

We look forward to a zoom meeting in the very near future

Thanks

Tom

Yours sincerely

Tom Buxton-Smith  
Engineering Projects Manager

## Technical Note

HaskoningDHV UK Ltd.  
Water & Maritime

To: Tom Buxton-Smith  
From: Guillermo Ingelmo de Tomas  
Date: Thursday, 07 October 2021  
Copy:  
Our reference: PC1679-RHD-ZZ-XX-FN-Z-0003  
Classification: Project Related  
Checked by: Lucia Stothert; Alec Sleigh; Tom Green

**Subject: Sidmouth BMS – Breakwaters Concept Design**

# 1 Introduction

## 1.1 Background

Following the updated Partnership Funding Calculator for FCRM projects by the Environment Agency in 2020, additional FDGiA was released for the approved flood defence scheme as shown in the draft OBC for Sidmouth, which provided the basis for exploring alternative options. Therefore, East Devon District Council (EDDC), in collaboration with an elected Stakeholders Sub-Group, have requested Royal HaskoningDHV (RHDHV) to undertake a high-level assessment of additional flood defence options, including but not limited to, options that were previously discounted during the development of the Beach Management Plan (BMP) for the main town (Frontage B) and East Beach (Frontage C), see Figure 1-1.

**Error! Reference source not found.** shows an aerial image of the scheme in which the different areas of the projects have been identified.



Figure 1-1 : Aerial image of Sidmouth's frontage

## 1.2 Project Objectives

The objectives of the Sidmouth Flood Defence Scheme are as follows (as per “Pause Study Scope V8” by EDDC):

1. Maintain the 1990’s Sidmouth Coastal Defence Standard of Service (Sidmouth Beach);
2. Reduce the rate of beach and cliff erosion to the east of the R Sid (East Beach).
3. Carry out (1) and (2) in an integrated, justifiable and sustainable way

The scheme described in this document have been conceived to meet all the above objectives. In addition, construction costs, including elements outside the scope of this exercise and risks need to be between £10M and £12M.

It is worth noting that at this stage, no Landscape Visual Impact Assessment (LVIA) or environmental impact assessments were instructed for this exercise.

## 1.3 Purpose of the Document

The purpose of this technical note is to summarise the design process behind the assessment of the alternative options for Sidmouth Flood Defences Scheme, providing information on the technical and non-technical considerations behind the proposed schemes.

## 2 Proposed Schemes

This section provides information about the proposed schemes and the conclusions reached from technical evaluation during this stage.

### 2.1 Long groyne to the west of River Sid

The possibility of implementing a long groyne immediately to the west of the river Sid’s training wall was evaluated and considered to have only limited success in meeting the objectives of the project.

From engineering judgement, the longer than existing groyne would retain a wider beach. However, due to the closed sediment system, an initial beach nourishment followed by regular recharge would be required. Nonetheless, without detailed modelling, it was challenging to determine a profile of a likely retained beach and whether the beach alone, without raising the splash wall to the back of the promenade, would provide sufficient wave energy absorption during severe storm events. Moreover, the beach crest may lower during winter storms with consequent limited success in reducing the wave energy when most needed.

Another likely issue was increased sediment deposition at the mouth of the River Sid (to the east of the proposed long groyne), following south easterly storms leading to increase maintenance costs.

Due to time and budget constraints, in addition to technical and cost uncertainties, it was agreed by EDDC and the Sub-Group that this option would not be progressed forward.

### 2.2 Offshore breakwaters

The option of a series of offshore breakwaters was also evaluated and was found more feasible and likely to meet the requirements of the project.

Four breakwaters of different lengths were initially considered: two larger ones in front of the town beach and two smaller ones in front of East Beach.

The orientation of the breakwaters was discussed. Initial consideration was given to the possibility of implementing the breakwaters with an orientation similar to the existing ones, i.e. against south-westerly waves. However, this orientation would leave the Town front and East Beach exposed to south-easterly waves which could mobilise sediment and potentially overtop the sea wall and / or reach the base of the cliffs during severe events. A more parallel alignment to the coastline was considered more likely to produce the best results for protection against all wave climates. Moreover, the two existing breakwaters were found to provide significant protection to the western part of the town front from south westerly waves.

At East Beach, it was felt that the easternmost breakwater should be aligned more north- east to south-west to enhance the required protection in this area against south-easterly waves.

The existing splash wall at Frontage 6, by Port Royal, will likely need raising to provide adequate protection from south easterly waves. This element of the scheme has not been costed at this stage.

The existing beach will need to be renourished to the 1990 design as per BMP recommendation. This element of the scheme has not been assessed further nor costed in this exercise.

As offshore breakwaters were considered technically feasible and expected to meet the project requirements, a concept design was prepared to enable costing and evaluate the financial viability of the scheme.

Further refinement on the exact alignment and dimensions of the breakwaters require modelling which was outside the scope of this commission.

### **3 Site Conditions**

The site conditions have been obtained from previous modelling work undertaken by RHDHV.

The waterfront was divided in frontages which helped to identify wave conditions for each of the structures. Figure 3-1 shows the frontage division used to identify the wave climate for each structure.



Figure 3-1: Frontage division for wave climate

### 3.1 Bathymetry

The bathymetry was extracted from the modelling exercise undertaken by RHDHV in 2018. Figure 3-2 shows an image of the model in which the contours of the bathy can be appreciated.

