REPORT

Sidmouth Beach Management Scheme

Preliminary Environmental Information Report

Client: East Devon District Council (EDDC)

Reference: I&BPB6525R001D0.1

Status: 0.1/Final

Date: 24 November 2022

East Devon District Council

Royal HaskoningDHV
Enhancing Society Together

HASKONINGDHV NEDERLAND B.V.

Regus House
Exeter Business Park
1 Emperor Way
Exeter
EX1 3Qs
United Kingdom
Industry & Buildings
Trade register number: 56515154

+44 1392 447999 **T**
email **E**
royalhaskoningdhv.com **W**

Document title: Sidmouth Beach Management Scheme

Document short title: SBM Scheme
Reference: I&BPB6525R001D0.1
Status: 0.1/Final
Date: 24 November 2022
Project name: Sidmouth Beach Management Scheme
Project number: PB6525
Author(s): Dr Peter Brunner, Abbie Garry, Victoria Cooper & Christa Page

Drafted by: **Dr Peter Brunner**

Checked by: **Lucia Stothert**

Date: 23/11/2022

Approved by: **Dr Peter Brunner**

Date: 24/11/2022

Classification
Project related

Table of Contents

1	**Introduction**	**8**
1.1	Overview	8
1.2	The Preliminary Environmental Report (PEIR)	10
1.2.1	Additional reporting requirements	11
1.2.1.1	Habitats Regulation Assessment (HRA)	11
1.2.1.2	Water Framework Directive (WFD) Compliance Assessment	11
1.2.2	Reporting not included	11
1.3	Planning and Policy	12
1.3.1	National Planning Policy framework	12
1.3.2	Defra's 25 Year Environment Plan	12
1.3.3	Marine Policy Statement	12
1.3.4	Local Plans	13
1.4	Report structure	13
2	**Description of the Scheme**	**14**
2.1	Introduction	14
2.1	Development of Options	14
2.1.1	Original Scheme	15
2.1.2	Preferred Way Forward	16
2.2	Proposed Scheme Description and Construction Methodology	17
2.2.1	Beach Nourishment Works	17
2.2.2	Construction of the Offshore Rock Breakwater and Terminal Rock Groyne	17
2.2.3	Construction of the Shore-based Works	17
2.3	Proposed Programme	19
2.3.1	Working Hours	19
2.4	Proposed Monitoring and Maintenance	19
3	**Environmental Appraisal Approach**	**20**
3.1	Introduction	20
3.2	Environmental Impact Assessment Methodology	20
3.2.1	Impact Significance	20
3.2.2	Impact Assessment Matrix	22
3.3	Consultation	23
3.3.1	Formal Consultation to Date	23
3.3.2	Informal Consultation and Public Exhibition to Date	30
3.4	Risk Work Shop	31
3.5	Cumulative Impacts	31

4 Designated Sites 32
4.1 Introduction 32
4.2 International Designated Sites 32
4.3 National Designated Sites 32
4.4 High Level Screening for the Consideration of Designated Sites 33

5 Socio-economics, Health, Tourism, Amenity and Recreation 38
5.1 Introduction 38
5.2 Baseline Environment 38
5.2.1 Local Community, Health, Leisure and Tourism 38
5.2.2 Designated Sites 41
5.3 Impacts during Construction 41
5.3.1 Impacts arising as a result of the diversion or closure of the Esplanade 41
5.3.2 Impacts arising from the rolling closure of the beach during recharge 42
5.4 Impacts during operation 42
5.4.1 Beneficial impact to Sidmouth residents, business operators and visitors through increased flood protection 42
5.4.2 Beneficial impact to the Sidmouth boating community 42
5.4.3 Potential amenity improvements as a result of the upgrade to splash wall 42
5.4.4 Improved accessibility to the AONB and Jurassic Coast at East Beach 43
5.5 Proposed Mitigation 43

6 Traffic and Transport 44
6.1 Introduction 44
6.2 Baseline Environment 44
6.2.1 Traffic 44
6.2.2 Marine Traffic 45
6.3 Impacts during Construction 45
6.3.1 Impact of increased number of HGVs and construction vehicles on local traffic 45
6.3.2 Impact on marine navigation 46
6.4 Impacts during Operation 46
6.5 Proposed Mitigation 46

7 Ecology 48
7.1 Introduction 48
7.2 Baseline Environment 48
7.2.1 Designated Sites 48
7.2.2 Habitats and Species of Principal Importance in England 49
7.2.3 Migratory Fish 49
7.2.4 Fish Spawning and Nursery Areas 50
7.2.5 Shellfish Ecology 51
7.2.6 Benthic and Intertidal Ecology 52
7.2.7 Marine Mammals 52

7.3 Impacts during Construction 53
7.3.1 Increased suspended sediment concentration and smothering 53
7.3.2 Underwater noise due to rock placement and beach recharge 53
7.4 Impacts during Operation 54
7.4.1 Loss of habitat 54
7.4.2 Increased suspended sediment concentration and smothering 54
7.5 Proposed Mitigation 54

8 Landscape 55
8.1 Introduction 55
8.2 Baseline Environment 55
8.3 Impacts during Construction 58
8.4 Impacts during Operation 59
8.4.1 East Devon Area of Outstanding Natural Beauty (AONB) 59
8.4.2 Setting of Conservation Area 59
8.4.3 Setting of World Heritage Site 59
8.4.4 Setting of High Peak Camp 60
8.4.5 Setting of Grade II and II Listed Buildings 60
8.4.6 Users of the South West Coast Path 60
8.4.7 Proposed Mitigation 60

9 Archaeology and Cultural Heritage 62
9.1 Introduction 62
9.2 Baseline Environment 62
9.2.1 Designated Heritage Assets 62
9.2.2 Non-Designated Heritage Assets and Archaeological Potential 67
9.2.3 Historic Character 70
9.3 Impacts during Construction 72
9.3.1 Direct Impacts 72
9.3.2 Indirect Impact: Coastal Processes 74
9.3.3 Indirect Impact: Historic Character 76
9.3.4 Indirect Impact: Historic Character 78
9.4 Proposed Mitigation 82

10 Noise, Vibration and Air Quality 84
10.1 Introduction 84
10.2 Baseline Environment 84
10.2.1 Noise and Vibration 84
10.2.2 Air Quality 85
10.3 Impacts during Construction 85
10.3.1 Impacts on air quality arising from the movement of construction vehicles 85
10.3.2 Increased noise and vibration levels associated with works to the splash wall 87
10.3.3 Increased noise levels during beach recharge at Sidmouth town frontage 88

10.3.4 Increased noise levels during construction of the new breakwater and groyne 88
10.3.5 Increased noise levels associated with construction traffic 88
10.4 Impacts during Operation 88
10.4.1 Impacts arising from increased noise levels during period recharge to retain design beach 88
10.5 Proposed Mitigation 89

11 Coastal Processes and Hydrodynamics 91
11.1 Introduction 91
11.2 Baseline Environment 91
11.2.1 Wave climate 91
11.2.2 Tidal Currents 92
11.2.3 Sediment Transport 93
11.3 Impacts during Construction 94
11.4 Impacts during Operation 94
11.4.1 Sediment Transport 94
11.4.2 Waves 95
11.4.3 Tidal currents 99
11.5 Proposed Mitigation 99

12 Geology and Geomorphology 100
12.1 Introduction 100
12.2 Baseline Environment 100
12.2.1 Cliff erosion 101
12.3 Impacts during Construction 102
12.4 Impacts during Operation 103
12.4.1 Impacts on sediment transport 103
12.4.2 Impacts on cliff erosion 103
12.4.3 Impacts on designated sites 103
12.5 Proposed Mitigation 103

13 Water Environment 104
13.1 Introduction 104
13.2 Approach and Baseline Environment 104
13.3 Overall Construction and Operation Impacts 106
13.4 Proposed Mitigation 106

14 Cumulative Effects 107

15 Summary 107

16 References 108

Table of Tables

Table 3.1 Terminology for Defining and Classifying Environmental Impacts 20
Table 3.2 Criteria for Determination of Significance 21
Table 3.3 Definitions of Impact Significance 21
Table 3.4 Matrix for Calculation of Significance 22
Table 3.5 Summary of Consultation Responses in 2018 and Current Relevance to the Proposed New SBM Scheme of 2022 24
Table 4.1 High Level Screening for Designated Sites 36
Table 7.1 Key Fish Species and Migration Periods 50
Table 9.1 HLC and HSC Character Types 70
Table 9.2 Potential for Change to Historic Character in Each Area of the SBM Scheme 76
Table 9.3 Summary of Settings Assessment 80
Table 10.1 Sensitive Receptors of Sidmouth Town Frontage 84
Table 10.2 Recommended Mitigation Measures 85
Table 11.1 Tide Levels for Lyme Regis, the Nearest Tide Data Point to Sidmouth 92
Table 11.2 Pre-and Post-Scheme Wave Overtopping along Road in Meters - 2017 96
Table 11.3 Pre-and Post-Scheme Wave Overtopping along Road in meters - 2117 96
Table 12.1 Cliff Erosion Rates Calculated from Historical Ordnance Surveys. Values m/year. 101
Table 12.2 Cliff Erosion Rates Calculated from Historical Aerial Photography. Values m/year. 101
Table 13.1 Summary of Activities and Potential Pathways for Effects on WFD Water Bodies Screened in for Consideration 105

Table of Figures

Figure 1.1 Sidmouth and Frontages 9
Figure 1.2 Proposed SBM Scheme 10
Figure 2.1 Sidmouth's current coastal defence arrangements 15
Figure 2.2 Proposed SBM Scheme Shore-based works 18
Figure 4.1 International and National Designated Sites - Overview 34
Figure 4.2 International and National Designated Sites – Site Specific 35
Figure 5.1 Key Sidmouth Local Community, Health, Leisure and Tourism Features 39
Figure 5.2 Key Public Rights of Way and National Trails 40
Figure 5.3 Sidmouth Population Age 40

Figure 6.1 Sidmouth Transport Routes 44
Figure 7.1 Fisheries Spawning/Nursery Data for Lyme Bay 51
Figure 8.1 Key Landscape and Seascape Designations in the Study Area 56
Figure 9.1 Study Area Showing Heritage Interests 63
Figure 9.2 Non-designated Heritage Assets in the Study Area 68
Figure 11.1 Met Office WaveWatch III Hindcast Wave Record 91
Figure 11.2: Wave Overtopping Along Sidmouth Town 92
Figure 11.3 Sediment Movement 1 93
Figure 11.4 Sediment Movement 2 93
Figure 11.5 Model Output Illustrating Continued Overtopping of Town Frontage with the Design Beach and Splash Wall in Place 97
Figure 11.6 Wave Run Up During a 100% AEP (1 in 1 year) Storm Event on East Beach Indicating Very Low Levels of Water Reaching the Toe of the Cliff. 98
Figure 11.7 Wave Run Up During a 0.5% AEP (1 in 200 year) Storm Event on East Beach Showing More Water Reaching the Cliff 98
Figure 12.1 Cliff Recession Predictions for 100 Years at East Beach 102
Figure 13.1 Works Extent Against the WFD Water Bodies 105

Appendices

Appendix 1 – Habitats Regulations Assessment
Appendix 2 – Water Framework Directive Compliance Assessment
Appendix 3 – Stakeholder Engagement Plan
Appendix 4 – Engineering Reports
Appendix 5 – Archaeology and Cultural Heritage Plates

1 Introduction

1.1 Overview

Sidmouth is a town on the English Channel in Devon, South West England, 14 miles (23 km) southeast of Exeter (**Figure 1.1**). The frontage of Sidmouth has a long history of construction and maintenance in regard to coastal flooding and erosion risk management schemes. Following the storms of 1989 and 1990, the Sidmouth Town frontage experienced substantial damage to its existing defences and substantial volumes of shingle were lost to the east of Sidmouth. This storm damage triggered the need for upgraded coastal flood and erosion risk management measures. The need for further works was triggered following storms in 1993 and 1994.

The current flood and coastal erosion risk management measures along the Sidmouth Town frontage were constructed over many phases between 1991 and 2000 and comprise seawalls, rock revetments, splash wall, rock groynes, offshore rock breakwaters, a river training wall, coupled with beach recharge and recycling as required. Wave overtopping and the subsequent risk of coastal flooding along the Sidmouth town frontage is generally controlled by the retained beach in front of the seawall and the low splash wall that is situated on the landward side of the promenade. The beach, in conjunction with the buried rock revetment, also helps to protect the seawall from undermining and subsequent potential failure. Over recent years, beach levels have dropped to lower than the design level (which was set as part of the 1990s schemes); and in places the sea wall concrete apron and seawards rock armour are now exposed. This results in increased wave reflection on the exposed vertical seawall which exacerbates wave overtopping and increases the risk of flooding. Wave reflection also worsen the reduction in the already low beach levels.

The East Beach frontage consists of Pennington Point cliffs which has a small shingle beach at its base. The cliffs are otherwise undefended. The Pennington Point cliffs are eroding, and thereby retreating. Causes of erosion are associated with weathering and lack of drainage from above the cliffs, along with wave impact on the lower cliff. Beach levels have lowered in recent years causing more exposure of the cliff toe to wave action. The continued erosion of the cliffs is now posing a risk of outflanking of the Sidmouth Town defences. Retreating of the cliff face is resulting in the gradual increased exposure of the western river wall of the River Sid to coastal sea storm conditions (primarily from easterly / south-easterly directions). It is recognised that East Cliff is also subject to erosion as a result of other physical processes (e.g. weathering from above due to intense rainfall / insufficient drainage).

In addition, as East Cliff continues to erode over the next 100 years, the Alma Bridge will become unsustainable in its current position. The western wall of the River Sid, which currently provides fluvial flood defence, will become increasingly exposed to full coastal conditions. Therefore, there will be an increased likelihood of defence failure and thus occurrence of flood damages.

Following the updated Partnership Funding Calculator for Flood and Coastal Risk Management (FCRM) projects by the Environment Agency in 2020, additional Flood Defence Grant in Aid (FDGiA) was released for the approved flood defence scheme, which provided the basis for exploring alternative options. Therefore, East Devon District Council (EDDC), in collaboration with an elected Stakeholders Sub-Group, 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) (**Figure 1.1**). Based on the assessment, it has been concluded the preferred way forward for the new Sidmouth Beach Management (SBM) scheme (herein refereed to as the “proposed SBM scheme”) comprises a permutation of the originally BMP’s preferred option.

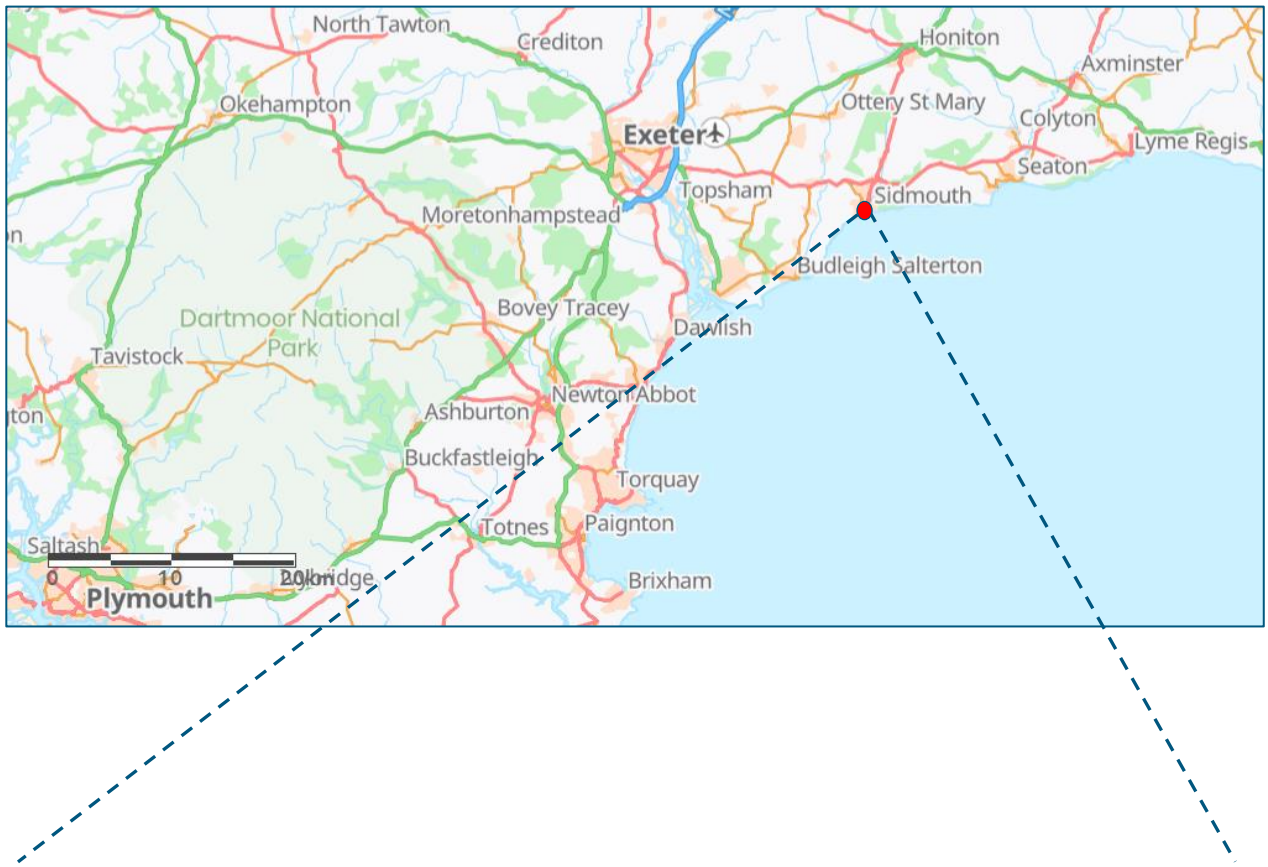


Figure 1.1 Sidmouth and Frontages

In summary the preferred solution for the proposed SBM scheme will include the following (**Figure 1.2**):

- Beach recharge (with shingle) along the town (Sidmouth) beach frontage.
- Raised splash wall and flood gates to 1m high at key locations.
- New long groyne and beach nourishment at East Beach.
- New maintenance ramp.
- In line with the new offshore breakwater, new splash wall foundations enabling future raising of upstand when overtopping rates become unacceptable in the mid to long term (to be refined at detailed design stage).
- Construction of one offshore breakwater (rock islands) in front of the Town Beach (dimensions and location to be refined at detailed design stage).

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.

Furter details on the proposed new SBM scheme of 2022 is presented in **Section 2.2** of this Preliminary Environmental Report (PEIR) report.

1.2 The Preliminary Environmental Report (PEIR)

The PEIR has been prepared in support of the Outline Business Case (OBC) for the Environment Agency's internal application for funding and technical approval for the proposed SBS scheme. This report therefore aims to identify and describe the environmental issues, constraints, and opportunities relating to the scheme where information exists and recommend where possible, actions required to further assess or manage any environmental impacts during subsequent phases of implementation. It should be noted the PEIR is not a formal Environmental Impact Assessment (EIA), and as such, an EIA screening and scoping letter will be prepared and sent to EDDC and the Marine Management Organisation (MMO) to seek their opinion on the requirements of an EIA under the Town and Country Planning (EIA) Regulations 2017; and the Marine Works (EIA) Regulations 2017. This will be sent on completion of the Final Business Case (FBC) for the SBM scheme.

1.2.1 Additional reporting requirements

1.2.1.1 Habitats Regulation Assessment (HRA)

The proposed SBM scheme is located within the Sidmouth to West Bay Special Area of Conservation (SAC) and within 6km of the Lyme Bay and Torbay SAC.

Regulation 63 of the Conservation of Habitats and Species Regulations 2017 (as amended) defines the procedure for the assessment of the implications of plans or projects on European sites (Special Areas of Conservation (SACs) and SPAs). Under these Regulations, if a proposed development is unconnected with site management and is likely to significantly affect a European site, the statutory regulator (the 'Competent Authority') of the proposed development must undertake an 'appropriate assessment' (Regulation 63(1)).

Changes to The Conservation of Habitats and Species Regulations 2017 (as amended) have been implemented by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019. The key changes are the creation of a 'National Site Network' (NSN) (which no longer forms part of the EU Natura 2000 network) and the establishment of management objectives for the NSN. The network objectives are to:

- Maintain or, where appropriate, restore habitats and species listed in Annexes I and II of the Habitats Directive to a favourable conservation status.
- Contribute to ensuring, in their area of distribution, the survival and reproduction of wild birds and securing compliance with the overarching aims of the Wild Birds Directive.

Given the location, nature and scale of the proposed works, the proposed SBM scheme will need to comply with the measures set out in Council Directive (92/43/EC) on The Conservation of Natural Habitats and Wild Flora and Fauna (herein referred to as the 'Habitats Directive'). A high level HRA has been carried out for the scheme. Further information on the designations is provided in **Section 4**; and the HRA can be found in **Appendix 1**. It should be noted **a detailed HRA will be required once the final design has been determined for the proposed SBM scheme**.

1.2.1.2 Water Framework Directive (WFD) Compliance Assessment

The WFD was transposed into national law in England by means of the Water Environment (WFD) (England and Wales) Regulations 2017. The requirements of these Regulations continue following the UK's withdrawal from the EU under the provisions of the Floods and Water (Amendment etc.) (EU Exit) Regulations 2019. Unlike the EU Birds and Habitats Directives (EC Directive on the Conservation of Wild Birds (2009/147/EC) and EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC), respectively), which apply only to designated sites, the WFD applies to all bodies of water, including river, lake, groundwater, estuary and coastal wate bodies.

The proposed SBM scheme is located within the Lyme Bay West Coastal water body (GB650806420000) and within the Sidmouth and Honiton Mercia Mudstone Groundwater body (GB40802G802800). There is also the potential that the works could indirectly impact on the River Sid waterbody (GB108045009160). As a WFD Compliance Assessment has been undertaken for the scheme which is presented in **Appendix 2**. It should be noted **an updated WFD Compliance Assessment will be required once the final design has been determined for the proposed SBM scheme**.

1.2.2 Reporting not included

For the OBC phase of the project, a Landscape Visual Impact Assessment (LVIA) has not been carried out, although based upon the outcomes of the EIA screening and scoping opinion for the proposed SBM scheme,

an LVIA may be required as part of the Environmental Statement (ES) for the scheme. Although Biodiversity Net Gain (BNG) Assessments will become mandatory for developers in 2023, this only applies to developments which are permitted under the Town & Country Planning Act, and therefore only applies to developments taking place on land, at the coast, or anywhere above low tide. However, Natural England and Defra are currently working closely in developing net gain approaches for the marine environment which may be applicable for the construction of the groyne and breakwater if marine net gain becomes mandatory for developers.

1.3 Planning and Policy

The proposed SBM scheme has been developed in line with the requirements of relevant national and local policies and plans. In recognition of the developing policy landscape, a summary of key recently adopted plans/policies is provided below.

1.3.1 National Planning Policy framework

The National Planning Policy Framework (Ministry of Housing, Communities and Local Government, 2018) sets out the Government's planning policies for England and how these should be applied. It provides a framework within which locally-prepared plans for housing and other development can be produced. Planning law requires that applications for planning permission be determined in accordance with the development plan, unless material considerations indicate otherwise.

Chapter 14 of the NPPF focusses on meeting the challenge of climate change, flooding and coastal change and specifically states that '*the planning system should…help to shape places in ways that…minimise vulnerability and improve resilience'* and that '*in coastal areas, planning policies and decisions should take account of the UK Marine Policy Statement and marine plans. Integrated Coastal Zone Management should be pursued across local authority and land/sea boundaries to ensure effective alignment of the terrestrial and marine planning regimes'*.

The development of the proposed SBM scheme is considered to be wholly in line with the NPPF.

1.3.2 Defra's 25 Year Environment Plan

On the 11th January 2018, the Defra published its 25-Year Environment Plan outlining the objectives created to ensure that we leave the environment "in a better state than we found it". This will involve the government working with both communities and businesses in order to "improve the environment within a generation". A key goal to address environmental benefits and pressures identified in the plan includes '*making sure everyone is able to access the information they need to assess any risks to their lives and livelihoods, health and prosperity posed by flooding and coastal erosion'.*

The development of the proposed SBM scheme is considered to be wholly in line with the 25-Year Environment Plan.

1.3.3 Marine Policy Statement

The UK Marine Policy Statement (MPS) is the framework for preparing Marine Plans and taking decisions affecting the marine environment. In areas where a Marine Plan has not been adopted, planning decisions should be taken in line with the MPS. The South West Inshore Marine Plan has yet to be adopted however draft policies are being developed. The UK MPS recognises the importance of coastal management and specifically states that '*marine plan authorities should liaise with terrestrial planning authorities, drawing on Shoreline Management Plans (SMPs), and equivalent plans where available…and any other relevant*

evidence and coastal policies or strategies'.

The proposed SBM scheme has been developed in line with the recommendations of the SMP and is therefore considered to be in line with the UK MPS.

1.3.4 Local Plans

Sid Valley Neighbourhood Plan 2018 – 33

The designated Sid Valley Neighbourhood Plan area includes Sidmouth, Sidbury, Sidford and Salcombe Regis. EDDC approved the designation of The Sid Valley as a Neighbourhood Area on 1st April 2016. The intention of the plan is to provide a policy framework within which development in the Sid Valley, whether rural or urban, must take account of its highly prized natural and built environment and its cultural and community assets for the benefit of future generations and visitors. The Vision for the Sid Valley captures the aspirations of the community and provides a cohering framework for our Neighbourhood Development Plan. The Sid Valley Neighbourhood Plan (SVNP) aims to balance economic growth (jobs, homes and reasons to visit) with the protection and enhancement of its town, villages and open spaces. The policies provide local, specific detail to implement obligations in the East Devon Local Plan. The proposed SBM scheme has been developed in line with Sid Valley Neighbourhood Plan.

1.4 Report structure

A summary of sections is provided below:

- **Section 1** – provides an introduction to the PEIR and describes the background to and the need for the proposed SBM scheme.
- **Section 2** – describes the proposed SBM scheme in detail and the process by which the preferred option has been reached.
- **Section 3** – describes the overall methodology employed for the PEIR.
- **Section 4** – describes the designated sites potentially at risk.
- **Sections 5** to **13** identify and assess the potential environmental impacts of the scheme on a variety of parameters relating to the physical, natural, human and built environment comprising:
    - **Section 5** – Socio-economics, tourism, amenity and recreation
    - **Section 6** –Traffic and transport, including marine navigation
    - **Section 7** – Ecology
    - **Section 8** – Landscape
    - **Section 9** – Archaeology and cultural heritage
    - **Section 10** – Noise, vibration and air quality
    - **Section 11** – Coastal processes and hydrodynamics
    - **Section 12** – Geology and geomorphology
    - **Section 13** – Water environment

This PEIR also includes a number of appendices to support the assessment as follows:

- **Appendix 1** – Habitats Regulations Assessment
- **Appendix 2** – Water Framework Directive Compliance Assessment
- **Appendix 3** – Stakeholder Engagement Plan
- **Appendix 4** – Engineering Reports
- **Appendix 5** – Archaeology and Cultural Heritage Plates

2 Description of the Scheme

2.1 Introduction

This section of the PEIR describes the development of the preferred solution for the SBM scheme and proposed construction methodology.

