

1907



2009



Sidmouth Through the Ages

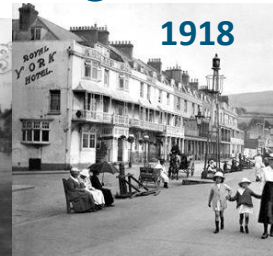
1924



1914



1918



2018



2006



2018



2013



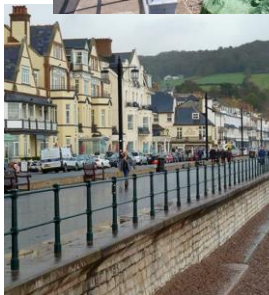
2014



2016



2009



2014



1957



1930



2011



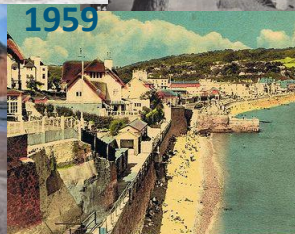
1985



2013



1959



2011



Royal HaskoningDHV

Sidmouth Coastal Scheme

The Story so Far



Coastal Flooding History

Wave overtopping along the town front is increasingly becoming a major source of flood risk to the community and commerce at Sidmouth. Successive coastal flood defence measures over the past 200 years have sought to progressively manage this risk.

1825-1826: Timber groynes and breastwork built.

1835: First seawall built.

1917-1919: Seawall repaired and extended.

1918: River Sid training wall replaced with structure that acted as terminal groyne.

1957: Seawall and promenade built to protect Connaught Gardens.

1991: Sidmouth Coast Protection Scheme Phase 1 encased old seawall, build low level rock apron and removed timber groynes.

1993: Rock revetment placed along frontage as emergency works.

1994: Rock revetment placed in front of 1957 Connaught Gardens seawall.

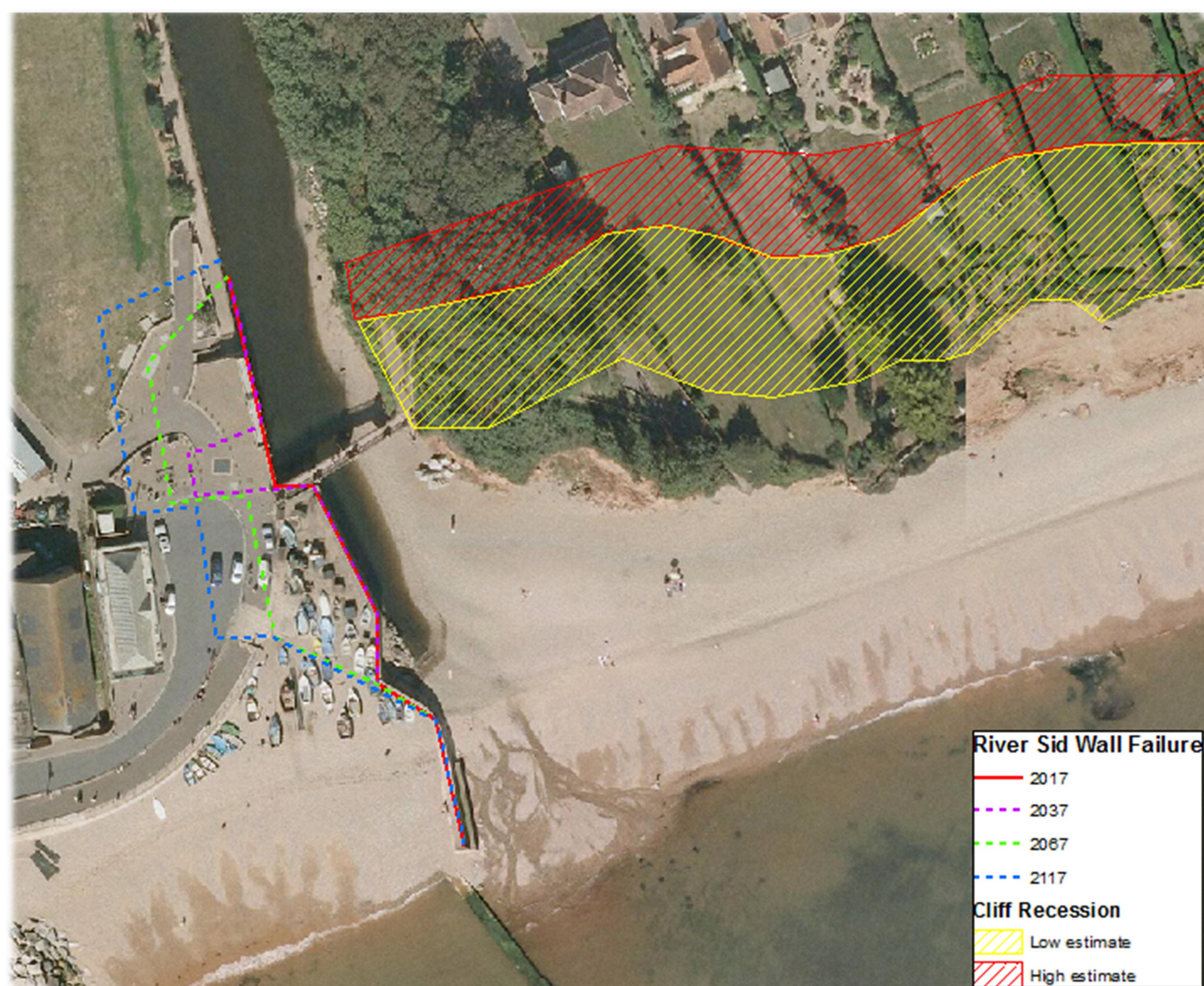
1995: Sidmouth Coast Protection Scheme Phase 2 built. This included 2 offshore breakwaters, 2 rock groynes (York and East), and Beach recharge (buried rock revetment built in 1993).

1999: Clifton Walkway built.

2000: Sidmouth Coast Protection Scheme Phase 3 completed. This included construction of the Bedford groyne and some beach sediment recycling along the frontage.

2015: Beach recycling operation to re-distribute beach sediment along the Sidmouth Town frontage.

2016-2017: Beach Management Plan developed to look at options to improve defences.

