

Analysis of the Sidmouth Beach Management Plan's Aims & Objectives

A framework compiled by the Vision Group for Sidmouth for the BMP Advisory Group: 14th February 2021

PROJECT AIMS AND OBJECTIVES:

1) Maintain the 1990's Sidmouth Coastal Defence Scheme Standard of Service

The Outline Business Case focusses on recycling and recharging Main Beach.

2) Reduce the rate of beach and cliff erosion to the east of the River Sid (East Beach)

The BMP focusses on schemes at East Beach.

3) Carry out (1) and (2) in an *integrated, justifiable and sustainable way*.

It is understood that the Aim to provide an 'integrated' solution applies to the integration of the separate elements (Supergroyne, Splash Wall, Recycling/Recharging) forming the OBC and BMP.

PREFERRED OPTION:

The problem with the Preferred Option is that it does not appear to achieve Aim 3. The following analysis takes each of the aspects in Aim 3 and considers specific problems, together with evidence and sources.

a) The Preferred Option does not appear to be *justifiable* for the following reasons:

Problem 1a: SUPERGROYNE:

The **modelling** that has been used to justify building a supergroyne appears sound; it is nevertheless questionable, on the grounds that it will not protect the **entirety of the Eastern cliffs**, primarily due to increased levels of cliff erosion.

- Rates of cliff erosion at Eastern Beach have accelerated since 2000.
 - Photographic evidence 1860s to date clearly indicates rates have increased: [Erosion at Sidmouth in pictures - Vision Group for Sidmouth](#)
 - In 2019, the SVA put on a comprehensive exhibition of how the cliffs have evolved – which also showed increases in erosion: [The Lost Cliffs of Sidmouth > Exhibition - Vision Group for Sidmouth](#)
- The Plymouth study 2020 demonstrates there will be greater rates of erosion than the modelling anticipated.
 - In this study, erosion is at least ten times faster than the original Shoreline Management Plan (SMP2) predictions: [6a CCMA briefing paper V4.pdf](#)
 - The Plymouth report takes into account rising sea levels, whereas the SMP2 numbers do not; Plymouth have based their predictions upon measurements taken since 1998: [Beach Management Plan: an analysis of the Plymouth report - Vision Group for Sidmouth](#) and [13 October 2020 - Councillors consider University of Plymouth research on coastal change in East Devon - East Devon](#)
 - The Supergroyne is likely to produce 'terminal erosion'; that is, not only would the

Supergroyne fail to achieve a reduction in the rate of erosion at East Beach, it would increase erosion for all points to the east: “Groyne construction creates a problem known as terminal groyne syndrome. The terminal groyne prevent longshore drift from bringing material to other nearby places.” [Coastal management - Wikipedia](#)

- At East Beach, this would lead to outflanking and a consequent threat to householders further east, in locations such as Laskeys Lane and Alma Lane: [Beach Management Plan: an analysis of the Plymouth report - Vision Group for Sidmouth](#)
- The study suggests that parts of the coastline at Seaton, areas either side of Branscombe and East of the River Sid at Sidmouth may see more erosion than previously predicted: [13 October 2020 – Councillors consider University of Plymouth research on coastal change in East Devon – East Devon](#)

Problem 1b: SUPERGROYNE:

The **modelling** that has been used to justify building a supergroyne is questionable, on the grounds that the **exact size and dimensions** are not clear.

- At the public consultation, the length of the supergroyne was 120m.
 - “This is currently estimated at about 120m compared to the town beach structures of about 75m long.” <https://eastdevon.gov.uk/media/2450852/6-sidmouth-portrait-poster-proposed-improvements-2.pdf>
- The draft Outline Business Case gives 100 to 120m.
 - “To maintain beach levels in front of the cliff 1no. approximately 100m to 120m long rock groyne will be constructed.” [Press releases about the Sidmouth and East Beach Management Plan - 4th June 2018 - 'Outline business case for Sidmouth and East Beach Management Scheme makes steady progress' - East Devon](#)
- At the FAQs on the EDDC website, the length is below 100m.
 - Here the drawings show a design for the supergroyne where it is described as ‘100 metres approximately’, but is actually drawn at 96.5 metres: <https://eastdevon.gov.uk/media/3721314/pb6525-06-p3-preferred-option-area-c-groyne-section.pdf>
- The Long List Appraisals Report shows the supergroyne at 70-75 m long - ie, the same length as the nearest groyne. In which case, the visual intrusiveness of the supergroyne could not have been appreciated.
 - This image was also recently used to illustrate the presentation of the Plymouth University report to the Strategic Planning Committee. This Photoshopped image of the supergroyne has clearly been lifted from a groyne on Main Beach, which is only 75 metres long. In fact, it is slightly truncated, making it approximately 70 metres long: [6a CCMA briefing paper V4.pdf](#)

Problem 1c: SUPERGROYNE:

The **economics** that was used to choose the Preferred Option over other options is questionable, on the grounds that the costings are not transparent or accurate.

- In 2016, the Preferred Option 1 was chosen over either Option 4 or Option 4B on the grounds of cost.
 - “The project team explained that it would be unlikely that the magnitude of the costs of Option 4 (with a potential £11.1 m partnership funding shortfall) could be reduced so much as to alter the recommendations made within the BMP.
“Therefore it has been concluded that Option 1 - to repair and shorten the length of

both the current freestanding section of the training wall and East Pier, and to construct one short/low level rock groyne to the east of the River Sid, to aid retention of a healthy beach as it transitions, should progress to outline design unless significantly more partnership funding can be found.” [Futures Forum: Beach Management Plan: looking for funding for the 'technically preferred' option 4b](#) (as the press report is no longer available on EDDC website)

- And yet, it was the Technically Preferred Option 4B which had been chosen above all the others: this was much less invasive than Option 4, Halcrow’s daunting illustration of shore parallel breakwaters, which had actually been rejected.
 - Notice how poorly illustrated the tombolas are and how closely spaced (over engineered) the shore parallel breakwaters are, which will have inflated the cost estimate. (Option 4) [Futures Forum: Beach Management Plan: Option 4b or not 4b >>> or: how to ignore everyone else's opinion](#) and [Futures Forum: Beach Management Plan: Local stakeholders welcome project consultant's report >>> Options S4 and S4b "technically preferred"](#)
 - It is very possible that shore parallel breakwaters (or oblique ones) and tombolas like those in Norfolk would have enthused the residents and business in Sidmouth and attracted more local funding and tourism grants. (Option 4B) [Sidmouth Beach Management Plan: Offshore islands would reduce the need to raise the splash wall – Vision Group for Sidmouth](#)
- There has been confusion over what Options 4 and 4B are offering.
 - *“Cllr Booth has questioned the transparency of the process, and why option 4B was only added once a public consultation was underway.”* [Sidmouth beach plan: ‘too big a decision to get wrong’ - News - Sidmouth Herald](#)
 - The two Options have been routinely confused with each other - as with this typical mix-up over illustrations in the press: [D-day looms on option to protect £85m of Sidmouth property | Sidmouth Herald](#)
- A commitment was made to determine the exact costs of 4 and 4B. In September 2016, a funding subgroup was formed to see if the higher level of funding would be available for option 4B. *“If it can do so in the next six months, the preferred option could change.”* This has not been carried out.
 - *“Cllr Gardner said 4B could cost much less than currently estimated, but neither option can be properly costed without computer modelling and tank testing.”* [Futures Forum: Beach Management Plan: looking for funding for the 'technically preferred' option 4b >>> latest reports](#) (press report is no longer available on EDDC website)
 - *Cllr Matt Booth, who sits on the new subgroup, said: “The newly formed funding subgroup will seek funding opportunities not only for the breakwaters, but also the more affordable option of rock groynes and beach recharging and recycling.”* [Sidmouth beach plan - questions over ongoing costs | Sidmouth Herald](#)
- To conclude, the lack of comparative modelling has meant that the costings are not transparent or accurate – as laid out in a report by the VGS representative on the BMP steering group in August 2016.
 - *“Ostensibly prudent advice from the consultants (CH2M) closes off any investigation into their own technically and environmentally preferred recommendation, although this appears to be the only one that can achieve the aims and objectives of the BMP. More careful consideration is needed, starting with comparative modelling.”*
 - *“1: The benefits of Option 1 seem to have been exaggerated...”*
 - *“2: The costs of modelling and of maintaining Option 1 may have been miscalculated or misrepresented...”*
 - *“2.5: An early investment in computer modelling should significantly reduce the*