2.1 Development of Options

During the development of the BMP a longlist of options were assessed against technical and economic factors (see Sections 3.3 and 3.5 of the OBC document). This was reduced to a shortlist of six options (see Section 3.2.4 of the OBC document). These were presented to the public for consideration and comment. As previously stated, 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, which provided the basis for exploring alternative options. Therefore, EDDC, in collaboration with an elected Stakeholders Sub-Group, 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 BMP for the main town (Frontage B) and East Beach (Frontage C) (**Figure 1.1**). Based on the assessment, it has been concluded the preferred way forward for the new Sidmouth Beach Management (SBM) scheme (herein refereed to as the "proposed SBM scheme") comprises a permutation of the originally BMP's preferred option, referred to as Option S4.4a.

To provide context to the preferred option, it is useful to understand the existing coastal defence arrangements along the BMP frontage. These are illustrated in **Figure 2.1** below.

Figure 2.1 Sidmouth's current coastal defence arrangements

Wave overtopping and the subsequent risk of coastal flooding along the Sidmouth town frontage is generally controlled by the retained beach in front of the seawall and the low splash wall that is situated on the landward side of the promenade. The beach, in conjunction with the buried rock revetment, also helps to protect the seawall from undermining and subsequent potential failure. Over recent years' beach levels have dropped to lower than the design level (which was set as part of the 1990s schemes) and in places the toe of the seawall is now exposed. This results in wave reflection on the exposed vertical seawall which exacerbates wave overtopping and increases the risk of subsequent flooding. The wave reflection also exacerbates the reduction in the already low beach levels.

This has recently been seen during the Valentines storm in February 2014 and Storm Brian in 2017. These storms highlight the current threat to the town of Sidmouth and the importance of ensuring adequate beach levels are maintained against the seawall to reduce wave overtopping risk. Along the eastern part of the Sidmouth Town frontage between East Pier Groyne and the River Sid Training Wall beach levels are much lower than adjacent frontages and there is an even greater risk of wave overtopping. This risk is exacerbated by the presence of the river training wall which causes reflection of the waves on to the promenade and wave run-up over the concrete slipway. The threat of coastal flooding is expected to increase in the future if no further intervention is undertaken as sea levels rise.

2.1.1 Original Scheme

The original preferred long-term approach to Flood and Coastal Erosion Risk Management (FCERM) along the Sidmouth open coast and East Beach frontage was developed by RHDHV in 2019. The preferred option included the construction of approximately 120m long rock groyne along East Beach, about 200m east of the River Sid; whilst modifying a length of the seaward end of the River Sid training wall to improve sediment transport between Sidmouth Town Beach and East Beach (and enable access for future beach management at East Beach). Beach nourishment was to re-establish the 1990 flood defence scheme beach profile and on East Beach; with the splash wall to the back of the promenade to be raised between 600mm and 100mm.

2.1.2 Preferred Way Forward

As mentioned above, the preferred solution for the new SBM scheme for 2022, is Option S4.4a which is detailed in **Section 2.2**,and comprises the following elements, as briefly discussed in **Section 1.1**; and presented in **Figure 1.2**:

- Beach nourishment works (62,250m^3 in total).
- 120m long rock terminal groyne.
- 70m long rock offshore breakwater.
- Shore-based works to raise / replace the splash wall; replace flood gates; new maintenance ramp; and modify a river training wall structure.

As stated, this option would reduce the need for maintenance / recharging of the beach by EDDC via introducing an offshore structure which would ensure a more stable beach at the town front and limit the potential loss of habitat.

2.2 Proposed Scheme Description and Construction Methodology

2.2.1 Beach Nourishment Works

The beach nourishment works (**Figure 2.2**),would be undertaken by trailing suction hopper dredgers (TSHD). A steel pipeline (either 1,000mm or 800mm diameter, depending on the vessel deployed) approximately 550m long will be sunk to the sea bed at the nourishment location (the sinkerline) for the duration of the works perpendicular to the coast, with the landward end located above the high water line.

The beach material (D50 in the region of 23mm) will be sourced from a Crown Estate licenced borrow area in the vicinity of the Isle of Wight and transported to Sidmouth in the hopper. At Sidmouth, the TSHD will connect to the sinkerline via a floating section of pipe and with the support of a multicat marine support vessel. With the connection made, the TSHD will discharge the hopper load onto the beach, pumping it ashore in a water/ shingle mixture. At this stage it is assumed that the material will be delivered as-dredged (i.e. unscreened).

Land based equipment such as an excavator and dozers will keep the end of the pipeline clear and move the material onto profile. Additional pipe sections will be added to extend the pipeline along the shore to nourish the entire beach area without the need for trucking the material along the beach. The sinkerline will be re-floated and repositioned to ensure coverage of the two beach sections of beach nourishment either side of the River Sid.

At this stage it has been assumed that nourishment in front of the cliffs east of the River Sid (**Figure 2.2**), will be undertaken with material delivered via a sinker pipeline and then profiled on the beach using land based equipment. However, it is noted that the existing cliffs east of the River Sid are unstable and consideration of this risk may render this methodology not possible to ensure the safety of site personnel. An alternative method / design that does not require the use of land based plant may be more suitable, allowing nature to profile the material. This will be reassessed at detailed design / tender stage.

2.2.2 Construction of the Offshore Rock Breakwater and Terminal Rock Groyne

The rock for the rock structures (breakwater and long groyne, **Figure 2.2**) will most likely be sourced from Norway and transported to site on barges. The offshore breakwater will be constructed by marine equipment. A backhoe dredger (BHD) fitted with a bucket/ grab will be used to place / profile the core and armour layers. GPS positioning equipment fitted to the bucket/ grab enable the operator to ensure accurate placement without the need for divers or surveyors to be put at risk. At this stage, it has been assumed that the rock terminal groyne can be constructed from the land using land based equipment such as dump trucks to transport the rock from a beach stockpile to the works. Excavators fitted with buckets and grabs will be used for the profiling and armour placement. It is likely that a long-reach excavator would be required for the seaward end of the structure. It should be noted that working from land in this way would require tracking along East Beach in front of the unstable cliffs. .Given the uncertainties related to the cliff stability, at this stage of the project, this has been considered an appropriate methodology. However, further review of this risk closer to the time of construction may conclude that the structure must be built from the sea, thus requiring the use of more costly marine equipment.

2.2.3 Construction of the Shore-based Works

All shore-based works in regard to raising or replacing the flood wall (sea wall); replacing the flood gates; improving the access ramp and modifying the river training wall structure will be undertaken through in-situ concreting with appropriate shore-based machinery (**Figure 2.2**).

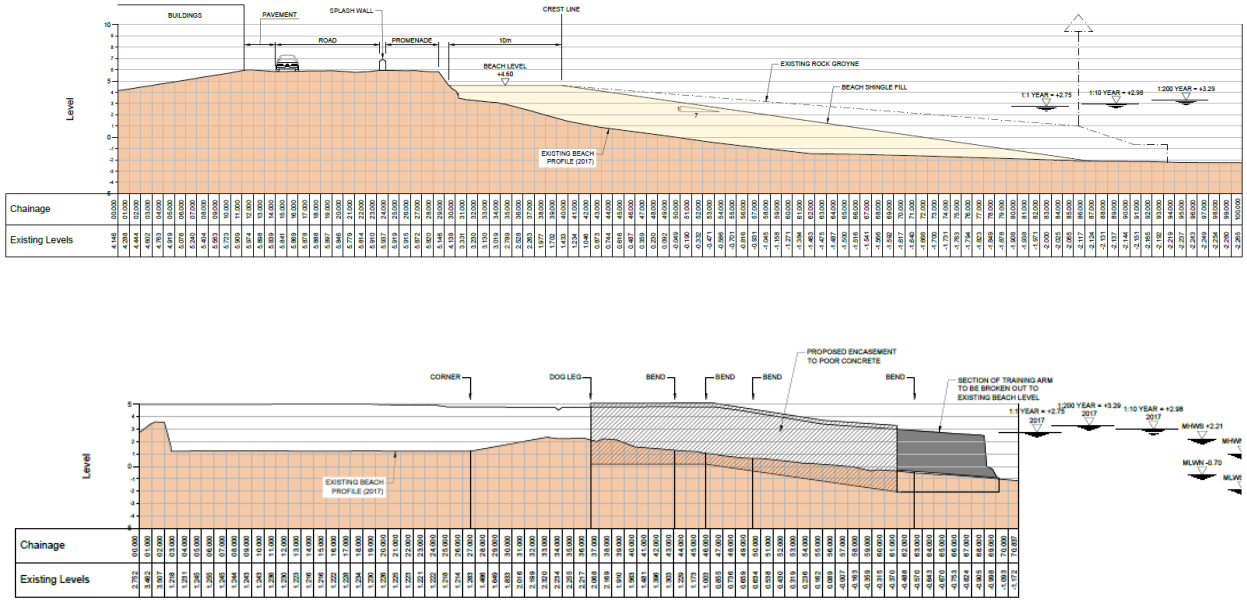


Figure 2.2 Proposed SBM Scheme Shore-Based Works

Appendix 4 provides further details on the proposed design of the new breakwater, which is the only difference between the 2018 / 2019 and 2022 proposed SBM schemes (see **Section 3.3.1**).

2.3 Proposed Programme

The marine works (i.e. beach nourishment and rock structures - breakwater and groyne) would need to be undertaken during the summer months to maximise construction productivity and reduce risk to construction personnel, plant and equipment.

The duration of the beach nourishment works would depend on the hopper capacity of the selected vessel, although would be in the region of two weeks, allowing for an appropriate amount of weather risk. The offshore breakwater (70m long) would take approximately eight weeks to construct; and the rock terminal groyne approximately six weeks.

The shore-based works could be undertaken out of season and would take approximately 43 weeks to complete, allowing for a 15% programme risk and mobilisation/ demobilisation. The majority of this time would be associated with works to the splash wall (33 weeks duration). All timings are indicative only at this stage.

The works to construct the terminal rock groyne structure would need to be undertaken prior to the beach nourishment works, whilst the construction of the offshore breakwater could probably take place at the same time as the nourishment operation.

The shore based works (i.e. sea wall, splash wall, ramp and river training wall works) could be undertaken independently of the marine works, and outside of the main tourist season.

2.3.1 Working Hours

During the construction phase, normal working hours are likely to be from 7am to 7pm Monday to Friday and from 7am to 2pm Saturday, unless planning conditions specify otherwise. Operations which may cause noise and/or vibration disturbance will be scheduled for daylight working hours wherever possible. Relaxation of the above hours are likely to be required for tidally affected activities, with construction activities possible between 6am and 10pm Monday to Saturday.

2.4 Proposed Monitoring and Maintenance

Following completion of the works, beach profiles will be monitored as part of the South West Regional Beach Monitoring Programme led by Plymouth Coastal Observatory. Through this, baseline monitoring surveys are carried out annually and post-storm surveys are also carried out after the winter.

The re-nourishment regimes described above will be reviewed in response to the beach monitoring regime and adapted as necessary. If beach crest levels increase significantly above the design beach profile, it is likely that the EDDC will reduce levels as appropriate. This is particularly relevant at East Beach to ensure the continued erosion of the cliffs, albeit at a slower rate. The detail of how this will be achieved will be presented as part of an updated SBM scheme which will be developed as part of the detailed design process.

3 Environmental Appraisal Approach

3.1 Introduction

This section of the PEIR describes the process and methodology which has been adopted at a high level only at this stage of the project including:

- the overall approach to the Environmental Impact Assessment (EIA), which would be fully implemented at the EIA stage (if an EIA is required under the Town and Country Planning (EIA) Regulations 2017; and the Marine Works (EIA) Regulations 2017);
- approach taken to assess impacts, including the evaluation of significance;
- approach taken to the derivation of mitigation measures and the assessment of residual impacts;
- consultation undertaken to date with consultees, including how previous raised concerns on the overall project have been adopted and addressed within the proposed new SBM scheme;
- previous scoping undertaken to define the requirements of the EIA for the previous proposed SBM scheme and if they are still relevant for the current proposed scheme; and,
- approach taken to assessing cumulative impacts.

3.2 Environmental Impact Assessment Methodology

EIA is a tool for systematically examining and assessing the impact and effects of development on the environment. Essentially it is a process that examines the environmental consequences of development actions before they go ahead (e.g. are granted planning permission). As part of the EIA process an impact assessment is presented which evaluates the positive and negative impacts of the proposed SBM scheme, and each impact is assessed for its likely significance. To classify the significance of predicted impacts and to provide a consistent framework for the consideration and evaluation of impacts on different environmental parameters, the terminology in **Table 3.1** will be adopted in the EIA process for the project and is thus also used in this PEIR.

Table 3.1 Terminology for Defining and Classifying Environmental Impacts

Impact	Definition
Major adverse	The impact gives rise to serious concern; it should be considered as unacceptable
Moderate adverse	The impact gives rise to some concern but it is likely to be tolerable (depending on its scale and/or duration)
Minor adverse	The impact is undesirable, but of limited concern
Negligible	The impact is not of concern
Minor beneficial	The impact is of minor significance but has some environmental benefit
Moderate beneficial	The impact provides some gain to the environment
Major beneficial	The impact provides a significant positive gain

3.2.1 Impact Significance

The concept of ‘significance’ is central to the EIA process. The classification of significance aids the identification of the main environmental effects of the proposed development and assists in determining what weight should be given to these effects. There is no statutory definition of what constitutes a significant effect and the guidance available is of a generic nature. However, it is widely recognised that significance fundamentally reflects the relationship between the magnitude of an ‘effect’, the importance (value) and/or sensitivity of the affected environmental ‘receptor’ and the likelihood of occurrence.

Nevertheless, in determining the significance of an impact it is important to consider several criteria; see for example **Table 3.2**.

Table 3.2 Criteria for Determination of Significance

Impact	Resource Definition	'Other' criteria
Spatial extent (local, regional or national)	Vulnerability	Reversibility
Magnitude (high, medium or low – large change or small change)	Sensitivity/intolerance (high, medium, low)	Probability of occurrence
Duration (short or long term)	Recoverability (low, medium, high)	Confidence in the prediction
Frequency	Importance (rarity, conservation value, commercial value)	Margins by which values are exceeded

For the purposes of the EIA process, a significant effect (or change) has been determined as one where the predicted net impact of the activity or process would exceed the normal variation in baseline conditions with respect to a relevant receptor without the scheme. **Table 3.3** classifies the range of potential influence for a number of key criteria.

Table 3.3 Definitions of Impact Significance

Magnitude of the Impact This is the scale of change which the impact may cause compared to the baseline and how this change relates to accepted thresholds and standards.	
High	A large change compared to variations in the baseline. Potentially a clear breach of accepted limits.
Medium	Change which may be noticeable and may breach accepted limits.
Low	When compared with the baseline, change which may only just be noticeable. Existing thresholds would not be exceeded.
Frequency of the Impact This is the duration of the impact compared to the activity causing it.	
Continuous	The impact persists over the life of the activity causing it.
Frequent	The impact is likely to occur for a period of greater than 5% of the life of the activity, or will be intermittent.
Infrequent	The impact is likely to occur for a period of less than 5% of the life of the activity.
Extent of the Impact This relates to the geographical area that the impact may affect. Unless otherwise explained in the accompanying text it is assumed that all identified impacts are local in extent, although interest features of potential regional and/or international significance may be affected.	
Local/immediate	The impact is likely to affect interests at district level or for a limited area around the scheme.
Regional	The impact is likely to affect sub-national concerns such as regional and county level interests.
International	The impact is likely to affect an interest of supra-regional concern.
Timescale of the Impact This is the duration of the impact irrespective of the activity causing it.	
Short-term	The period over which the impact is experienced is temporary and lasts for the period of construction or less.
Medium-term	The impact occurs for longer than the full period of construction.

Long-term	The impact remains for a substantial time, perhaps permanently after construction and during operation.
Sensitivity of the Receiving Parameter This is a measure of the adaptability and resilience of an environmental parameter to an identified impact.	
High	The environmental parameter is fragile and an impact is likely to leave it in an altered state from which recovery would be difficult or impossible.
Medium	The parameter has a degree of adaptability and resilience and is likely to cope with the changes caused by an impact, although there may be some residual modification as a result.
Low	The parameter is adaptable and is resilient to change.

Irrespective of recognised importance (value), all receptors will exhibit a greater or lesser degree of sensitivity to the changes brought about by a proposed SBM scheme, and the 'sensitivity' element of the criterion ensures that this characteristic of each receptor is brought into the assessment also; weighting being a matter of professional judgement. The precise form which these indicators take in each case will vary according to subject matter.

In general, throughout the EIA process for this project, including the PEIR, it is assumed, unless otherwise stated, that the impacts are:

- Short term, if impacts are only experienced during the construction phase.
- Long term, if impacts are experienced during the operational phase.

3.2.2 Impact Assessment Matrix

To assist in the assessment process, the impact assessment matrix provides a mechanism for assessing significance (see **Table 3.4**). An initial indication of impact significance (adverse or beneficial) is gained by combining magnitude and importance/ sensitivity in accordance with the impact assessment matrix provided. It should be noted that although the impact assessment matrix provides a good framework for the consistent assessment of impacts across all environmental parameters, there is still an important role for professional judgement and further objective assessment to play in moderating an impact's significance (where applicable). Given that the criteria represent levels on a continuum, professional judgement and awareness of the relative balance between magnitude and importance / sensitivity is required.

Table 3.4 Matrix for Calculation of Significance

Magnitude of Effect	**Importance (value) and/or Sensitivity of Feature**		
	High	Medium	Low
High	Major	Major	Moderate
Medium	Major or Moderate	Moderate	Minor
Low	Moderate or Minor	Minor	Minor or None/Negligible

The probability of an effect occurring (i.e. an effect-receptor interaction) has also been considered in the assessment process; capturing the probability that the effect will occur and also the probability that the receptor will be present. For example, the magnitude of the effect and the sensitivity of the receptor may have been established, and it may be highly probable that the effect will occur; however, the probability that the receptor will be present at the same time is a further consideration. The probability of an effect occurring is presented within the text of the assessment for each receptor.

Where adverse impacts are identified, potential mitigating measures are examined and recommended to reduce potential impacts, as far as possible, to environmentally acceptable levels. Residual impacts are then stated. The proposed SBM scheme is anticipated to be a long-term project, **with decommissioning not being applicable given the continuing need to protect Sidmouth sea frontage**. As such, a decommissioning phase will not be assessed through the EIA process for this project, including the PEIR.

3.3 Consultation

This section provides a brief summary of consultation undertaken to date on the overall project, including the proposed new SBM scheme. The strategy for the continued consultation for the SBM scheme is provided in **Appendix 3**).

3.3.1 Formal Consultation to Date

A formal EIA screening opinion was sought from both the MMO and EDDC in 2018 on the previous proposed SBM scheme (see **Section 2.1.1**). At the same time, a high-level scoping memo was shared with the relevant authorities to seek a scoping opinion based on the previous proposed SBM scheme developed in 2018 to inform the potential for an EIA and to formalise the advice received from statutory advisors in previous phases of the project. It also broadened the formal consultation to include the MMO and its primary advisors given the need for works below MHWS. In their capacity, as statutory bodies and/or primary advisors, the following organisations were consulted through this process:

- The Marine Management Organisation;
- East Devon District Council Planning Team
- Historic England;
- Environment Agency;
- Centre for Environment, Food and Aquaculture Science (Cefas);
- Devon and Severn Inshore Fisheries and Conservation Agency (IFCA);
- Natural England;
- East Devon District Council Landscape Officer;
- Sidmouth Town Council, and
- Devon County Council.

The comments raised through the above process are summarised in **Table 3.5** based on what should be considered in the preparation of an ES; and although an updated screening and scoping opinion will be formally sought from both the MMO and EDDC for the proposed new SBM scheme. **Table 3.5** also highlights if the comments are still applicable to the new scheme and how these have been initially addressed in the PEIR. It should be noted the key similarities from the 2018 and 2022 proposed SBM schemes include:

- Beach nourishment
- New ramp and work to training wall
- 120m long rock groyne along East Beach
- Raising of splash wall

The key difference is that proposed new SBM will have an additional 70m long breakwater.

Table 3.5 Summary of Consultation Responses in 2018 and Current Relevance to the Proposed New SBM Scheme of 2022

Name	Parameter	Points Raised in 2018	Still Relevant for the Proposed New SBM Scheme of 2022
East Devon District Council	Landscape	Concerned about changes in landscape character arising from coastal processes upon completion of the works. Potential for the undermining of the Area of Outstanding Natural Beauty (AONB) designation.	Yes, still relevant and addressed in **Section 8 (Landscape)** of the PEIR.
	Noise, Traffic and Pollution	Noise and vibration assessment required. Noise emanating from the construction phase, site servicing and the impact of deliveries and collection.	Yes, still relevant and addressed in **Section 10 (Traffic and Transport)** of the PEIR.
	Historic Environment including Archaeology	Habitats Regulations style Assessment in relation to the World Heritage Site. Heritage Impact Assessment (HIA) to detail heritage assets, assess the potential for encountering unknown assets and provide an impact assessment. Impacts on UNESCO Heritage Site. Impacts on the setting and character of the AOB and Conservation Area. Harm to the significance of heritage assets.	Yes, still relevant and addressed in **Section 4 (Designated Sites), Section 8 (Landscape)** and **Section 9 (Archaeology and Cultural Heritage)** of the PEIR.
	Leisure and Tourism	Construction Environmental Management Plan (CEMP)/Traffic Management Plan should ensure that consideration of construction works does not affect or has minimal impact on the tourist economy. Access to the South West Coast Path (SWCP) is likely to be disrupted in the construction phase. Coastal works have the potential to disrupt the tourist economy if taking place at the peak season.	Yes, still relevant and addressed in **Section 5 (Socio-economics, Tourism, Amenity and Recreation)** and **Section 10 (Traffic and Transport)** of the PEIR.
	Geology and Ecology	Ecological Impact Assessment, Phase 2 Habitat Survey, Water Framework Directive and Geomorphological assessments required.	Yes, still relevant and addressed in the PEIR. The HRA is provided in **Appendix 1** and **Section 4 (Designated Sites)**. The WFD Compliance Assessment is provided in **Appendix**

Name	Parameter	Points Raised in 2018	Still Relevant for the Proposed New SBM Scheme of 2022
		Impacts on WHC, SSSIs, SACs through habitat loss, general disturbance from construction and end use. Impact of all phases of the proposed development on protected species. Impact on marine ecology. Potential changes arising from the development in relation to geomorphology and natural processes which may be altered by the groyne.	**2**. Impacts on ecology are considered in **Section 7**. Impacts on designated sites are considered in **Section 4** and coastal processes are considered in **Section 11**.
	Traffic and Access	CEMP/Traffic Management Plan required. Potential for the volume of traffic and transportation of heavy material will impact on tourist season and Sidmouth lifeboat station.	Yes, still relevant and addressed in **Section 10 (Traffic and Transport)** of the PEIR.
	General	A description of the proposed development should be provided including information on the site, design, size and other relevant features. A description of any features or measured envisaged to avoid, prevent or reduce and if possible offset likely significant adverse effects on the environment. A non-technical summary. An additional copy for the Secretary of State.	Yes, still relevant and details of design are provided in **Section 2 (Description of the Scheme)** of the PEIR. Comments regarding requirement for a non-technical summary and additional copies are noted and would be provided during the actual undertaking of the EIA and completion of the ES for the scheme.
Marine Management Organisation (including key advisors: Historic England, Environment Agency, Cefas and	Habitats Directive/Wild Birds Directive	Proposal must consider the potential for impact on designated sites alone and in combination with other plans or projects. ES must consider if there will be lasting or irreparable loss to Annex 1 habitat including the Sidmouth to West Bay SAC. MMO note that the 'Summary of detail provided in the Sidmouth and East BMP documentation' section states that "Submerged or partially submerged sea caves hold many shellfish and sponges" within the Lyme Bay and Torbay marine SAC, though the species of these shellfish are not provided. Ascertaining these would help reduce uncertainty in the conclusions.	Yes, still relevant and details of potential cumulative impacts are considered in **Section 14** of the PEIR. HRA and therefore SAC designated features are considered and the output is provided in **Appendix 1** and **Section 4 (Designated Sites).**

Name	Parameter	Points Raised in 2018	Still Relevant for the Proposed New SBM Scheme of 2022
Natural England)	Sidmouth to Beer Coast SSSI and Ladram Bay to Sidmouth SSSI	ES must thoroughly consider the direct and indirect impacts on the SSSI features through changes in coastal processes with further assessment of the SSSI's geological interest features. Section 2.2 of the Scoping Report notes that there is evidence to suggest that erosion of the cliffs has accelerated in recent years. Whilst this is true, compared to the 1950 to 2006 period, the coastal baseline processes report did also note that there had been accelerated recession prior to that period from the 1890s to 1950. MMO expect the applicant to consider this when assessing potential impacts to SSSI features.	Yes, still relevant and addressed in the PEIR. Geology and SSSIs are considered in **Section 4 (Designated Sites)** and **Section 12 (Geology and Geomorphology)**. Coastal processes are considered in **Section 11** which feeds into the geology assessment.
	Local Sites	ES must consider the impacts on local wildlife or geoconservation sites.	Yes, still relevant and addressed in **Section 7 (Ecology)** and **Section12 (Geology and Geomorphology)** of the PEIR.
	Priority Habitats and Species	The ES must thoroughly assess the impact of the proposals on habitats and/or species listed as 'Habitats and Species of Principal Importance' within the England Biodiversity List, published under the requirements of S41 of the Natural Environment and Rural Communities (NERC) Act 2006. The ES must consider the impact on Biodiversity Action Plan (BAP) species. A habitat survey is required to identify if important habitats are present. The development should seek to avoid if possible adverse impact on sensitive areas for wildlife, and provide opportunities for habitat gain if possible.	Yes, still relevant. Opportunities for habitat gain have been considered but not identified. Note that for the majority of the works the structures already exist; and therefore there will be minimal habitat loss. Additionally, the recharge would not lead to habitat loss given the requirement to place like for like material to that already present. The only direct loss will be under the new rock groyne, breakwater, boat user access ramp and the consideration of this loss is presented in **Section 7 (Ecology)** of the PEIR.
	Underwater Noise	Construction methodology should be fully described to justify scoping decision concerning marine receptors with regard to underwater noise. Underwater construction activities should be assessed in the ES.	Details of design are provided in **Section 2 (Description of the Scheme)** of the PEIR. There will be very limited impacts on underwater noise given that percussive piling is not required for any element of the proposed new SBM scheme. Additionally, the majority of works will be undertaken in the

Name	Parameter	Points Raised in 2018	Still Relevant for the Proposed New SBM Scheme of 2022
		Marine mammals have been sighted in the area; therefore the impact should be assessed in the ES.	dry where possible. The only potential effect could be during beach recharge but given the natural mobility of the existing beach shingle this would not be outside of natural conditions already experienced. There may also be some underwater noise associated with the placement of rock for the groyne and breakwater, but given that the rock will be carefully placed and over a relatively short time period. This information is provided in **Section 7 (Ecology)** of the PEIR.
	Coastal Processes	A quantitative description of the local tidal currents and wave climate contextualising Sidmouth within the regional transport system. The ES should address local hydro and sediment dynamics. The ES should include details of what a 'manageable' rate of erosion is in respect to the BMP's balance between erosion of the World Heritage Site. The benefits of preventing erosion of the World Heritage Site should be identified in relation to the negative impacts on the World Heritage Site and SSSI features.	Yes, still relevant and addressed in **Section 4 (Designated Sites), Section 11 (Coastal Processes and Hydrodynamics)** and **Section12 (Geology and Geomorphology)** of the PEIR.
	Seascape and Landscape	Same as points raised by EDDC outlined in the Landscape section in above rows. Additional points are outlined below. The ES must consider whether developments would have an adverse impact on the Outstanding Universal Value (OUV), integrity, authenticity and significance of the World Heritage Site. Local landscape character areas, local management plans or strategies should be mapped at a scale appropriate to the development. The EIA process must detail the measures to be taken to ensure the building design will be of a high standard, as well as detail of layout alternatives together with justification of the selected option in terms of landscape impact and benefit.	Yes, still relevant and addressed in **Section 8 (Landscape)** of the PEIR. Regarding level of detail on building design, the best available information has been presented at the time of undertaking this PEIR. Further information will be available at later stages in the SBM scheme process. Justification of the selected option is presented in in **Section 2 (Description of the Scheme)** of the PEIR.