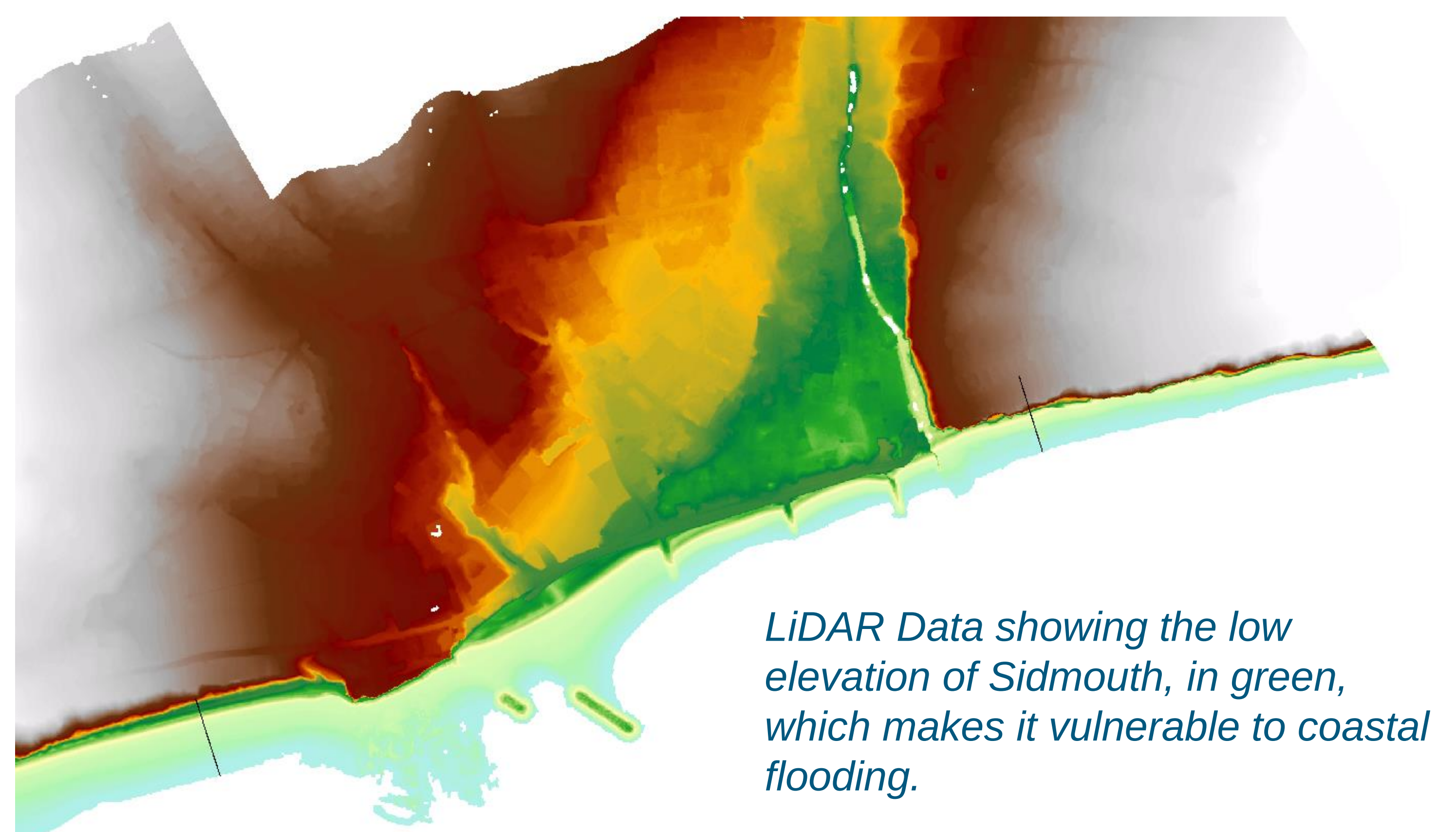


What is the Problem?

Changing conditions such as increasing storms, rising sea levels and change in the beach position mean that further works are required to the sea front to maintain protection of the town from storms. The recession of the cliff at East Beach is also of concern to properties along the cliff top. The loss of material (sand and shingle) from the beach means that less energy from storms is absorbed before hitting the existing defence walls. Wave overtopping during high tide can lead to localised flooding in the town. This is exacerbated by the relative low land levels of the town behind the sea front leading to ponding of flood water.

Scheme Aims

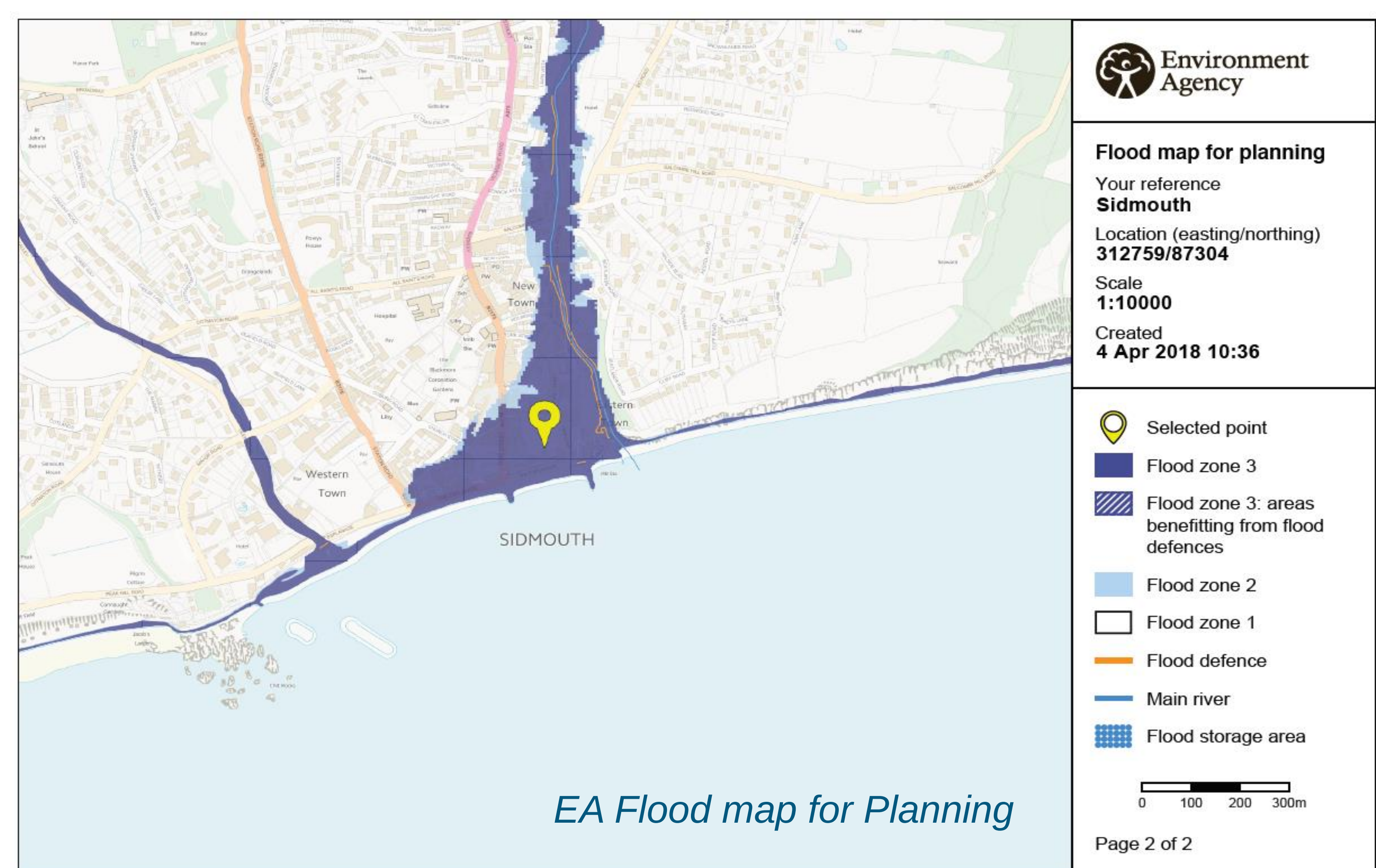
- Maintain the Standard of Service of Coastal Protection to the Town.
- Reduce the rate of cliff erosion to the east of the River Sid (East Beach).
- Carry out these aims in an integrated and sustainable way.



The Steering Group

To ensure that the BMP and the scheme aims considered the range of stakeholders involved, a steering group was set up by East Devon District Council (EDDC). The steering group meet at key points during the project, where the technical analysis can be explained, queries can be raised and actions agreed to take forward. This group consists of :

- East Devon District Council
- Cliff Road Action Group
- Vision Group for Sidmouth
- Sid Vale Association
- Sidmouth Sailing Club
- Local Fishermen
- Sidmouth Lifeboat
- Sidmouth Town Council
- Devon County Council
- Natural England
- National Trust
- Jurassic Coast Team
- Environment Agency
- South West Water



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<https://flood-warning-information.service.gov.uk/long-term-flood-risk/map>

Sidmouth Coastal Scheme

The Beach Management Plan

The Sidmouth and East Beach Management Plan (BMP) detailed how the beach and coastal frontage should be managed to maintain flood protection to communities whilst protecting the beach amenity and the local environment.

The BMP undertook extensive analysis of monitoring data. This included

- History of flooding and defences
- Land, utility and asset ownership searches
- Review of other local plans affecting these works
- Wave and water level climates
- Sediment transport rates and mechanisms
- Climate change
- Cliff erosion
- Influence of cliff on the river defences
- Environmental characteristics
- Previous design of existing elements of the Coastal Defences
- Condition assessment of existing structures
- Calculation of overtopping
- Beach profile and levels
- Maintenance regime
- Identification of issues in each frontage area.
- Investigation and appraisal of options
- Selection of Preferred option.