uncertainty of long-term planning cost-predictions, which currently include a 60% optimism bias.” [Futures Forum: Beach Management Plan: "More careful consideration is needed, starting with comparative modelling."](#)

Problem 2a: SPLASH WALL:

The **modelling** that has been used to justify raising the Splash Wall is inadequate.

- There is very limited modelling or evidence available.
 - There is no evidence in the OBC. The Options and the modelling of the Preferred Option are provided in detail; and yet the Splash Wall suddenly appears at a much later stage with no background: [Futures Forum: Beach Management Plan: “More careful consideration is needed, starting with comparative modelling.”](#)
- The raising of the height of the wall seems to have been justified on the basis of predicted sea level rise (see below), irrespective of how effective the existing wall is.
 - Recent storms have indicated that the current sea wall is effective in preventing flooding of the Esplanade.
 - The same storms have indicated that the raised sea wall built 30 years ago at Seaton has not been effective in preventing flooding: at 'three feet', it is over-engineered, its effectiveness has not been monitored since it was constructed and there is little or no evidence that it has saved Seaton from flooding 2014 and 2017. [Beach Management Plan: storms and sea walls - Vision Group for Sidmouth](#)
- The town centre of Sidmouth is not threatened by flooding from the sea – but by flooding from the River Sid.
 - *“10 July 1968 saw one of the worst natural disasters East Devon has ever experienced.”* [50th anniversary of the devastating floods in East Devon – GOV.UK](#)
 - *“Why Sidmouth might flood: Sidmouth is at risk of flooding from the River Sid.”* [Sidmouth Flood Plan - 20000849.pdf](#)

Problem 2b: SPLASH WALL:

The **modelling** that has been used to justify raising the Splash Wall is questionable, on the grounds that there have been **increases in height** of the Splash Wall.

- 1: In June 2018, the height was to be half that now proposed.
 - *“Royal HaskoningDHV’s thorough tests and methodical approach has resulted in a proposal to recharge the beach with a 10m flat section at the top, and a suggested increase in the height of the splash wall of up to 0.5m from its existing level, with sections of lower height where the beach is less exposed.”* [Press releases about the Sidmouth and East Beach Management Plan - 4th June 2018 - 'Outline business case for Sidmouth and East Beach Management Scheme makes steady progress' - East Devon](#)
- 2: At the meeting of the BMP steering group in August 2019, it was recorded that there was ‘concern’ as further proposals.
 - *“The existing low splash wall which runs along the landward side of the promenade will be raised by approximately 0.6m, which is up to a final height of approximately 1.0m, to reduce the amount of wave overtopping that reaches Sidmouth Town.”* [SBMPSG 220819 Agenda v2](#)
 - *“It is currently anticipated that this wall will need to be at one metre above the promenade to contain wave overtopping.”* [Press releases about the Sidmouth and East Beach Management Plan - 30th August 2019 - 'Sidmouth Beach Management Scheme Steering Group meeting update \(August 2019\)' - East Devon](#)

- 3: In January 2020, a much higher level was referred to justify further height increases.
 - *“The Government is requiring coastal projects to have a minimum allowance for 1.2m of sea-level rise in the future due to global warming”* [Press releases about the Sidmouth and East Beach Management Plan - 16th January 2020 - 'Temporary glass flood defence panel to be tested on Sidmouth esplanade as part of Sidmouth and East Beach Management Plan' - East Devon](#)

Problem 2c: SPLASH WALL:

The **modelling** that has been used to justify raising the Splash Wall is questionable, on the grounds that the impacts of **climate change** have not been properly taken into consideration.

- Sidmouth will not face sea level rises of 1 metre plus.
 - *“Sea level rise relative to the land is the combination of absolute sea level rise and vertical land movements. By 2100 relative sea level could have risen by as much as 80 cm around some parts of the UK coast (4).”* [Coastal floods - United Kingdom - Climatechangepost.com](#)
 - Sidmouth will not be nearly as badly affected as other coastal areas: [Flood Maps](#)
 - Sea level rise is accelerating – but it is unpredictable. More precise data gathered from satellite radar measurements reveal an accelerating rise of 7.5 cm (3.0 in) from 1993 to 2017: [ESSD - Global sea-level budget 1993–present](#)
 - Sea level rises could lead to a decrease in wave height, and this might have implications for the need for a higher splash wall. *“For the UK coast the mean wave height is projected to decrease by about 10% by the end of the century under the most extreme global warming scenario.”* [Climate change will alter waves along half the world’s coast | National Oceanography Centre](#) and *“Most studies have focused on studying parameters such as wave heights, but a systematic, global and long-term signal of climate change in global wave behaviour remains undetermined.”* [A recent increase in global wave power as a consequence of oceanic warming | Nature Communications](#) and [Exploratory sea level projections for the UK to 2300](#)
 - Charts show that the need for a higher wall will not occur until nearly 2117: Numerical Modelling appendix E, pages 22-24 of the OBC.
- An incremental approach might be an alternative. The August 2019 minutes of the Steering Group state that the idea of incrementally increasing the splash wall was not dismissed and was an option that ‘could be considered’.
 - We are not obliged to erect sea defences today in line with predictions for levels in 100 years; this could be carried out in stages over time. The Environment Agency acknowledge that in sensitive and accessible locations, an incremental approach is justified: [30 August 2019 - Sidmouth Beach Management Scheme Steering Group meeting update \(August 2019\) - East Devon](#)

Problem 2d: SPLASH WALL:

The **economics** that has been used to justify raising the Splash Wall is questionable, on the grounds that the costings are not transparent or accurate.

- No costings have been provided for Splash Walls of any type.
 - These will be dependent on the design, regular maintenance/replacement of sections and the timings of any raising of the Splash Wall, as laid out in the FAQs on the EDDC website: *“Depends on design and if it were raised when units were due to be replaced.”* [Sidmouth Beach Management Plan: Frequently Asked Questions - Which option would be cheaper in the event that the height needs to be raised? - East Devon](#)

Problem 2e: SPLASH WALL:

Building this structure is not justifiable because it will be rejected at the **planning application stage**, on the grounds that it will be contrary to planning regulations, the Local Plan and the Neighbourhood Plan.