Name	Parameter	Points Raised in 2018	Still Relevant for the Proposed New SBM Scheme of 2022
	Fish Ecology and Fisheries	The ES must consider impacts on local fishermen. Timings and consequences of works should consider the migratory period of Atlantic salmon, European eel and sea trout in the River Sid.	Yes, still relevant and addressed in **Section 7 (Ecology)** of the PEIR.
	Shellfish	Local fishermen and the Devon & Severn Inshore Fisheries and Conservation Authority (IFCA) should be contacted to determine if there will be an impact to shellfishers. Mitigation should be included in the ES if any impacts are identified.	Yes, still relevant and addressed in **Section 7 (Ecology)** of the PEIR.
	Archaeology and Cultural Heritage	A thorough assessment should be included following the Historic Environment Good Practice Advice in Planning Note 3 on The Setting of Heritage Assets (2017) and with reference to the Devon Historic Environment Record to update the 2002 South East BMP archaeological assessment. Pleistocene and/or Holocene fossil dunes/beach sediments, and river paleochannels should be included within the scope of the cultural heritage and archaeology assessment if any of these are to be impacted by the proposed works.	Yes, still relevant and addressed in **Section 9 (Archaeology and Cultural Heritage)** of the PEIR.
	Air Quality & Climate	The ES must reflect the England Biodiversity Strategy published by Defra.	The proposed SBM scheme has been selected to deliver long-term protection to Sidmouth from coastal flooding and erosion whilst minimising the impacts on the environment. It is therefore considered to be in line with the priority actions of the Biodiversity 2020 strategy and Defra's 25 Year Environment Plan (see **Section 1** of the PEIR).
	Water Quality	WFD assessment required. Bathing waters assessment required.	Yes, still relevant and addressed in **Section 13 (Water Environment)** and **Appendix 2 (Water Framework Directive Compliance Assessment)** of the PEIR.

Name	Parameter	Points Raised in 2018	Still Relevant for the Proposed New SBM Scheme of 2022
	Population and Human Health	Risks to human health must be included in the ES.	Yes, still relevant and considered within the assessment undertaken for air quality and noise. See **Section 10** of the PEIR.
	Tourism and Recreation	The ES must consider potential impacts to public and RYA training centre. Green infrastructure and other measures that encourage the users to enjoy the countryside are encouraged. The ES must consider impacts on access land, public open land, rights of way, coastal access routes and the England Coast Path National Trail. Reference to the relevant Right of Way Improvement Plan (ROWIP) is recommended.	Yes, still relevant and addressed in **Section 5 (Socio-economics, Tourism, Amenity and Recreation)** of the PEIR.
	Cumulative Impacts & In-Combination Impacts	The ES must identify, describe and evaluate the effects that are likely to result from the project in combination with other projects.	Yes, still relevant and addressed in **Section 14 (Cumulative Effects)** of the PEIR.
	Risk of Major Accidents and Disasters Relevant to the Project	The ES must include consideration of impacts climate change may have on the project. The ES must consider the risks of natural disasters on the development and surrounding area.	This is considered within **Appendix 4 Engineering Reports** of the PEIR.
	Mitigation	The ES must include mitigation measures required to offset any potential impacts identified in any of the above topics.	Consideration made throughout all environmental topic sections of the PEIR.

As stated, an updated screening and scoping opinion will be formally sought from both the MMO and EDDC for the proposed new SBM scheme, although the **Table 3.5** does provide a good indication of the most likely concerns to be formally raised given the similarities between the 2018 and 2022 proposed SBM schemes.

3.3.2 Informal Consultation and Public Exhibition to Date

Throughout the development of the previous proposed 2018 SBM scheme, a Steering (Advisory) Group has been involved representing key stakeholders including local residents and user groups, which continues for the current proposed scheme, for example consultation with Natural England and Jurassic Coast Team which is ongoing, have a “no objection in principle” already in place regarding the proposed new hybrid SBM scheme (see **Appendix 3**). Though informal, this consultation has provided the forum for discussion with community interest representatives as well as the statutory dedicated nature conservation bodies for the project. The statuary group for example, has representation from:

- EDDC Planning Team
- Marine Management Organisation (MMO)
- Natural England (NE)
- Environment Agency (EA)
- English Heritage (EH)
- Cefas
- Relevant Local Authorities (i.e. Devon County Council, Sidmouth Town Council)
- East Devon Area of Outstanding Natural Beauty (AONB)
- EDDC Landscape Architect
- EDDC Heritage/Conservation Officer
- EDDC Public Rights of Way Officer
- Jurassic Coast Team (World Heritage Site)
- Devon Wildlife Trust (DWT)
- West Country Rivers Trust

A wide range of feedback has been collected through previous public exhibitions on the 2018 SBM scheme with comments received focussing on the main topics which can be summarised as follows:

- Visual impact (splash wall) – members of the public expressed serious concern about the visual impact of raising the splash wall. Many people were keen to see benefits derived for the local community from an amenity perspective associated with this height increase. There was limited support for a plain concrete wall in this location. As such for the proposed new SBM scheme, the height and style of splash wall has been fully reviewed in line with comments raised by the public.
- Visual impact (groyne) – people expressed concern about the impact of the additional groyne on East Beach. As such for the proposed new SBM scheme, the impact of the additional groyne and breakwater has been fully reviewed in line with comments raised by the public.
- Cost – concerns were raised about the level of partnership funding required to deliver the scheme and the associated delays to construction if the funding could not be secured. As stated in **Section 1**, following the updated Partnership Funding Calculator for FCRM projects by the

Environment Agency in 2020, additional FDGiA was released which will be used to support the proposed new SBM scheme.

3.4 Risk Work Shop

A risk work shops was recently held in February 2022 for the proposed new SBM scheme, which detailed potential key risks which need to be considered for the construction of the scheme (see **Appendix 3**).

3.5 Cumulative Impacts

Cumulative impacts may occur where impacted receptors (from the project in isolation) also have the potential to be impacted by other existing, consented and/or proposed development/activity. The Institute of Environmental Management and Assessment (IEMA) defines cumulative impacts as:

"*…the impacts on the environment which result from incremental impacts of the action when added to other past, present and reasonably foreseeable future actions*…"

Based on the nature of impacts of the proposed SBM scheme, the potential cumulative impacts have been considered with reference to other proposed developments in the surrounding area (see **Section 14**). These have been assessed using the same methodology described above.

4 Designated Sites

4.1 Introduction

This section of the PEIR describes the designated nature conservation sites present within the vicinity of the proposed SBM scheme, including those protecting geological features. This section also provides an initial screening of the proposed SBM scheme's potential to have impacts on designated sites. Screening is informed by the project description, numerical modelling outputs and expert judgement.

This section does not consider Habitats and Species of Principal Importance in England (formerly UK Biodiversity Action Plan) and Threatened and/or Declining species and habitats under the Oslo Paris Convention for the Protection of the Marine Environment of the North-East Atlantic (the 'OSPAR Convention'). Instead, these are considered, where relevant, in **Section 7** Ecology.

4.2 International Designated Sites

Internationally protected sites include:

- Special Areas of Conservation (SACs) designated under Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna (the 'Habitats Directive');
- Special Protection Areas (SPAs) designated under Council Directive 79/409/EEC (as amended) on the conservation of wild birds (the 'Birds Directive');
- Ramsar sites designated under the Ramsar Convention on Wetlands of International Importance (the 'Ramsar Convention');
- World Heritage Site is the highest possible global conservation designation and recognises sites of unique and exceptional heritage.
- There are two SACs and one World Heritage Site within the vicinity of the proposed SBM scheme frontages the boundaries of which are illustrated on **Figure 4.1** and **Figure 4.2**.

It should be noted that, due to ongoing natural processes operating on the World Heritage Site, the illustrated boundary should be considered a point in time approximation. The physical boundaries of the World Heritage Site are defined to closely follow the earth science features that are of World Heritage interest, as described in the Jurassic Coast Partnership Plan: 2020-2025 (Jurassic Coast Trust, 2020), and due to these natural processes, these boundaries are subject to change. The nearest SPAs or Ramsar sites are 12.6km away in the Exe Estuary and are not considered relevant for this impact assessment given the distance to the project.

4.3 National Designated Sites

Nationally protected sites include the following:

- Sites of Special Scientific Interest (SSSI) are designated under Section 28 of the Wildlife and Countryside Act 1981. SSSIs include the UK's outstanding wildlife and geological sites, including coastal and marine habitats such as beaches and intertidal habitats.
- National Nature Reserves (NNRs) are established to protect some of the UK's most important habitats, species and geology, and to provide 'outdoor laboratories' for research.

- An AONB is a designation for landscapes with distinctive character and natural beauty. The purpose of the AONB designation is to conserve and enhance an area's high quality in terms of flora, fauna, historical and cultural associations as well as scenic views.
- There are two SSSIs and one AONB within the vicinity of the SBM scheme and the boundaries of these are illustrated on **Figure 4.1** and **Figure 4.2**. The nearest NNR is 16km away at Dawlish Warren and is not considered relevant for this impact assessment.

4.4 High Level Screening for the Consideration of Designated Sites

Table 4.1 summaries the designated sites considered to be relevant to the proposed SBM scheme. Against each site is a list of features, distance of the SBM scheme to the designated site and in the final column, a comment as to whether there is the potential for an impact to occur.

The overlap of the SBM scheme frontages with internationally designated sites has resulted in the scheme being screened in for assessment under the Habitats Regulations (see **Appendix 1**). The potential for impacts on the geological SSSIs that underpin the SAC designation is also explored in **Section 12** Geology and Geomorphology with ecological features considered in **Section 7**.

The potential for the proposed SBM scheme to impact on the outstanding universal value of the World Heritage Site is assessed in **Section 10** alongside other key heritage and landscape issues. A high level landscape assessment has been carried out to inform this as presented in **Section 8**.

It should be noted, it may have not been possible to address all concerns at OBC stage. A number of issues will require further attention and it is anticipated these will be addressed through the production of a full Environmental Statement to be submitted in support of any consent application once funding is secured and the full scheme design is confirmed.

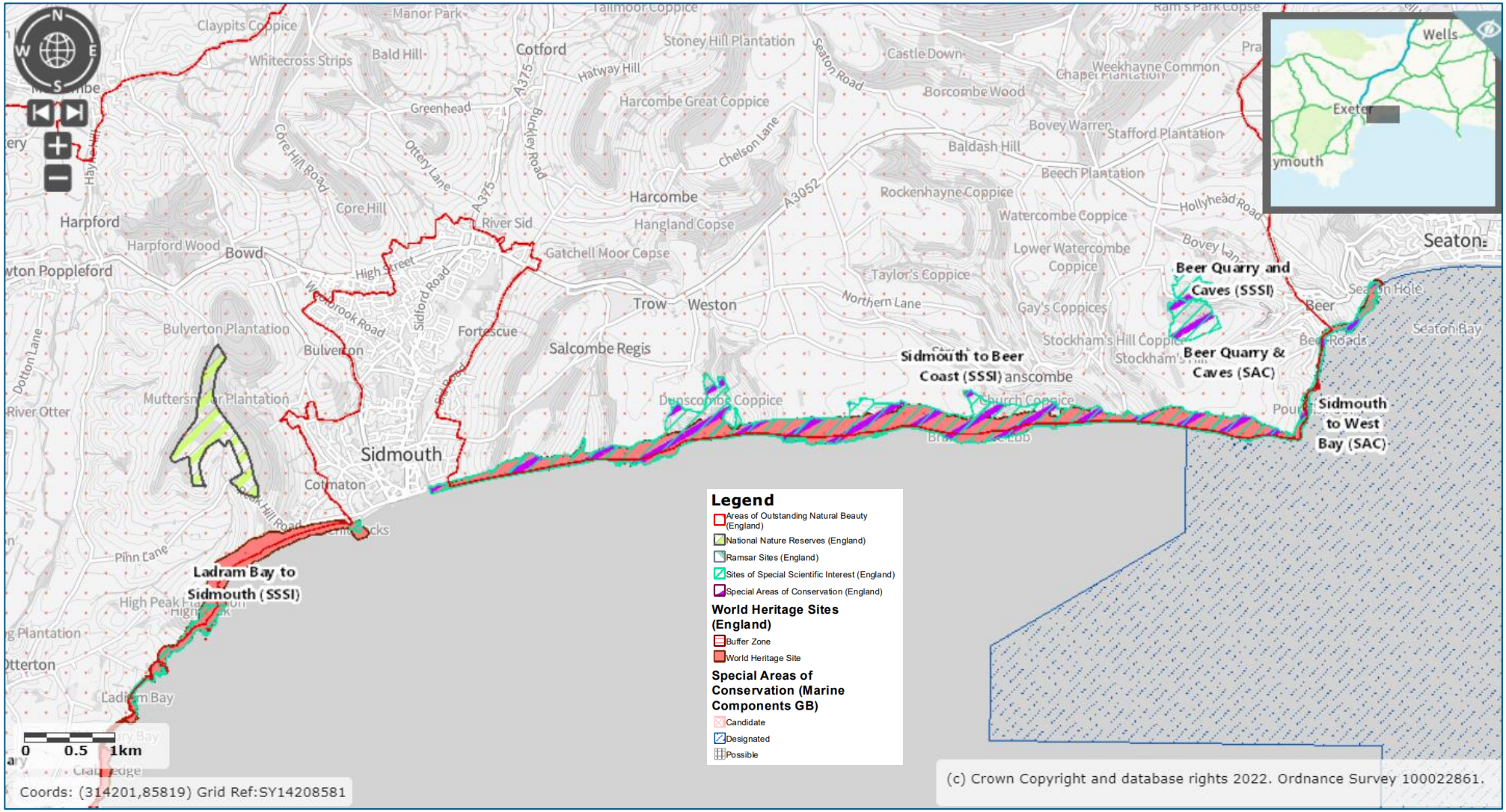


Figure 4.1 International and National Designated Sites - Overview

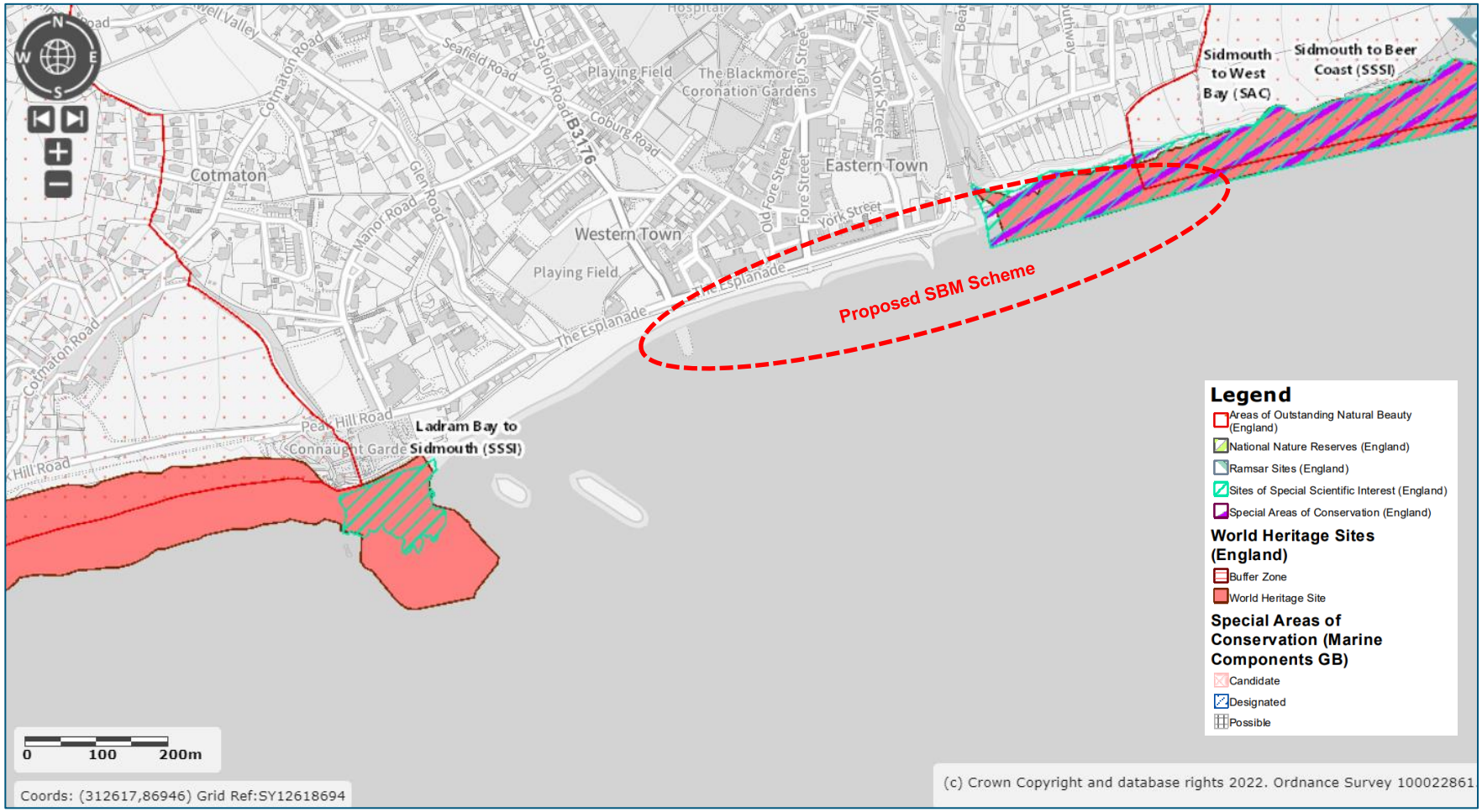


Figure 4.2 International and National Designated Sites – Site Specific

Table 4.1 High Level Screening for Designated Sites

Designated Site	Features	Distance from SBM Frontages	Potential for Impact
Dorset and East Devon World Heritage Site	Coastal exposures particularly the transitional boundary between two Triassic rock units.	0km – the boundary of the World Heritage Site extends to Orcombe Point which includes East Beach at Sidmouth.	Yes. Changes to the erosion rate has the potential to impact on the exposure rate on East Cliffs. The presence of the new breakwater will change views to and from the sea, however given the presence of existing structures, the change is likely to be of minor to moderate adverse significance. See **Section 9** Archaeology and Cultural Heritage. See **Section 12** Geology and Geomorphology.
Sidmouth to West Bay SAC	Vegetated sea cliffs of the Atlantic and Baltic coasts Tilio-Acerion forested slopes, screes and ravines Annual vegetation of drift lines	0km – the boundary of the SAC extends to the River Sid and therefore encompasses East Beach and include the cliffs.	No. Considering that the erosion of the vegetated sea cliffs will not be completely stopped, the small scale of the reduced erosion rates; and the extent of the feature, it is not considered that the works will interfere with the site's ability to sustain the habitat, complex of habitats and/or populations of species for which it has been designated. In conclusion therefore, no significant adverse effect is anticipated on the integrity of the Sidmouth to West Bay SAC, although this would be further assessed during the Appropriate Assessment phase of the HRA for the ES. Also see **Appendix 1 HRA**.
Lyme Bay and Torbay SAC	Reefs. Submerged or partially submerged sea caves.	6km east	No. Also see **Appendix 1 HRAg**.

Designated Site	Features	Distance from SBM Frontages	Potential for Impact
Sidmouth to Beer Coast SSSI	Foxmould Sands and Chert Beds; most westerly major Upper Cretaceous exposures in England; grassland on cliff tops and ledges supporting plants typical of calcareous soils; several species of orchid are also known to be present.	0km – the boundary of the SSSI overlaps with East Beach.	Considering that the erosion of the vegetated sea cliffs will not be completely stopped, the small scale of the reduced erosion rates; and the extent of the feature, it is not considered that the works will interfere with the site's ability to sustain the habitat, complex of habitats and/or populations of species for which it has been designated. In conclusion therefore, no significant adverse effect is anticipated on the SSSI. See **Section 12** Geology and Geomorphology
Ladram Bay to Sidmouth SSSI	Coastal geomorphology – well-developed cliffs, stacks and shore platforms cut into red sandstones	0km – Chit Rocks is part of this SSSI and is part of the Sidmouth frontage.	No. There will be no change to coastal processes to the west of the cell and therefore no impact to the SSSI. See **Section 12** Geology and Geomorphology
East Devon AONB	The East Devon AONB, full of contrast and colour, diverse and rich in wildlife and a working landscape home to approximately 30,640 residents.	0km – the AONB extends across East Beach and continues on to the west of Sidmouth; the Sidmouth Town frontage is not within the AONB boundary.	Yes. Visual impacts through the introduction of an additional groyne and changes to the erosion rates on the cliffs; Potential impacts on the accessibility of the AONB also relevant. See **Section 8** Landscape. See **Section 9** Archaeology and Cultural Heritage.

5 Socio-economics, Health, Tourism, Amenity and Recreation

5.1 Introduction

This section of the PEIR relates to the main issues raised as a result of the proposed SBM scheme in relation to socio-economic, recreation and amenity receptors. These effects have been determined through a desk-based study.

5.2 Baseline Environment

5.2.1 Local Community, Health, Leisure and Tourism

Sidmouth is a popular tourist destination and the local economy is heavily dependent on this source of revenue. Sidmouth is a Regency town with gardens, history and architecture and a range of shops. The Visit Sidmouth website (https://www.visitdevon.co.uk/sidmouth) highlights various accommodation types including hotels, caravan sites and holiday parks. Tourists are attracted to the beaches which are enhanced at low tide by the sandy tombolos formed between the shingle and offshore breakwaters.

The Esplanade runs along the beach frontage and is popular for walking and contains hotels, cafes, restaurants and shops. Connaught Gardens is a landscaped park with sea views which is a popular tourist attraction and includes The Clock Tower Cakery and Restaurant. There are many opportunities for walking and cycling with the South West Coast Path (which partly joins to the England Coast Path) which is 630 miles long and is the longest National Trail in the UK. The Sidmouth seafront is also part of the National Cycle Route Number 2 which is a long-distance cycle route which runs from Dover to St Austell (**Figure 5.1, Figure 5.2**). The seafront is popular for a range of activities including dog walking, swimming, sailing, kayaking, surfing, paddle-boarding, fishing and bird watching. The Sidmouth Sailing Club launches a number of small sailing dinghies and open angling boats from the beach. There are limited SCUBA diving opportunities just offshore, suitable for training. The frontage is also used for gig racing and community events such as Sidmouth Folk Week, Sidmouth Sea Fests and Sidmouth Carnival. The Sidmouth Gig Racing Club for amateur pilot gig rowing takes place on the Sidmouth frontage and meet on Wednesday and Friday evenings and Sunday mornings during the summer months and during the winter months they launch from either Sidmouth or Lyme Regis on Saturdays and Sundays. The Sidmouth Sailing Club put on the Sidmouth Regatta every year with events for local facilities and visitors including sailing races.

The existing launch ramp / slipway at Port Royal is considered by the local community to be not fit for purpose. The length of the ramp is such that it can only be reliably utilised at the highest tides. In recent years the lifeboat crew and gig racing teams have needed to manoeuvre their vessels across the accreted shingle built up at the end of the slipway. This is a challenging procedure and introduces delays to the lifeboat response times. The inclusion of an improved maintenance ramp as part of the proposed SBM scheme has the wider benefit to improve the amenity value of this facility. The local community have been consulted on the proposals for this ramp and the associated flood gates at the top of the ramp which will need to be manually operated during flood conditions.