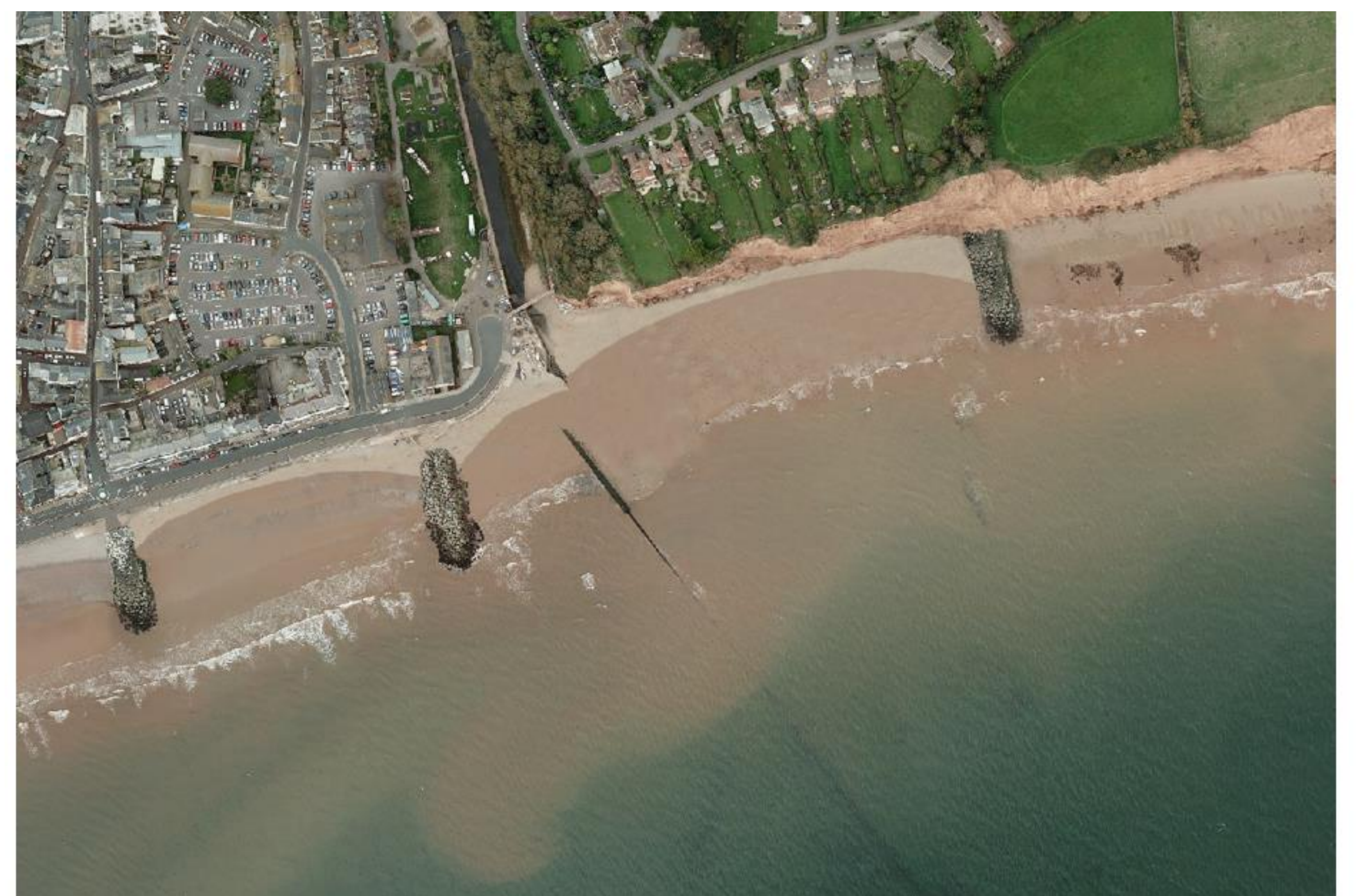


Options Appraisal

The Sidmouth coastline was divided into four separate frontages allowing the options to be assessed in terms of their effectiveness and viability in each specific environment.

The coastal frontage varies from the unconstrained beach at Jacobs Ladder, rock revetments at Chit Rocks to limit erosion, to the offshore breakwaters creating sheltered waves and bigger beach behind; and rock Groynes at the town beach, to the River Sid training wall and cliffs at East Beach.

A long list of options were assessed within the BMP with consideration for the technical, environmental and economic factors. This was reduced to a practical short list. Public consultation and sensitivity testing were also conducted to gauge feedback from each of the short-listed schemes.



The Preferred Option

The preferred option considered the various risks and pressures facing the different parts of the coastal frontage, such as overtopping, outflanking, erosion and sediment loss as well as aspects such as affordability, buildability and impact on the environment.

The preferred option for each frontage was agreed as the following:

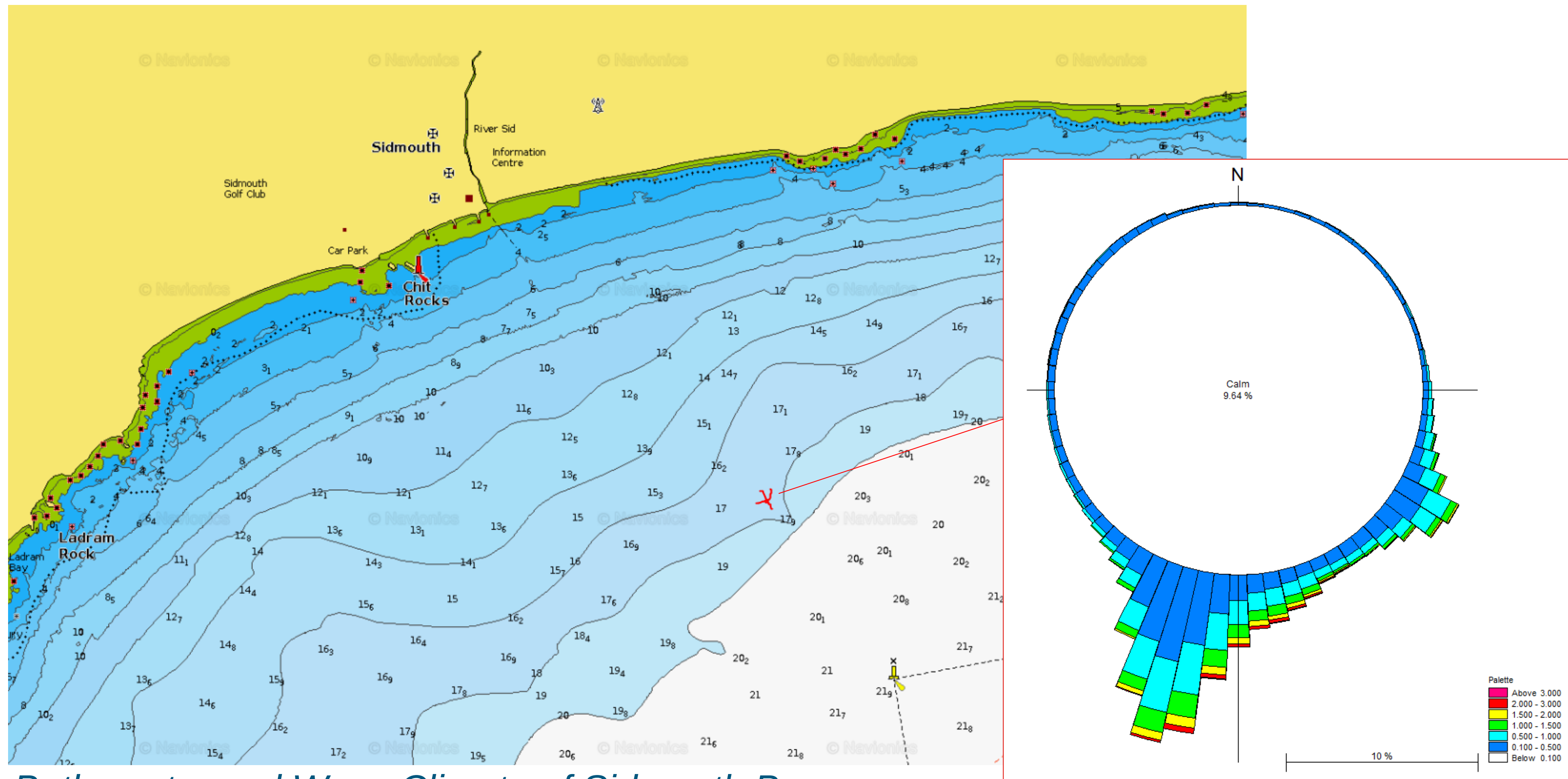
- **Frontage A: Maintain Chit Rocks Revetment and clear promenade**
- **Frontage B: Renourish the shingle beach and provide protective wall**
- **Frontage C: Restoration and maintenance to the River Sid flood wall and repairs to the Training Wall**
- **Frontage D: Build Rock groynes and beach to reduce cliff erosion**

This is considered to be the most suitable option given the requirements to balance the technical implementation, environmental acceptability and the economic case. Other options assessed did not meet the overall need of the scheme.