- A splash wall will not pass planning as it will have a serious visual impact on the seafront.
 - The Preferred Option, including a raised Splash Wall, does not guarantee protection of Sidmouth's heritage; it will not protect the Esplanade and town centre from flooding – areas of Sidmouth which contain its largest number of heritage assets: *“Historic environment as an asset, and giving it new life, has been one of the cornerstones of the economic and social revival of our towns and cities.”* (Deloitte 2017) [Heritage and the Economy | Historic England](#) and <https://historicengland.org.uk/content/heritage-counts/pub/2018/heritage-and-the-economy-2018/>
 - It will be detrimental to the setting and significance of a range of heritage assets and many listed buildings on the Esplanade: [Beach Management Plan - Vision Group for Sidmouth](#) and [Pictures of proposed splash wall 2019](#) and [Futures Forum: Sidmouth has the largest number of listed buildings in East Devon](#)
 - It will be detrimental to the economy of Sidmouth: *“We have to consider the ‘Splash Wall’ as a feature which will have a considerable effect on the attractiveness of Sidmouth as a tourist destination.”* [Our doc BMP May 2018](#)
- A large splash wall will not pass planning as, specifically, it will contravene Listed Building legislation.
 - The law in 4.31 and the ruling 4.32 apply to raising the height of the splash wall at Sidmouth: *“4.31 Section 66 of the Planning (Listed Buildings and Conservation Areas) Act 1990, places a statutory duty on local planning authorities to have special regard to the desirability of preserving listed buildings and their setting or any features of special architectural or historic interest which they possess.”* [Planning \(Listed Buildings and Conservation Areas\) Act 1990](#) and https://www.legislation.gov.uk/ukpga/1990/9/pdfs/ukpga_19900009_en.pdf

Problem 3: BEACH RECHARGING:

The **economics** that has been used to justify replenishing the Main and East Beaches is questionable, on the grounds that the costings are not transparent or accurate.

- Recharging beaches is universally understood to be an expensive option.
 - Why Beach Replenishment is a Waste of Money and Natural Resources: A look at why it's necessary to begin embracing newer coastal engineering technology: [Is Beach Replenishment A Waste Of Money And Natural Resources - delaware-surf-fishing.com](#)
- It will be necessary to fund regular recharging of the Eastern Beach should the Preferred Option of a Supergroyne be installed.
 - Considerable work will have to be undertaken to predict how much recharge will be needed. The current Preferred Option assumes a permanent design level beach, but a minimum recharge programme will mean increased erosion and a permanently depleted beach: [\(Public Pack\) Agenda Document for Sidmouth and East Beach BMP Project Steering Group, 22/08/2019 14:00](#)
 - The current EDDC recommendation is once every ten years; costly professional work will have to be undertaken to arrive at a recharge ‘plan’. Specifically, on Main Beach, it is predicted that recycle will be required every four years and recharge every ten, with the predicted need identical for East Beach. (page 35)

- It has been indicated that there will be 'trigger points' over the life of the project, at which recycle/recharge will take place.
 - It is understood that Haskonings have been approached.

b) The Preferred Option does not appear to be *sustainable* for the following reasons:

Problem 1: BEACH RECHARGING:

Over its 100 year lifetime, the Preferred Option will rely on regular beach recycling and recharging to achieve Aims 1 and 2, which is unsustainable.

- By most definitions of sustainable development, the Preferred Option fails - and in particular, the burden placed on further generations to regularly replenish the beach is not sustainable.
 - *“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own need.”* [East Devon District Council East Devon Local Plan 2006 to 2026](#)
 - *“It must be recognised that, in the very long term, continuing to defend such stretches of shoreline may be technically unsustainable.”* [SDAD SMP2 partsito5 FINAL.pdf](#)
 - *“In new development, however, we need to also consider whole-life carbon emissions and resource depletion. This includes both “in-use” energy efficiency and “embodied” carbon emission contained within the construction process such as the production, supply and recycling of materials.”* [Unsustainable over-development in East Devon - Vision Group for Sidmouth](#)
- Funding for beach recharging is not included in the OBC or any other documentation.
 - The FAQs on the EDDC dedicated website pages do not refer to costs or funding sources: [Sidmouth Beach Management Plan: Frequently Asked Questions - East Devon](#)
- Recharging is unlikely to be sustained over the next 100 years.
 - *“The scheme’s aim is to maintain the 1990’s Sidmouth Coastal Defence Scheme Standard of Service.”* [25 April 2018 - High levels of interest from public in Sidmouth Beach Management Scheme exhibition on April 19 - East Devon](#)
 - Phase II was monitored post-construction to assess the need (or otherwise) for further recycling of sediment along the frontage, and/or periodic further beach recharge. However, such works have only involved one single period of beach recycling, carried out in 2015, to re-distribute beach sediment along the Sidmouth town frontage: https://visionforsidmouth.org/wp-content/uploads/Beach-Management-Plan/sidmouth-and-east-bmp_final_23-01-2017.pdf and [Press releases about the Sidmouth and East Beach Management Plan - 6th January 2015 - 'Work commences on shingle recycling project at Sidmouth main beach' - East Devon](#)
 - *“It is extremely unlikely – I would say impossible – that EDDC can ringfence monies for the next 100-odd years for recharging the beach. Selecting an option that requires long-term maintenance in such an uncertain financial climate has to be madness. District councils all over the country are facing huge financial challenges due to continued government cutbacks. How can we expect beach recharging to be done?”* [Sidmouth beach plan - questions over ongoing costs | Sidmouth Herald](#)
 - *“EDDC has consistently failed to recharge Main Beach in accordance with the 1990s scheme, despite the fact that Main Beach is more visible, much more used, and much more accessible. It is extremely unlikely that EDDC will maintain the ‘perfect’ beach with which the comparison is made.”* [Beach Management Plan, Revetment part 2 - Vision Group for Sidmouth](#)

- Recharging will not only fail to stop beach erosion, but is environmentally unsustainable on several counts.
 - *“We provide multiple lines of evidence that beach fill projects are not a sustainable strategy to protect or defend oceanic beaches of the Florida panhandle (USA), nor likely most of the world's developed coastlines at risk to the effects of climate change.”* [Beach nourishment is not a sustainable strategy to mitigate climate change](#)
 - *“The entire removal, transportation, and finalization process creates costs which are not always calculated into the final figures of the project. Fuel charges, carbon releases, and potential wave changes caused by dredging all create potential issues which may need to be addressed.”* [20 Beach Renourishment Pros and Cons – Green Garage](#)
 - *“As one example, there is growing appetite for sand for ‘beach nourishment’, a practice increasingly being employed in the Netherlands and the United Kingdom to replenish beaches that are important for property, tourism or ecological reasons. This form of integrated coastal-zone management deposits large quantities of marine sand onto vulnerable beaches as an effective, albeit temporary, way to stem coastal erosion. One expert speaking at a [January 2019 conference](#) at the British Geological Society estimated that the demand for sand for beach nourishment globally was likely to rise from 50 million cubic metres today (roughly 80 million tonnes) to 500 million cubic metres by 2050 (roughly 800 million tonnes).”* [Driven to Extraction: Can Sand Mining be Sustainable? by Oli Brown and Pascal Peduzzi | Hoffmann Centre for Sustainable Resource Economy](#)
 - *“Beach nourishment is the latest chapter in a never-ending tale of erosion.”* [The problems with rebuilding beaches – YouTube](#)

Problem 2: SPLASH WALL:

Over its 100 year lifetime, the Preferred Option will rely on the regular raising of the Splash Wall, which is unsustainable.