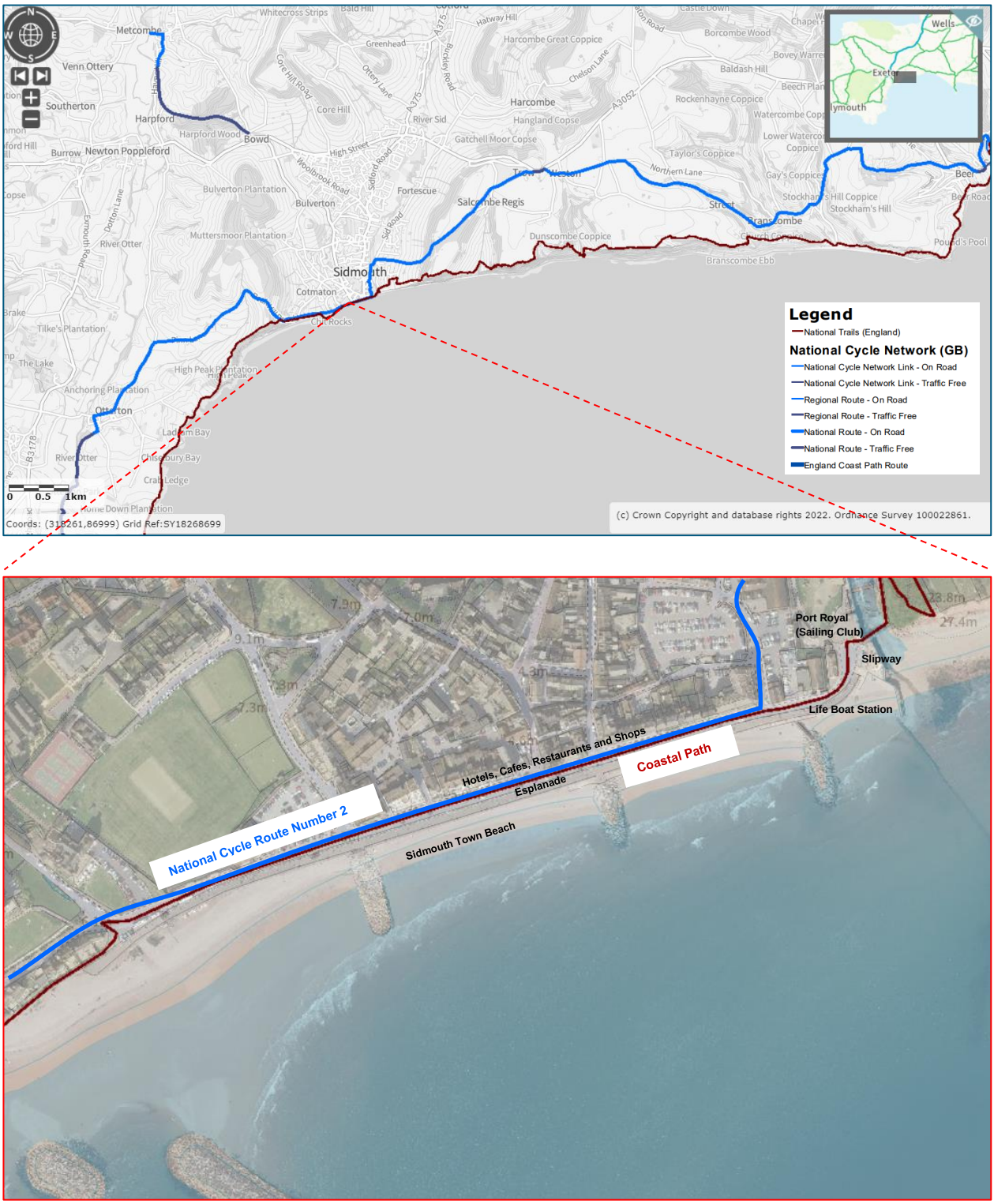


Figure 5.1 Key Sidmouth Local Community, Health, Leisure and Tourism Features

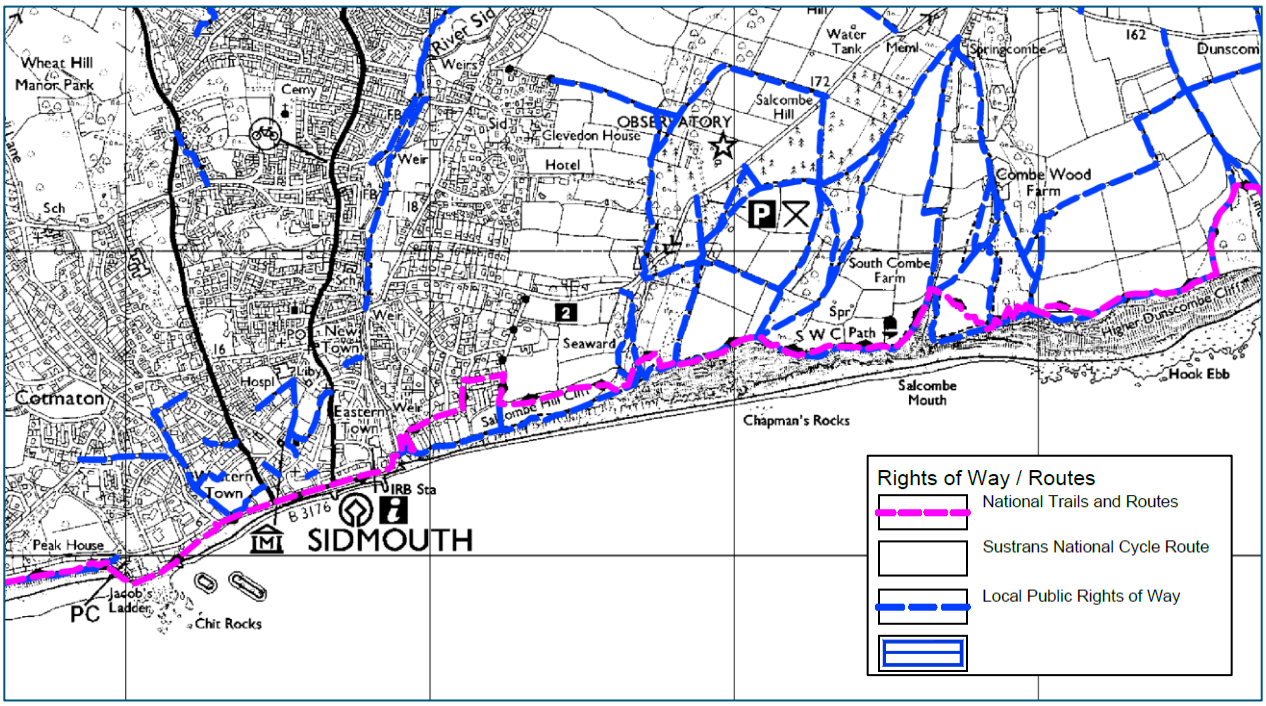


Figure 5.2 Key Public Rights of Way and National Trails

The overall population of Sidmouth (currently at 17,888) as a whole, is older than the national average (currently at 40) (**Figure 5.3**). The English Indices of Deprivation has health statistics for Sidmouth. They measures the risk of premature death and the impairment of quality of life through poor physical or mental health. For Sidmouth, based on the Lower-Super Output Areas (LSOAs) index of deprivation statistics, it is ranked 27,792 out of 32,844, where 1 is the most deprived; and is the 20% least deprived places in England (McLennan et al., 2019).

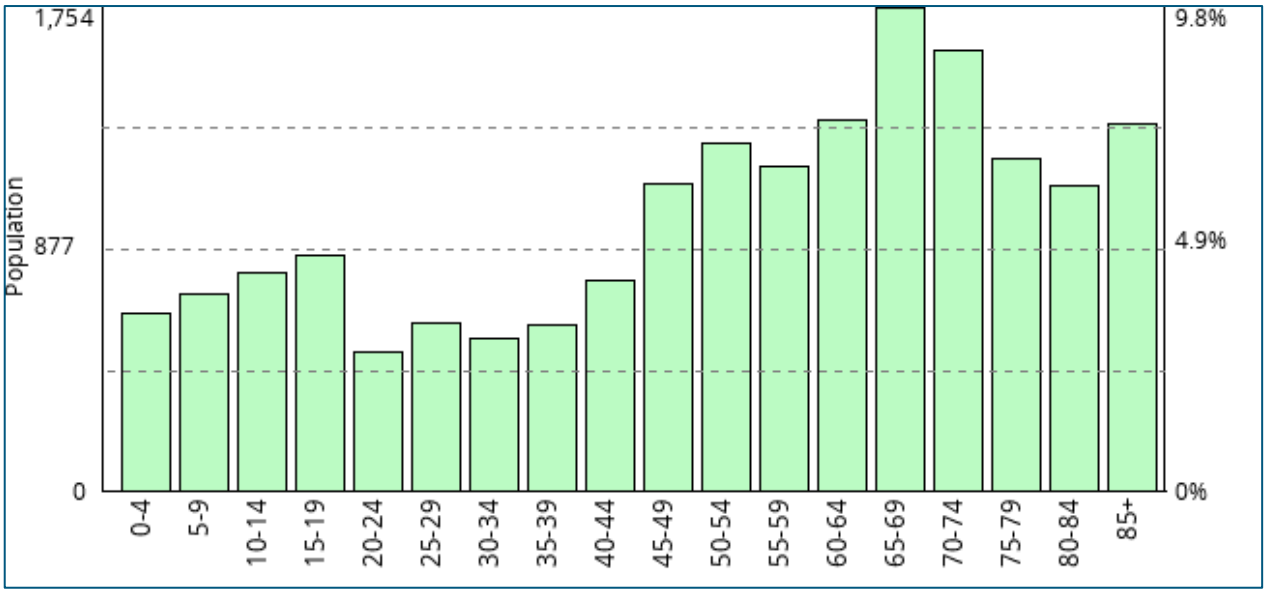


Figure 5.3 Sidmouth Population Age
Source: https://www.devon.gov.uk/communities/your-community/sidmouth-profile

5.2.2 Designated Sites

As well as the landscape and heritage qualities of the AONB and the World Heritage Site (see **Figure 4.1**), it is important to also recognise their value from an engagement perspective, as well as the contribution they make to the local economy. Thousands of people are known to visit the Jurassic Coast each year (www.jurassiccoast.org) and it is estimated to bring in up to £111 million per year to the Dorset and East Devon economy, as well as supporting up to 2000 jobs (Ash Futures, 2015). Whilst specific figures are not available for the AONB, statistics are available for the South West Coast Path (which passes through the AONB), estimate that walkers using the path spent around £436 million during 2012 which represents a 15% increase from 2009 (The South West Research Company, 2014). The data collected by the survey indicates that 52% of respondents highlighted that they walk on cliffs and headlands, which would include the coastline either side of Sidmouth. The recognised quality of the historical and environmental setting of Sidmouth town which is reflected in these 'designations' is likely to contribute to the visitor attraction of the area and the associated revenue for the town.

The management plans for both the World Heritage Site (Jurassic Coast Trust, 2020) and the AONB (East Devon AONB, 2021) include targets that relate to visitor engagement and education. Access is an important element of enabling engagement; at present access to East Beach is restricted as a result of the limited beach size. This combined with the instability of the cliffs means that public access is often inadvisable for health and safety reasons (although access is not officially restricted or managed by EDDC). Whilst both the AONB and the World Heritage Site can be 'accessed' from the sea (by viewing the areas from vessels), land access to these areas is limited to the South West Coast Path which runs on top of the cliffs (see **Figure 5.1**).

5.3 Impacts during Construction

5.3.1 Impacts arising as a result of the diversion or closure of the Esplanade

During the construction phase, the Esplanade may require closure or diversion for the shore based works, to the flood (splash) wall, flood gates, access ramp and river training wall structure. The diversion/temporary closure of the Esplanade has the potential to affect residents, business operators and visitors. There is the potential for temporary traffic lights or lane closures or total road closure of the Esplanade during the replacement of the splash wall and this will cause disruption to both pedestrians and road users.

The magnitude of this impact is considered to differ during the winter and summer months in recognition of the increased number of people and vehicles present in and passing through Sidmouth during these periods. It is considered likely that the closure/diversion of the Esplanade will cause a greater impact during the summer months as the restricted access will restrict access to this area of the seafront. During the summer months therefore the magnitude of this impact is considered to be high, although in the winter months, it is considered to be of medium-low magnitude, depending on the extent of any closure.

It is noted however that any diversion or closure will be temporary in nature and therefore the impact will be of relatively short duration. Furthermore, it is assumed that the works will be carried out in sections to allow some access to the Esplanade to be maintained as much as possible to minimise disruption.

Overall, the potential impact of diversion/closure of the Esplanade is considered to be a **minor-moderate adverse impact** for tourists and residents, and **moderate-major adverse impact** for businesses, depending on the level of closure (partial to complete closure). However, the magnitude of the impacts may be further reduced with mitigation in place (see below).

5.3.2 Impacts arising from the rolling closure of the beach during recharge

To manage access to the beach and health and safety during construction works, the beach will need to be closed one groyne bay at a time during recharge activities. As a result, there will be temporary closures along the frontage of Sidmouth as the recharge activity progresses along the shore. These closures will however be short term and access to other areas of the beach will be maintained throughout the works. As a result, a **minor adverse impact** is predicted upon the public access to the beach.

Restricted access to the beach also has the potential to reduce the ability of the public to access and engage with the AONB and the World Heritage Site during the construction works. However, given the instability of the cliff within East Beach, access to this part of the Sidmouth foreshore by public is discouraged by EDDC (although not formally restricted), with signage highlighting the risk of cliff falls. It is noted that access to the South West Coast Path will be maintained (albeit through a temporary diversion) and people will still therefore be able to view the landscape and seascape of the sites. Access from the sea will also be maintained. Given the temporary nature of this restriction and the availability of other options for access and engagement, a **minor adverse impact** is predicted upon public engagement with the AONB and WHS.

5.4 Impacts during operation

5.4.1 Beneficial impact to Sidmouth residents, business operators and visitors through increased flood protection

The purpose of implementing the proposed SBM scheme is to improve the standard of protection provided to the town of Sidmouth in the face of predicted sea level rise. Securing an improved standard of defence against coastal flooding through overtopping will reduce the potential for flood events in Sidmouth. This is considered to deliver a **major beneficial impact** to Sidmouth residents, business operators and visitors.

The SBM scheme will also reduce the rate of erosion of East Cliffs which will result in a beneficial impact to the residents of East Cliff Road whose properties are currently at risk from coastal erosion. It will also prevent outflanking of the defences at the eastern end of the Sidmouth town frontage and therefore overtopping into Sidmouth from this direction. It is noted however that the objective of the SBM scheme is not to cease erosion in this location completely and that erosion will therefore continue, albeit at a reduced rate. Overall a **minor beneficial impact** is predicted at East Beach.

5.4.2 Beneficial impact to the Sidmouth boating community

Following completion of construction, a new launch ramp will be opened for use by the local community. Reconfiguration of this area and the upgrade of the launching facilities will result in a **major beneficial impact** on the local community including the Sidmouth Gig Club, the sailing club, the lifeboat crew and other boat users in the area.

5.4.3 Potential amenity improvements as a result of the upgrade to splash wall

The upgrade to the splash wall provides an opportunity to review and improve the existing arrangements for directing pedestrian flows. Careful design, including the position of openings with flood gates, could demonstrably improve the current situation where the pedestrian/vehicle interface is less than optimal. Formally changing the crossing points across the road for example will ensure pedestrians are crossing in the safest location; increasing the height of the splash wall will also help to discourage ‘informal’ crossing of the road by pedestrians stepping over the wall into the road. Through the use of higher quality finishes and a design that enhances the seafront overall as well as positioning gaps / flood gates at more appropriate

locations in terms of pedestrian circulation and possibly retention of views, the upgrade of the splash wall is considered to deliver a **minor – major beneficial impact**.

5.4.4 Improved accessibility to the AONB and Jurassic Coast at East Beach

As a result of the instability of the cliffs at East Beach, access is currently discouraged onto East Beach (although not formally restricted), with signage highlighting the risk of cliff falls; and as such, the absence of a beach in this location would not overall change the current emphasis of EDDC on public health and safety over engagement with the World Heritage Site. However, the placement of a design beach and its retention by the installation of the rock groyne will improve access to East Beach and therefore the potential for members of the public to engage with the AONB and the Jurassic Coast. This is considered to be a **minor beneficial** impact for both residents and visitors to Sidmouth.

5.5 Proposed Mitigation

It is recommended that a Community Engagement Plan is drawn up by EDDC to ensure that once the final design and construction details are known, they are clearly communicated to the immediate residents and business operators along the Esplanade. It will be important to ensure that these people understand the timings of all aspects of the work and the implications for the operations of their business interests as well as their everyday lives. Engaging with the local community early will ensure that people are aware of mitigation measures (such as rolling closures of different groyne bays); and the potential options available for consideration e.g. reduced working hours on Saturdays and a longer overall programme vs longer working hours and shorter overall programme. Whilst this Plan would primarily be drafted with those people most directly affected by the proposed works, it would also form the basis of broader public communications in line with construction excellence best practice. An important element of this Plan would be to agree a method through which to distribute up to date construction activity schedules so that residents and business operators are aware of periods of beach/Esplanade closure as well as temporary diversions.

The following mitigation measures will also be required during the construction phase of the SBM scheme:

- Rolling closure of the beach.
- Diversions and closures where necessary will be kept as minimal as possible and for the shortest possible period to reduce disruption as much as possible.

To ensure that the upgraded splash wall is built to deliver benefits to the local community, the final design will be developed in consultation with the EDDC Conservation Officer and broader EDDC Planning Team. In particular, the following points raised to date by the EDCC Conservation Officer will be considered:

- It is important to make sure that any works done as part of the SBM scheme do not inhibit future opportunities to regenerate the seafront on Sidmouth;
- The raised splash wall must be designed to be in keeping with the Conservation Area and a basic concrete wall would not fulfil this requirement;
- The position of the flood gates will be determined as part of the detailed design phase and will be agreed in collaboration with the landscape/conservation officers to ensure opportunities to improve the flow of the promenade and its links with the rest of Sidmouth town centre;
- Consideration should be given to both the road side and prom side of the splash wall and the way in which it interfaces with the openings around the floodgates;
- Careful consideration must be given to how best to retain the character of the lighting columns along the promenade, and
- Seating is a key amenity feature of the existing splash wall and should be retained if possible.

More details on how the above relates to the heritage assets along the seafront at Sidmouth is provided in **Section 9**.

6 Traffic and Transport

6.1 Introduction

This section of the PEIR presents the baseline environment with regard to traffic and transportation within the study area of the proposed SBM scheme. Any potential impacts during construction and operation are discussed, and mitigation measures are recommended where necessary. It also considers the potential impacts of the proposed works and operational period on navigation. It discusses changes to existing navigation in terms of risks as well as any disruption that may occur to marine users of the area.

6.2 Baseline Environment

6.2.1 Traffic

The Esplanade runs along the seafront providing access for local residents and visitors. There are limited routes in and out of Sidmouth with the B3176 and A375 the main roads into the town, which both reach the Esplanade. The volume of traffic accessing Sidmouth increases dramatically during the peak tourist season, with increases in coach traffic as well. **Figure 6.1** shows the main road network around Sidmouth.

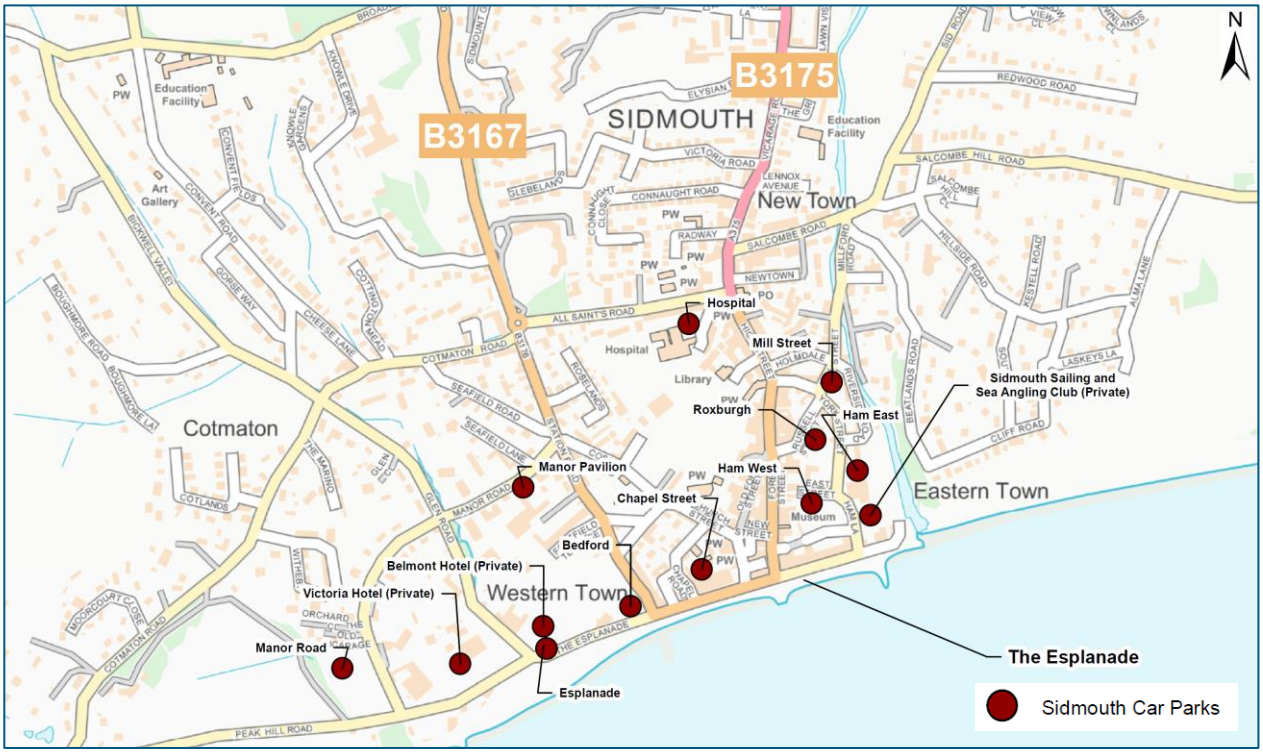


Figure 6.1 Sidmouth Transport Routes

There are several car parks in Sidmouth as shown in **Figure 6.1**, these include:

- Private cars and moto cycles only: The Ham (East and West), Roxborough and Russell Street, Sidford Church Street, Bedford Lawn.
- Coaches, private cars and motor cycles: Manor Road, Sidmouth.

Traffic accessing these car parks need to arrive via the two main routes described above and this influences the flow of traffic around Sidmouth town and along the frontage.

6.2.2 Marine Traffic

Marine traffic around the local area is generally limited to recreational boats and water craft and the Sidmouth Inshore Rescue Service lifeboat operating from Sidmouth beach (see **Section 5**). There have historically also been a number of commercial fishers working from small vessels (less than 12m) which are stored and launched from the beach at Sidmouth. It is understood however through consultation with the Steering Group that commercial fishing is now a very minor activity out of Sidmouth, with only one or two vessels regularly operating. Offshore fishing activity is also present but given the location of the works along the frontage, effects on these vessels are not anticipated.

The UK's first large scale offshore rope cultured mussel farm is approximately 4.3 km to the south west of the seafront. Whilst vessels service this farm on a daily basis, in light of the distance from the shore and the fact that these vessels operate out of Brixham, they are unlikely to be affected by the proposed works at Sidmouth seafront.

Stuart Line Cruises which operate out of Exmouth also run regular boat trips to and from Sidmouth throughout the summer which requires access to the shore and a place for disembarkment (to lower a ramp onto the beach). This service is well used with up to 150 passengers participating in each trip. A number of other boat trips also take place in and around Sidmouth including a Jurassic Coast cruise (which sometimes departs from Sidmouth with up to 50 passengers) and a Sidmouth Bay Cruise (departs from Sidmouth with up to 100 passengers). In the peak summer season, these trips can run up to 4 times a day. The largest vessel Stuart Line Cruises utilise to operate these cruises is 24m long and 6.5m wide, with a draft of 1.35m.

6.3 Impacts during Construction

6.3.1 Impact of increased number of HGVs and construction vehicles on local traffic

During construction, the impacts of heavy good vehicles (HGVs) and other plant would need to be closely managed through a Traffic Management Plan which would include specific approach routes for HGVs to minimise disruption. Where possible, works would also be planned to avoid the peak summer season to minimise impacts on traffic. In particular, efforts will be made to avoid the Sidmouth Folk Week which is of core importance to the town and sees visitors from local as well as distant locations. Although parking is encouraged outside of Sidmouth town centre, the increase in both vehicle and pedestrian traffic is significant during this period and should be avoided if possible. Further detail on this is provided in **Section 5 – Socio-economics, Amenity, Tourism and Recreation**.

Traffic management in the form of signage and two-way lights may be required as there is a possibility that road narrowing may be needed during periods of the works. Should it be determined that this is required, all activities will be coordinated with Devon County Council to minimise disturbance. A Stop/Go board type system may also be used to manage short term traffic restrictions such as unloading. Vehicle access to the frontage will maintained wherever possible.

Since the requirement for any measures which restrict traffic flow will be short term in nature (for a period of hours or at most a small number of days), the impact on congestion is considered to be **negligible** on the basis that when traffic management measures are implemented, there will only be a short delay in passing through the area.

6.3.2 Impact on marine navigation

There may be periods of time in which the delivery vessels (if required) and/or a dredger will be manoeuvring around the frontage; this could present a risk to recreational navigation. Although the exact size of the vessels to be used in these activities are not known at this time, it is anticipated that close to shore all vessels will be operating at very slow speeds. Risks to other vessels in the area are therefore deemed to be **negligible**. In the event of marine based plant and equipment being used the following control measures will be put in place:

- A marked beacon will be placed at the seaward end of the groyne;
- An exclusion zone will be established around the works;
- Construction vessels will be lit and marked in compliance with Marine and Coastguard Authority (MCA) navigational standards; and,
- A Local Notice to Mariners will be issued prior to the commencement of construction works.

In light of the small level of risk and the implementation of best practice control measures, impacts on marine navigation are considered to be **negligible**.

6.4 Impacts during Operation

Given that the proposed SBM scheme would enhance the existing frontage features, the operational phase is not anticipated to give rise to any additional impacts over and above those that exist now. As noted in **Section 9**, there is the potential for beneficial impacts to be achieved if the SBM works facilitates a broader regeneration of the Sidmouth town frontage. As part of the detailed splash wall design, every attempt will be made to consider improvements to the flow of pedestrians using the Esplanade and this is likely to have beneficial impacts to traffic flow in this area. More consideration will be given to this aspect of the impact assessment prior to the submission of any applications for consent.

6.5 Proposed Mitigation

It is recommended that a Traffic Management Plan is drafted and agreed with EDDC before commencement of the SMP works.

It is also recommended that a Community Engagement Plan is drawn up by EDDC to ensure that once the final design and construction details are known they are clearly communicated to the immediate residents and business operators along the Esplanade. It will be important to ensure that these people understand the timings of all aspects of the work and the implications for the operations of their business interests as well as their everyday lives. Engaging with the local community early will ensure that people are aware of mitigation measures (such as diversions or temporary traffic lights) and can make arrangements to minimise disruption. Whilst this Plan would primarily be drafted with those people most directly affected by the proposed works, it would also form the basis of broader public communications in line with construction excellence best practice.

In the event of marine based plant and equipment being used the following control measures will be put in place:

- A marked beacon will be placed at the seaward end of the groyne;
- An exclusion zone will be established around the works;
- Construction vessels will be lit and marked in compliance with Marine and Coastguard Authority (MCA) navigational standards; and,
- A Local Notice to Mariners will be issued prior to the commencement of construction works.

7 Ecology

7.1 Introduction

This section of the PEIR considers how the SBM scheme, as described in **Section 2**, may affect fish and shellfish resources; and ecology (marine and terrestrial) within the study area and compliments **Section 4** and **Appendix 1** of the PEIR. This includes species which are considered to be of commercial or conservation importance.

Note that a detailed Construction Environment Management Plan (CEMP) will be drafted and implemented prior to the commencement of the SBM scheme works which will cover all issues relating to best practices when working in and around water to reduce the risk of environmental damage associated with accidental spills and leaks for example. As a result, the risk of accidental environmental contamination is not considered further within this section.

7.2 Baseline Environment

7.2.1 Designated Sites

Sidmouth to West Bay SAC

The Sidmouth to West Bay Special Area of Conservation (SAC) is designated to protect the vegetated sea cliffs and Tilio-Acerion forested slopes, screes and ravines. The Sidmouth to West Bay is a highly unstable soft cliff coastline subject to mudslides and landslips. Vegetation is very varied and includes pioneer communities on recent slips and calcareous grassland and scrub on detached chalk blocks. Therefore, the continuing erosion of the cliffs is central to the integrity of the SAC and the variety of habitat niches that are available as a result of the erosion is fundamental to the functionality of the SAC.

Lyme Bay and Torbay SAC

The Lyme Bay Reefs area is classified as an Annex I reef habitat and is indicative of offshore reefs, where sea squirts (such as *Ascidiella aspersa* and *Phallusia mammillata*), sponges (such as *Cliona celata*), anemones (such as *Aiptasia mutablilis* and *Urticina felina*), corals (such as *Alcyonium digitatum, Caryophillia smithii* and *Leptopsammia pruvoti*), sea fans (such as *Eunicella verrucosa*) and bryozoans (such as *Pentapora fascialis*) dominate and sustain a wide diversity of other species.