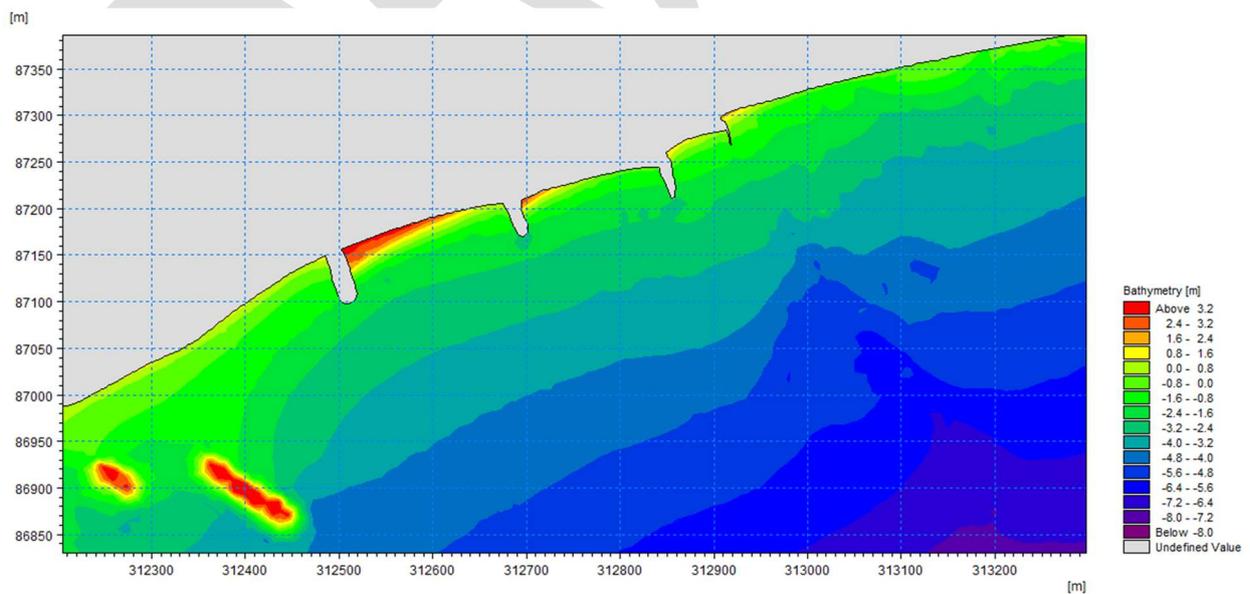


Figure 3-2: Bathymetry extract from numerical modelling at Sidmouth

## 3.2 Wave Conditions

### 3.2.1 Present Day

The present day wave conditions at the different frontages have been obtained from previous modelling work, which was summarised in report WATPB6525R001, from 17<sup>th</sup> August 2018. These wave conditions are shown in Table 3-1.

Table 3-1: Wave conditions at different frontages – South-westerly waves

Joint Probability Combination	Offshore Conditions			Water Level (mODN)	Nearshore Wave Height (Hs)						
	Wave Height (m)	Wave Period (Tp)	Wind Speed (m/s)		F1	F2	F3	F4	F5	F6	F7
1	11.15	14.14	25.89	2.41	4.11	4.09	4.29	4.42	4.59	4.16	4.11
2	10.33	13.66	24.84	2.47	4.09	4.07	4.27	4.40	4.56	4.14	4.09
3	9.81	13.34	24.15	2.55	4.10	4.08	4.27	4.40	4.56	4.14	4.10
4	9.26	13.00	23.41	2.61	4.09	4.07	4.25	4.38	4.54	4.14	4.09
5	8.54	12.53	22.40	2.69	4.06	4.03	4.21	4.34	4.49	4.11	4.06
6	8.00	12.17	21.60	2.75	4.05	4.00	4.17	4.30	4.44	4.09	4.05
7	7.45	11.79	20.79	2.81	4.01	3.96	4.11	4.24	4.37	4.06	4.01
8	6.74	11.27	19.66	2.91	3.92	3.87	4.01	4.13	4.24	3.97	3.92
9	6.20	10.86	18.77	2.98	3.83	3.79	3.89	3.99	4.09	3.87	3.83
10	5.66	10.44	17.85	3.05	3.70	3.63	3.67	3.75	3.83	3.69	3.70
11	4.95	9.84	16.55	3.15	3.43	3.30	3.28	3.33	3.40	3.33	3.43
12	4.63	9.56	15.94	3.18	3.25	3.10	3.07	3.11	3.17	3.12	3.25
13	4.41	9.35	15.50	3.21	3.11	2.95	2.92	2.97	3.02	2.97	3.11
14	3.87	8.84	14.39	3.29	2.70	2.56	2.53	2.56	2.60	2.57	2.70

The table above shows a series of offshore and nearshore (300m offshore) wave heights along the different frontages (F1-F7) for 14 joint probability cases between water levels and wave heights giving each of them a return period of 1 in 200 years. South westerly waves were found to cause the worst overtopping.

For this exercise, extreme water levels have been updated using the latest UKCP18 predictions.

A sensitivity test using several joint probability cases has been undertaken for the concept design.

### 3.2.2 Mid Term

Mid-term (2067) wave conditions have also been considered in the design. Only wave heights corresponding to Joint Probability Case 3 have been estimated as these produce the highest overtopping, see Table 3-2 below:

Table 3-2: Mid-term (2067) wave heights in meters along different frontages

F1	F2	F3	F4	F5	F6
4.27514	4.24892	4.43703	4.56727	4.7252	4.31969

### 3.2.3 Long Term

Similarly to the mid term case, the long term (2117) wave conditions for joint probability case 3 have been determined, see Table 3-3.

Table 3-3: Long-term (2117) wave heights in meters along different frontages

F1	F2	F3	F4	F5	F6
4.42	4.39	4.57	4.71	4.86	4.46

## 4 Design Approach

Concept design for three different locations have been undertaken:

- Layout 1: offshore structures
- Layout 2: nearshore structures
- Layout 3: intermediate structures

The three concepts have been conceived with the aim to meet the projects objectives, as described in Section 1.2.

Construction costs were estimated for the breakwaters based on two estimates received by EDDC for the construction of the existing breakwaters. Other elements of the scheme, such as beach nourishment, raising of the splash wall at discrete locations and risks were not included.