- The Environment Agency's own strategy for flood and coastal erosion states that walls are not sustainable: we cannot rely on them and cannot continue to raise them.
 - *“The assessment is largely based on the costs and benefits of traditional flood and coastal protection – such as building and maintaining flood barriers, embankments and sea walls – although it also considers the potential for some other ways of improving resilience.”*
 - *“Raising flood and coastal defences will become technically and socially challenging with higher climate change scenarios. For instance, to contain an extreme flood through an urban area may require high flood walls deemed to be unacceptable to a local community.”* [Environment Agency – National Flood and Coastal Erosion Risk Management Strategy for England](#)
 - It is becoming increasingly clear that we will need alternative approaches to protect coastal communities from flooding associated with climate change.
 - *“The fix for inundation might seem pretty simple: just erect tall seawalls and other barriers to keep the ocean at bay. But barriers can fail...”*
 - *“Fundamentally, there is an issue with the concept of building walls to stop flooding,” says Rachel Gittman, an environmental scientist and ecologist at East Carolina University. “We should not be thinking that we can stop every flood.”* [Walls Won't Save Our Cities From Rising Seas. Here's What Will](#)
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c) The Preferred Option does not appear to be *integrated* for the following reasons:

Problem:

The **SUPERGROYNE** by itself does not adequately achieve Aims 1 and 2 of the Project.

The **SPLASH WALL** is not part of the Preferred Option; rather, it was added at a later date in order to compensate for the inadequate functionality of the Supergroyne and Recharging.

- The Preferred Option, when adopted in 2016/17, only referred to the 'wall' at Pennington Point.
 - *“Therefore it has been concluded that Option 1 - to repair and shorten the length of both the current free-standing section of the training wall and East Pier, and to construct one short/low level rock groyne to the east of the River Sid, to aid retention of a healthy beach as it transitions - should progress to outline design.”* [Futures Forum: Beach Management Plan: looking for funding for the 'technically preferred' option 4b](#)
 - The Splash Wall was not part of the initial set of Options and was added to the Preferred Option once was adopted. There is no evidence as to its origins, appearing later in the documents for the Outline Business Case – without any background, drawings, costing, or modelling.
 - The early work on the BMP had little effect on the Esplanade and was confined to engineering concepts of offshore breakwaters, rock revetments and groynes.
 - Modelling for flood risk was carried out by Halcrow and showed the Splash Wall did not need to be raised, which is why the BMP Preferred Option does not include raising the Splash Wall.
 - The Preferred Option was selected in 2016/17 - prior to the latest sea-level estimates: [Press releases about the Sidmouth and East Beach Management Plan - 6th April 2017 - 'Cabinet adopts Sidmouth and East Beach Management Plan' - East Devon](#) and [Coastal flood risk United Kingdom | climatechange.gov.uk](#)
 - Haskoning tested the BMP Preferred Option in 2018: *“As a result, the option of raising the existing splash wall was considered as a way of reducing wave overtopping reaching the road.”*
 - Their test is reported in their numerical modelling report (17 August 2018): Appendix E of the draft Outline Business Case: “4.2 Wave overtopping modelling...”
 - Splash Wall designs were only introduced to the public in 2018: [Press releases about the Sidmouth and East Beach Management Plan - 28th March 2018 - 'Public exhibition for Sidmouth and East Beach Management Scheme to be held at Kennaway House Sidmouth, 19 April 2018' - East Devon](#)
 - Splash Wall FAQs appear on EDDC website at a much later stage: [Sidmouth Beach Management Plan: Frequently Asked Questions - What is the glass panel installed on Sidmouth seafront, and how does it fit with the BMP? - East Devon](#)
 - EDDC has not reviewed the 2018 test.
 - EDDC has not asked why the the BMP Preferred Option failed the test or why Haskoning's modelling results were so significantly different from Halcrow's.
 - It is not clear what Haskoning's technical justification is for raising the Splash Wall, considering Halcrow concluded that it did not need to be raised: Appendix E of the draft Outline Business Case: “4.2 Wave overtopping modelling...”
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PROPOSED SOLUTIONS:

The following Alternative Options fulfil the Project Aims:

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

The following analysis takes each of the aspects in Aim 3 and considers specific justifications for the alternative solutions, together with evidence and sources.

a) The Alternative Solutions are *justifiable* for the following reasons:

Solution 1a: ROCK ISLANDS:

Proper **modelling** of the Preferred Technical Option has not been carried out; therefore, the modelling of the Preferred Option is questionable and so unjustifiable; whereas proper modelling of the Preferred Technical Option would be justifiable.

- Calls to allow for proper modelling of Option 4B were dismissed.
 - As stated by both Tony Burch (Assistant Project Manager and Senior Technical Consultant) and Tony Flux (who holds a senior position within the National Trust and a member of the BMP steering group), it is essential that all options are properly tested and thereby exhausted in order to arrive at an optimal solution – rather than simply setting up a cost-saving exercise: [Futures Forum: Beach Management Plan: "We cannot and will not request that expert advice is altered because some stakeholders are not getting the answers they wish to hear."](#) and 'Public being misled over Sidmouth's beach management plan' - [claim | Sidmouth Herald](#)
- The 2016 public consultation, which favoured the rock islands, was all too readily dismissed.
 - EDDC reports on the consultation downplayed the result by focussing on the 'low turnout': [1% turnout for Sidmouth beach protection vote - News - Sidmouth Herald](#)
- The several tested, alternative modellings for rock islands carried out elsewhere have been dismissed.
 - Offshore islands, breakwaters or reefs would reduce the need to raise the splash wall, creating a shallow foreshore causing waves to break there - before they reach the beach – as demonstrated in several successful examples: [AERIAL PHOTOGRAPH OF ARTIFICIAL REEF OFFSHORE BREAKWATER AT SEA PALLING ON THE NORFOLK COAST](#)

Solution 1b: ROCK ISLANDS:

The **economics** that was used to reject the Preferred Technical Option over other options is questionable and so unjustifiable; whereas proper consideration of the economics of the Preferred Technical Option demonstrate it to be justifiable.