Lyme Bay and Torbay SAC has examples of the classical wave-eroded sea caves and solution caves with entrances to the open sea which exhibit some of the best examples of coastal solution caves in the UK. The caves that are subject to strong wave surge and are characterised by communities of mussels *Mytilus edulis*, barnacles *Balanus crenatus*, cushion sponges, encrusting bryozoans and colonial ascidians, depending on the degree of water movement and scour at particular points in the cave system. There are also caves that occur in deeper water where sponges, soft corals, solitary ascidians, bryozoans and sessile larvae of jellyfish can be found as well as crabs, lobsters *Homarus gammarus*, crawfish *Palinurus elephas*, and fish such as leopard-spotted goby *Thorogobius ephippiatus*.

Sidmouth to Beer Coast SSSI

The grassland of the cliff tops and ledges is characteristically species-rich with many plants typical of calcareous soils including Purging flax *Linum catharticum*, Squinancywort *Asperula cynanchica*, Carline Thistle *Carlina vulgaris*, Small Scabious *Scabiosa columbaria*, Common Rockrose *Helianthemum nummularium*, Ploughman's Spikenard *Inula conyza* and Salad Burnet *Sanguisorba minor*. Several species

of orchid occur including Pyramidal Orchid *Anacamptis pyramidalis* and Autumn Lady's-tresses *Spiranthes spiralis*.

7.2.2 Habitats and Species of Principal Importance in England

The following habitats are represented within or in close proximity to the SBM scheme frontages:

- Maritime cliffs and slopes;
- Coastal vegetated shingle;
- *Sabellaria alveolata* reefs; and
- Sub-littoral sands and gravels.

A review of the current data on the distribution of these habitats indicates that maritime cliffs and slopes are in closest proximity to the 'footprint' of the proposed SBM scheme as they form part of the SSSI and SAC which extend across East Cliffs. An intertidal walkover survey carried out to inform this PEIR did not identify any significant areas of vegetated shingle, however, more detail is provided below.

A desk-based study was undertaken for legally protected species using the NBN Atlas (https://nbnatlas.org/) showed that there was one record of an otter (*Lutra lutra*) and three records of pipistrelle bat (two of *Pipistrellus pipistrellus* and one of *Pipistrellus pygmaeus*) there were no records of great crested newt, badger or water vole.

7.2.3 Migratory Fish

The River Sid has been classed as a 'recovering salmon river' by the Environment Agency. There is therefore an overall objective to ensure that the river recovers and stocks of Atlantic salmon improve. A survey by the Sid Vale Association in 2013 identified both migratory and non-migratory fish within the River Sid including Atlantic Salmon, European eel and Sea Trout. The populations of these migratory species in the River Sid is uncertain as there is no regular monitoring of the stock.

Sea trout were recently observed during a recent Steering Group meeting for the SBM along the River Sid in 2022 below a small weir upstream of the slipway which could be a fish migration barrier during low river flows. School Weir further upstream, which is a larger weir structure, can restrict the natural freshwater distribution range for salmonids to the reach between School Weir and the tidal limit. Therefore, the catchment status is overall somewhat threatened due to the significantly limited amount of habitat available. There is a shingle bar which can also present an obstacle to fish migration under certain conditions (such as during periods of low river flow and during neap tides). The shingle bank has the potential to impact sea trout or salmon smolts descending downstream to the sea during their migratory period (late March to early June). This could allow concentrations of smolt in the lower river pools which would make them more susceptible to predation and would delay their seaward migration to feeding areas.

Adult sea trout enter the river at any time throughout spring and summer, but peak migration is usually between mid-October to mid-November, with spawning in freshwater taking place typically between mid-October to January. Flooding tides are the primary time to enter the river, especially when combined with a high river flow. Migratory salmonids may dwell for a period of time in the inshore waters around the river discharge of the River Sid until the conditions are suitable to enter the freshwater system. There is a risk that if they are prevented from entering for too long after their initial arrival, they may not ascend the river and will complete their life-cycle.

A full list of key migration periods for key fish species is shown in **Table 7.1**.

Table 7.1 Key Fish Species and Migration Periods

Key Fish Species	Upstream/Downstream	Key Migration Periods
Salmonid (salmon, sea trout)	Upstream	October/November – February/March (peak upstream migration for salmon usually mid-October to mid-November in the UK)
Salmonid (salmon, sea trout)	Downstream	April - June
Young eel migration	Downstream	March – May (peak is May)
Adult eel migration	Downstream	Autumn – Winter (the silver eel migration is less defined than others, although generally between November and March)
Lamprey	Upstream	Winter and spring
Lamprey	Downstream	Autumn - Winter
Bullheads spawning		February - June

7.2.4 Fish Spawning and Nursery Areas

The coastal waters of Sidmouth are likely to be used as a nursery area for a number of fish species which are present within the wider Lyme Bay. Data from Cefas indicates high intensity usage by mackerel *Scomber scombru* and low intensity usage by:

- Spurdog *Spulaus acanthias*;
- Thornback ray *Raja clavate*;
- Spotted ray *Raja montagui;* and
- Anglerfish *Lophius piscatorus.*

They have also been utilised as a low intensity spawning area by *Sandeels Ammodytidae* and sole *Solea solea* (Ellis et al., 2012; Coull et al., 1998).

Figure 7.1 shows the fisheries spawning/ nursery data for Lyme Bay.

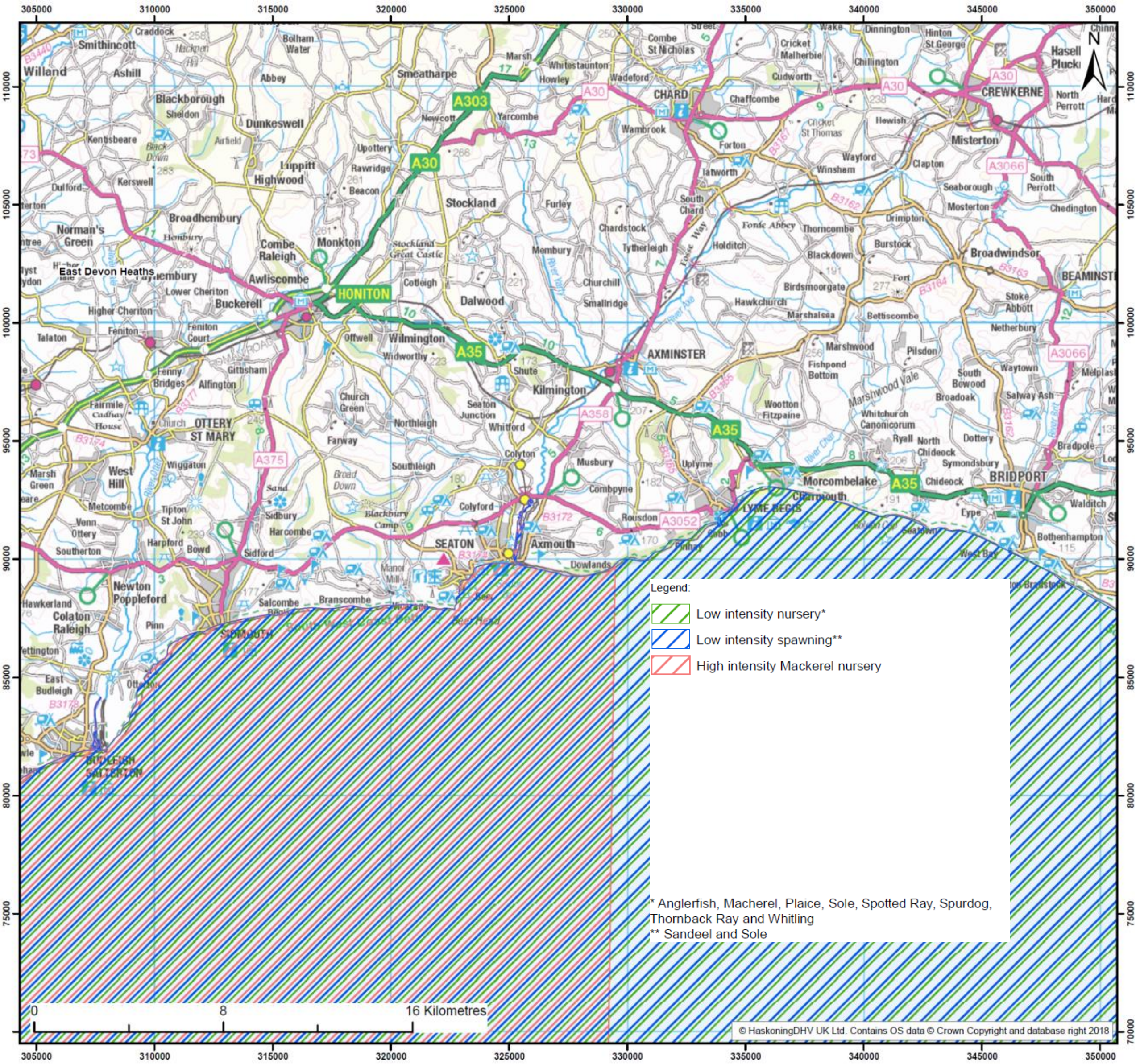


Figure 7.1 Fisheries Spawning/Nursery Data for Lyme Bay
Source: Ellis et al. (2012); Coull et al. (1998)

7.2.5 Shellfish Ecology

As previously mentioned (in **Section 4** Designated Sites) within Lyme Bay and Torbay SAC, there are examples of the classical wave-eroded sea caves and solution caves which are characterised by communities of mussels *Mytilus edulis*, barnacles *Balanus crenatus*, cushion sponges, encrusting bryozoans and colonial ascidians, depending on the degree of water movement and scour at particular points in the cave system. There are also caves that occur in deeper water where shellfish such as crabs, lobsters *Homarus gammarus* and crawfish *Palinurus elephas*.

Off the Sidmouth Coast there is also a pot fishery which targets brown crab (*Cancer pagurus*) and European lobster (*Homarus gammarus*). There is also a classified bivalve mollusc harvesting area approximately 4km off the coast of Sidmouth (www.magic.gov.uk). The UK's first large scale offshore rope cultured mussel farm is approximately 4.3 km to the south west of the seafront. Still working towards full scale commercial operations, eventually the farm (run by Offshore Shellfish Ltd) will be the largest of its kind in Europe. The farm utilises screw-type moorings to attach the ropes on which the mussels grow between 3 and 6 miles out from shore.

7.2.6 Benthic and Intertidal Ecology

The predominant intertidal habitat present is shingly/sand with a rock platform present at Chit Rocks. Data obtained from www.magic.gov.uk indicates that the subtidal habitat is dominated by sand and there do not appear to be any records indicating the presence of protected habitats or species. Furthermore, Natural England have confirmed that apart from those linked to the HRA, no other SAC qualifying features are present within the areas covered by the proposed SBM scheme. Some records of *Sabellaria* were identified in the baseline documentation supporting the scheme, however these are not located within the footprint of or within close proximity to the proposed works.

An intertidal walkover survey undertaken for PEIR on a falling tide which covered the entirety of the SBM scheme frontage between Jacob's Ladder and East Beach. The upper shore along the frontage comprises shingle with larger stones close to the sea-wall grading to smaller gravel towards the water line with sand present at extreme low tide. In places the upper shore supports patches of vegetation including a 5-7m strip in front of the Belmonth Hotel, between the outfall and steps at SY12338710. A few yellow-horned poppy were noted at the base of the seawall in front of the Bedford Hotel and Hotel Riviera.

The existing groynes along the Sidmouth Town frontage are sparsely colonised by lichens on the upper boulders with *Enteromorpha* present at and below the waterline. *Littorinids* are common on the lower boulders with increasing frequency down the shore. Some fucoid seaweed is occasionally present on the groyne structures, more frequent at the lower ends of the groynes which are only exposed on spring tides. The River Sid Training Wall is more heavily colonised than the groyne structures with fucoid seaweeds commonly present along with *Enteromorpha*.

During the walkover of East Beach very little intertidal flora and fauna were identified with only occasional fragments of fucoid seaweed present along with small *littorinid* scattered within the shingle.

The relatively low presence of intertidal species is considered to be reflective of the highly mobile nature of the beaches in this location. The regular movement of the shingle will prevent the settlement of many intertidal species and hence the stable rock structures e.g. groynes, training wall etc provide a focal point for biodiversity along this frontage

7.2.7 Marine Mammals

The JNCC Cetacean Atlas (Reid *et al.,* 2003) shows the species of cetacean most commonly seen on the southwest coast of England. These are bottlenose dolphin *Tursiops truncatus*, short-beaked common dolphin *Delphinus delphis*, long-finned pilot whale *Globicephala melas* and harbour porpoise *Phocoena phocoena*. All are in low numbers when compared to the rest of the UK.

It is considered that the English Channel (where the proposed scheme is located) as a whole has a low density and diversity of marine mammals. A large scale survey for cetaceans across all European Atlantic waters was undertaken in 2016; the SCANS-III survey (Hammond *et al*., 2021). The proposed scheme is located within SCANS-III Survey Block C[1]. Within this block, the most predominant species recorded was harbour porpoise. Two sightings of unidentified common or striped dolphin *Lagenorhynchus acutus* were recorded, as well as one minke whale *Balaenoptera acutorostrata*.

Harbour porpoise sightings along the south coast of England are predominantly off the Cornwall, Dorset, Hampshire and Sussex coastlines and in offshore areas. The nearest sightings of harbour porpoise were recorded at Salcombe (south Devon) and offshore at Weymouth (Heinanen & Skov, 2015).

The Joint Cetacean Protocol Phase III Report (Paxton *et al*., 2016) supports this, with very low densities of minke whale, bottlenose dolphin, and short-beaked common dolphin identified in the region of the proposed scheme. A report used to identify persistent harbour porpoise hot-spots around UK identified no area of consistently high harbour porpoise density near the proposed SBM scheme.

Considering the low density and diversity of cetacean species within the vicinity of the proposed scheme and the low potential for any impact to occur (i.e. from the placement of rock in very shallow water with no piling to take place) as well as the lack of restrictions placed on marine mammal movement away from any noise source, it is concluded that there is a very low risk of having an effect on any marine mammal species. Marine mammals are therefore not considered further in this assessment.

7.3 Impacts during Construction

7.3.1 Increased suspended sediment concentration and smothering

Beach renourishment could result in changes to suspended sediment concentrations within the water column. However, given the requirement to place shingle on the beaches, the risk of significant suspension of fines is considered relatively low. Additionally, the effect will only occur during placement in water and for short periods at a time (i.e. the recharge will not continue over night) and is unlikely to extend very far offshore before settling. As a result, any temporary changes to suspended solids concentrations will be quickly dispersed following cessation of the recharge. Consequently a **negligible impact** on water quality and therefore marine ecology and fish is anticipated.

7.3.2 Underwater noise due to rock placement and beach recharge

The majority of the works required for the proposed SBM scheme will be undertaken in the dry as far as possible. There may, however, be a requirement to place shingle and rock for the new breakwater and groyne in the water. This is however unlikely to be of a sufficient level or pitch to have a negative impact on the most sensitive receptor, such as fish (including their migration behaviour), given background underwater noise associated with wave action; and overall low noise impact upon fish sensitivity regarding the placement of rocks compared to piling (*Popper et.,*2004) (which will not be taking place for the works). The duration of the works will also be temporary and short term in nature. Overall therefore, **no impacts** on underwater noise are predicted upon marine ecology and fish.

[1] Note that Survey Block C is quite large, covering a total area of 81,297km^2 from the south Cornwall coast (at Landsend) along the south England coastline to east Sussex, and across to the north coast of France.

7.4 Impacts during Operation

7.4.1 Loss of habitat

During operation there will be a permanent loss of habitat of approximately 2800m^2 due to the construction of the breakwater, groyne and boat access ramp.

As set out above, the intertidal habitats present are of low ecological value and sensitivity (https://www.marlin.ac.uk/). Considering this as well as the small area that will be permanently lost in context of the total extent of these habitats, a **negligible adverse impact** is anticipated on the intertidal and subtidal habitats and species present through permanent loss of habitat.

It should be noted the new breakwater and groyne will create artificial reef habitat for fish, such as bass; and could be further enhanced through making the structures 'living structures' through the implementation of sea wall panels to encourage marine species to colonise the breakwater and groyne. This would be a **beneficial impact** of the proposed SBM scheme.

The above could be incorporated into an educational resource for local school projects and community monitoring initiatives of the local marine environment.

7.4.2 Increased suspended sediment concentration and smothering

Beach recharge during operation will have similar effects to those assessed during construction however at a much smaller scale. It is therefore considered that there will be **no impact** on ecological receptors during operation.

7.5 Proposed Mitigation

Given that significant impacts are not predicted, no specific mitigation measures are required over and above the requirement for a CEMP.

8 Landscape

8.1 Introduction

This section of the PEIR relates to the main issues raised as a result of the proposed SBM scheme in relation to the landscape and seascape environment. These effects have been determined through a desk-based study and previous landscaping assessments carried out for the previous proposed 2018 SBM scheme. As stated in **Section 1.2.2**, for the OBC phase of the project, an LVIA has not been carried out, although based upon the outcomes of the EIA screening and scoping opinion for the proposed new SBM scheme, an LVIA may be required as part of the Environmental Statement for the scheme. This section is also supported by **Section 9 – 9 Archaeology and Cultural Heritage**.

8.2 Baseline Environment

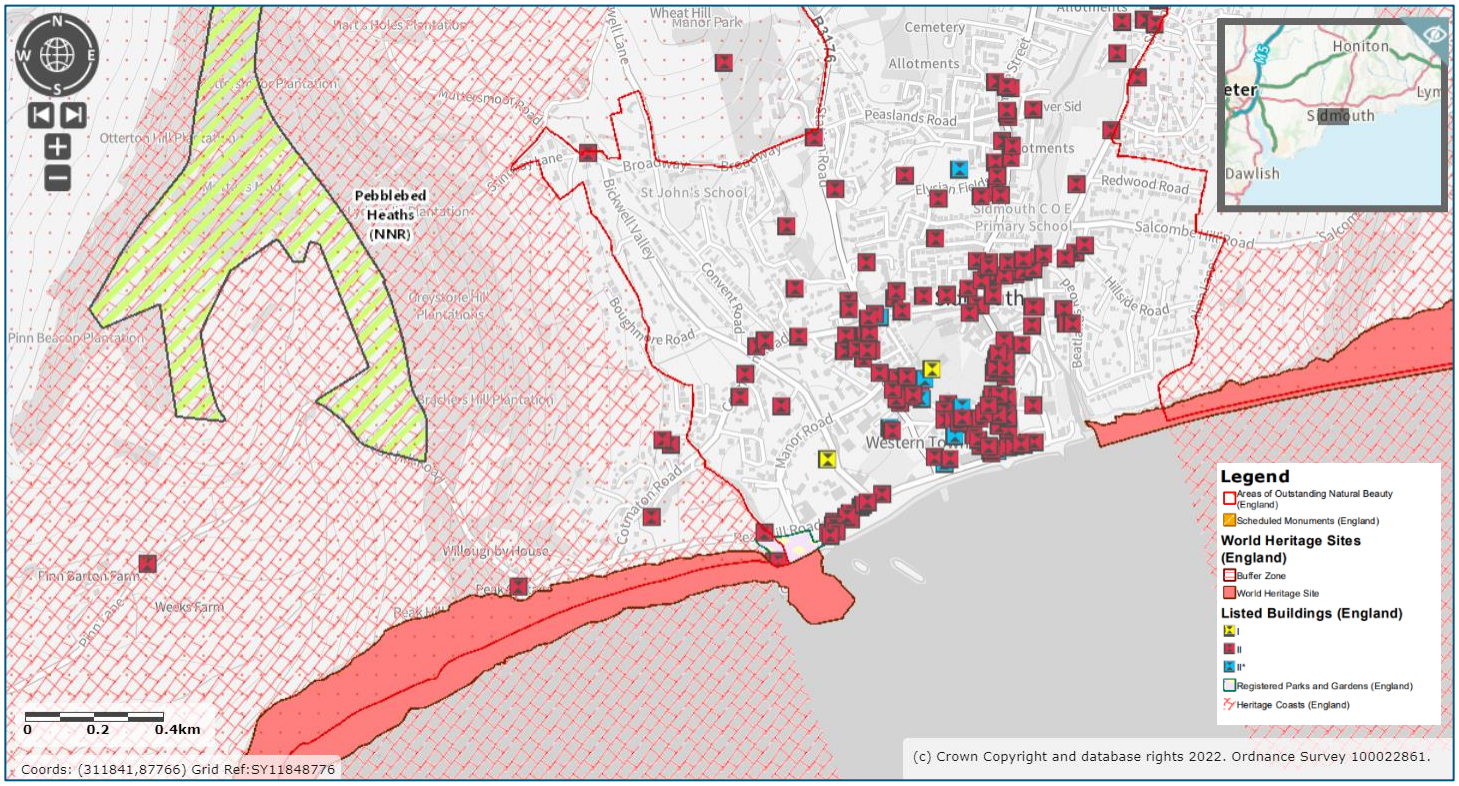
The key landscape and seascape designations in the study area include the Dorset and East Devon World Heritage Site (WHS); East Devon AONB; Connaught Gardens Registered Park and Garden (RPG); and the Sidmouth Conservation Areas (in terms of their contemporary setting and users, see Heritage Assessment for heritage issues). The Heritage Coast, South West Coast Path, Scheduled Monuments, local designations and footpaths also contribute to the surrounding landscape and seascape designations of the study area (**Figure 8.1**).

With regard to protection and management requirements, the WHS Statement of Outstanding Universal Value (SOUV) states that one of the main management issues is that related to coastal protection schemes. The introduction of man-made structures will potentially impede natural processes and undermine the SOUV. Overall, the long term preservation of OUV depends on the maintenance of dynamic natural processes in the WHS.

The AONB Management Plan describes the area's special qualities (key features and attributes of significance) as its varied and dramatic coastal scenery, the grandeur of the sheer red sandstone cliffs, intimate wooded combes and coves contrast with the stark white chalk outcrop at Beer Head and further east, the wilderness of the undercliffs. With the exception of the white cliffs, these qualities are all present within the study area. It further describes the recreational, cultural and spiritual qualities associated with the South West Coast Path and extensive opportunities for open air recreation, uninterrupted views or an escape to tranquillity and relative isolation.

Key landscape character units in the study area include:

- NCA147 Blackdowns (National)
- DCA52 Sidmouth and Lyme Bay Coastal Plateau (Regional – Devon)
- LCT 4H Cliffs (Regional / local)



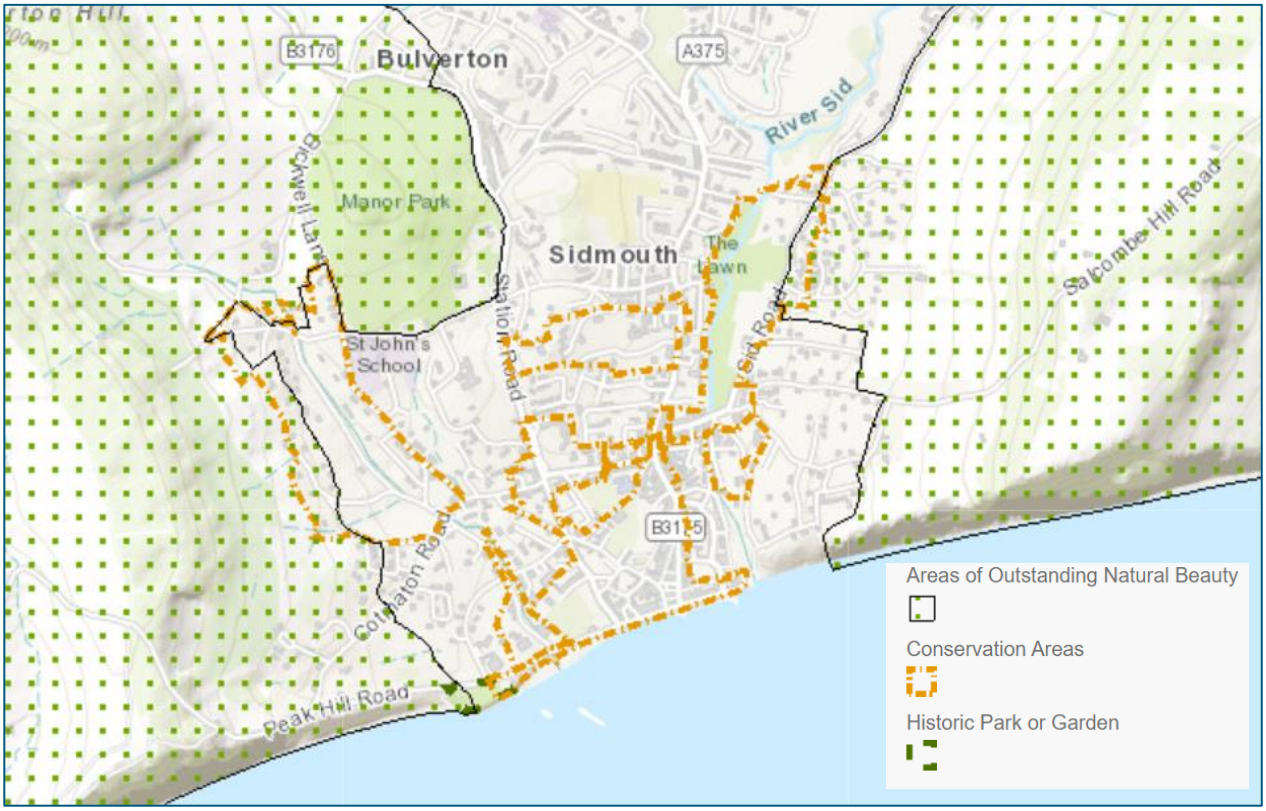


Figure 8.1 Key Landscape and Seascape Designations in the Study Area
Source: EDDC (2022); Magic Map Application (2022)

The defining influences within the study area are the built environment of Sidmouth, the linear expanses of beach with existing sea defences and the rising red sandstone cliffs and hills to the west and east. Key landscape characteristics evident within the study area include the flat-topped ridges with far reaching views, narrow steep-sided valleys, dynamic coastline of tall often crumbling cliffs and open and exposed cliff-top plateau, narrow shingle and pebble beaches, and ancient dispersed settlement pattern. It also includes Sidmouth as an urban area with existing sea defences (existing concrete splash wall, two breakwaters, three groynes, river training wall and slipway), defining the central parts of the study area and influencing visual amenity throughout.

Key themes running through all the levels of landscape character information with greatest relevance to the proposed SBM scheme are the influence of coastal erosion as a key force for future change, the need to maintain the natural qualities of the coastal landscape and the protection of the open and largely undeveloped character of the cliffs, avoiding siting new development and vertical structures on prominent skylines.

The historic character of the study area is overall defined by the Historic Settlement and Sand Historic Landscape Character Types (HLCTs); with the seascape overall dominated by urban areas along the seafront of the Sidmouth; with the east and west seascape less busy and the natural landscapes having a strong influence on seascape.

Visual amenity of the study areas can be considered to be defined by the following key elements:

- Woodlands along the slopes of Peak Hill and Salcombe Hill, and on some ridges.
- The cliff faces with intense red and green colours, pebble beaches, and the undulating and sweeping nature of the coastline.
- The rural hinterland and fields running up to the often abrupt cliff edges.
- Prominent points along cliffs and associated rocky outcrops – High Peak, Peak Hill, Jacobs Ladder, Salcombe Hill, Higher Dunscombe Cliff.
- Built up area of Sidmouth.
- Open water areas south of Sidmouth.