### 4.1 Layout 1 – Offshore Structures

Layout 1 comprises four breakwaters of different lengths, see Figure 4-1. Two breakwaters in front of the town beach have been located at ~200-250m from the shoreline and two in front of East Beach at ~135m and ~70m from the shoreline.

Initially, similar dimensions to the existing breakwater were chosen. The two breakwaters in front of the town beach have been assumed 135m and 140m long; the structure to the east of the River Sid in front of East Beach is 130m long and the easternmost is 75m long.

All proposed breakwaters are assumed parallel to the coastline, apart from the easternmost one in front of East Beach which is assumed at an angle providing best protection against south-easterly waves.

In agreement with the Option Appraisal (Appendix C) in the BMP, this alignment is considered most effective in reducing the wave climate reaching the beach and therefore reducing overtopping to acceptable rates. In front of East Beach, it is estimated that the chosen alignment would significantly reduce wave energy thus limiting the impact of winter storms on the toe of the cliffs.

Without detailed modelling (including sediment and physical modelling), it is not possible to confirm the effectiveness of the scheme, especially in limiting waves travelling through the gaps between the breakwaters. However, it is reasonable to assume that sufficient interference would be caused by the breakwaters to significantly reduce the wave energy reaching the shoreline.

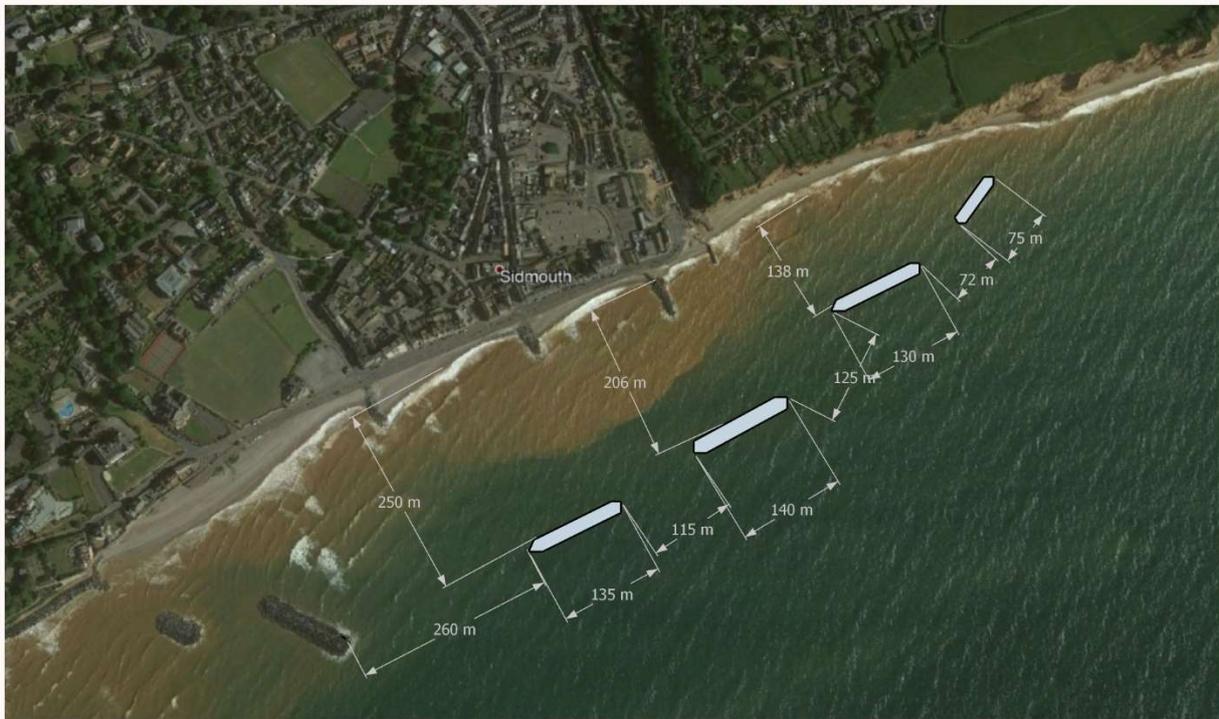


Figure 4-1: Layout 1 with offshore breakwaters

### 4.1.1 Type of Structures

#### **Town beach breakwaters:**

The breakwaters are designed as detached structures built at -4mOD, with a 2 layer 8t-12t rock armour with a 1:3 slope on the seaside and 1:2.5 slope on the leeside.

The core of the structures are designed as 1t-3t rock core and the whole structure is supported by a bedding layer formed of 100-1000kg rock laying directly on the seabed rock. The soft sediment is envisaged to be dredged, to allow for the structure to be supported by rock.

The dimensions of the crest of the breakwater have been determined considering overtopping and with the objective to achieve a transmitted wave passing over and through the structure which would allow to achieve acceptable overtopping rates at the town frontage. Further overtopping analysis at the town frontage showed that the assumed dimensions of 11.2m and crest level of 4.5mOD would dissipate the wave height sufficiently so that overtopping rates directly behind the breakwater would be 'acceptable' and not require a beach nourishment / design beach. Note: this is the case for the area directly behind the beach, assuming waves travel directly through the breakwater. Tests on wave overtopping between the breakwater structures, or wave transmission at different angles has not been undertaken. Although smaller structures could be potentially analysed at the same location in conjunction to the 1990 design beach nourishment, estimating the construction costs for these structures would provide a useful baseline for comparison to alternative potentially cheaper layouts.

The corner rocks at the crest and at the toe are to be within the upper 50% of the rock grading to increase stability at these locations, which are often the most vulnerable ones.

At the roundhead, the grading of the rock armour is increased to 10t-14t.