- The lack of proper modelling puts into doubt the given costings of both Options 1 and 4B.
 - "I hope the Steering Group will agree to modelling the two main alternative solutions rather than opting for the least popular and least effective option simply on the grounds that it appears to be cheaper in the short term." [Futures Forum: Beach Management Plan: "More careful consideration is needed, starting with comparative modelling."](#)

- All the parties (including NE) preferred Option 4B, but concurred that this should be precluded due to cost; new evidence proves that the original costs were wrongly calculated and that Option 4B, or some variant, is in fact affordable.
 - Construction costs: One small rock island, further to the east than depicted in Option 4B, at a 45 degree angle, either opposite Main Beach or beyond the site of the proposed supergroyne would provide protection for Pennington Point or Laskeys Lane/Alma Lane, at a lower cost than the Preferred Option.
 - Construction costs of 'soft rock islands': There are alternatives to the 'hard' engineering of rock islands: see below.
 - Maintenance costs: As with the effect of the current two rock islands on the Main Beach, a third island would create a further 'tombola' effect, thus avoiding the ongoing costs of recharge/recycle.
- The costs given for Option 4B are excessive - if compared to quotes provided by contractors in the field.
 - Knights Brown, a long-established sea defence contractor, price an offshore island the size of the larger existing one at £5.5m. This compares with the EDDC estimate of £9m, having previously stated £35m, and then £13m: [Coasts, Rivers & Ports | Knights Brown | Civil Engineering](#)
 - For example, a small island the same size as the smaller of the current rock islands, has been given a cost of £2m: [NORTH PORTSEA ISLAND COASTAL DEFENCES PHASE 2 | Knights Brown](#) and [Major Engineering Project to Safeguard Iconic Aberavon Seafront](#)
- On the other hand, the Halcrow report of 2017 highlights the creation of tombolas by the current rock islands – and the considerable 'amenity value' they offer.
 - *“The beach has an amenity value which is likely enhanced at low tide by the sandy tombolas formed between the shingle and the offshore breakwaters.”* [sidmouth-and-east-bmp_final_23-01-2017.pdf](#)

Solution 2a: ROCK REVETMENT:

Qualified official justification has already been given for Rock Revetment.

- In March 2020, the County Councillor called for emergency rock revetment.
 - Cllr Hughes said that some emergency action may need to be taken, for which planning permission is not required, which could include filling the cave that appeared and putting some sort of revetment in place to protect the cliffs: [Call for 'emergency action' after latest Sidmouth cliff fall | sidmouthherald.co.uk](#) and [Beach Management Plan: emergency revetment](#)
 - A survey was subsequently commissioned: Cllr Stuart Hughes has said that he will be using some of his locality budget to carry out a further cliff survey and has asked the contractors currently re-building the adjacent Alma Bridge to assist in rearranging the small section of rock revetment at Pennington Point that has been moved by the storms: [Councillor funds cliff erosion survey | sidmouthherald.co.uk](#) and [Beach Management Plan: emergency survey](#)
- The “Sidmouth Pennington Point Short Term Rock Armour improvements” report of July 2020 considered that this was not an emergency – but did not rule out revetment:
 - *“However we will continually review the situation, and should a period of increased erosion occur, and it qualifies for emergency works, we will investigate adding additional rock armour, and using emergency powers to carry out the works.”* [Beach Management Plan: Saving Pennington Point](#)
- East Devon's MPs have supported revetment.
 - Sir Hugo Swire stated in 2013: *“A combination of rock revetment and then placing the*

shingle behind the revetment is what is required.” [MP to discuss Sidmouth’s crumbling cliffs | Sidmouth Herald](#)

- And in 2018: “Action was needed on two fronts - with a rock revetment to protect Alma Bridge and what remains of Pennington Point in the short-term.” [MP Swire calls for action at Pennington Point | Sidmouth Herald](#) and [I agree with my hon. Friend that it...: 12 Jun 2018: Westminster Hall debates - TheyWorkForYou](#)
- Simon Jupp stated in 2020: “We need emergency action from East Devon District Council now.” [Today's cliff fall in Sidmouth | Simon Jupp](#) and [LATEST: Sidmouth cliff fall | sidmouth.nub.news](#)

Solution 2b: ROCK REVETMENT:

The **economics** that was used to reject the rock armouring over other options is questionable and so unjustifiable; whereas proper consideration of the economics of the Rock Revetment demonstrate it to be justifiable.

- This option is cheaper than the Preferred Option.
 - EDDC's own studies of emergency revetments provides the figure of £0.5m, as opposed to the initial £1m cost of the Supergroyne: [Beach Management Plan: Saving Pennington Point](#)
 - Revetment would not require ongoing recharging and recycling costs – which have not been clearly defined: [Cost estimation for coastal protection – summary of evidence](#)
 - Revetment can be implemented much more speedily, as it is a simpler, cheaper process: [CSG 15 - Defra, UK](#)

Solution 2c: ROCK REVETMENT:

The argument against Rock Revetment at East Cliff due to the possibility of **fossils** being found is questionable and therefore unjustifiable.

- The Natural England report in 2017 rebuffed demands for rock revetment, on the grounds that fossils might be in the cliffs.
 - “*The East Cliff section provides key evidence for the environmental transition between the two rock units and is also known to yield a particularly diverse fauna of fossils.*”
 - SSSI designation allows for natural erosional processes to steadily produce new surfaces for scrutiny, including new fossils. “*A rock revetment is a hard coastal defence and as such does not fit with SMP policy and does not allow for any mitigation of the permanent negative impacts coastal defences will have on the OUV of the WHS and the geological interests of the SSSI.*” [Position statement in regards to a rock revetment at east beach v 2](#)
- Nevertheless, compromises can be reached, according to Natural England.
 - “*But, in reality, when the cliff slips it uncovers more rocks behind it, possibly new fossils, and a new surface for plants to invade. It was made a SSSI to allow it to naturally “fall apart” so we can learn more about how it works and what happens next. So what happens if a group of residents who live on top of a part of that cliff then ask if they can slow down the cliff from slipping into the sea to buy them more time to live there? That’s where it gets a bit tricky...*” [The importance of perception - Natural England](#)
- There are probably fossils in the Salcombe Hill Cliffs, both the Otter Sandstone and the Mercia Mudstone – but not enough evidence has been gathered to secure their scientific value on local, regional, national and international scales.

- Papers by R Wgallois et al: [Geology of the sidmouth district-A brief explanation of the geological map | Request PDF](#) and <https://core.ac.uk/download/pdf/386544.pdf> and [Geology of Sidmouth, and Ladram Bay, Devon](#)
- Nevertheless, and despite regular cliff-falls over the past decade, there have been no reports of any fossil finds on East Beach: [Devon cliff collapses 100 feet sending rubble to beach below and a plume of red dust in the air | Daily Mail Online](#) and [Shed falls off cliff in Sidmouth cliff landslip](#)
- East Beach is de facto closed, and the introduction of the Supergroyne will exacerbate safety issues. Those who wish to study the cliffs will also be confronted by access concerns.
 - Hard hats will not protect wearers against typical cliff falls: [Pennington Point, a rock fall in action - landslide case study - British Geological Survey \(2009\)](#) and [Latest Sidmouth cliff fall sparks calls to action over 'risk to life' - Devon Live \(2020\)](#)

Solution 2d: ROCK REVETMENT:

This option has been seriously **considered** several times over many years, has been recommended and accepted, and can therefore be justified.