The following key receptors are likely to be a key consideration in the decision making process and will be discussed in more detail in the impact assessment section of this report (there are other receptors that are not considered individually as key effects are likely to be associated with these listed below):

Landscape receptors

- Dorset and East Devon WHS.
- East Devon AONB, with character areas DCA52 Sidmouth and Lyme Bay Coastal Plateau and LCT 5 Cliffs information referenced as required to discuss effects.
- Heritage Coast including seascape.
- Connaught Gardens RPG.
- Town Centre and Seafront Conservation Area, with Townscape Character Area Town Centre & Esplanade information referenced as required to discuss effects.

Visual receptors:

- Users of Dorset and East Devon WHS.
- Users of East Devon AONB.
- Users of Heritage Coast including water users.
- Users of South West Coast Path (SWCP).
- Users of Peak Hill.

- Users of Salcombe Hill.
- Users of Connaught Gardens RPG.
- Users of Town Centre and Seafront Conservation Area.
- Residents of and visitors to Sidmouth seafront.
- Residents at southern end of Townscape Character Area Bickwell.
- Valley, where some properties on slopes overlook Sidmouth.
- Residents at southern end of Townscape Character Area Hillside where some properties on slopes overlook Sidmouth.
- Sidmouth beach users.
- Salcombe beach users.

8.3 Impacts during Construction

Construction stage effects relate to the repairs and renovation of the existing rock armour, demolition and rebuilding works of the splash wall, construction of the new groyne and breakwater; and re-charging of various beach areas for an approximate duration of less than 12 months. During these months construction sites including materials, fencing and ongoing works including presence of machinery, some noise and dust, and material deliveries on road (and potentially sea) are the most likely construction effects. All of these effects would however only be temporary and in an area already set and seen within an urban context as opposed to open countryside / undeveloped seascape.

It is not considered that this would increase the wider area landscape, seascape and visual effects in such a manner that it would result in an increased degree of effect. No additional areas than those used in the construction footprints and beach recharge operations would be used along the beaches. Some additional movement of suction hopper dredgers may be seen in the wider view, which would be slightly different to the normal presence of leisure and small fishing boats.

There would be an increase in degree of effect along the seafront. The townscape would be more disrupted, with ongoing changes. Visual amenity would be reduced through presence of construction sites, materials and equipment. During construction, it is considered that there would be temporary up to moderate landscape effects and substantial visual effects along the promenade and on views to the east from the eastern end of the promenade. These are temporary, and fully reversible, hence not considered significant. It is suggested that construction works could be combined with implementing educational boards along the seafront to inform visitors of the works and the Jurassic Coast context, thereby somewhat mitigating adverse amenity effects.

Overall, the above is considered have a **minor – moderate adverse impact**, although this will only be temporary in nature, which may be further reduced with the aforementioned mitigation and those further detailed below.

8.4 Impacts during Operation

8.4.1 East Devon Area of Outstanding Natural Beauty (AONB)

The new groyne and breakwater will be visible within longer views of the East Devon AONB , although this will not affect the wider panorama and will not alter the overall quality or character of the view. This effect is assessed to be of **negligible** significance. In shorter views, for example near East Beach and Town Beach, the new groyne and breakwater will be prominent and readily perceptible in this view, introducing a man-made structure into this view currently devoid of man-made structures. This is considered to be a **moderate adverse impact**; reduced to **minor – moderate adverse impact** at high tide when less of the groyne and breakwater are visible. However, the magnitude of the impacts may be further reduced with mitigation in place (see below).

The splash wall will not be readily perceptible and unlikely to be noticed by most people. The presence of the new breakwater and groyne will change views to and from the sea, however given the presence of existing structures, the change is likely to be a **minor – moderate adverse impact**, which may be further reduced with mitigation in place (see below).

8.4.2 Setting of Conservation Area

The new groyne will be largely imperceptible from the Conservation Area, from all but the eastern end of the Esplanade looking east. In the context of the existing seafront and flood defences it is unlikely that the new groyne would detract from people's experience of the Conservation Area or its character. As such, a **minor adverse** impact is predicted upon the Conservation Area in response to the presence of the new groyne.

The presence of the new breakwater will change views to and from the sea, however given the presence of existing breakwater structures, the change is likely to result in a **minor – moderate adverse impact**, may be further reduced with mitigation in place (see below). The splash wall will not be visible from most of the Conservation Area, although along the Esplanade and up to 100m to within the town, the small increase in height of the splash wall in its current form is anticipated to have a **minor adverse impact** upon the character of the Conservation Area and peoples experience of this as a heritage asset. However, beneficial effects could be achieved if changes to the sea wall were combined with improvement works to the promenade and there was a designed approach to the appearance of the wall.

8.4.3 Setting of World Heritage Site

The new groyne will be visible within longer views of the World Heritage Site (WHS), although this effect will be localised and the key characteristics and special qualities of the designated site will be retained. In addition, views of the wider coast and sea will be preserved and will not alter the overall quality or character of the view. The effect of the new groyne regarding longer views is assessed to have **negligible impact** on the setting of the WHS.

In shorter views, for example, East Beach, the new groyne will be prominent and readily perceptible in this view, introducing a man-made structure into this view currently devoid of man-made structures. This is considered to be a **moderate adverse impact**; reduced to **minor –-moderate adverse impact** at high tide when less of the groyne is visible. However, the magnitude of the impacts may be further reduced with mitigation in place (see below).

The splash wall will not be readily perceptible and unlikely to be noticed by most people. The presence of the new breakwater will change views to and from the sea, however given the presence of existing structures, the change is likely to be a **minor – moderate adverse impact**, which may be further reduced with mitigation in place (see below).

8.4.4 Setting of High Peak Camp

There are no Scheduled Monuments directly within the study area, although High Peak Camp (List Entry 1003887), is located on the cliff top to the west of Sidmouth. The primary importance of High Peak Camp lies in its potential value as a rare example of a causewayed enclosure and fortified settlement, particularly for the potential of the buried archaeological and environmental deposits which are anticipated to survive at the site. Its location on the cliff is a part of how it is experienced by visitors to the site, although is not considered to be an inherent part of its significance as a Scheduled Monument. As a result, for this reason, the new groyne, breakwater and splash wall are considered to have **no adverse impact** upon the setting of the Scheduled Monument.

8.4.5 Setting of Grade II and II Listed Buildings

In the context of the existing harbour and flood defences it is unlikely that the new groyne and breakwater would detract from people's experience of the Listed Buildings. The splash wall will not be visible from most of the Listed Buildings, although along the Esplanade and up to 100m to within the town, the small increase in height of the splash wall in its current form is anticipated to have a **minor adverse impact** upon the character of the Conservation Area and peoples experience of this as a heritage asset. Due to the high importance of the Listed Buildings, this has the potential to result in an adverse effect. However, beneficial effects could be achieved if changes to the sea wall were combined with improvement works to the promenade and there was a designed approach to the appearance of the wall.

8.4.6 Users of the South West Coast Path

From the western end of the Esplanade views of the new groyne will be restricted to glimpses behind urban structures and merging in view with the existing groyne. The main focus of views from this point are on the Esplanade and fore/mid ground and there will be no effect upon the view of cliffs behind. The effect of the new groyne is assessed to have **negligible impact** upon users of the South West Coast Path, which includes the Esplanade.

The increase in height of the splash wall will be perceptible and will slightly decrease the extent of sea visible to users of the South West Coast Path (Esplanade), although it will not block views of the sea or horizon and will not alter the overall appearance of the view. The effect of the splash wall is assessed to have **minor adverse impact** upon users of the South West Coast Path.

The presence of the new breakwater will change views to and from the sea, however given the presence of existing structures, the change is likely to have a minor-moderate **minor adverse impact** upon users of the South West Coast Path.

8.4.7 Proposed Mitigation

It is considered that construction effects would not be significant, due to their temporary nature. It is recommended that options are explored to undertake the 36 weeks construction programme outside the main holiday season, or that at least the most disruptive elements are planned to avoid that season, and that construction management along the promenade and at its eastern end includes educational resources about the works and the wider Jurassic Coast. Mitigation options for the new groyne and breakwater are likely to be limited considering the technical requirements.

The final designs however should ensure the structures do not interrupt the existing natural processes (i.e. mitigation design), thereby not undermining the WHS purpose.

Higher quality finishes should be implemented and a design that enhances the seafront overall as well as positioning gaps / flood gates at more appropriate locations in terms of pedestrian circulation and possibly retention of views. The use of re-enforced glass sections could also be considered if feasible, in a flood defence context, to preserve some views along roads from the Conservation Area to the sea.

9 Archaeology and Cultural Heritage

9.1 Introduction

This section of the PIER assesses the likely significant effects of the proposed SBM scheme on the historic environment resource and includes a summary of the historic environment baseline data collated as part of the desk-based assessment used to inform this section. Specific consideration is given the 'Dorset and East Devon Coast' World Heritage Site located either side of the Sidmouth town frontage. This section also further supports the outcome of **Section 8 – Landscape**.

9.2 Baseline Environment

9.2.1 Designated Heritage Assets

World Heritage Site

The Jurassic Coast, along with the Giants Causeway and Causeway Coast in Northern Ireland, is one of only two natural World Heritage Sites in the UK. The designation comprises the sections of undeveloped coast between Orcombe Point in East Devon and Studland Bay in Dorset, excluding built up-sea fronts within this coastal stretch, which includes Sidmouth. The cliffs on either side of Sidmouth, including Pennington Point, form part of the 'Dorset and East Devon Coast' World Heritage Site (the Jurassic Coast) (**Figure 9.1**).

The statement of Outstanding Universal Value (OUV) for the Jurassic coast states that:
'The coastal exposures along the Dorset and East Devon coast provide an almost continuous sequence of rock formations spanning the Mesozoic Era, or some 185 million years of the earth's history. The area's important fossil sites and classic coastal geomorphologic features have contributed to the study of earth sciences for over 300 years'.

Of specific geological interest at Sidmouth is the transitional boundary between two Triassic rock units: the Otter Sandstone Formation (part of the Sherwood Sandstone Group); and the Sidmouth Mudstone Formation (part of the Mercia Mudstone Group). The Otter Sandstone (now obsolete and referred to as the Helsby Sandstone Formation) and the Sidmouth Mudstone form the characteristic red cliffs at Sidmouth and the transitional boundary between the two formations survives, exposed in the cliff face at the mouth of the River Sid at Pennington Point. This boundary represents the transition from a fluvial depositional environment to a mudflat environment during the Anisian Stage (247.2 million to 242 million years ago) of the Triassic Period. As a narrow window of evidence for this transition, this boundary is both a geologically important, and particularly sensitive survival. The sea cliffs between Budleigh Salterton and Sidmouth were formerly the type section for the Otter Sandstone Formation and, although the type section is now placed at Helsby Hill, Cheshire, the sea cliffs remain as a reference section for the Helsby Sandstone Formation (British Geological Survey, 2014).

Sidmouth is also an important site for Triassic fossils, specifically as a source of vertebrate skeletal remains, particularly of reptiles. Fossil material from Pennington Point has yielded a more diverse assemblage of vertebrate fossils than at any other Triassic locality in Devon (Gallois, 2004). Much of the material (in the form of bones, teeth and fish scales) has been found in *in situ* outcrops exposed at times of low beach level.

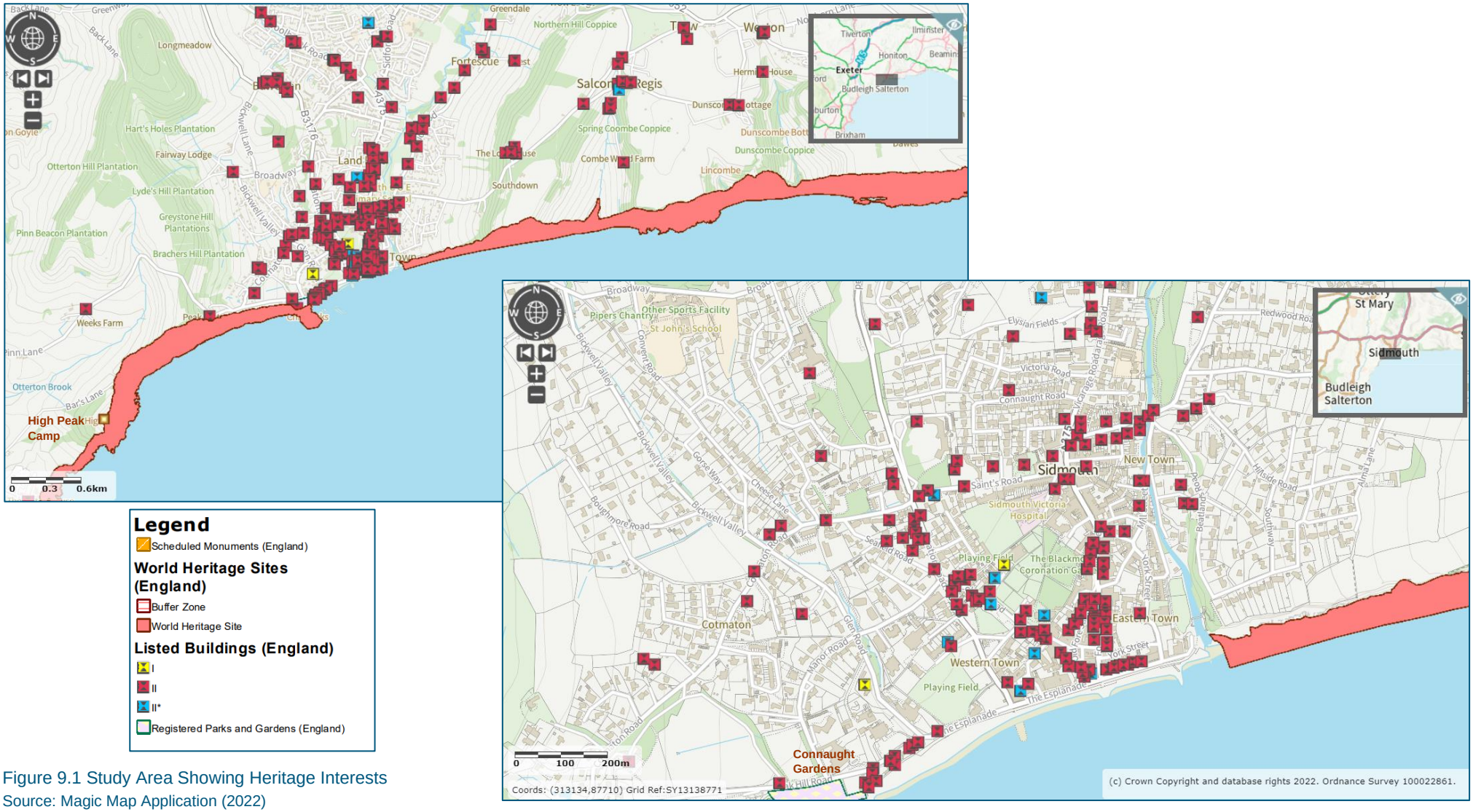


Figure 9.1 Study Area Showing Heritage Interests
Source: Magic Map Application (2022)

Scheduled Monuments

As previously stated, there are no Scheduled Monuments directly within the study area, although High Peak Camp (List Entry 1003887), a multi-period site encompassing part of an Early Neolithic causewayed enclosure and part of an early medieval fortified settlement, is located on the cliff top to the west of Sidmouth (**Figure 9.1**) with views towards the town and is therefore included within the baseline with respect to potential settings impacts.

Listed Buildings

There are over 180 Listed Buildings within the study area (**Figure 9.1**). Two are Grade I Listed Buildings:

- Royal Glen Hotel (List Entry 1097909) located c. 245m to the north west of the western end of the proposed splash wall. A two-storey stuccoed building with a crenellated parapet, previously known as Woodbrook Glen when it was visited by the Duke and Duchess of Kent and the infant princess Victoria in 1819-1820. The Duke of Kent died here.
- The Old Chancel (List Entry 1289171) located c. 320m to the north of the proposed splash wall. Built in 1864 by Peter Orlando Hutchinson, a local antiquary and historian, using original fabric from the parish church following its restoration in 1860, buying and re-erecting the chancel with its 18th century east window in the garden of his house in Coburg Road. The building is Gothic in style, incorporating some original Medieval work from the church.

Nine are Grade II* Listed Buildings:

- Coburg Terrace (List Entry 1097956) located c. 300m to the north of the western end of the proposed splash wall, group of two storey stuccoed houses built c. 1830.
- Bedford Hotel (List Entry 1097931) located on the northern side of the Esplanade adjacent to the proposed splash wall, three storey stucco faced building built c. 1810. The west front was originally John Wallis's Library and Reading Rooms, a fashionable meeting-place of the time. The building was enlarged between 1815 and 1840 with later additions to the Esplanade front.
- Little Cob, Merton Cottage, Tudor Cottage (List Entry 1333802) located c. 100m to the north of the proposed splash wall, row of two storey cottages built of stone and cob dating back to C1500.
- Beach House (List Entry 1097933) located on the northern side of the Esplanade adjacent to the proposed splash wall, three storey stucco faced villa with Gothicised details built c. 1820.
- Church of St Giles with St Nicholas (List Entry 1333807) located c. 180m to the north of the proposed splash wall. Grade II* late Medieval perpendicular tower with the remainder rebuilt 1859-60 by William White, one of the leading church architects in Victorian England.
- Audley (List Entry 1098005) located c. 500m to the north of the western end of the proposed splash wall, built c. 1810 as a ‘cottage orné’ (decorated cottage, a rustic building of picturesque design). Originally thatched, the cottage was altered c. 1830 and is two storeys with roughcast facing.
- Aurora Church House (List Entry 1097959) located c. 245m to the north of the western end of the proposed splash wall, a two and a half storey rectangular red brick block building built c. 1820.
- St David’s (List Entry 1097908) located c. 175m to the north of the western end of the proposed splash wall, terrace of three storey, two window, stucco faced houses built 1792-1800.

- Sidholme (List Entry 1097928) located c. 875m to the north of the proposed splash wall, a Gothicised, stuccoed villa built for the Earl of Buckingham in 1826 with later extensions and alterations.

There are over 169 Grade II Listed Buildings within the study area. Twenty of these are located within 100m inshore of the splash wall:

- Eight individual list entries for buildings within York Terrace on the Esplanade (List Entry 1288988, 1097936 1097937, 1097938 and 1097939 including Carlton Mansions 1213647, the Faulkner Hotel 1213627 and the Royal York Hotel 1097935).
- The rear garden wall (List Entry 1097934) of the Grade II* Beach House.
- Five list entries for buildings fronting Old Fore Street off the Esplanade including the Mocha Café (List Entry 1215960) and Prospect Café (List Entry 1287836), premises described as occupied by a sports shop (now occupied by Pobby and Blue?) (List Entry 1215959) and two list entries for premises occupied by Fields Department Store (List Entry 1212886 and 1287955).
- The Marlborough Hotel (now Dukes Inn) set back from and facing the Esplanade (List Entry 1097932).
- The former Royal London Hotel (List Entry 1288856) and two list entries for premises formerly occupied by Knight and Sons Drapers (List Entry 1097942 and 1213787) which front onto Fore Street.
- The Riviera Hotel (List Entry 1333822) on the Esplanade.
- The former Sussex Hotel (List Entry 1228183) which forms a group with the Grade II* Listed Bedford Hotel.

- Twelve are located to the west of the splash wall and area of beach recharge:
- The gateway to Belmont Hotel at the western end of the Esplanade (List Entry 1097930);
- No1 Clifton Place (List Entry 1213059), Clifton Lodge (List Entry 1097991) and Clifton House (List Entry 1097948) at the eastern end of Peak Hill Road;
- Rock Cottage (List Entry 1333829) and the garden walls of Rock Cottage along Peak Hill Road (List Entry 1097949) and the Sea Front (List Entry 1097950);
- The Beacon (List Entry 1333830) and the garden walls of the Beacon along Peak Hill Road (List Entry 1097951) and the Sea Front (List Entry 1333831); and
- Clifton Cottage (List Entry 1097952) and the garden wall of Clifton Cottage along the Sea Front (List Entry 1333832).

Further to the west along the coastal path at Jacobs Ladder, the three flight wooden stairway leading from the cliff top at Connaught Gardens to a terrace just above beach level (List Entry 1215954) and the castellated, partly rendered, flint Clock Tower (List Entry 1215955) are also Grade II Listed.

The remaining Grade II Listed Buildings are located within the town or beyond 100m from the proposed works for the new SBM scheme.

Conservation Area

Sidmouth town centre and seafront are designated as a Conservation Area (see **Figure 8.1**). The Conservation Area Appraisal (EDDC, 1999: 4-5) subdivides the designated area into six to provide understanding of the different historic components of the town:

1 Town Centre (North): *There is an attractively grouped concentration of mainly early 19th century listed buildings around the junction of Salcombe Road and Vicarage Road, but little of remarkable note within this part of the High Street, which contains some bland modern infill and several examples of poor frontage treatment.*

2 Town Centre (South): *This part of the town centre is of great quality with a preponderance of buildings listed, and many finely preserved shopfronts and good fascia lettering.*

3 The Seafront: *Here are most of the importance three to four storey well-preserved hotel frontages which provide Sidmouth with much of its unique resort character. The dramatic views along the coastline in both directions are also an important feature.*

4 The Regency Terraces and Suburbs: *Apart from containing many of the extensive parks, gardens and recreational facilities for which Sidmouth is also renowned, this part of the town centre reflects the early 19th century speculative Regency and Victoria Gothic developments, most notably Fortfield Terrace, and other more scattered groups of buildings of similar date.*

5 The Cottages: *This area is similar in form and date of origin to the separate conservation area of Elysian Fields and forms the other main group of "cottages orné". More than elsewhere, character here has somewhat regrettably been eroded by large extensions or adjoining recent development that has tended to conceal or overshadow several of the buildings as originally conceived.*

6 The Glen and Seafront Cottages: *This part of the conservation area both contains and adjoins several of the largest hotels in Sidmouth which are somewhat overbearing in scale and not considered to merit listing since much of the earlier building has been absorbed by later extensions. Nevertheless two separate areas of character are maintained by the group of discreet, mainly thatched, and largely unspoilt "cottages orné" facing the sea; and to the north by the Royal Glen Hotel and finger of beautiful landscaped gardens. The character of this area is further enhanced by the small stream that snakes through the narrow glen*.

Stucco is the dominant exterior finish to buildings and slate the most common roof covering with some use of natural stone used decoratively, such as the entrance to the Belmont Hotel (EDDC: 1999). Ornate boundary walls are also a particular feature of the Conservation Area, mainly of brick or flint. Buildings fronting the Esplanade area characterised by a, '*a profusion of balconies, bays, colour-patterned glass with lettering incorporated, (for example the Devoran Hotel), fanlights and other opening with ornate glazing bar's*'. The appraisal lists outstanding examples as the Beach House and the York and Faulkner Hotels.

Registered Parks and Gardens

There is a single entry within the Register of Historic Parks and Gardens with the study area (**Figure 9.1**). Connaught Gardens are situated on the headland to the west of the Esplanade, beyond the group of early 19th century cottage ornés and villas which includes Clifton Cottage (List Entry 1097952). The gardens are bounded to the north by Peak Hill Road and to the south by the coast and Chit Rocks, with Clifton Cottage to the East and Jacobs Ladder to the west.

The gardens were originally part of the villa Cliff Cottage constructed c, 1820, renamed Sea View in the late 19th century and occupied by private owners until 1930 when it was placed on the market and Sidmouth Urban District Council bought the gardens and the house was demolished. The gardens were opened as a

public park in 1934. The formal gardens with ‘castle-like’ walls, comprise lawns, mature trees and ornamental shrubbery. A Second World War pillbox is located within the gardens, testament to an important strategic role the gardens played during the war when they were closed to the public and two 138mm swivel guns, taken from the French battleship *Paris* were installed. The clock tower was fitted with a searchlight and another gun was placed in the Sunken Garden.

9.2.2 Non-Designated Heritage Assets and Archaeological Potential

The distribution of the non-designated heritage assets defined by record type within the study area are shown on **Figure 9.2**.

Of the total 202, 58 are records of findspots, recorded positions where isolated artefacts have previously been found but which are not known to correspond to a recorded archaeological site or feature. Although these do not represent extant heritage assets, they are useful in identifying the types of activities which have taken place within the study area, and consequently the potential for further archaeological material to be present. Twenty-two of the findspots date from the prehistoric period including Neolithic (MDV11069) and Bronze Age (MDV30165, MDV14399, MDV47874) axes, a stone pendant (MDV30536), mammoth remains found on the beach (MDV11089) and multiple records of worked flint. There is also a large number of coins found from the beach and the general Sidmouth area including Roman, Medieval and Post-medieval coins. Other finds of interest include an elephant tusk (MDV11004) and other finds from the mouth of the River Sid and animal bones from the brook running from Mutter’s Moor to the Esplanade (MDV10993).

These findspots, therefore, indicate a high potential for the presence of prehistoric remains within the study area, as well as isolated finds associated with a Roman presence and thereafter relating to the origins and subsequent growth of Sidmouth from the medieval period onwards.

This pattern is also reflected in records of archaeological sites and features including a number of prehistoric artefact scatters from Lansdowne Villa (MDV62805), Salcombe Hill (MDV11051) Somerton Lodge (MDV62804), the Belmont Hotel (MDV62801), Connaught Gardens (MDV11033), southeast of Southdown (MDV14755) and from the beach (MDV69876). In addition, a lithic working site (MDV11059) and flint pile (MDV14752) are recorded from Salcombe Hill and a cairn to the East of Sidmouth (MDV10997). From the Roman period, a bronze figure of Achilles and the centaur was found on the beach, close to the river mouth, in 1840 (MDV58138 and MDV11005).

Although evidence for the Roman period is Sidmouth is limited to chance discoveries, finds such as the coins and the bronze centaur indicate that there was at least some activity in the study area at this time. There is no material evidence for Early Medieval settlement, although a Saxon mint may have existed at Sidmouth under Aethelraed II (MDV29879).

By the time of the Domesday survey, Sidmouth appears as a reference to *Sedemuda*, meaning "mouth of the Sid. Historic records refer to a "mercato de Sidemune" as early as 1200 suggesting that Sidmouth had a market charter by this time. A market cross is mentioned in 1322 which wasn’t taken down until 1795 (MDV10995). The HER reports that Sid House farmstead may be the medieval settlement of Biside, mentioned in a deed of 1282 and forming part of the Domesday Manor of Salcombe (MDV16643). In 1415 the manor of Sidmouth is recorded as having been given to Syon Abbey, possibly at that time being an alien grange dependent upon Mont-St Michel, or under Otterton Priory (MDV16946). A fraternity of Augustinian monks is said to have once existed near Sidmouth and there are still the remains of a building which tradition affirms to have been a chapel of ease at the period when Sidmouth belonged to the parish of Otterton (MDV29906). Sidmouth is also recorded as a borough with a Porteeve (port warden) in the 13th century (MDV21836).