Figure 4-2 shows a sketch of the breakwaters in front of town beach.

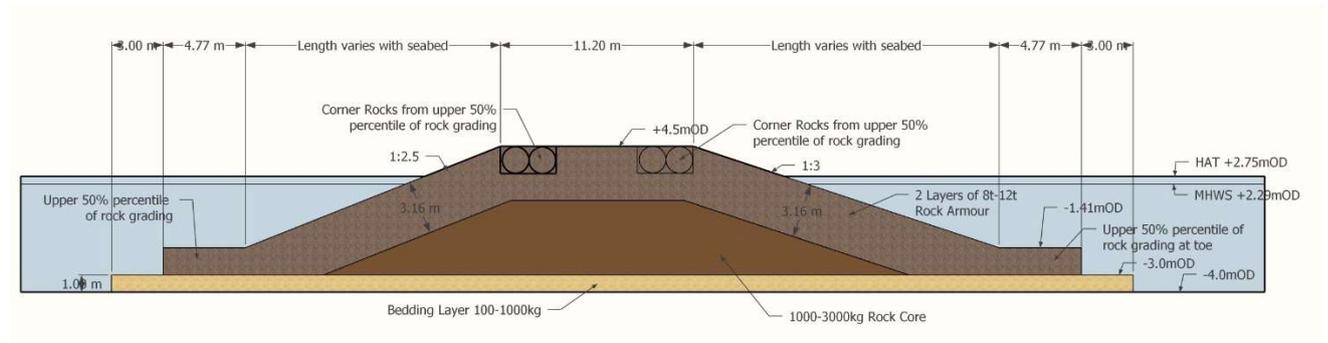


Figure 4-2: Sketch of breakwaters in front of town beach

### **East beach breakwaters:**

The breakwaters on East beach have a similar structure as those on the town beach. The main difference is that the armour size is designed as a 2-layer 6t-10t rock armour with a 1:3 slope on the seaside and 1:2.5 slope on the leeside.

The core of the structures has 1t-3t rock and the whole structure is supported by a bedding layer formed by 100-1000kg rocks laying directly on the seabed rock. The soft sediment is envisaged to be dredged, to allow for the structure to be supported by rock.

The dimensions of the breakwater crests have been determined considering overtopping and the reduction in energy transmission from waves. It has been determined that a crest width of 11.2m and a crest level of 4.5mOD would provide a substantial reduction in wave height behind the structures. This reduction, in combination with the beach recharge at East Beach, was considered to be sufficient to provide enough protection to the base of the cliffs for the medium to long term. However, further detailed analysis is required to confirm the assumptions at design stage.

The corner rocks at the crest and at the toe are within the upper 50% of the rock grading to increase stability in these points, which are often the most vulnerable in the structure.

At the roundhead, the grading of the rock armour is increased to 8t-12t.

The easternmost breakwater, closer to the shore, is founded in shallower waters, at -2.5mOD instead of -3mOD for the one closer to the mouth of the River Sid.

Figure 4-2 shows a sketch of the longer breakwater at East Beach

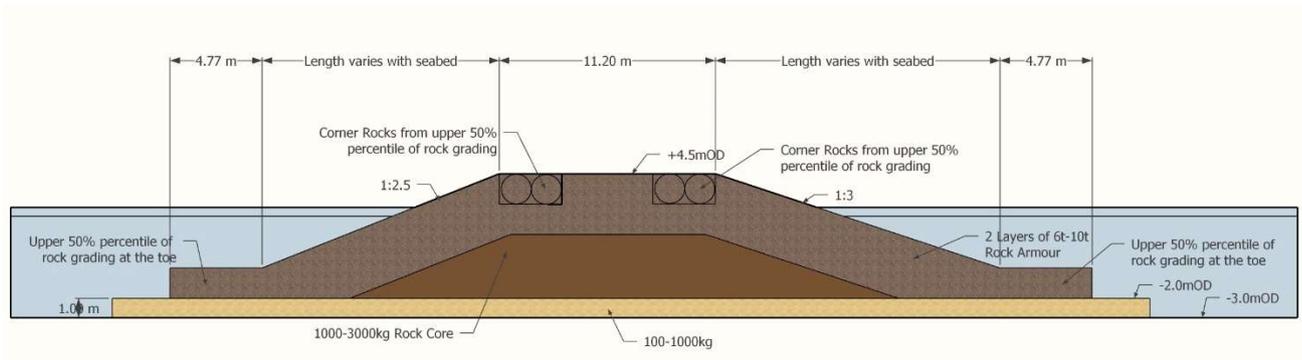


Figure 4-3: Sketch of breakwater in front of East Beach

### 4.1.2 Cost Evaluation

Following the design of the breakwaters, an estimate of construction costs of the structures only was undertaken.

The costing exercise showed total construction cost for the breakwaters of ~£18.5M. This did not include specific construction risks. The two main breakwaters in front of the town beach were estimated at £6.0M each, the largest breakwater in front of East Beach at ~£4.5M and the smallest one at ~£2.0M.

### 4.1.3 Conclusions

Although the exact layout and dimensions would need further refinement at outline and detailed design stages, Layout 1 was considered to be technically viable and to meet the requirements of the project in terms of overtopping of the waterfront and protection to the cliffs at East Beach for both the present day and the mid-term, while maintaining the overall structural stability of the structures.

However, given the existing budget constraints, the scheme was not economically viable. The possibility to implement smaller structures by moving them closer to the shore were investigated.

## 4.2 Layout 2 – Nearshore Structures

The design of Layout 2 is conceived by moving the structures much closer to shore to evaluate the potential construction cost savings whilst maintaining sufficient wave energy absorption to limit wave overtopping / cliff erosion. These structures are considered in combination with shallow tombolo / salient at the beach.

The structures are located ~70m from the shoreline both at the town beach and at East Beach.