- In 2002, Haskoning recommended a Rock Revetment along East Beach.
 - On page 2, the Aims state: *“English Nature have specified that due to the international designations which protect this site, a scheme will only be considered if it does not completely stop erosion. In order to comply with English Nature, it is proposed that a revetment be constructed with a crest level that would allow some overtopping – ideally the revetment should simulate the same conditions at the cliff toe that would prevail with a full beach fronting the cliffs.”*
 - On page 13, the conclusions state: *“A revetment with a crest level of 3.5 metres ODN constructed within the range of 0 to 15 metres from the cliff face would simulate the conditions that prevailed under the interpreted 1987 beach conditions.”*
 - The recommendations state: *“A revetment of varying height be constructed along the frontage. A crest of 4.0 metres ODN at the western end (Pennington Point), where the frontage is more susceptible to cliff falls, tapering to 3.5 metres ODN over the remaining frontage.”* [64. 2002-Sidmouth-P.Point-WaveModelling-PH-3H6923](#) and [Beach Management Plan, Revetment part 2 – Vision Group for Sidmouth](#)
- Rock Revetment was then considered in 2003 by the Devon County Council.
 - Report of Committee Site Visit: *“East Devon District: Proposed Rock Revetment Designed to Reduce Erosion of the Cliff Face at Pennington Point, Sidmouth”* 28 January 2003 [Futures Forum: 28th January 2003](#): *“EDDC is proposing a coast protection scheme aimed at reducing the rate of cliff erosion at Pennington Point. The scheme would protect the properties located at the top of Salcombe Hill and the Alma Bridge.”*
- In 2003, a planning application was made for EDDC’s own Rock Revetment proposal for East Beach.
 - The application was approved by the then Planning Committee of EDDC – but was subsequently withdrawn: [03/P0033 | Rock Revetment Structure | Pennington Point Sea Defence Cliff Road Salcombe Hill Sidmouth Devon](#)
- In 2011, residents of the properties above Pennington Point proposed such a scheme.
 - *“CLIFF-top residents have devised a £900,000 scheme they hope will stop Sidmouth’s crumbling coastline from claiming their homes.”* [Residents devise £900k bid to halt Sidmouth cliff erosion – News – Sidmouth Herald](#) and [Futures Forum: 24th April 2011: ‘Popular Alma Bridge, a gateway to Salcombe Hill for a quarter of a million residents](#)

and visitors every year, is just 24 months and eight metres away from being lost forever, campaigning cliff-top residents fear'

- The application was withdrawn, to await the recommendations of the working party: [cabinet-mins-010212.pdf](#) and [Futures Forum: Beach Management Plan: 'accelerated erosion' had occurred since 1996 – after the installation of rock groynes along the seafront in 1995](#)
- In 2017, the then-chair of the BMP Steering Group voiced his opposition to any such scheme, thus closing down debate and further consideration.
 - *"The East Devon AONB has given us clear and consistent guidance on the unsuitability of a rock revetment for East Beach. Furthermore, their position gives the district's planning officers no alternative but to recommend to refuse any applications for planning permission for this type of coastal and flooding defence in this location should such an application be made. Following extensive debate, with many views being expressed, it has become clear to the SG that rock revetment is unacceptable."* [Futures Forum: Beach Management Plan: Cabinet approves next stage](#)

Solution 2e: ROCK REVETMENT:

This option has been undertaken at other **similar locations** on the SW Coast and can therefore be justified.

- In Seaton, as reported March 2018.
 - However, the Seaton BMP with rock revetment and good drainage from the cliff top does not set a positive precedent for agreement from NE and WHS for the Sidmouth BMP, because *"Seaton already has a rock revetment and it also has a different environmental designation from Sidmouth"*: [Futures Forum: Beach Management Plan: meeting Thursday 15th March >>> report](#)
- In Paignton, as reported August 2017:
 - Thousands of tonnes of heavy grade "rock armour" from Chywoon Quarry, near Falmouth, are being shipped up the coast for a major protection scheme where cliffs at Hollicombe are crumbling and threatening the branchline from Torquay to Paignton: [Futures Forum: Rock armouring to protect South Devon coast](#)
- In Branscombe, in 2014.
 - In February 2014, the worst storms in a generation hit the south Devon coast. Among those affected were the owners of five beach chalets at Branscombe... Natural England won't let the owners move shingle... They also adhere to a "Shoreline Management Plan", which says that there should be "no active intervention" to protect the beach from erosion.
 - In September 2014, the VGS representative on the SMP2 and the BMP stated in an email to the chair of the BMP steering group: *"I also managed to establish that the SMP2 policies are not rigid rules."* [Rock armour at Branscombe beach - Vision Group for Sidmouth](#)
 - Natural England insist Sidmouth and Branscombe cannot be compared: *"... the geological interests impacted are not as sensitive as those at Sidmouth. In contrast, the proposals being developed for the Sidmouth BMP represent permanent impacts to an otherwise pristine landscape and natural environment and a reduction in the quality of the geological and other scientific interests."* [Position statement in regards to a rock revetment at east beach v 2](#)
- At Clifton, Sidmouth: the western cliffs.
 - *"We can reflect on what has happened in the past because if rock armour similar to that which was placed at Clifton (between Main and West Beach)... had been*

replicated east of the Sid and which Consulting Geologist Dr Geoffrey Kellaway fought for... Then we wouldn't be in the position we are in today." [Futures Forum: Sidmouth Beach Management Plan @ Streetlife](#)

- In fact, the first protection at Jacob's Ladder and the cliffs between this site and Clifton were installed in around 1895: [VINTAGE POSTCARD OF Jacob's Ladder and Beach from Peak Hill Sidmouth - £1.99 | PicClick UK](#)
- County Cllr Stuart Hughes: *"I've been studying this area ever since consulting geologist and member of the Geographical Survey Dr Geoffrey Kellaway contacted me and came to Sidmouth back in the early 90's and warned of the consequences of building hard rock off shore breakwaters in a soft rock area. He was absolutely correct as we have seen enhanced erosion, he also quite rightly claimed that rock revetment at the toe of the cliff would be environmentally acceptable and would dissipate wave action. "This would still allow cliff falls until the angle of repose at the top was reached however Natural England (formerly English Nature) and Jurassic Coast WHS objected and we are where we are today and still awaiting an affordable Beach Management Plan scheme.."* [Tunnel exposure could lead to catastrophic cliff fall | sidmouth.nub.news](#)
- In West Bay in 2005.
 - *"Protecting the Jurassic Coast"* [Beach Management Plan: rock armour at West Bay, Dorset – Vision Group for Sidmouth](#)
 - West Bay is internationally important for its World Heritage Site (Jurassic Coast)... We have taken great care in working closely with the conservation and heritage organisations. These include Natural England, Jurassic Coast Team, Historic England, the Marine Management Organisation as well as Dorset County Council. [5 things you need to know about the upcoming sea defence work at West Bay](#)
 - Note that, whilst Natural England 'objects', the Jurassic Coast World Heritage Site agreed to the proposals: "balance the needs of local communities, the economy and the environment, to secure a sustainable and affordable approach to the threat while protecting natural interests." [West Bay Dorset can manage their beach! – Vision Group for Sidmouth](#)

Solution 3: JETTY/PIER:

Examples of jetties and piers demonstrate that adding a landing platform to an offshore island is justifiable.

- A third offshore island would provide a lagoon and safe harbour for a regular ferry service and safer anchorage for passing sailing craft.
 - Tomboloas: Coastal formation of beach material developed by refraction, diffraction and longshore drift to form a "neck" connecting a coast to an offshore island or breakwater: [sidmouth-and-east-bmp_final_23-01-2017.pdf](#)
- Another rock island or jetty/pier would provide offshore interest and activity.
 - *"The area surrounding a river, lake, lagoon or sea coast acts as a transition zone between water and land. Therefore, [turning the water banks](#) into dynamic and appealing public spaces helps to establish a certain balance between the stiffness of the built environment and the fluidity of water."* [Between Water and Land: 10 Projects of Promenades and Waterfronts | ArchDaily](#)
- There is a history of jetties and piers at Port Royal, with boats docking at Dunning's Pier where they would unload coal and take timber onboard.
 - *Coastal defences along the Sidmouth BMP frontage has had numerous phases of construction throughout the past two centuries. 1875: Dunning's Pier built: [sidmouth-and-east-bmp_final_23-01-2017.pdf](#)*

Solution 4: RECURVED WALL:

Current examples and further modelling demonstrate that adding an increased 'Recurve' to the existing sea walls is justifiable.