Sidmouth Coastal Scheme

Progress to date



Bathymetry and Wave Climate of Sidmouth Bay.

Coastal Modelling

Detailed coastal and numerical modelling of the Sidmouth frontage has been conducted to understand the effects and impacts of the preferred option on the beach environment, the existing structures and defences and the proposals as part of the scheme.

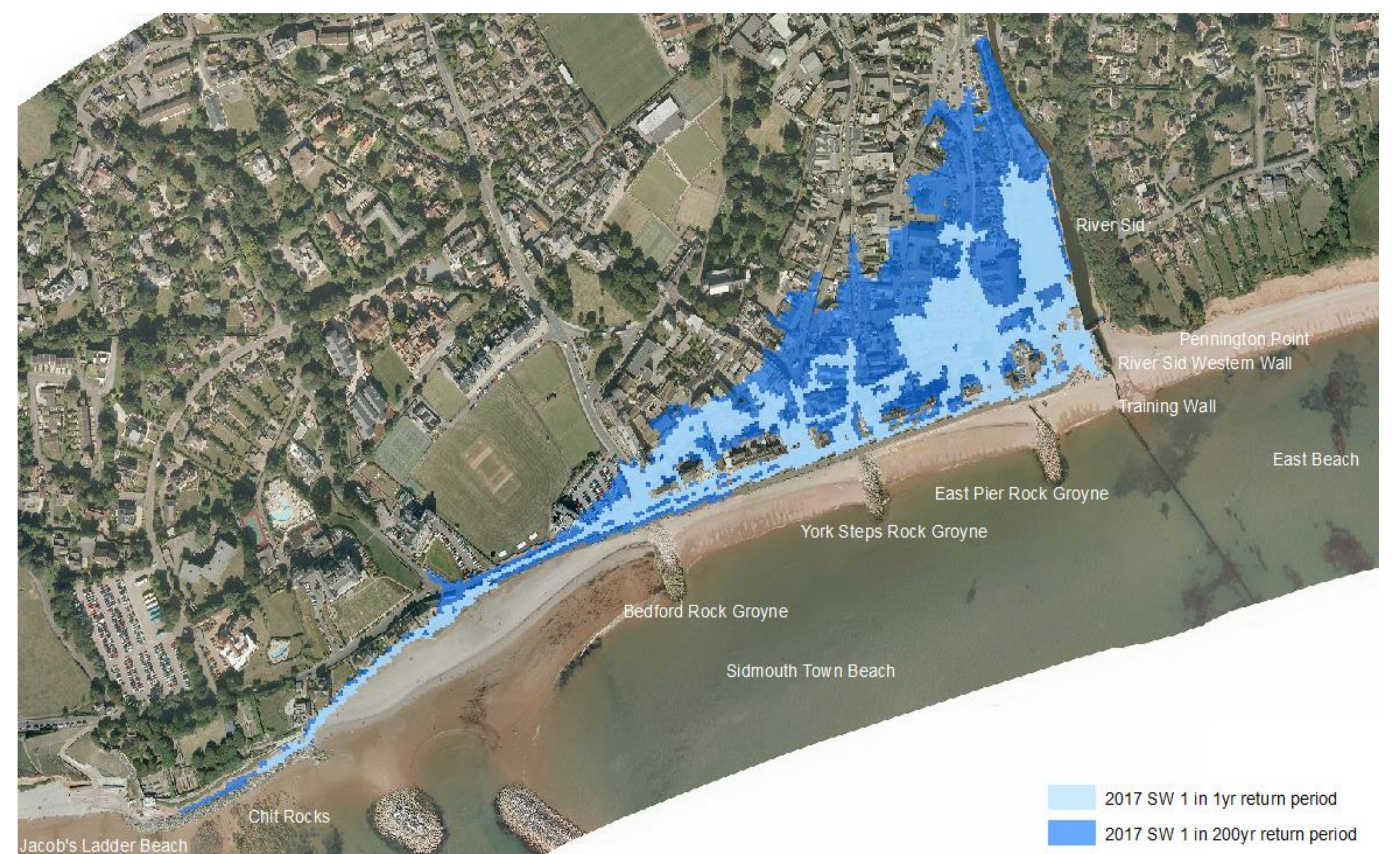
This modelling allows the changes to shoreline processes, cliff erosion and flood risk to be understood. This was then used to compare the baseline environment to the scheme for different storm events and future scenarios.

The results are then used to estimate the cost of future flooding on the town and then the benefits of reducing this which supports the case for funding.

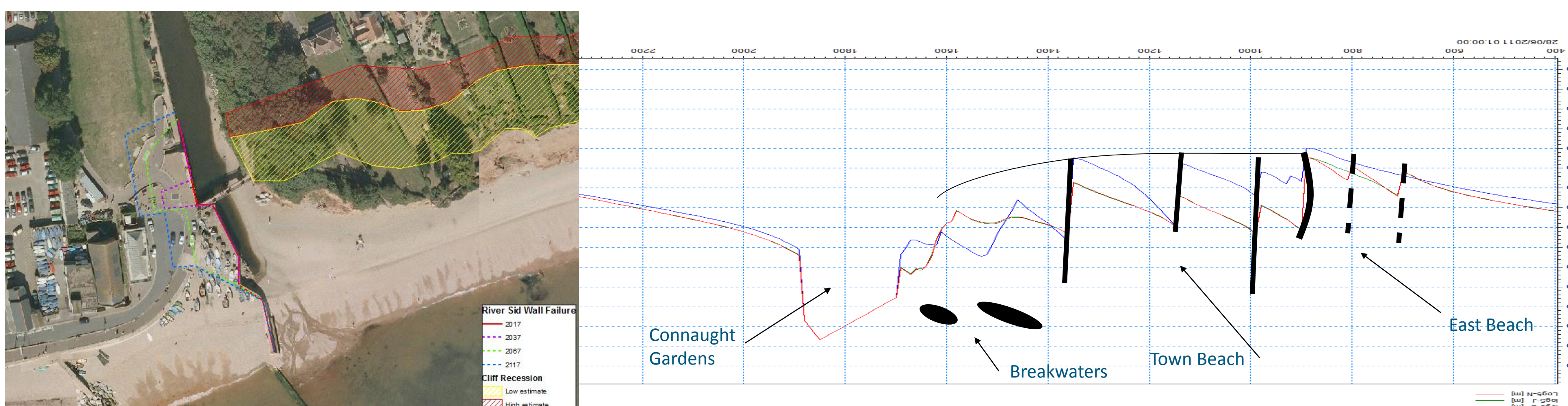
How is the scheme simulated?

A range of computer software were used to simulate the coastal environment of Sidmouth.