Shorter breakwaters have been designed in comparison to Layout 1, as the closer proximity to the shoreline allows to take more advantage of the existing groynes and the presence of shallow tombolos to the lee of the structures. The length of the breakwaters in front of the town beach is ~100m, and at East beach ~90m and ~60m respectively.

The overall layout can be seen in Figure 4-4.

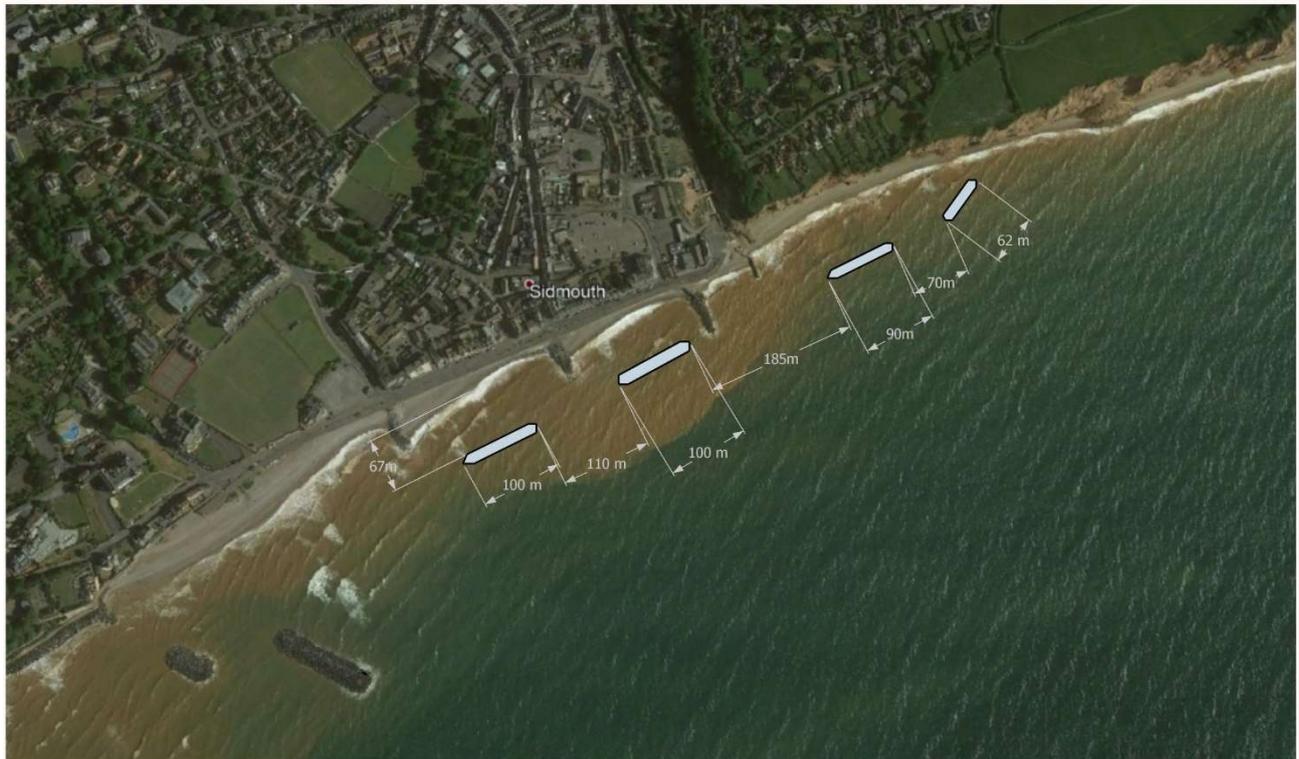


Figure 4-4: Layout 2 with nearshore breakwaters

## 4.2.1 Type of Structures

### **Town beach breakwaters:**

The closer proximity to the shore and the limited water depth made the structure to be designed as a single rock type with no core but all rock armour. The depth limited wave heights allow a reduction in the armour grading at the trunk to 6t-10t in comparison to the 8t-12t of the offshore location.

The armour slope is still designed as 1:3 on the seaside and 1:2.5 on the leeside.

The structure is still envisaged to be founded on a bedding layer of 100-1000kg, which would be directly laying on rocky seabed after dredging the soft sediment.

The dimensions of the crest of the breakwater have been determined considering greater overtopping and wave transmission rates than for Layout 1. However, these structures would work in combination with shallow tomobolo / salient features to their lee which would contribute to the dissipation of the surplus energy. Costs to create these features would need to be accounted for in the overall scheme design, as although these would be created naturally by the breakwaters, to be effective the scheme needs to rely on their presence since implementation. In this layout, the crest width is decreased to 9.8m and the crest height to +3.75mOD, reducing construction costs.

The corner rocks at the crest and at the toe are within the upper 50% of the rock grading to increase stability in these points, which are often the most vulnerable locations in the structure.

At the roundhead, the grading of the rock armour is increased to 8t-12t.

Figure 4-5 shows a sketch of the breakwaters in front of the town beach.

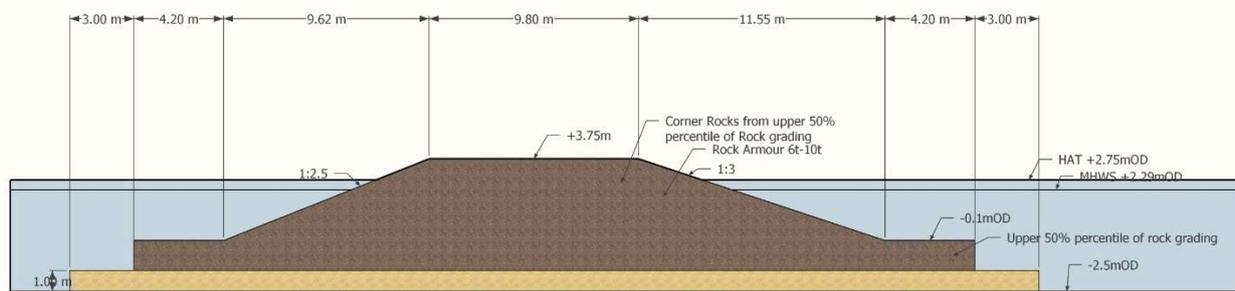


Figure 4-5: Sketch of Breakwater in front of town beach

### **East beach breakwaters:**

The breakwaters at East beach have the same structure as those on town beach. The only difference is the foundation depth for the smallest and easternmost breakwater which is at -2.0mOD.