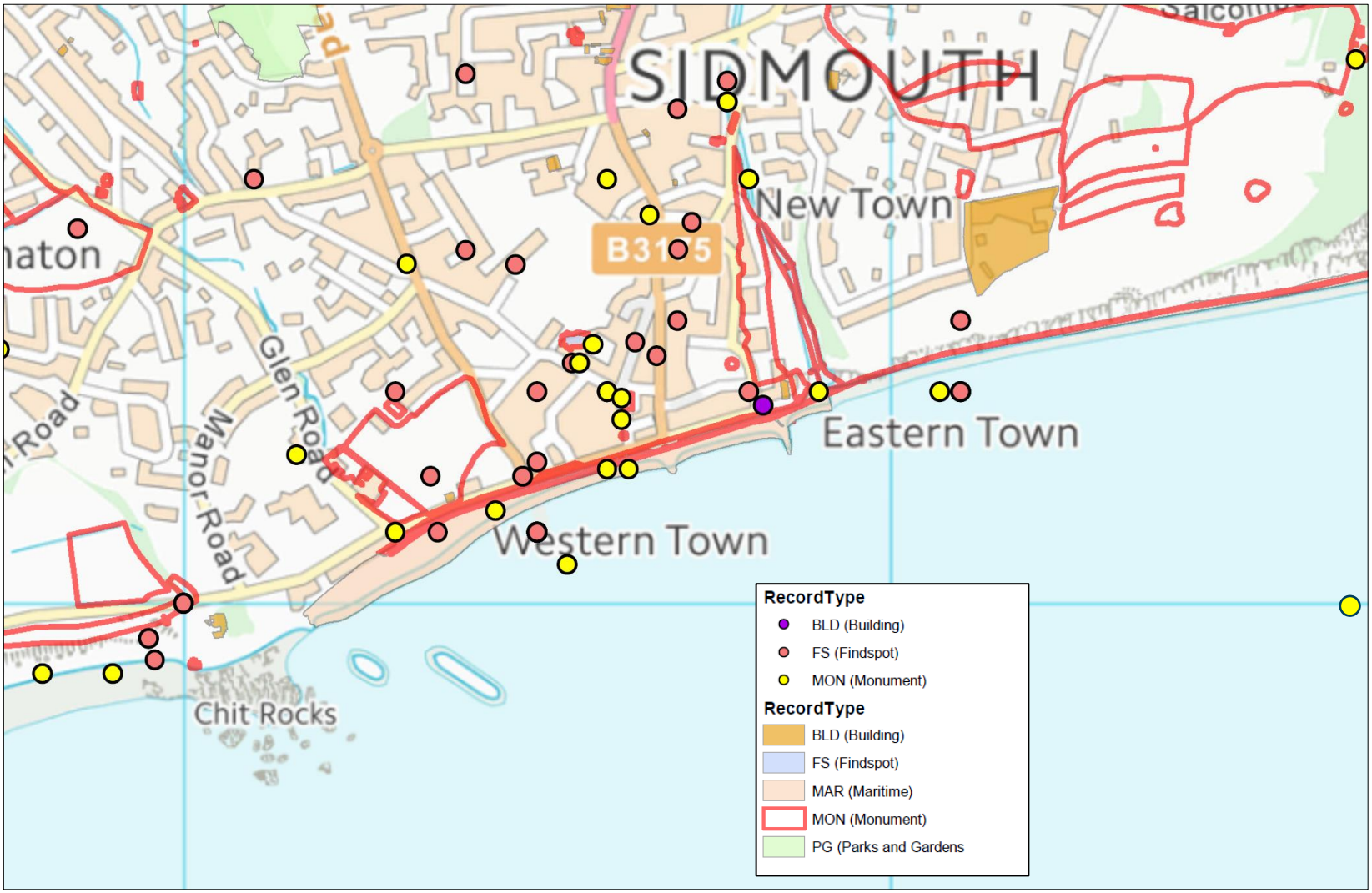


Figure 9.2 Non-designated Heritage Assets in the Study Area
Source: Historic Environment Records (2020)

From its origins as a small market and fishing town, supporting a herring fleet in the 17th, 18th and 19th centuries, the decline of the fishing industry and the Napoleonic wars at the end of the 18th century provided a major stimulus to the development of the town as a visitor destination. This phase of the towns history saw the construction of the cottages and villas, apartments, hotels and boarding houses, many of which are now designated as described above and illustrated as specifically by the Esplanade which runs the length of the seafront and characterised by buildings dating from the early 19th century onwards.

There are a large number of documentary refences recorded in the HER relating to former industries within the town, such as a tucking (or fulling) mill, adjacent to the town corn mill between 1674 and 1755 (MDV60894), old limekilms reported near Jacob's Ladder (MDV11079) and saltworks recorded in the Domesday survey (MDV16642 and MDV29883). There are also a large number of features and former buildings marked on historic maps, from ponds, wells and weirs to gravel and sand pits and field systems, as well as archaeological evidence and surviving historic structures and buildings which evidence the historical development of the town. These are discussed further where relevant to the assessment of impacts below.

From 1812 onwards there were several attempts to establish a harbour although proposed projects ultimately came to nothing and in 1835 a sea wall was finally built after flooding at Sidmouth (MDV10990). A pier is recorded as having been built c. 1875 by as a landing place for coal by the owner of the local gasworks, but it was never used commercially and was in ruins by 1922, after losing six or eight big concrete blocks in a storm and becoming separated from the Esplanade (MDV10989). About the same time, repairs to a breach in the sea wall and the resulting extensive damage to the Esplanade following a gale are visible on aerial photographs of 1925 (MDV106667).

On the beach itself, masonry known as 'the foundations' (MDV11065) are recorded, possibly a former breakwater although local reports of a limeash floor and a hearth suggest a possible dwelling. Local fisherman, however, are recorded as reporting the beach to be entirely clear of any form of obstruction, and 'the foundations' are considered no longer to exist. There are also two records of shipwrecks within the study area, reported as having wrecked on the beach. The first is an unknown Danish merchant vessel (MDV61899) which was recorded carrying tar, butter and tallow, but was stranded and lost on Sidmouth Beach in 1669. After the vessel ran ashore on the beach, all the crew and 200 out of 400 barrels were saved. This, however, is a documentary reference to a reported loss only and the actual location of the wreck itself is unknown.

The second is the *Duchess of Devonshire*, a paddle steamer wrecked on Sidmouth Beach in 1933 (MDV61902). The ship was built in 1892 for the Devon Dock Pier and Steamship Co. Together with the slightly larger *Duke of Devonshire,* the ships ran a service from Exmouth and Torquay, sailing along the coast between Weymouth and Plymouth calling at ports and beaches in between. In 1934, the *Duchess of Devonshire* grounded port side onto the beach at Sidmouth making two holes in the hull and, followed by poor weather in the following days, was declared a total loss. Work to break up the ship on the beach was undertaken at the time and in 1950 some of the bottom plates were uncovered and had to be removed, although additional remains are likely still present.

In addition to the above, further wrecks are likely to have occurred at or near Sidmouth and there is potential for further maritime archaeological remains to be present within the study area which may not have been previously recorded. For example, two further losses are recorded by the HER at an arbitrary location just outside the study area, that of the *Bishop*, lost near Sidmouth in 1766 and the *Diamond*, lost in Sidmouth Bay in 1800. The remains of these wrecks have never been found and it is possible that they may be present within the study area, possible fragmentary or buried.

9.2.3 Historic Character

As the study area includes both terrestrial and marine areas, the historic character of the study area has been assessed with reference to both the Devon Historic Landscape Characterisation (HLC) and the National Historic Seascape Characterisation (HSC).

The HSC of coastal and marine areas around England has been mapped through a series of eight separate projects funded by Historic England and undertaken between 2008 to 2015. This has since been followed by an initiative to consolidate the existing projects into a single national database (LUC, 2017a, 2017b, 2017c). The Devon HLC was undertaken by the Devon County Council Historic Environment Service and Historic England (Turner, 2005).

The HSC/HLC programmes use GIS to map data that can be queried to identify the key cultural processes that have shaped the historic seascape and landscape within a given area. These datasets were mapped against the study area to identify the primary cultural processes and accompanying character texts were used to identify the primary values and perceptions for each character type summarised in **Table 9.1** below.

Table 9.1 HLC and HSC Character Types

HSC/HLC Broad Character Type	Character Sub-Types	Description and Present Perceptions
Recreation	Bathing/Swimming Golf course Leisure beach	There are strong local perceptions associated with Sidmouth as a recreational and holiday destination. Recreation has long had a major formative role along much of England's present coastline. Primarily associated with positive outcomes including health benefits, greater social inclusion, cohesion and quality of life valued for its contributions to society as a whole. Much recreation is essentially about various form of human enjoyment of landscape and seascape as an amenity.
Fishing	Bottom trawling Potting	There are strong local perceptions associated with Sidmouth's origins and history as a fishing town. Fishing is nationally deeply engrained and has a transitional economic role for many coastal communicates in England. It is greatly valued for the distinctiveness it affords such areas by both local communities and visitors.
Navigation	Maritime safety (Buoyage, Daymark)	Maritime safety features are strongly integrated with landscape and seascape perceptions. As part of the coastline or shoreline, to fulfil their roles they generally have to be readily recognisable and distinction with strong contribution to the present landscape/seascape. Lighthouses, beacons and daymarks are iconic markers of place for many people viewing them from both land and sea. They bridge the perceptual boundaries between land and sea.
	Navigation hazard (Rock outcrops)	Offshore, rock outcrops as a navigational hazard have always been a preoccupation for sailors and such hazards became prominent in people's consciousness due to the danger associated with them. Within the study area, these rocky outcrops are recorded offshore from Lyme Bay rather than Sidmouth town.

HSC/HLC Broad Character Type	Character Sub-Types	Description and Present Perceptions
Cultural topography (intertidal)	Sandy foreshore Shingle foreshore	Many sandy foreshores are visited for leisure and form one of the principle areas by which most people engage directly within the intertidal and marine zones. The distribution of sand varies, giving potential in some areas for the occasional exposure of buried ancient land surfaces, occupation layers and structures, and associated palaeoenvironmental deposits. In England, this character type remains highly valued as a place for inspiration and recreational activities. The foreshore at Sidmouth is highly valued as a leisure beach.
	Outcrop/scree/cliffs Rocky foreshore Cliff	The red cliffs of the Jurassic Coast are a fundamental part of the historic character of Sidmouth and the historic values and perceptions of both visitors and the local population. Chit Rocks is also a highly valued local landmark, as also evidence by Jacobs' Ladder to the west of Sidmouth.
Cultural topography (marine)	Exposed bedrock Mixed sediment plains	The marine cultural topography overall is highly valued due to its biodiversity and habitat ranged and has high archaeological potential, and can contribute to our understanding of past landscape use. Exposed bedrock and mixed (variable) sediment plains are less conducive towards the preservation of archaeological remains than finer grained seabed material.
	Palaeolandscape component	Value is becoming more positive on these remains and resource due to growing interest in submerged landscapes fuelled by the media and popular culture. Developing interest within certain sectors of society who come into contact with the resource (e.g. fishermen and aggregate dredgers). Submerged landscapes are becoming ever more recognised and valued within the archaeological community.
Ports and docks	Landing point	Sidmouth's historic value as a landing point is primarily associated with recreation and tourism and with its history as a fishing town as described above. The landing point recorded in the HSC corresponds to the mouth of the River Sid.
Rough Ground and Woodland	Plantation Conifer plantation Other woodland Orchard Rough Ground	This corresponds in the HSC to the coastal plantation from Peak Hill to Peak Plantation which forms part of the coastal character to the west of Sidmouth. As part of the coastal landscape, patterns of woodland are culturally defined and perceived, combining with other variations in topography and other cultural aspects to give a sense of place and position to mariners and coastal users alike. Conifer plantations and Post-medieval orchards are recorded further inland in the HLC. Orchards formed an important part of the post-medieval agricultural economy in Devon. The area also includes areas of Medieval and Post-medieval rough ground corresponding to normally unenclosed and unimproved ground in rural areas.
Enclosed land	Enclosures, strip fields Watermeadow	The HLC maps Medieval, Post-medieval and Modern enclosures, primarily at the inland boundaries of the town to the west, east and to the north of the stud area. There is a single mapped are of Medieval watermeadow in the north east of the study area which also correspond to an area marker reclaimed wetlands in the HSC. These are linked to the historic agricultural activities which surround the urban settlements.

HSC/HLC Broad Character Type	Character Sub-Types	Description and Present Perceptions
Coastal infrastructure	Flood and erosion defence (sea defence)	Sea and flood defences are generally perceived as essential for the preservation of many English coastal settlements as well as for the safety of the people who live in them. Some people view the more visually intrusive sea defences as having a detrimental effect on the picturesque character of the of the smaller villages of England. Sea defences are a prominent current perception of Sidmouth with existing sea defences comprising rocks groynes at the western end of the Esplanade and both historic and current sea walls. The current project proposes further sea defence elements which would be in keeping with this current character type.
Settlement	Urban Settlement Public civil complex Park/garden	These areas correspond to the urban settlement of Sidmouth itself, including the public civil complexes (hospitals, government offices, schools, colleges, cemeteries etc.), extant parks and gardens (Connaught Gardens and gardens at The Knowle, for example).

9.3 Impacts during Construction

Potential impacts to heritage assets within the study area include both direct and indirect impacts.

Direct impacts are those which result in damage to, or total destruction of, heritage assets, including archaeological material or the relationships between that material and the wider environment (stratigraphic context or setting). These relationships are crucial to developing a full understanding of an asset. Such impacts may occur if heritage assets are present within the footprint of elements of the proposed scheme (i.e. excavations for the splash wall, seabed preparation and placement of the rock groyne and breakwater, placement of material during beach recharge or anchoring of vessels).

The proposed scheme also has the potential to directly and indirectly change the hydrodynamic and sedimentary process regimes, both locally and regionally. Changes in coastal processes can lead to re-distribution of erosion and accretion patterns, while changes in tidal currents, for example, may affect the stability of nearby morphological and archaeological features. Indirect impacts to heritage assets may occur if buried heritage assets become exposed to marine processes, due to increased wave/tidal action and erosion, for example, as these will deteriorate faster than those protected by sediment cover. Conversely, if increased sedimentation (including that associated with beach recharge) results in an exposed site becoming buried this may be considered a beneficial impact. Potential effects of erosion patterns are of particular relevance to the integrity of the Jurassic Coast, as natural erosion must be allowed to continue in order to keep the cliff face fresh and well exposed.

Indirect impacts to setting may occur if a development affects the surroundings in which a heritage asset is experienced. Similarly, impacts to the historic seascape and landscape character may occur with the introduction of new elements causing a change in that character which may affect present perceptions of that seascape across an area. This is of particular relevance to the character of the Sidmouth Conservation Area, and the setting of the red cliffs of the Jurassic Coast.

9.3.1 Direct Impacts

Direct impact to the WHS will occur from the construction of the new long groyne which is partially located within the boundary of the World Heritage Site as described in Appendix 2 of the Jurassic Coast Management Plan (Jurassic Coast Trust, 2014), the seaward boundary of the Site being taken as Low Water

Mark. East Beach is located within Section 2 of the WHS (River Sid, Sidmouth to Seaton Hole) and covers 'cliff exposures and coastal geomorphological features that lie entirely within the Sidmouth-Beer Coast SSSI. The East Devon AONB boundary is drawn at the high-water mark and thus excludes the intertidal area. Although direct impacts to the intertidal area from the construction of the rock groyne will occur, seabed preparation and the placement of rocks for the structures will directly impact only the local beach/seabed deposits and not the key cliff exposures and coastal geomorphological features which are fundamental to the integrity of the World Heritage Site at Pennington Point. Therefore, these direct impacts are considered acceptable, localised with the key characteristics and special qualities of the designated site retained. As such, in accordance with the definitions provided in **Section 3** for defining and classifying environmental impacts, direct impact to the WHS from the new groyne is anticipated to be **negligible** (the impact is not of concern).

Direct impacts to designated heritage assets will not occur as these are all located beyond the immediate footprint of works. In addition, during works along the Esplanade, each section will be fenced by Heras panels preventing accidental damage to the Listed Buildings in the vicinity of works. Similarly, there are no known extant and above-ground non-designated heritage assets within the footprint of the works.

Direct impacts to archaeological material may occur during ground works and/or seabed preparation, and during the anchoring of vessels, if present within the footprint of works. All direct impacts have the potential to result in a total, permanent loss of archaeological material and the relationships between deposits (context). Direct impacts are not reversible and heritage assets, once lost or damaged, do not have the capacity to recover from the impact. As such, the significance of a potential direct impact depends solely upon the heritage significance (importance) of the impacted archaeology.

The potential for archaeological material to be present within the footprint of the splash wall is anticipated to be low due to previous disturbance associated with the construction of the Esplanade and the existing splash wall. If the ground works for the new splash wall are restricted to the existing footprint and occur to depths within made ground associated with the construction of previous sea defences and the Esplanade only, then it is anticipated that significant adverse impacts will not occur. Following detailed design, if the required ground works are of a greater than anticipated footprint than currently proposed, then mitigation (e.g. a watching brief or protocol for archaeological discoveries, see below) may be required.

The potential for archaeological material to be present within the footprint of groundworks in advance of the installation of the new boat ramp (excavating of the beach up to the rock layer) is also anticipated to be low. Trial pits, excavated as part of a site investigation campaign to inform the project in November 2017, show that, in the area of East Beach, marine beach deposits (generally comprising gravel nearer to the cliff face and sand further seawards) directly overly the Otter Sandstone Formation or Sidmouth Mudstone Formation at 0.38m down to 1m below the surface. This suggests that, due to the erosion of the cliff and beach in this area, the potential for *in situ* archaeology is limited, although isolated finds may be present within the beach deposits. A protocol for archaeological discoveries, to be implemented and applied throughout works, will allow for the efficient reporting and provision of advice in the event of an unexpected discovery (see below).

There is a potential for direct impacts to occur as a result of the placement of pipes required for delivery of beach nourishment material and activities associated with the land-based plant. However, as no above ground heritage are known to be present within the area of the beach recharge, these impacts are less likely to occur.

The area around the training wall and existing slipway at the mouth of the River Sid deposits described as residual soils (sand and clay) and deposits with potential organic content (gravel and sand) are noted. In TP07, for example, marine beach deposits described as, 'Loose, black, sandy, fine to coarse, rounded GRAVEL of chert' with an organic odour is described in the log overlying horizontal bedded Otter Sandstone Formation with possible paleostreams. This may indicate potential for *in situ* prehistoric deposits with paleoenvironmental potential in association with these former channels. As described above, an elephant tusk (MDV11004) and other finds from the mouth of the River Sid are recorded in the HER. However, as the primary purpose of the activity is to raise and not reduce the level of the beach, the potential for unexpected discoveries and impacts to buried material from the placement of beach material is reduced.

Within the footprint of the beach recharge there is also potential for the presence of wreck remains (e.g. associated with the known Danish merchant vessel (MDV61899), *Duchess of Devonshire* (MDV61902) or further reported losses or unknown wrecks) and remains associated with previous structure or defences (e.g. 'the foundations' (MDV11065)). However, the trial pits excavated as part of the site investigation campaign for the project included a number of inclusions within the marine beach deposits such as steel pipe, wire, concrete, timber shuttering, lead pipe wood and branches which indicates that the beach deposits include significant amounts of modern debris.

On this basis, the effect of direct impacts upon archaeological remains from beach recharge is considered to be **negligible** (the impact is not of concern).

Ground works to facilitate the construction of a new boat ramp will also have the potential to impact buried archaeological material. Trial pits within this area record marine beach deposits directly overlying the Otter Sandstone Formation or Sidmouth Mudstone Formation. Within TP11, a loose, dark brown black sand is recorded, with an organic odour noted, although this appears at a layer within the marine beach deposits and is unlikely to represent *in situ* organic remains with paleoenvironmental potential. As with the splash wall, it is anticipated that ground works associated with the boat ramp would take place within deposits previously disturbed during the construction of the existing slipway, training wall and rock groyne and that significant adverse impacts will not occur. Following detailed design, if the required ground works are of a greater than anticipated footprint than currently proposed, then mitigation (e.g. a watching brief or protocol for archaeological discoveries, see below) may be required.

Potential direct impacts may also occur from anchors placed on the seabed during delivery of material to the beach for the rock groyne, breakwater or beach nourishment material. The extent of any impact will depend on the presence and nature of any archaeological remains (e.g. wreck material or aircraft crash sites) on the seabed and may only be encountered as an unexpected obstruction if the anchor became caught on remains, for example. A protocol for archaeological discoveries, to be implemented and applied throughout works, will allow for the efficient reporting and provision of advice in the event of an unexpected discovery (see below).

9.3.2 Indirect Impact: Coastal Processes

An assessment of coastal process is presented in **Section 11** and summarised where relevant to the assessment of indirect impacts below.

The primary driver for flood risk to Sidmouth Town is via wave overtopping with low tidal current strengths, not capable of moving gravel-sized sediment along the beach. Movement of sediments is, therefore, determined by wave strength and direction. The volume of beach material is variable and, since 2000, there has been no significant trend of loss of beach material, although the material that was added as part of the 1990s scheme is no longer present. There are very limited inputs of shingle into the Sidmouth frontage and the sediment source that originally supplied the beaches is now exhausted with most of the sediment in

deep waters offshore beyond the influence of waves and currents. Similarly, there is limited supply of material to East Beach, evident by East Beach often being bare.

As previously stated, the proposed SBM scheme has been developed to reduce the risk of coastal flooding and erosion and there is no potential for hydrodynamic changes which could result in buried heritage assets becoming exposed to marine processes due to increased wave/tidal action and erosion. The modelling of cross shore beach and wave movement along the Sidmouth Town frontage and East Beach has demonstrated that there will be no effect on the wave climate and that waves are still able to run up the design beach. Tidal currents may vary slightly due to the introduction of the groyne though this is unlikely be a noticeable effect.

Conversely, the reduction in erosion rates coupled with the additional material placed on the beach (and the maintenance of beach levels) has the potential to provide additional protection to buried archaeological remains if the potential for erosion and exposure of such remains is reduced, thereby resulting in a **moderate beneficial (indirect) impact** (the impact provides some gain to the environment).

Of primary importance are the potential effects of erosion patterns to the integrity of the Jurassic Coast, as natural erosion must be allowed to continue to keep the cliff face fresh and well exposed. The integrity of the World Heritage site, along with meeting the criterion and with the requirement for an adequate system of protection and management to safeguard its future, together form the three pillars of OUV as specified by UNESCO. Integrity is a measure of the 'wholeness and intactness' of the World Heritage Site, it can also relate to its size in terms of being an adequate size to ensure the complete representation of the features and processes which convey the site's significance. Any threats affecting the future survival of the site are also considered an element of its integrity. For this reason, although changes to erosion at Pennington Point may only affect a small part of the designated site in terms of area, these changes can also threaten the integrity of the entire Jurassic Coast. If this unique exposure at Sidmouth is lost or adversely impacted then the World Heritage Site may no longer be considered 'whole' or 'intact' or as embodying a complete representation of the *185 million years of the earth's history* which is an integral part of the OUV of the Jurassic Coast.

The processes already active on the cliffs and the way these processes can lead to cliff recession are outlined in **Section 12**. In summary, cliff erosion at East Beach is driven by a combination of slope stability, weathering by rain and frost, ground water seepage and wave action, with wave action the primary influence at the toe of the cliff, and the toe supporting the cliff material above. The introduction of a beach at the toe of East Beach cliff, will dissipate the wave energy so that any waves (whether during a storm event or during ordinary conditions) reaching the toe of the cliff do so with less energy and erosive power compared to a no beach situation. The result is that some erosion will still occur although the rate will be reduced. It has not been possible to directly calculate the future erosion rates at the cliff, although wave overtopping volumes indicate the extent of the reduced rate. For example, modelling for a pre- and post-scheme, 1 in 1 year storm event, wave overtopping is reduced from 0.30l/s/m to 0.00l/s/m and for a 0.5% AEP is reduced from 2.69l/s/m to 0.18l/s/m.

It is concluded in **Section 12** that the proposed scheme should ensure the continued erosion of East Cliff whilst reducing the erosion rate sufficiently to decrease risk of outflanking and exposing of the River Sid wall, increase the protection to property and other material assets in Sidmouth and on Cliff Road. In reducing the erosion rates, but in allowing the erosion to continue, the proposed scheme incorporates consideration of policy 1.2 from the management plan (Jurassic Coast Trust, 2014, 39): *Where developments affecting the Site or setting do take place, avoid or at least mitigate negative impact on the natural processes of erosion and exposed geology*. In delivering this policy, EDDC and their representatives have worked closely with the Jurassic Coast Team in developing the proposed coastal defence scheme to ensure that potential

negative impacts on the integrity of the World Heritage Site have been reduced to an acceptable level. In accordance with the definitions provided in **Section 3** for defining and classifying environmental impacts, therefore, the impact to the World Heritage Site is anticipated to be **negligible** (the impact is not of concern).

In addition, as set out in **Section 2.5** above, following completion of the works, beach profiles will be monitored as part of the South West Regional Beach Monitoring Programme. If beach crest levels increase significantly above the design beach profile it is likely that the EDDC will reduce levels as appropriate to ensure the continued erosion of the cliffs. The detail of how this will be achieved will be presented as part of an updated SBM scheme which will be developed as part of the detailed design process.

9.3.3 Indirect Impact: Historic Character

Potential indirect impacts to the historic character of the study area are assessed with reference to how that character could change as a result of the project and how the ability to perceive that historic character could be affected by works.

Construction activities, including the presence of heavy plant and other machinery, for example, will have a short-term effect upon the public's ability to perceive the historic character throughout the duration of the works. A fundamental objective of the proposed new SBM scheme is to reduce the long-term potential for change in terms of prevention of risk from coastal flooding and erosion. The potential for change to the historic character is, therefore, shown in **Table 9.2**. The SBM scheme frontages are illustrated on **Figure 1.1**.

Table 9.2 Potential for Change to Historic Character in Each Area of the SBM Scheme

Frontage Area	Description	Comment	Conclusion
Frontage A	Jacobs Ladder and Connaught Gardens	No new elements are proposed with maintenance of the existing rock revetment, sea wall and promenade forming the basis of work.	No change to historic character. Given no new elements are proposed and no ongoing maintenance will be included as part this OBC, Frontage A (Connaught Gardens) is not directly assessed.
Frontage B	Sidmouth Town (maintenance of defences)	The new breakwater would introduce a new 'sea defence' element into what is currently perceived to be a 'natural environment'. However, sea defences are generally perceived as essential for the preservation of many English coastal settlements as well as for the safety of the people who live in them. In addition, the presence of similar rock groynes to the west of the Sidmouth Town frontage and the proximity of the location to the existing concrete training wall materially lessens the potential impact of change on the character of Sidmouth overall.	Change to historic character from presence of new breakwater, although keeping with the character of Sidmouth overall.
Frontage B	Sidmouth Town (beach recharge and construction of boat user ramp)	Beach recharge and the construction of a new boat ramp will add to the public's ability to perceive historic character in terms of the maintenance and use of the beach as associated with strong local perceptions of Sidmouth as a recreational and holiday destination and the high value placed on the leisure beach as a fundamental part of Sidmouth's past.	Positive change to the public's ability to perceive historic character of Sidmouth leisure beach.