- The current sea wall already absorbs the impact of sea waves: the addition of a 'Recurve' would reduce any overtopping.
 - The JBA Trust's wave tank shows the impact of different types of coastal defences on the rate of overtopping and resulting coastal flooding. This Recurve wall redirects the wave back out to sea, preventing any overtopping: [Wave tank showing impact of coastal defence - recurve wall – YouTube](#) and [Wave tank demonstration showing the impact of coastal defences on flood risk - YouTube](#)
- It is understood that, whilst the addition of a 'Recurve' was rejected under the Preferred Option, it is to be reconsidered:
 - *“Evaluate if the existing wall can be engineered to take the recurve structure; evaluate the impact of the extra “slamming” on the wall and the buildings on the esplanade; calculate the costs.”* [Re: Feed back from Weekend emails: 22/09/20]
 - Retrofitting would be an environmentally-friendly option: [Enhancing climate resilience of vertical seawall with retrofitting - A physical modelling study - ScienceDirect](#)

Solution 5: GEOTEXTILE TUBE:

Current widespread **installations and modellings** demonstrate that installing 'Geotextile Tubes' at East Beach is justifiable.

- This would reduce the impact of wave action on East Beach, as this would act as a submerged breakwater.
 - *“TenCate Geotube® geotextile systems are a proven alternative to conventional shoreline management approaches and are used worldwide to provide reliable, resilient shoreline protection in a broad range of applications. This technology is cost-effective, easy to install and highly versatile.”* [Geotube® Geotextile Systems for Reliable, Resilient Shoreline Protection webinar - YouTube](#)
 - The leading manufacturer and developer is Tencate, although many companies produce them: [VideoCast | Geotextile Coastal Protection Tubes - YouTube](#)
- As with the Rock Island solution, this would slow down but not halt erosion, thus protecting the geology of East Cliff.
 - If the Geotextile tubes were positioned at an appropriate distance on East Beach, it might be possible to retain the rock as it falls; this would establish a stable slope which would facilitate the search through rock strata and for fossils. Establishing the right 'slope' can be calculated: [Stability of rubble mound breakwaters and shore revetments - Coastal Wiki](#) and [So You'd Like to Stop Shore Erosion along the Calvert Cliffs. You'd better think before you act.](#)
- Geotextile Tubes could also act as a revetment at East Cliff.
 - *“Revetments are used to provide permeable surface protection to exposed soil surfaces.”* [TenCate Geotube® Dewatering and Revetment - YouTube](#) and [TenCate Geotube® and GeoContainers protect people and their living environment - YouTube](#)
- The costs would be much lower than those of the Preferred Option.
 - Installation is very straightforward and inexpensive: [Geo Tube Installation at sea side – YouTube](#) and [Geotextile Tubes as Submerged Breakwaters for Harbor Protection - YouTube](#)

- By forming the majority of the structure, with rock forming just the surface, the geotextile tubes could significantly reduce the costs of islands, groynes and revetments: [\(PDF\) Environmental Benefits of Sand Filled Geotextile Structures for Coastal Applications](#)
- An estimate of £0.3m has been given for East Cliff.
- A low cost Geotextile Tube could be trialled along East Beach: this could be implemented very quickly and so provide some protection while other solutions are considered: [Sand-filled geosystems in coastal engineering - Coastal Wiki](#)

b) The Alternative Solutions are *sustainable* for the following reasons:

Solution 1: ROCK ISLANDS AND BREAKWATERS:

Two/three small new islands would carry out Aims 1 and 2 over a period of the Project, would not require further large-scale engineering and would offer a more sustainable solution.

- There are fewer environmental impacts than a 'Supergroyne'.
 - *“Soft cliff retreat has often triggered a hard adaptation response by the building of seawalls and groynes. On adjacent undefended coasts erosion continues, resulting in set-backs. Continued setback often leads to outflanking of defences, making them ineffective at their extremities, particularly at the downdrift end where it is most severe. Solutions to outflanking usually involve extending defences, initiating a cycle of set-back, outflanking and further extensions.”* [Shoreline response of eroding soft cliffs due to hard defences](#)
- There are 'softer' breakwater solutions than using rock or stone – which can also enhance the natural environment.
 - *“The Green Breakwater at Cleveland Harbor is a pilot project to test the viability of ecological breakwater blocks to function as marine and intertidal habitat.”* [Sustainable Coastal Design and Planning](#)
- 'Submerged' breakwaters would have even less of an impact.
 - *“Around the world, breakwaters are the preferred choice as they are capable of dissipating wave energy, provide protection to the shore and act as habitat for marine life.”* [A Short Review of Submerged Breakwaters](#)
- The Technically Preferred Option 4B, an 'array' of rock islands', could also operate as an offshore Wave Energy Converter (WEC) array, thus providing renewable energy.
 - *“The extraction of energy by an offshore wave energy converter array will create a wave energy shadow down wave.”* [The wave energy shadow cast by an offshore wave energy converter array - University of Plymouth](#) and [Supergen Offshore Renewable Energy Hub - University of Plymouth](#) and [Impact - Supergen ORE | Supergen ORE](#)

Solution 2: GEOTEXTILE TUBE:

A series of Geotextile Tubes would carry out Aims 1 and 2 over a period of the Project, would not require further large-scale engineering and would offer a more sustainable solution.

- This solution has been tried out in sensitive areas in the South West.
 - At the ecologically protected Poole Harbour: [Coastal erosion stopped by using geotextile bags filled with solid sediment](#)
- They can create new habitats.

- When used submerged, Geotextile Tubes can form the basis of seaweed or sea-grass forests and so improve the marine environment. From North America: [Improving Waterways, Coastlines, and Marine Habitats with Geosynthetics](#) to Australia: [\(PDF\) Marine Ecosystem Enhancement on a Geotextile Coastal Protection Reef - Narrowneck Reef Case Study -](#)
- They are environmentally-friendly.
 - They reduce transport costs both because the tubes are lightweight and because the filling material can be sourced at the site; although of man-made material, they can be integrated into the landscape/seascape and protected from degradation; their ability to retain solids while letting water through is useful in many areas: [Geotextile Tubes & Sand Bags Installation - Superior Ground Cover](#)
 - The current rock islands and groynes could be dismantled and rebuilt using Geotextile Tube bases, reducing the need to import more rock onto site: *“sustainable construction is related to consumption of non-renewable resources for construction materials and consumption of fossil fuels for transport energy:”* [Environmental Sustainability of Constructing the Newquay Artificial Surfing Reef](#)
 - Their carbon footprint is comparatively low: [Contribution of Sand Filled Geotextile Tubes to Decrease Carbon Footprint Emissions in Building Marine Structures | CoastalManagement](#) and [\(PDF\) Quantifying the carbon footprint of coastal construction – a new tool HRCAT](#)

Solution 3: ROCK & ALTERNATIVE REVETMENTS:

Revetment would carry out Aims 1 and 2 over a period of the Project, would not require further large-scale engineering and would offer a more sustainable solution.