Figure 4-6 shows a sketch of the most eastern breakwater on East Beach.

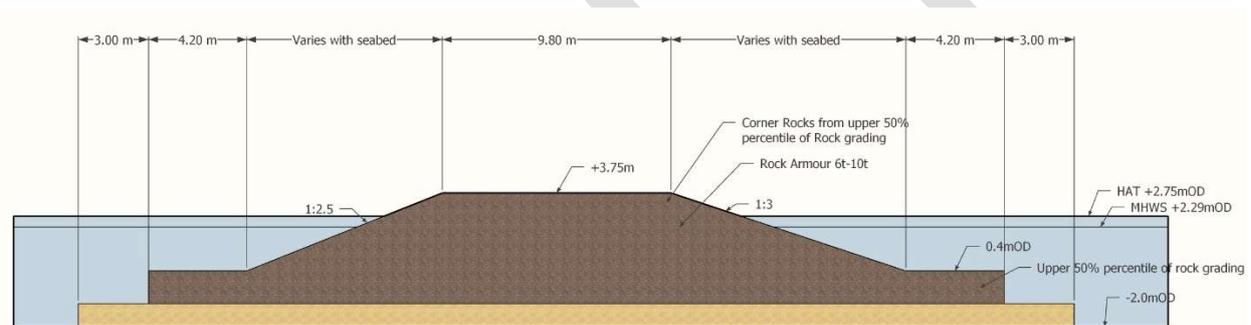


Figure 4-6: Sketch of eastern breakwater in front of East Beach

## **4.2.2 Cost Evaluation**

The cost evaluation exercise for Layout 2 scheme showed a significant reduction in construction costs for the breakwaters compared to Layout 1, due to the shallower location of the breakwaters (~1.5m shallower than Layout 1) and smaller dimensions.

The overall cost for the construction of the breakwaters as per Layout 2 is ~£8.9M. The cost of the two breakwaters in front of town beach are ~£2.6M each. On East Beach, the western breakwater is ~£2.3M and the smallest breakwater is ~£1.4M. This estimate does not include any specific construction risks.

## **4.2.3 Conclusions**

Layout 2 is a scheme that would technically meet the requirements of the project with an appropriate beach renourishment and potential raising of the splash wall at Frontage 6. Numerical modelling is required to confirm layout and sediment transport in the long term. Furthermore, this scheme reduces construction costs to about 50% compared to Layout 1. However, the close proximity of the breakwaters to the existing beach coupled with the formation of tombolos would significantly reduce the swimming area and potentially neglect the amenity value of the waterfront. In addition, the additional costs for beach nourishment, raising of the splash wall and risks are estimated to be greater than the available funding.

The possibility of relocation structures of similar dimensions further offshore, between layouts 1 and 2 was investigated. This would maintain the lower construction costs but provide the much-needed recreational ground for residents and tourists.

### 4.3 Layout 3 – 150m Offshore Structures

Layout 3 is a modification of Layout 2 in which structure of similar size are relocated slightly offshore, 150m from the shoreline. The aim of this layout is to maintain lower project costs whilst achieving the remaining project objectives. Therefore, whilst the dimensions of the structures are the same as in Layout 2, these are located further offshore and 0.5m deeper.

A sketch of the layout is shown in Figure 4-7.