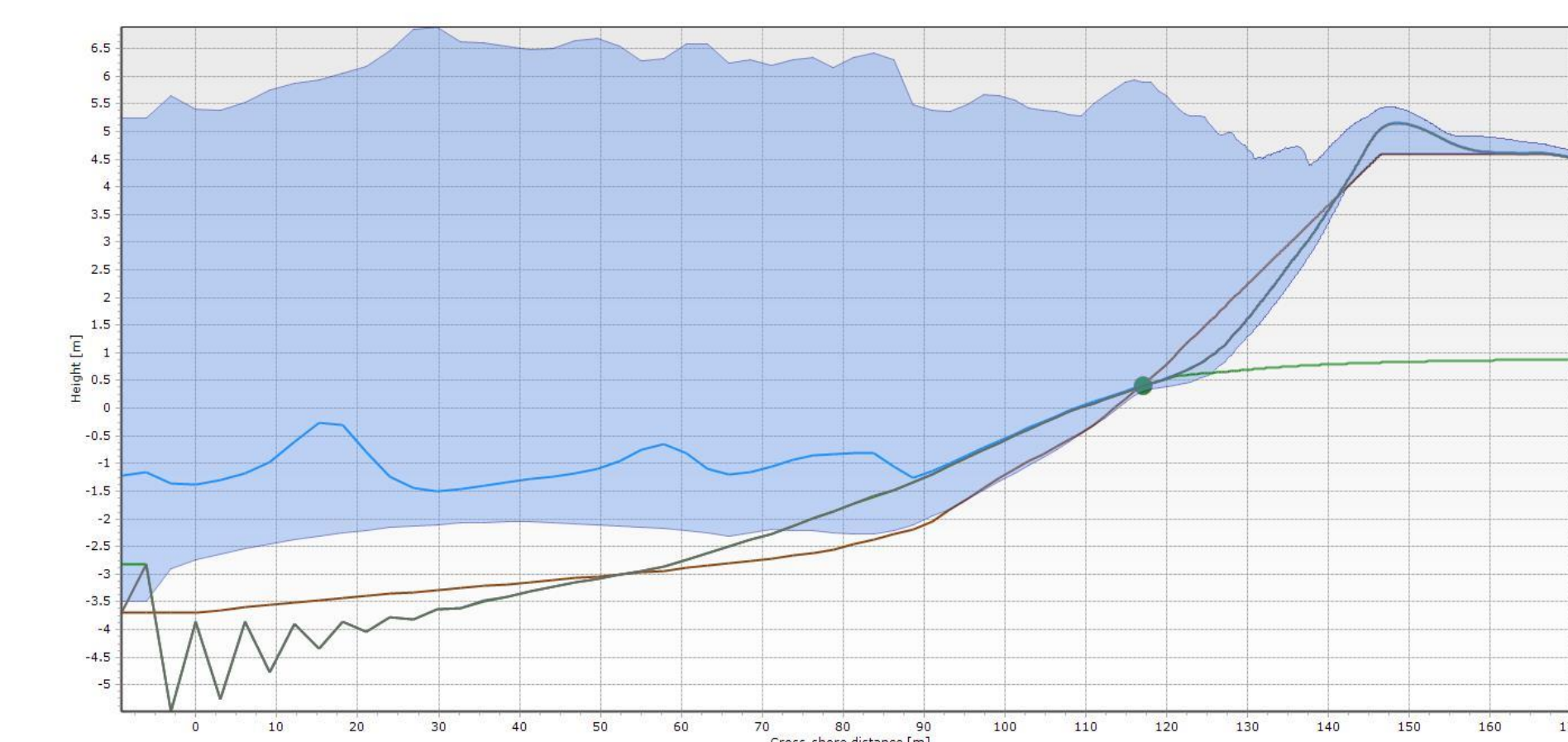
- The wave climate for different storms was simulated using a combination of bathymetric and Met Office offshore tidal data. Statistical analysis of this data allows the size of waves arriving at Sidmouth to be predicted.
- Overtopping modelling is combined with the wave climate to predict how much water might splash or flow over the coastal defences.
- Two-dimensional hydraulic modelling of wave overtopping informs the changes to flood risk within the town, showing how the dynamics affect the rate and depth of flooding.
- Long-shore Litline modelling using the wave climate and shoreline profile is then used to estimate the impact of storm conditions on the rate of movement of shingle and sediment.
- The preferred scheme can then be simulated within the different software to understand how it affects the coastal environment.



Hydraulic modelling of flood risk was conducted for different scenarios.



Shoreline modelling investigating behaviour of structures



Computer modelling analysis of storms and sediment movement.



Engineering Investigations

In addition to the computer modelling there have been site surveys to assess the existing conditions of the structures and beach. We have also undertaken geotechnical investigations to assess the size of shingle beach material and trial pits to determine the depth of beach and the type of sediment that the new structures will be founded on.

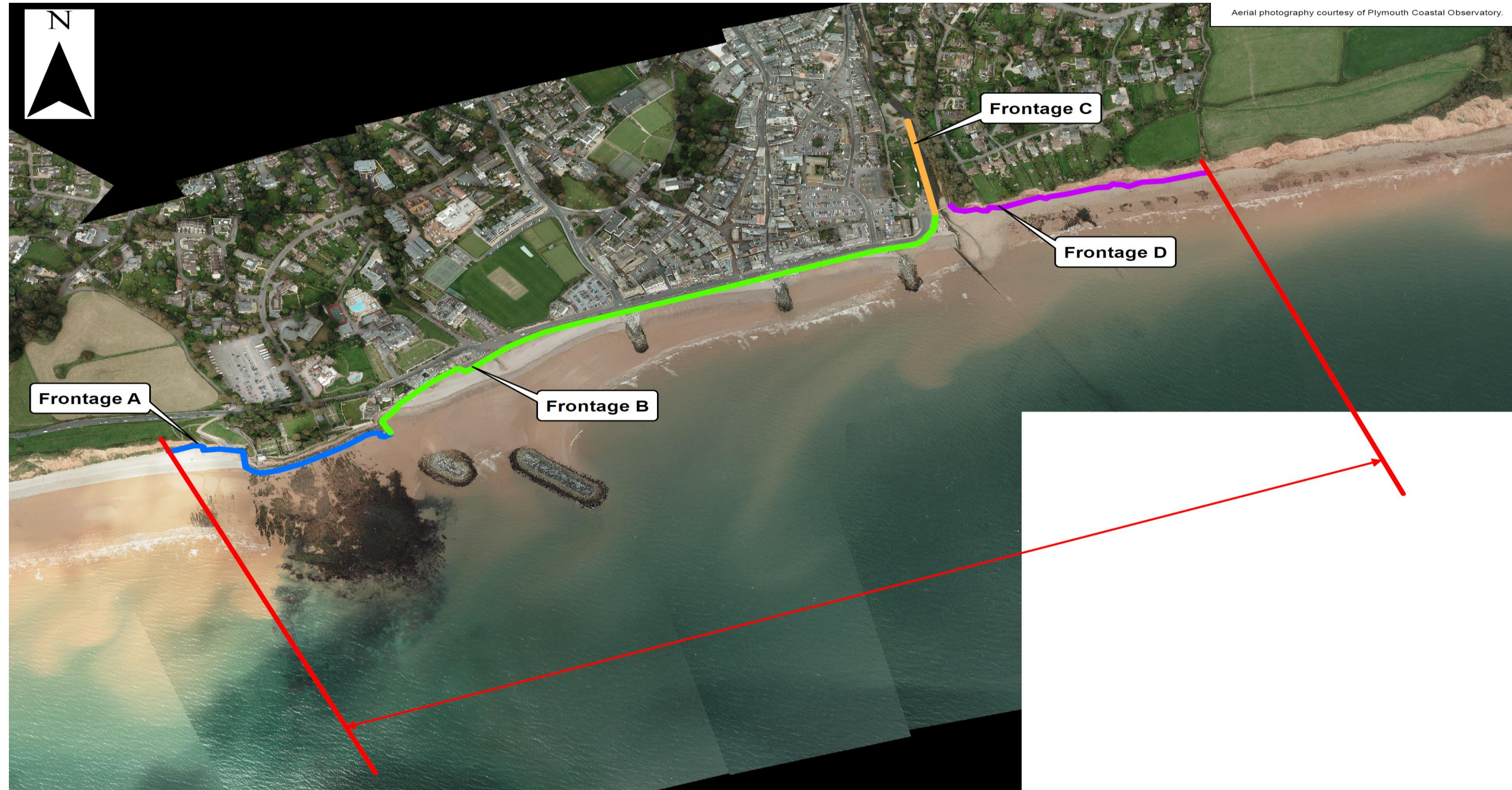
Environmental Screening and Scoping

Further work has been undertaken in contacting the statutory stakeholders to confirm their formal opinion on the work required to be submitted as part of the Licence and/or Planning submissions. We have also had informal discussions to understand and explore what they see as sensitivities to the protected areas and how we can best manage these with any proposals.



Sidmouth Coastal Scheme

Proposed Improvements



The different frontages are characterised by different features and environments.

Introduction

The preferred scheme contains a number of measures that together will help to maintain and improve the existing coastal defences currently in place along Sidmouth frontage. The new defences will reduce cliff erosion, shingle loss and flooding.