- There are significantly fewer environmental impacts.
 - It is clear that less alien material, less recharge & recycle, and less carbon will be used on and off-site: [Hard Engineering Coastal Management - Internet Geography](#)
- There are 'softer' revetment solutions than using rock or stone – and which can also enhance the natural environment.
 - *“When it comes to erosion control, our commitment is that the habitat we leave behind is more durable with greater bio-diversity than the one we inherited.”* [Erosion Control Revetments | Land & Water Group](#)
 - “Pyramat - High performance turf reinforcement mat”: [5859 Greenfix](#)
 - There is the concept of 'the living shoreline' which might be applied to projects to prevent cliff erosion: *“The movement away from traditional rock revetments and seawalls over the past two decades has been driven primarily by coastal wetlands regulations.”* [National Coastal Conference Abstracts: Thursday AM Sessions](#)

Solution 4: REVERSE BEACH EROSION VIA THE SANDGRABBER/SANDBSAVER

Other low-impact technologies would allow beaches to rebuild naturally: they would carry out Aims 1 and 2 over a period of the Project, would not require further large-scale engineering and would offer a more sustainable solution.

- The SMP has decided on a policy of 'managed realignment'.
 - *“allowing the shoreline position to move backwards (or forwards) with management to control or limit movement:”* [SDAD SMP2 parts1to5 FINAL.pdf](#)

- *“To the west of Seaton, a proposed policy of Managed Realignment would ensure defences along the cliff toe continue to be provided but this will not prevent cliff erosion completely and so the cliff top assets could be lost over time.”*
[SDAD SMP2 Final Leaflet.pdf](#)
 - The SMP is not considering 'managed retreat' for the Eastern Cliffs.
 - *“According to some land-use consultants, rather than pursuing seawalls or sand replenishment projects, the more cost-effective and longer-lasting solution would be to locate coastal development further inland. This option is technically called “managed retreat.” Supporters of this option argue that relentless efforts to reverse beach erosion create a vicious circle, by encouraging additional building along the shore, thus putting more people and public resources at risk. With the likelihood of increasing liability, insurers may decline to cover risky properties, and the state would become the last resort.”* [New Study Forecasts Dramatic Beach Erosion Along U.S. Coastline | Washington Spectator](#)
 - To enable 'managed realignment', there are cheaper and more environmentally-friendly alternatives to 'seawalls or sand replenishment projects'.
 - This is universally understood by non-experts: [Effective Measures To Stop The Reverse Beach Erosion](#)
 - There is an urgency in terms of rescuing key habitats – and there have been inexpensive solutions on the market for some years: [Take Action: Restore Coral Reefs and Prevent Beach Erosion with Biorock – Gaia Discovery](#)
 - One inexpensive solution is the “Sandgrabber”, the former brand-name for a commercial system to reduce erosion.
 - *“Reverse beach erosion and build a sand beach with Sandgrabber(tm), an environmentally friendly, proven and lowcost system that uses the energy and sand contained in wind-driven waves to rebuild beaches.”* [Reverse Beach Erosion with Sandgrabber – YouTube](#)
 - “Sandsaver” is the new brand-name for the Sandgrabber – and offers an alternative to dredging, groynes, jettys or coastal armoring.
 - *“The Sandsaver, is improved technology based on past proven technology, previously known as “The Sandgrabber”.”* [Natural Solution to Beach Erosion | Stop Beach Erosion | Sandsaver | Dredging Alternatives](#)
 - *“See how the Sandsaver has started rebuilding beach front and growing the overall width profile of the beach in just 6 short months!”* [Sandsaver Beach Erosion Solution Africa Kenya Part 3 6 Month Update Indian Ocean Stop Beach Erosion - YouTube](#)
 - *“The Sandsaver is quickly becoming one of the most sought after beach erosion solutions. Using basic conservative calculations, the Sandsaver re-builds beachfront property through a natural means of beach renourishment, using the wave energy, activity and sand contents of the water at a fraction of the cost of other traditionally accepted methods such as dredging, groynes, jettys or coastal armoring. The modular sandsaver system can be used on a temporary basis, putting the modules in place, allowing them to re-build the beach and either moving them forward into the surf in effort to build additional width profile to the beach, leave them in place to provide a long term solution or remove them, allowing for nature to run its course and putting them back once the beachfront property becomes eroded once again.”* [Sandsaver Beach Erosion Solution | Rotational Molding | Granger Plastics Company](#)
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c) The Alternative Solutions are *integrated* for the following reasons:

Solution 1: ROCK ISLANDS/GEOTEXTILE TUBE vs SPLASH WALL:

The Technically Preferred Option of offshore Rock Islands (or Geotextile Tubes) would reduce if not eliminate the need to raise the Splash Wall.

- An offshore Rock Island, as was originally proposed by Posford Duvivier in 1990, would reduce the need for a Splash Wall – as would a Geotextile Tube.
 - Unfortunately, the report has been destroyed: [Sidmouth Beach Management Plan: Offshore islands would reduce the need to raise the splash wall - Vision Group for Sidmouth](#) and [Futures Forum: Sidmouth Beach Management Plan: "reports will not be available for discussion until next February": more news, more information](#)
- Offshore Islands, breakwaters or reefs would reduce the need to raise the Splash Wall – as reiterated some three decades later:
 - *"Waves break when they move from deep water to shallow water. So a shallow foreshore will cause waves to break there before they reach the beach."* [Sidmouth Beach Management Plan: Offshore islands would reduce the need to raise the splash wall - Vision Group for Sidmouth](#)

Solution 2: ROCK ISLANDS/GEOTEXTILE TUBE vs RECYCLING/REPLENISHMENT:

The Technically Preferred Option of offshore islands (or Geotextile Tubes) would reduce if not eliminate the need to Recycle and Replenish the Main and East Beaches.

- Halcrow's Shoreline Management Plan from 2010 relates the history of recharging the beaches – indicating the use of “seawalls, groynes and detached breakwaters with beach recharge” to compensate for the loss of natural fluvial deposits.
 - *“Along this section of coast, the only coastal defence structures to be found are at Sidmouth, where the construction of seawalls, groynes and detached breakwaters with beach recharge has been implemented to prevent further erosion of the local cliffs. The defences act to inhibit both the eastwards littoral drift of beach material and the offshore transport (draw down) of beach levels during storm events. The River Sid that discharges to the sea at Sidmouth has also been extensively modified by human intervention and is now largely trained along the east side of Sidmouth before flowing out to sea via an outfall. The net effect of defence construction has been to reduce the supply of sediment to the beaches east of Sidmouth, which has led to a reduction of beaches in this area and an increase in cliff toe exposure to wave action (and so an increased risk of cliff failures here also).”* [Microsoft Word - C - Baseline Process Understanding FINAL December 2010.doc](#)
 - The Outline Business Case, presented a decade later, in August 2019, compares the options – clearly indicating that Option 1 will not protect the beach from erosion to the extent that Option 4 will.
 - *1: “Option will hold sufficient beach material to provide protection to cliff toe. However, beach will be at very high risk of drawn-down / erosion under sea storm conditions.”*
 - *4: “Option will hold sufficient beach material to provide protection to cliff toe. Beach will be at low risk of drawn-down / erosion under sea storm conditions.”* ([Public Pack Agenda Document for Sidmouth and East Beach BMP Project Steering Group, 22/08/2019 14:00](#))
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