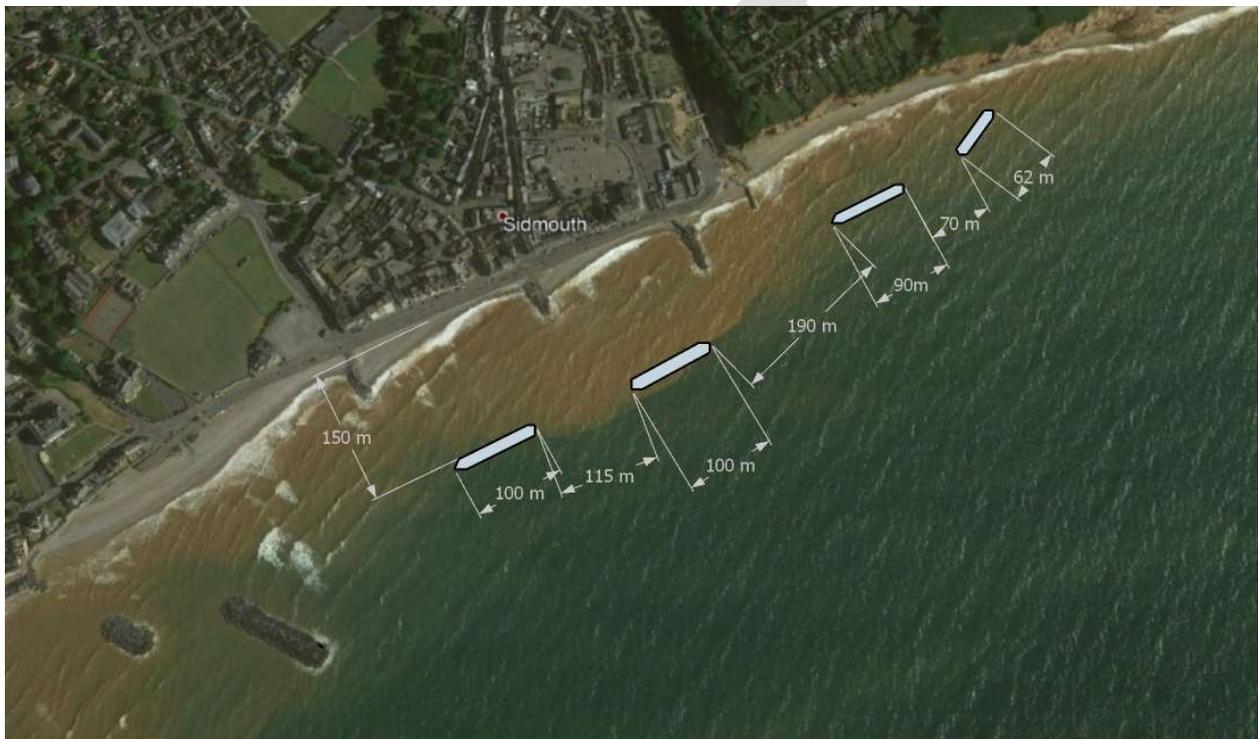


Figure 4-7: Sketch of Layout 3 with breakwaters located 150m offshore.

#### 4.3.1 Type of Structures

##### Town beach breakwaters:

At 150m from the shoreline, at a depth of -3.0mOD, incident wave heights during a 200 year storm event are not depth limited and therefore a bigger grading of rock armour of 8t-12t is needed to ensure stability.

The slope of the structure on the seaside is 1:3 whereas on the leeside is 1:2.5.

The same foundation detail of Layout 2, comprising a bedding layer of 100-1000kg after dredging of the soft sediment is envisaged.

With regards to overtopping and wave transmission, the relocation of the breakwaters into deeper waters without increasing the height of the structure translates into a smaller freeboard during a storm. Therefore, the amount of overtopping and energy transmission over the structure is estimated to be greater. However,

similar to Layout 2, the structures are conceived to work in combination with a renourished beach on their leeside forming shallow tombolos adequate to reduce overtopping over the waterfront to acceptable limits. It is estimated that the assumed dimensions shown in Figure 4-8 are appropriate and stable to withstand storms with present day values. However, by mid-term (2067), the structures are likely to experience damage both at the seaside and leeside.

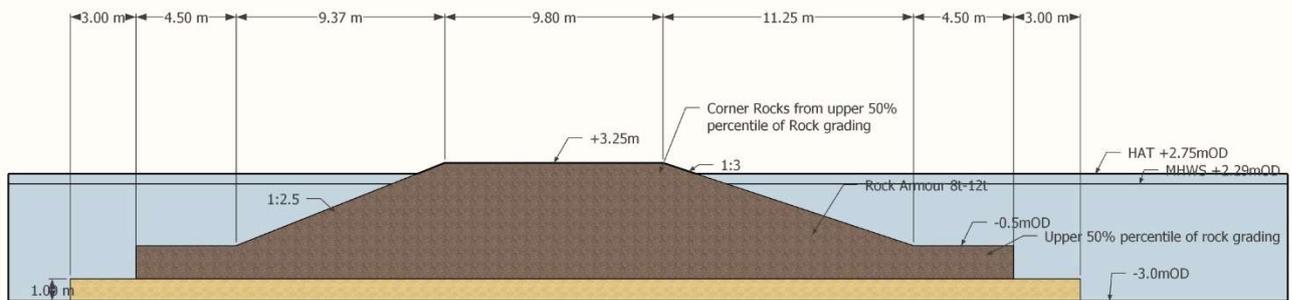


Figure 4-8: Sketch of town beach breakwaters according to Layout 3

### **East beach breakwaters:**

The breakwaters at East beach have the same structure and location as those in Layout 2.

Figure 4-9 shows a sketch of the westernmost breakwaters on East Beach.

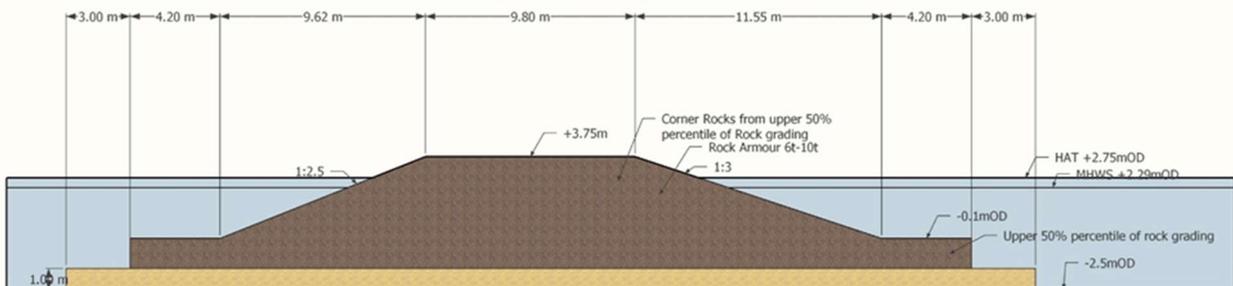


Figure 4-9: Sketch of westernmost breakwater at East Beach

Figure 4-10 shows a sketch of the easternmost breakwater at East Beach.