The final designs of the scheme, in terms of appearance and additional amenity benefits are yet to be finalised. While there is scope to adjust the final design details, the function of the proposed measures must ensure that the requirements of the Beach Management Plan are fulfilled.

Jacobs Ladder rock revetment

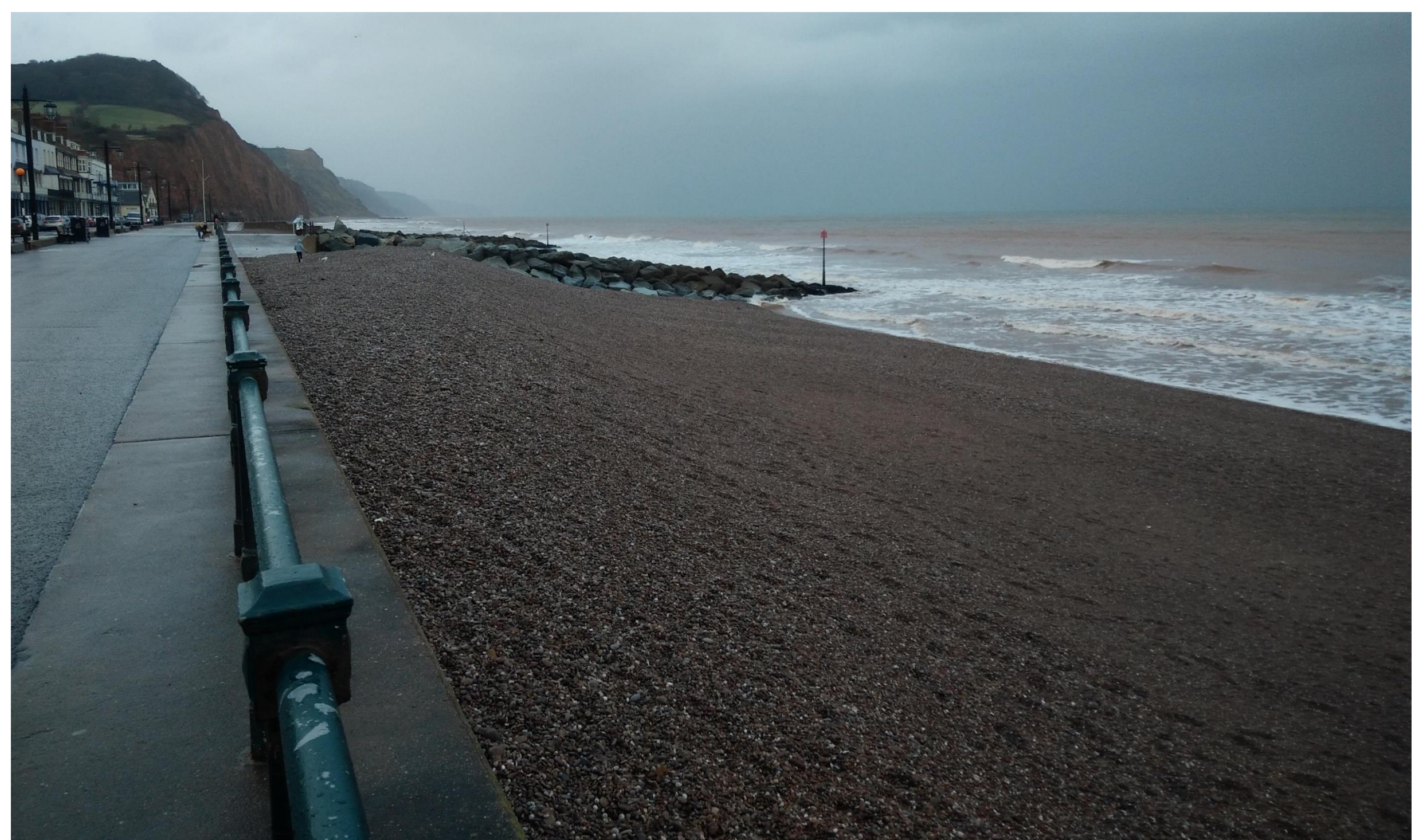


Frontage A - *Jacobs Ladder Revetments*

- The rock revetment helps to absorb wave energy, reduce erosion and protect Connaught Gardens.
- The existing rock revetments that connect Jacobs Ladder beach to the town beach are in a moderate condition and do not require significant alteration.
- These revetments will be maintained and restored to their original condition where required.
- Where the promenade is affected by beach shingle during a storm this will be cleared when practical.

Frontage B - *Town Beach*

- The primary structure along the town beach is the sea wall that reduces the horizontal erosion of the shore. This has in the past been improved and foundations strengthened.
- The existing rock breakwaters and groynes are designed to hold a wider shingle beach that will both protect the wall and dissipate some of the wave energy reducing wave overtopping.
- The existing shingle beach has been depleted over time and therefore it is intended to recharge the beach to the design levels. This will also increase the amenity space available to the community.
- The increased beach shingle will absorb storm energy, further reducing wave energy and the rate of wave overtopping along the frontage.
- The existing groynes will continue to help reduce the loss of shingle from the beach in the future.
- With the expected water level and storms, the height of the defences will need to be increased to provide an acceptable standard of defence and obtain funding for the improvements.
- The splash wall at the back of the promenade can be increased in height to reduce the volumes of sea water reaching the town, reducing the flood risk.
- The style of this wall is presented on another poster where we welcome your ideas.
- Maintenance to the River Sid training wall at the east end of the Town Beach. This structure helps to maintain the level of shingle on the beach before the river.



Sidmouth Coastal Scheme

Proposed Improvements



East Beach



View of current groynes from Jacob's Ladder



Height of a person in relation to the eastern groyne

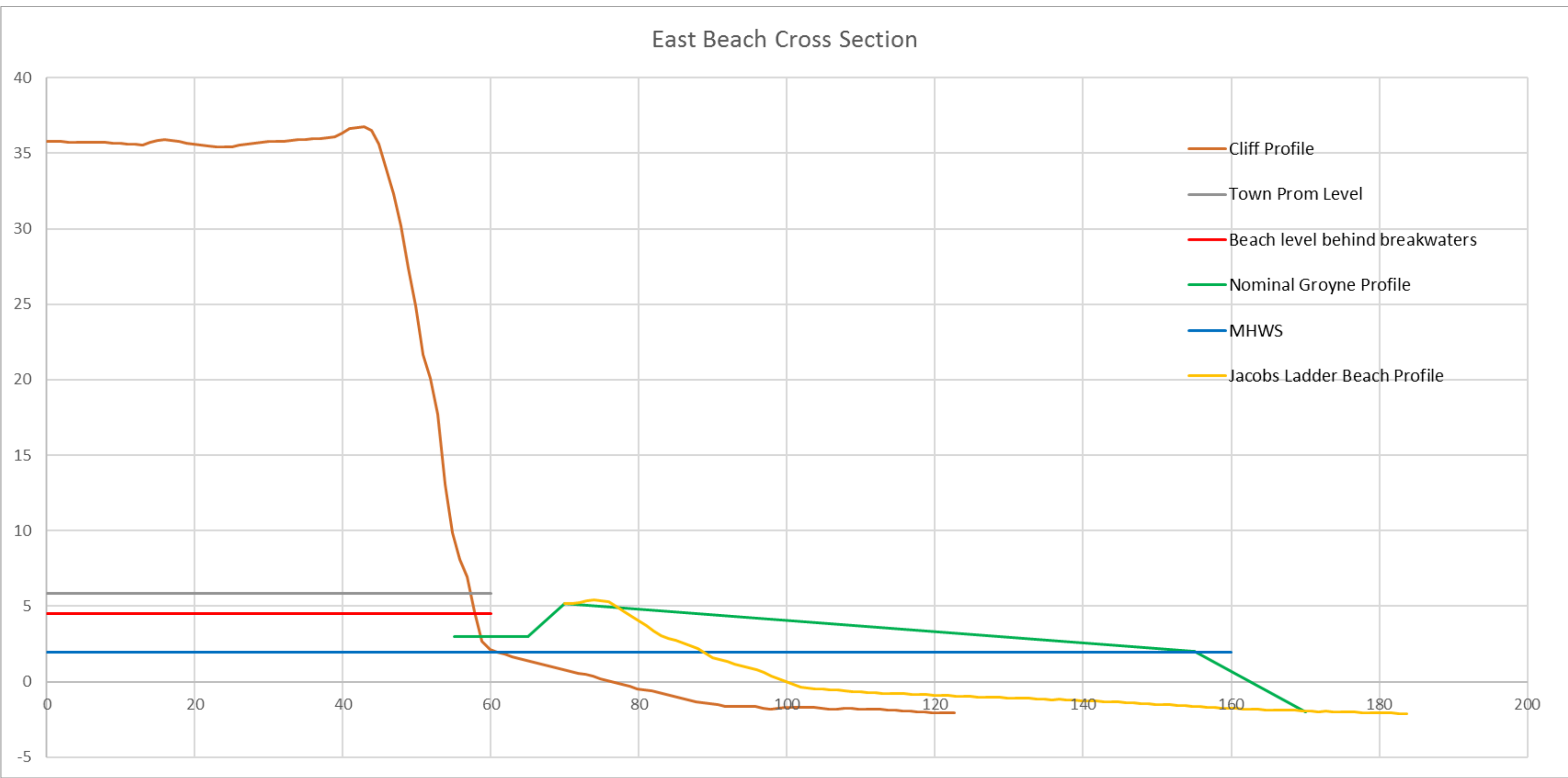
Frontage D - *East Beach Rock groynes*

At East Beach there is a change in character from the town beach as it is backed by some 35+m high sandstone cliffs. These cliffs have been eroding like cliffs in the surrounding area due to the impact of waves particularly, during storms. There is occasionally a small beach that builds following periods of waves from the South East, though due to the dominant South Westerly Wave the beach continues to move further eastwards.

The Beach Management Plan determined the preferred option for reducing the erosion of the cliffs would be to hold a nourished beach with 1 or 2 new rock groynes. Further modelling and analysis have determined that one longer groyne is the most effective approach to hold a beach. This is currently estimated at about 120m compared to the town beach structures of about 75m long. This will allow a more secure beach and enable some beach material to be collected that differs to the east from the town beach. This may in the future be used to recycle the material back on to the main beach when necessary.

The groyne would be constructed first and then additional shingle will be placed to the west as part of the beach renourishment.

The new groyne will look similar to those currently on the town beach but will extend the protective measures to the cliffs.



Geographical assessment from locations to understand likely shapes and sizes of structures



Existing Town Beach rock groynes retain the shingle



Strategic layout of the proposed East Beach and River Sid measures

Sidmouth Coastal Scheme

What Happens Next?

Next Steps

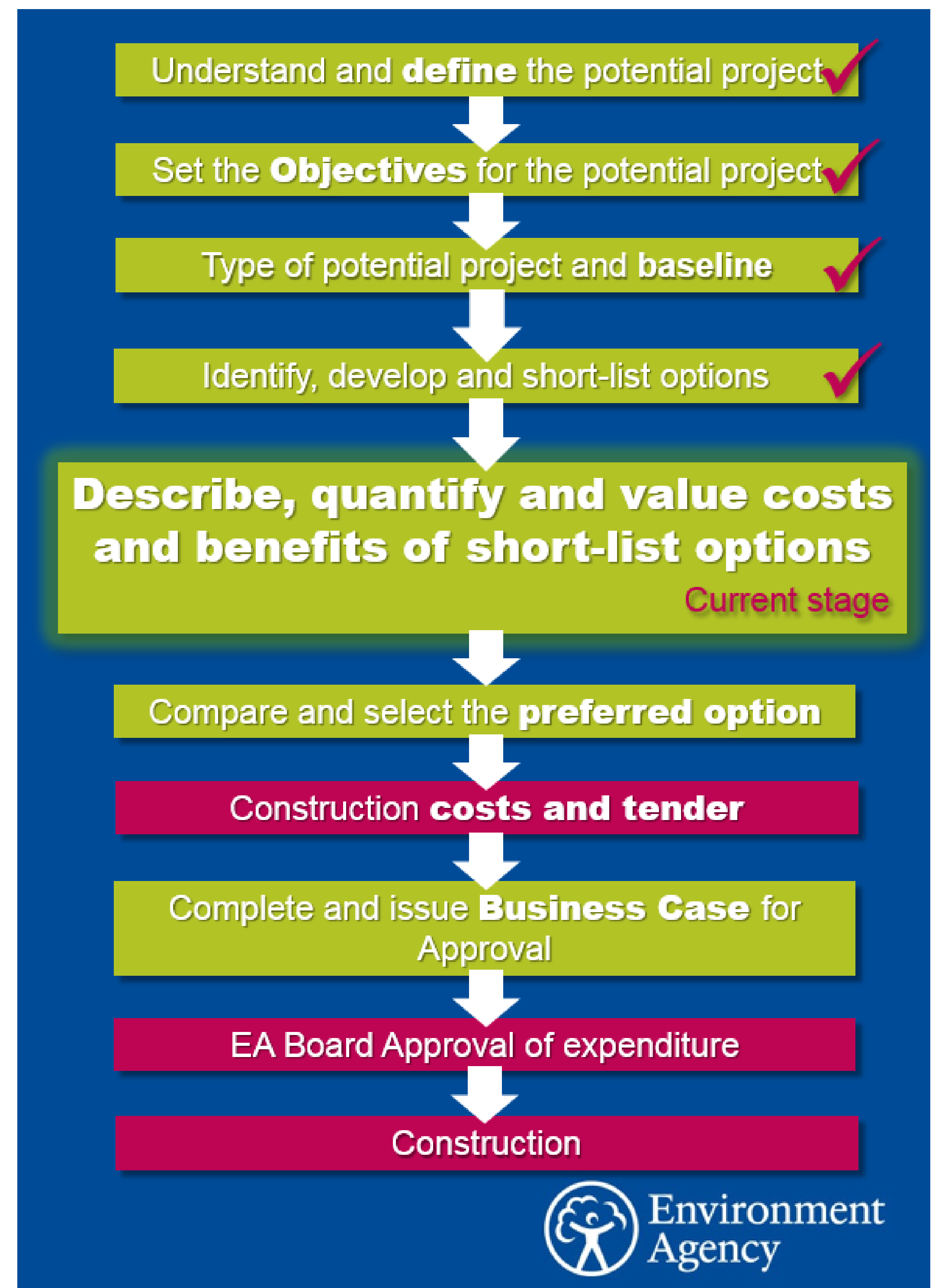
The next steps of the project are to finalise the Preferred Option and obtain approval for the Outline Business Case that is required to obtain funding for the Detailed Design Stages.

Further work will be required to collate and present all the supporting information that is required for the Licensing and Consents as required by the Marine Management Organisation and Planning Authority. This will be supported by an Environmental Statement to ensure that any impacts due to the works are minimised.

Alongside this, the detailed design and engineering drawings, calculations and specifications will be produced to define the construction requirements.

This design information is then used for pricing and the procurement of a Construction Contractor who will undertake the works.

Then to ensure that the money continues to be well spent, further approval is required with a Full Business Case. This considers benefits, funding and affordability of the works as well as the risks of the scheme going forward. This will then require sign off by both East Devon District Council and the Environment Agency to confirm the FDGiA funding for Construction of Scheme Improvements.