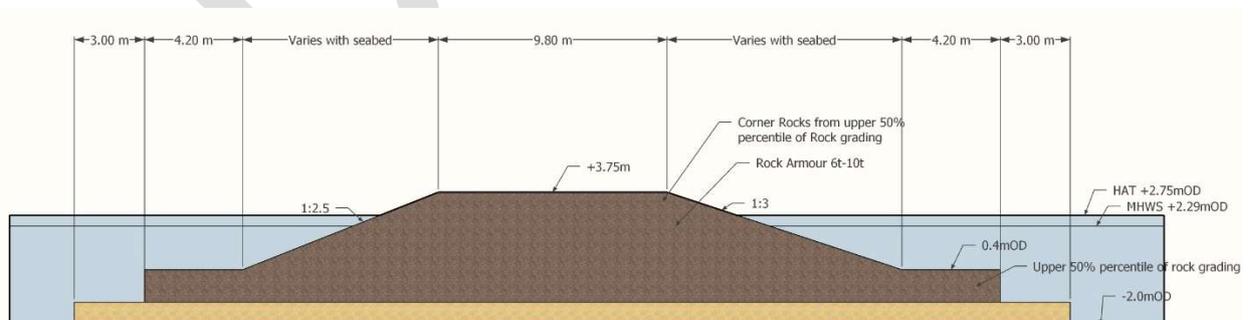


Figure 4-10: Sketch of eastern breakwater in front of East Beach

### 4.3.2 Cost Evaluation

Construction costs for the breakwaters in Layout 3 are the same as for Layout 2, as the same dimensions and lengths of the breakwaters have been maintained: total costs of ~£8.9M, comprising of ~£2.6M each for the breakwaters at the town beach and £2.3M and £1.4M respectively for the structures at East Beach. No specific construction risks were included.

### 4.3.3 Conclusions

The scheme comprising the four breakwaters at the location shown in Layout 3 and beach nourishment is considered to be effective to meet the requirements of the project, including maintaining the amenity value of the beach in front of the town.

The stability of the structure is considered to be adequate for the present day condition but the concept design assessment showed that it would be likely to experience damage both at the seaside and potentially at the -leeside in the mid-term (2067). However, numerical modelling is required to confirm the performance of the structures and to determine the required dimensions of the renourished beach. Also, it would be necessary to undertake sediment transport modelling to ensure that the structures are effective in preventing washing out of the sediment and to demonstrate that the beach would be stable in the short to long term.

Despite construction costs being reduced, it is estimated that the overall project costs, when considering beach nourishment, raised splash wall and risks would be higher than the available funding. Therefore, this option although technically viable, would not meet the overall economic requirements of the project and should not be explored further.

## 5 Conclusions and Next Steps

RHDHV have provided conclusions on the three schemes and layouts considered for the coastal scheme at Sidmouth. These conclusions summarised technical issues and viability, cost estimates and other considerations such as the amenity value of the beaches. It should be noted that these conceptual layouts have been developed based on engineering judgement and high-level calculations, without the use of numerical modelling to confirm the layout, including the development of the wave climate and sediment within the gaps between the structures and general behaviour of the sediment.

The assessment of the first layout was undertaken considering offshore structures in front of town beach and the 1990 beach profile. Although shallow tombolos may still form in the medium to long term, these are not to be relayed upon in the short term to absorb surplus wave energy through and over the breakwaters. Therefore, bigger structures have been designed to ensure sufficient wave energy is absorbed offshore.

Layouts 2 and 3 have been developed in combination with tombolos / salients established at the same time as constructing the breakwaters to their lee and subsequently maintained by the structures. These features would act in combination to the structures in absorbing wave energy and thus protecting the town frontage and the toe of the cliffs. In addition, the whole frontage would be renourished as per the 1990 profile to provide the required level of flood and erosion protection. The structures height and crest width are reduced allowing a higher overtopping rate, with the view that the beach and features to the lee would dissipate a larger amount of energy.

Whilst Layout 3 was considered the preferred option, overall construction costs would be higher than the available funding and therefore it was recommended not to explore it further in isolation.

In order to refine Layout 3 numerical modelling (wave, overtopping and sediment transport) would be required to assist with the following tasks:

- Confirm wave height values at the leeside of the structures and in front of the beaches, as a result of wave penetration and wave transmission through the structures;
- Confirm wave height transmission in the gaps between the structures;
- Determine the required dimensions for the renourished beach to achieve acceptable overtopping rates at the waterfront;
- Investigate alignment of the breakwaters to provide best reduction of wave energy for most wave climates;
- Investigate sediment transport after the implementation of the structures;
- Update incoming wave conditions to allow an accurate evaluation of the stability of the structures in the mid-long term during detailed design.

**Error! Reference source not found.** shows a summary of the construction costs for the breakwaters for the different layouts:

Table 5-1 - Breakwaters construction costs for different layouts

	Layout 1	Layout 2	Layout 3
Breakwater 1 – town frontage	£6.0M	£2.6M	£2.6M
Breakwater 2 – town frontage	£6.0M	£2.6M	£2.6M
Breakwater 3 – East Beach west side	£4.5M	£2.3M	£2.3M
Breakwater 4 – East Beach east side	£2.0M	£1.4M	£1.4M
<b>Total</b>	<b>£18.5M</b>	<b>£8.9M</b>	<b>£8.9M</b>

### **Hybrid Solution**

Following a meeting with EDDC and the Sub-Group on 02/09/2021, a hybrid solution was suggested comprising the following elements:

- Beach nourishment along the town beach frontage to the 1990 scheme profile, as per original OBC;
- Raised splash wall at Frontage 6, as per original OBC;
- Raising existing splash wall by 100mm along the promenade with new foundations enabling raising of the splash wall further when overtopping rates become unacceptable in the mid to long term (to be refined at detailed design stage);
- New long groyne and beach nourishment at East Beach, as per original OBC;
- Use surplus funding, following updated PF calculator, to construct one or two breakwaters in front of the Town beach. Increased risk pot and other elements to be consider when assessing available funding.

This option would reduce the need for maintenance / recharging of the beach by EDDC, by introducing offshore structures which would ensure a more stable beach at the town front.

Further investigation is needed to assess the full viability of this option, including but not limited to revised economic analysis, environmental assessment, visual impact and risk register.

DRAFT