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

Version 8 January 2014

Project Name: []

Unique Project Number: []

All figures are in £'s

Figures in Blue to be entered onto Medium Term Plan

SUMMARY: prospect of FCRM GIA funding

Raw Partnership Funding Score: [] (1)

Adjusted Partnership Funding Score (PF): [] (2)

PV FCRM GIA towards the up-front costs of this scheme (PV Cost for Approval): [] (4)

1. Scheme details

1a. Management Authority type of asset maintained: [] (5)

Duration of Benefits (years): [] (7)

PV Whole-Life Benefits:

PV Costs:

PV Design & Construction Costs: [] (10)

Sub Total - PV Cost for Approval (appraisal, design, construction): [] (11)

PV Post-Construction Costs: [] (12)

PV Whole-Life Costs: [] (13)

PV Contributions secured to date:

PV Local Levy secured to date: [] (14)

PV Public Contributions secured to date: [] (15)

PV Shared Contributions secured to date: [] (16)

PV Funding from other Environment Agency functions/resources secured to date: [] (17)

PV Total Contributions secured to date: [] (18)

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

Number of households in:

20% most deprived areas: []

21-40% most deprived areas: []

41-60% most deprived areas: []

61% least deprived areas: []

Change in household damages, in:

20% most deprived areas: []

21-40% most deprived areas: []

41-60% most deprived areas: []

61% least deprived areas: []

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

Number of households in:

20% most deprived areas: []

21-40% most deprived areas: []

41-60% most deprived areas: []

61% least deprived areas: []

Change in household damages, in:

20% most deprived areas: []

21-40% most deprived areas: []

41-60% most deprived areas: []

61% least deprived areas: []

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

Payments under:

OM4a: []

OM4b: []

OM4c: []

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

Qual. benefits: []

Payment rate: []

FCRM GIA contribution: []

Assumed benefits per unit:

OM4a: []

OM4b: []

OM4c: []

OM4d: []

OM4e: []

OM4f: []

OM4g: []

OM4h: []

OM4i: []

OM4j: []

OM4k: []

OM4l: []

OM4m: []

OM4n: []

OM4o: []

OM4p: []

OM4q: []

OM4r: []

OM4s: []

OM4t: []

OM4u: []

OM4v: []

OM4w: []

OM4x: []

OM4y: []

OM4z: []

Assessment for Outcomes delivered: []

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

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

Funding

Funding of the coastal defence improvements will primarily be through the Environment Agency FDGiA. This money is available to reduce the number of homes at risk from flooding. This is undertaken through a cost and benefit analysis. The costs incurred include the construction of the scheme e.g. rocks and beach shingle. The Do Nothing damages have been assessed at approximately £97m, this needs to be assessed again for the preferred Option and the difference is the benefit the scheme provides. The costs need to be assessed over the lifetime of the assets which is 100 years. Over this timeframe the current discounted cost estimates are in the region of £11m.

Due to the presence of existing defences and the potential levels of future flooding damages there will be some funding available. This is assessed through the Partnership Funding Calculator. This funding however, will not be sufficient to cover all the costs of the project and therefore further funding will be required from other sources to ensure that this can be progressed. East Devon District Council have been working with a number of partners to secure contributions to support these works.

Any comments ?

Further comments can be made either directly to East Devon District Council or via any Steering Group Members.

There is planned to be a further public exhibition prior to planning and licence applications.

Formal comments may also be submitted to the authorities when the planning and licences are formally advertised.



More than just a seawall..

We want to hear your thoughts!



Why do we need to raise the wall?

Our current work suggests raising the height of the splash wall. A higher wall would provide Sidmouth Town with better protection from future flooding, and the beach management plan would be more likely to receive the necessary government funding.



How the raised splash wall may look from the beach

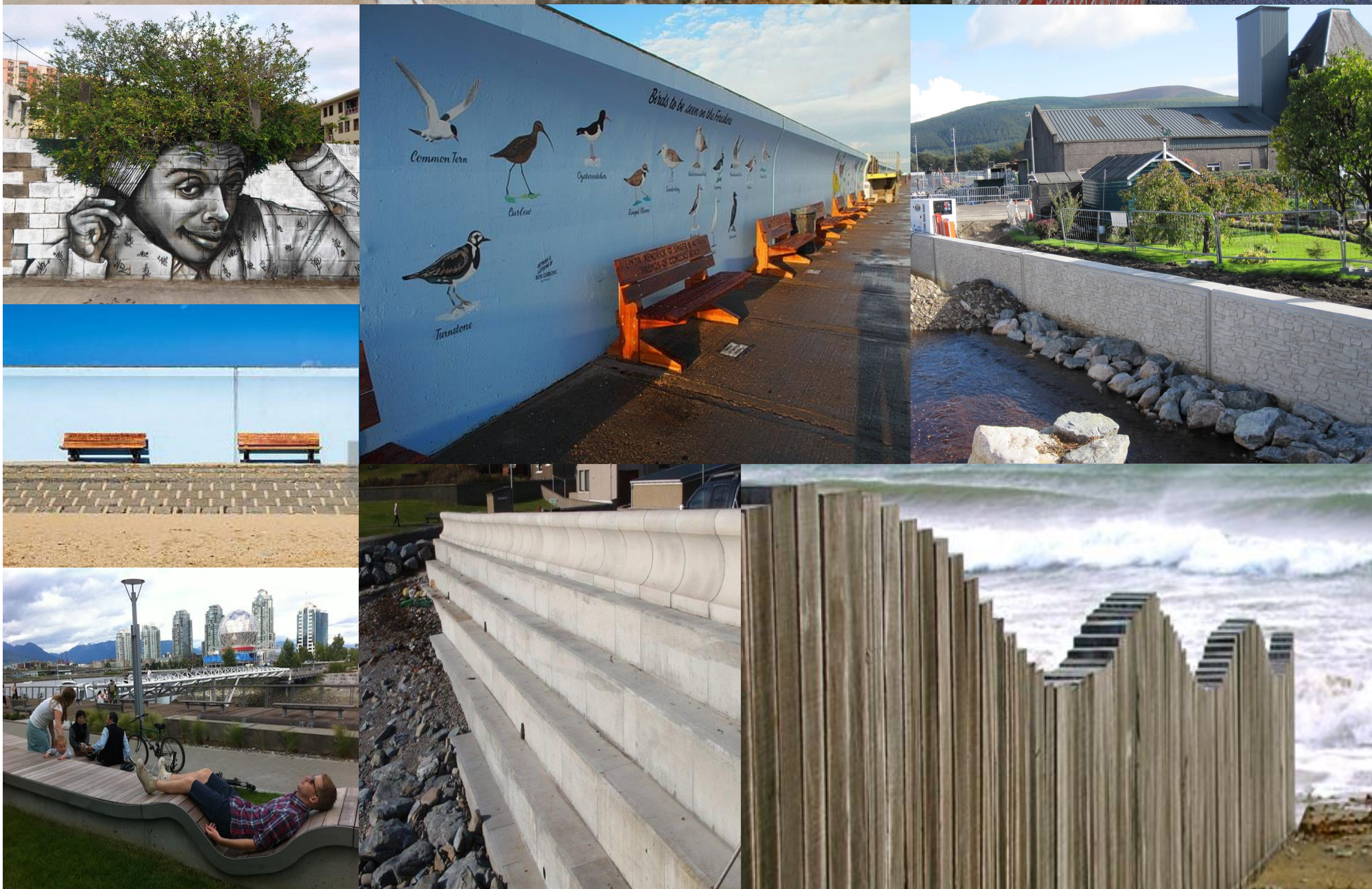


Approximate height of splash wall from promenade



Please share your ideas for the wall below...

Post it



East Devon Area of Outstanding Natural Beauty (AONB)

Recreational Amenity

The beaches surrounding Sidmouth provide space for dog walking, storm watching, swimming, surfing, kayaking, paddle boarding, fishing/angling, beachcombing, bird watching and fossil hunting. They are also home to community events such as folk week, Sidmouth sea fest, Sidmouth carnival. Disturbance to these activities and events will be minimised wherever possible

Chit Rocks

Contain rare remains of Middle Triassic fossils and form part of the Ladram Bay to Sidmouth Special Site of Scientific Interest



Tourism

The flood defence works will take place outside peak holiday season, weekends and public holidays wherever possible to minimise impacts on the tourism industry

Sidmouth Town Centre Conservation Area

Historic city centre with shops dating back to the 19th century



Dorset and East Devon World Heritage Site

Shows the transition between two different geological periods and rare remains of fish, amphibians and reptiles. The addition of a groyne should reduce the rate of coastal erosion along East Beach, as well as the cliffs

Sidmouth to West Bay Special Area of Conservation

Vegetated sea cliffs



Cultural Heritage

Roman and Bronze Age Activities plus Neolithic and Dark Age settlements on High Peak

Jacob's Ladder Beach

Jacob's Ladder Bathing Waters

Sidmouth Town Bathing Waters

Pennington Point

East Beach

Boat launching

Activities such as sailing and gig racing, will be impacted as minimally as possible due to work occurring out of season