Frontage Area	Description	Comment	Conclusion
Frontage B	Sidmouth Town (splash wall)	The extent to which the new splash wall could change the historic character, particularly of the Conservation Area, will depend upon the detailed design.	Potential change to historic character
Frontage C	East Beach	The new rock groyne would result in a change to the immediate historic character of the East Beach. This would introduce a new 'sea defence' element into what is currently perceived to be a 'natural environment', characterised by the red cliffs of the Jurassic Coast. However, as described above (**Table 9.1**) the HSC suggests that sea defences are generally perceived as essential for the preservation of many English coastal settlements as well as for the safety of the people who live in them. In addition, the presence of similar rock groynes to the west of the Sidmouth Town frontage and the proximity of the location to the existing concrete training wall materially lessens the potential impact of change on the character of Sidmouth overall.	Change to historic character of East Beach with introduction of new sea defences but in keeping with the character of Sidmouth overall.
Frontage D	River Sid Training Arm	No new elements are proposed with maintenance of training arm.	No change to historic character

For each of the character types outlined above in **Table 9.1**, therefore the following changes to historic character might be anticipated to occur in association with the proposed project:

- Recreation: potential **positive change** to historic character associated with the ongoing maintenance of Sidmouth as a recreational and holiday destination as a result of the project;
- Fishing: **no change** to the historic character type;
- Navigation: **no change** to the historic character type;
- Cultural topography (intertidal): potential **positive change** to historic character associated with the ongoing maintenance of the foreshore at Sidmouth as a highly valued leisure beach;
- Cultural topography (marine): the archaeological potential of the marine area (wrecks and palaeolandscapes) is more directly associated with potential direct impacts as described above. Potential **positive change** to the public perception of historic character in terms of additional understanding of the marine archaeological environment of Sidmouth would depend upon the completion of studies to professional standards and the public dissemination of results;
- Ports and docks: **no change** to the historic character type;
- Rough Ground and Woodland: **no change** to the historic character type;
- Enclosed land: **no change** to the historic character type;
- Coastal infrastructure: potential **positive change** associated with public perceptions of sea defences as essential for the preservation of Sidmouth and for the safety of the people who live there; and
- Settlement: no change to the historic character type.

In conclusion, therefore, the proposed new SBM scheme is anticipated as having a neutral change overall on the historic character, and potentially positive in terms of representing a reduction in risk to the future of Sidmouth.

9.3.4 Indirect Impact: Historic Character

The setting of a heritage asset is described as the surroundings in which a heritage asset is experienced (Historic England, 2017). Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance or may be neutral.

A selection of heritage assets have been identified so that key views could be captured and considered for potential visual impact as part of the assessment of potential impacts to the setting of these heritage assets. This also informed **Section 8 – Landscape**.

The majority of the town, and the Conversation Area, are visually and physically separated from the seafront and from the proposed constructed elements of the scheme. There are some views to the site along roads up to *c.* 100m from the site (**Appendix 5,** Plate A5-1).

Beyond this, intervening urban development and vegetation means that no visual impacts, or non-visual impact to the setting of heritage assets, are anticipated. The following key heritage assets in the town are therefore scoped out of further assessment:

- Royal Glen Hotel (List Entry 1097909) located c. 245m to the north west of the western end of the proposed splash wall and shown in (**Appendix 5**, Plate A5-2), viewed northwards from the bottom of Glen Road c. 110m further west from the end of the splash wall;
- The Old Chancel (List Entry 1289171) and Coburg Terrace (List Entry 1097956) located c. 300m to the north of the site and physically and visually separated by intervening buildings and trees;
- Little Cob, Merton Cottage, Tudor Cottage (List Entry 1333802) located along Chapel Street with views towards the sea blocked by intervening buildings, including blocks of flats and the United Reformed Church;
- Church of St Giles with St Nicholas (List Entry 1333807) located c. 180m to the north of the sites. There are no views from ground level and, although the tower could not be accessed during the site visit, large trees were seen to be present which would restrict any potential visibility with the seafront (**Appendix 5**, Plate A5-3);
- Audley (List Entry 1098005) located c. 500m to the north, Aurora Church House (List Entry 1097959) located c. 245m to the north, St David's (List Entry 1097908) located c. 175m to the north and Sidholme (List Entry 1097928) located c. 875m to the north, all visually and physically separated from the seafront by intervening buildings and trees; and
- All Grade II Listed buildings other than those located along the sea front and Esplanade, and up to 100m along Fore Street, Church Street and Station Road leading from the Esplanade into the Conservation Area.

The setting of all of the remaining designated heritage assets along the seafront and Esplanade is considered to contribute to the overall significance of each individual heritage asset as their deliberate placement along the seafront, and the views overlooking the beach are a primary component of their original design.

For all designated heritage assets importance is considered to be high, as their designation recognises them as being of special, and in some cases (i.e. the World Heritage Site, Scheduled Monument and Grade I Listed Buildings) exceptional historic interest.

During construction, the setting of the Esplanade and all heritage assets along the seafront will be disrupted by the works (i.e. from the presence of work teams and machinery and the associated disturbance to how an asset is experienced in terms of visual impact, noise of machinery and dust and smells associated with works). In accordance with the criteria and definitions for assessing significance presented in **Section 3**, this is considered to have an adverse effect upon the heritage assets. However, although the impact will be continuous (the impact persists over the life of the activity causing it), it will also be short-term (the period over which the impact is experienced is temporary and lasts for the period of construction or less) and limited to the immediate area of the works. It is also considered that the heritage assets are of low sensitivity to these temporary disturbances given their proximity to the Esplanade and the associated traffic and activities associated with the immediately adjacent urban environment. Therefore, a **minor adverse impact** is predicted (the impact is undesirable, but of limited concern).

During operation/ maintenance works, the new boat ramp and training arm encasement are anticipated to have **no potential impact** upon the setting of heritage assets as these elements represent modifications of existing elements in keeping with the existing character and setting of the sea front.

The presence of additional shingle associated with the beach recharge will have **either no impact**, or possibly a **minor beneficial impact** upon the setting of the heritage assets. As set out in **Table 9.1** above, the foreshore at Sidmouth is highly valued as a leisure beach and shingle foreshores form one of the principal areas by which most people engage directly within the intertidal and marine zones. The recharge of the beach with shingle, therefore, could be considered to represent a beneficial impact.

Similarly, although raising the height will increase the visual impact of the splash wall, there is also a potential for beneficial effects, dependent upon the final design of the wall. The Conservation Area appraisal (EDDC, 1999: 11) describes the existing splash wall as a, '*somewhat unpleasant concrete wall separating carriageway from promenade*'. The proposed scheme therefore presents an opportunity to enhance the character of the Esplanade through the use of more suitable materials and a more visually appealing finish to the structure, in keeping with local character. The extent of the beneficial impact will depend upon the detailed design which will be developed in consultation with the EDDC Conservation Officer; and Historic England as appropriate.

The outcomes of **Section 8 – Landscape**, combined with previous landscape assessments undertaken for previous proposed 2018 SBM scheme and OBC have been considered with respect to the setting of the Conservation Area, the World Heritage Site, High Peak Camp Scheduled Monument and the Listed Buildings along the seafront and Esplanade. These are summarised in **Table 9.3** below.

Table 9.3 Summary of Settings Assessment

Heritage Asset	Significance of Settings Impacts
Conservation Area Appendix 5 Plate 5A-1	The rock groyne will be largely imperceptible from the Conservation Area, from all but the eastern end of the Esplanade looking east. In the context of the existing seafront and flood defences it is unlikely that the new rock groyne would detract from people's experience of the Conservation Area or its character and the impact to the setting of the Conservation Area overall is assessed to be of low magnitude, and minor adverse impact is predicted. The presence of the new breakwater will change views to and from the sea, however given the presence of existing breakwater structures (to the west), the change is likely to be minor to moderate adverse impact is predicted. The splash wall will not be visible from most of the Conservation Area although along the Esplanade and up to 100m to within the town, the increase in height of the splash wall in its current form is anticipated to have a medium magnitude impact upon the character of the Conservation Area and peoples experience of this as a heritage asset. Due to the high importance of the Conservation Area, this has the potential to result in a major adverse impact predicted. However, beneficial effects could be achieved if changes to the sea wall were combined with improvement works to the promenade and there was a designed approach to the appearance of the wall.
World Heritage Site Appendix 5 Plate 5A-4	The new groyne will be visible within longer views of the World Heritage Site, although this effect will be localised and the key characteristics and special qualities of the designated site will be retained. In addition, views of the wider coast and sea will be preserved and will not alter the overall quality or character of the view. The effect of the new groyne regarding longer views is assessed to have negligible impact on the setting of the WHS. In shorter views, for example, East Beach, the new groyne will be prominent and readily perceptible in this view, introducing a man-made structure into this view currently devoid of man-made structures. This is considered to be a moderate adverse impact; reduced to minor-moderate adverse impact at high tide when less of the groyne is visible. However, the magnitude of the impacts may be further reduced with mitigation in place (see below). The splash wall will not be readily perceptible and unlikely to be noticed by most people. The presence of the new breakwater will change views to and from the sea, however given the presence of existing structures, the change is likely to be a minor-moderate adverse impact, which may be further reduced with mitigation in place (see below).
High Peak Camp Appendix 5 Plate 5A-4	The primary importance of this Scheduled Monument lies in its potential value as a rare example of a causewayed enclosure and a very rare example of a 5th/6th century fortified settlement, particularly for the potential of the buried archaeological and environmental deposits which are anticipated to survive at the site. Its location on the cliff is a part of how it is experienced by visitors to the site but is not considered to be an inherent part of its significance as a Scheduled Monument. For this reason, both the new rock groyne, breakwater and splash wall are considered to have no impact upon the setting of the Scheduled Monument.

Heritage Asset	Significance of Settings Impacts
Connaught Gardens and Jacobs Ladder Appendix 5 Plate 5A-5 and 5A-6	Connaught Gardens are largely sheltered from the coast by high brick, stone and flint walls although the design of the garden includes various openings and outer promenade walks with extensive coastal views. The primary importance of the stairway at Jacobs Ladder is for its position in local tradition and as a local landmark. Views towards the new breaker and rock groyne; and splash wall, from these designated assets are largely restricted to the viewing platform at Connaught Gardens. For this reason, the new breaker and rock groyne; and splash wall are considered to have a negligible impact upon the setting of the Registered Park and Garden and Grade II Listed stairway.
Grade II Bedford Hotel and adjacent Grade II Riviera Hotel Appendix 5 Plate 5A-7 and Plate 5A-8	The setting of the designated heritage assets along the seafront and Esplanade is considered to contribute as a key part of their overall significance, as their deliberate placement along the seafront and the views overlooking the beach are a primary component of their original design. In the context of the existing harbour and flood defences it is unlikely that the new long groyne and breakwater would detract from people's experience of the Listed Buildings. The splash wall will not be visible from most of the Listed Buildings, although along the Esplanade and up to 100m to within the town, the small increase in height of the splash wall in its current form is anticipated to have a minor impact upon the character of the Conservation Area and peoples experience of this as a heritage asset. Due to the high importance of the Listed Buildings, the above has the potential to result in an adverse effect. However, beneficial effects could be achieved if changes to the sea wall were combined with improvement works to the promenade and there was a designed approach to the appearance of the wall.
Grade II Beach House Appendix 5 Plate 5 A-9 and Plate 5A-10	
Grade II Clifton Cottage Appendix 5 Plate 5A-11 and Plate 5A-12	
Grade II Belmont Hotel Appendix 5 Plate 5A-13 and Plate 5A-14	
Grade II York Terrace Appendix 5 Plate 5A-15 and Plate 5A-16	

9.4 Proposed Mitigation

Mitigation to prevent significant impacts described above includes:

Watching brief during groundworks associated with the splash wall;

- The implementation of a protocol for archaeological discoveries; and
- Sympathetic design of the splash wall and approach to construction works along the Esplanade.

Pre-application advice will be sought from the Devon County Council Historic Environment Team to determine any requirement for archaeological mitigation from the works along the Esplanade during the installation of the splash wall. If required, the approach to archaeological mitigation will be developed in consultation with them and set out in an archaeological Written Scheme of Investigation (WSI) in accordance with the appropriate specification prepared by Devon County Council. For example:

- Specification for a programme of Archaeological Monitoring and Recording (also known as a Watching Brief).

Consultation will also be undertaken with Historic England as statutory advisers to the MMO on the historic environment. This will include consultation on the approach to any mitigation for works which may impact archaeological material below MHWS. As the potential for encountering archaeological material during works is anticipated to be low, this may take the form of an archaeological recording protocol.

The main objective of the archaeological reporting protocol will be for those working on the scheme to report unexpected archaeological discoveries in a manner that is conducive to their everyday work and that allows for efficient reporting so that archaeological advice can be provided in a timely manner. Training to construction staff, site crews and work teams with regard to the practical application of the protocol in their day to day work would be required and the protocol will include provision for archaeological monitoring to support its implementation. Specific objectives of the protocol will include:

- Ensuring all staff and contractors are fully aware of the mechanisms for reporting under the protocol and are provided with advice on identifying finds, ‘first-aid for finds’ and initial recording;
- Ensuring that all discoveries are addressed in an efficient and proportionate manner to prevent adverse effects from further impacts associated with the proposed scheme; and
- Ensuring that details of the discovery(ies) are forwarded to Historic England, Devon County Council’s Historic Environment Team, the Receiver of Wreck and the MOD (if required), and any other stakeholders, as relevant and required.

The proposed protocol would be agreed in advance of works commencing with Historic England and will be set out in accordance with the principles of the methodology adopted for existing industry good practice protocols including:

- The marine aggregates industry protocol set out in the British Marine Aggregate Producers Association (BMAPA). Protocol for reporting finds of archaeological interest (BMAPA and English Heritage, 2005); and
- The Offshore Renewables Protocol for Archaeological Discoveries (ORPAD) (The Crown Estate, 2014).

As stated above, the potential beneficial impact to the character of the Conservation Area from the splash wall will depend upon the detailed design. Based om previous consultation with the EDCC Conservation Officer, the following key considerations of both the design of the splash wall, and the approach to the proposed works along the Esplanade should be implemented:

- It is important to make sure that any works done as part of the SBM scheme do not inhibit future opportunities to regenerate the seafront on Sidmouth;
- The raised splash wall must be designed to be in keeping with the Conservation Area and a basic concrete wall would not fulfil this requirement;
- Whilst recognising that further discussion will take place during the detailed design phase, stone cladding along the length of the splash wall should be taken into account as a worst-case scenario;
- The position of the flood gates will be determined as part of the detailed design phase and will be agreed in collaboration with the landscape/conservation officers to ensure opportunities to improve the flow of the promenade and its links with the rest of Sidmouth town centre;
- Consideration should be given to both the road side and prom side of the splash wall and the way in which it interfaces with the openings around the floodgates;
- Careful consideration must be given to how best to retain the character of the lighting columns along the Promenade, the retention of existing lighting columns for replacement as part of the works may not be achievable due to the age of the lighting columns (and therefore their condition); and
- Seating is a key amenity feature of the existing splash wall and should be retained if possible.

To this end, the final design will be developed in consultation with the EDDC Conservation Officer to ensure that the final design compliments, and does not detract from, the setting of the Conservation Area and its Listed Buildings.

10 Noise, Vibration and Air Quality

10.1 Introduction

This section of the PIER examines the potential environmental noise, vibration and air quality impacts arising from the proposed SBM scheme as described in **Section 2**. This section does not examine occupational noise and vibration issues nor does it include underwater noise and vibration impacts, the latter of which has been considered in **Section 7 – Ecology.**

The existing ambient noise and air quality levels are not expected to change significantly following construction as the baseline environment, once construction is complete, will remain similar to that present prior to works being commenced. Operational impacts have therefore been scoped out of the PEIR.

10.2 Baseline Environment

The Esplanade and areas backing the Sidmouth frontage consist of catering businesses, hotels, commercial outlets and also residential properties. East Beach is backed by cliffs with residential properties located to the east and woodland immediately behind. Sensitive receptors along the town frontage of Sidmouth are summarised in **Table 10.1** below.

Table 10.1 Sensitive Receptors of Sidmouth Town Frontage

Sidmouth Frontage Element	Receptor (s)
Connaught gardens (Frontage A)	Connaught Gardens and The Clock Tower Cakery and Restaurant. As stated in **Table 9.2**,given no new elements are proposed and no ongoing maintenance will be included as part this OBC, Frontage A (Connaught Gardens) is not directly assessed.
Splash Wall (Frontage B)	Businesses and residential housing along the Esplanade.
Training Arm (Frontage D)	Sidmouth sailing and angling club, SW Coastal Path, The Ham.
Beach recharge (Frontage B and C)	Businesses and residential properties along the Esplanade, users of East Beach.

10.2.1 Noise and Vibration

Baseline noise is considered to be seasonal at Sidmouth, with increased levels during the summer given its popularity with tourists and visitors. During the summer months there is also likely to be an increase in vehicles entering/passing through the town, particularly around the main through roads (B3176 and A375) and around the Esplanade. As well as higher noise levels during these months there will also therefore be a greater number of receptors (people) around who have the potential to be affected by construction noise.

However, as many of the human receptors present in the summer are visitors and tourists during peak season, they may be less sensitive to increases in noise beyond the baseline as they may not have an ‘out-of-season baseline’ against which to compare. In order to ensure this PEIR captures the ‘worst case scenario’ in terms of envelope of impact the assessment has been based on impacts to residents/business owners as it is considered reasonable to assume that impacts to occasional visitors are proportionately less significant than for permanent residents.

There are no significant sources of ground-borne vibration in the local environment and any vibration felt by residents is likely to result from delivery vehicles passing through the town.

10.2.2 Air Quality

The main pollutant of concern in East Devon is Nitrogen Dioxide (NO2) arising from road traffic around the busier and more congested areas. Fifty four passive monitoring sites monitored NO2 concentrations across East Devon in 2018, as well as the Honiton Urban Background automatic monitoring site. Air quality across East Devon is of a high overall standard; with only two exceedances in the most recent reporting year, with both being below the exceedance limit after distance correction. Monitoring results from the more populous towns such as Honiton and Axminster were slightly elevated compared to other areas (EDDC, 2019).

Historically there was one Air Quality Management Area (AQMA) declared in East Devon which was revoked in April 2018 as a result of improvement in air quality in the designated area as well as the preparation of a detailed air quality report that found no exceedances observed at sensitive receptor locations (EDDC, 2019).

Monitoring is undertaken on the A3052 Exeter to Sidmouth Road and these data indicate that there was an overall reduction in measured nitrogen dioxide levels from 2013 to 2015. Monitoring carried out within Sidmouth Town itself (Sidmouth Market Square) indicates nitrogen dioxide levels are significantly lower than the national exceedance level criteria. As a result, air quality is considered to be good in and around the study area.

10.3 Impacts during Construction

10.3.1 Impacts on air quality arising from the movement of construction vehicles

During the construction phase, the movement of construction vehicles and increased traffic levels associated with potential HGV deliveries will result in temporary increases in vehicle emissions. However, given that the number of construction vehicles required is likely to be small and the fact that any intense periods of activity are likely to be short in duration, a **minor adverse impact** is predicted.

By implementing the following air quality mitigation measures (**Table 10.2**) in line with best practice, impacts to air quality are considered to be negligible and are not considered further in this PEIR.

Table 10.2 Recommended Mitigation Measures

Recommended Mitigation Measures
Communications
▪ Develop a communications plan for engaging with the local community ▪ display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager; and, ▪ display the head or regional office contact information.
Dust management
▪ develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority; ▪ record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken; ▪ make the complaints log available to the local authority when asked; ▪ record any exceptional incidents that cause dust and/or air emissions, either on or off site, and the action taken to resolve the situation in a log book; ▪ undertake regular on-site and off-site inspection, where receptors (including roads) are nearby, to note any dust deposition, record inspection results, and make the log available to the local authority when asked. This should

Recommended Mitigation Measures
include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of site boundary, with cleaning to be provided if necessary; ▪ increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions; ▪ plan site layout so that machinery and dust causing activities are located away from receptors, as far as is practicable; ▪ erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site; ▪ consider enclosure of site or specific operations where there is a high potential for dust production and the site is active for an extensive period; ▪ take measures to control site runoff of water or mud; ▪ keep site fencing, barriers and scaffolding clean using wet methods; ▪ remove materials that have a potential to produce dust from site as soon as possible; ▪ cover, seed or fence stockpiles to prevent wind whipping; ▪ ensure all vehicles switch off engines when stationary - no idling vehicles; ▪ avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable; ▪ impose and signpost a maximum-speed-limit of 15mph on surfaced, and 10mph on unsurfaced, haul roads and work areas; ▪ produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials; ▪ only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems; ▪ ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate; ▪ use enclosed chutes and conveyors and covered skips; ▪ minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate; ▪ ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods; and, ▪ bonfires and burning of waste materials should not be permitted.
Measures specific to demolition
▪ ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground; ▪ avoid explosive blasting, using appropriate manual or mechanical alternatives; and, ▪ bag and remove any biological debris or damp down such material before demolition.
Measures specific to construction
▪ ensure sand and other aggregates are stored in silos, bunded areas or in a controlled and well-managed manner; and, ▪ avoid scabbling (roughening of concrete surfaces) if possible.
Measures specific to trackout
▪ use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use; ▪ avoid dry sweeping of large areas;

Recommended Mitigation Measures
▪ ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport; ▪ record all inspections of haul routes and any subsequent action in a site log book; and, ▪ install a wheel washing system as per industrial standard to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable.
Measures specific to Non Road Mobile Machinery (NRMM)
Non Road Mobile Machinery (NRMM) and plant will be well maintained. If any emissions of dark smoke occur then the relevant machinery should stop immediately and any problem rectified. In addition, the following controls should apply to NRMM: ▪ all NRMM should use fuel equivalent to ultralow sulphur diesel (fuel meeting the specification within EN590:2004); ▪ all NRMM should comply with either the current or previous EU Directive Staged Emission Standards (97/68/EC, 2002/88/EC, 2004/26/EC). As new emission standards are introduced the acceptable standards should be updated to the previous and most current standard; ▪ all NRMM should be fitted with Diesel Particulate Filters (DPF) conforming to defined and demonstrated filtration efficiency (load/duty cycle permitting); ▪ the ongoing conformity of plant retrofitted with DPF, to a defined performance standard, should be ensured through a programme of onsite checks; and, ▪ implementation of energy conservation measures including instructions to throttle down or switch off idle construction equipment; switch off the engines of trucks while they are waiting to access the site and while they are being loaded or unloaded, ensure equipment is properly maintained to ensure efficient energy consumption.

All these measures will be considered and included within a CEMP.

10.3.2 Increased noise and vibration levels associated with works to the splash wall

During the construction phase, there is the potential for disturbance to sensitive receptors from works to the training wall and splash wall. The works will involve saw cutting the existing wall which has the potential to create high noise levels close to sensitive receptors including residents, businesses and tourists/visitors. The works are regularly planned to be from 7am-7pm from Monday – Saturday, but this may be relaxed to 6am to 10pm Monday- Saturday for tidally affected activities. It is anticipated that the demolition of the wall will be undertaken in a 'rolling' process along the length of the splash wall which will minimise the duration of impact in any single location along the length of the Esplanade. Construction of the new wall is not considered to be likely to generate particularly high levels of noise or vibration and will also be undertaken as a 'rolling' process.

The impact of the increased noise and vibrations levels will vary depending on the location of the works along the Esplanade, and whether demolition activities are taking place directly outside a residential property or business or further away. The sensitivity of tourists, business owners and residents is considered to be medium however, the source will be intermittent and relatively short term as the building works move along the Esplanade.

Overall given the sensitive receptors close to the Esplanade, a **minor – major adverse impact** is predicted depending on proximity to the demolition/construction activity. The impact to businesses in particular has the potential to be **major adverse** during the peak tourist season. However, the magnitude of the impacts may be further reduced with mitigation in place (see below).

10.3.3 Increased noise levels during beach recharge at Sidmouth town frontage

Beach recharge at the Sidmouth town frontage, depending on the method used has the potential to create significant noise impacts due to the pumping or 'rainbowing' of shingle onto the shore. There will also be increased noise levels associated with the operation of excavators and bulldozers during the reprofiling. This has the potential to affect residents, business and tourists (both on and off the beach). This recharge should only take around 12 weeks and would be done in stages to retain access to the beach. The works are regularly planned to be from 7am-7pm from Monday – Saturday, but this may be relaxed to 6am to 10pm Monday- Saturday for tidally affected activities.

The sensitivity of human receptors to the noise of the beach recharge is considered to be high-medium, depending on the proximity of the activity to any specific receptor. The magnitude of impact to sensitive receptors is considered to be medium across the year despite the differences in visitor population between the winter and the summer. In light of the relatively short-term duration of this activity, an overall **moderate adverse** impact is predicted. However, the magnitude of the impacts may be further reduced with mitigation in place (see below).

10.3.4 Increased noise levels during construction of the new breakwater and groyne

The construction works at Town Beach and East Beach will include the construction of a new breakwater and rock groyne. Potential sensitive receptors would include residents, businesses and tourists/visitors along the seafront; residents at properties along Cliff Road; and people accessing the Port Royal end of the Esplanade as well as East Beach itself. Visitors to the AONB and the Jurassic Coast may also be affected by construction noise. Residents of Cliff Road are considered to be less sensitive than those receptors present on the seafront as these properties are between 80-100 m from East Beach and the cliffs are likely to act as a natural shield for noise.

The sensitivity of human receptors to the construction activities associated with new breakwater and groyne is considered to be medium, depending on the proximity of the activity to any specific receptor. This impact will however only continue for the duration of the construction works at Town Beach and East Beach and is therefore temporary in nature. Overall a **moderate adverse impact** is predicted.

10.3.5 Increased noise levels associated with construction traffic

Many of the construction works will require additional road movements including deliveries of materials for construction of the sea wall and groyne as well as movements to take away waste material. The increases in traffic on the roads have the potential to cause increased noise levels which may be more significant outside of the peak tourist season. Receptors include tourists, residents and businesses which are considered to have medium sensitivity. However, the increase in vehicle movements above the baseline are considered to be small and therefore the overall magnitude is considered to be low. Furthermore, the passage of an additional vehicle through Sidmouth will only generate a temporary increase in noise levels. Overall therefore an impact of **minor adverse** impact.

10.4 Impacts during Operation

10.4.1 Impacts arising from increased noise levels during period recharge to retain design beach

The proposed SBM scheme identifies a potential need for occasional recharge of the Sidmouth town beach and East Beach in order to maintain the design beach and therefore the standard of protection delivered

through the preferred option of the SBM scheme. It is anticipated that this recharge activity will be required every 10 years for the Sidmouth Town frontage, and every 5-10 years at East Beach. During each recharge activity it is anticipated that there is the potential for similar impacts to those identified in **Section 10.3** to arise. It is recognised however that the scale of works involved during these periodic recharge activities will be smaller than for the initial 'construction phase' and the magnitude of any impact is therefore considered to be similarly reduced. In light of this and given the temporary nature and short duration of maintenance recharge activities, a **minor adverse** impact is predicted.

The recycling and re-nourishment regimes described in **Section 2** will be reviewed in response to the beach monitoring regime and adapted as necessary. If beach crest levels increase significantly above the design beach profile it is likely that the EDDC will reduce levels as appropriate. This is particularly relevant at East Beach to ensure the continued erosion of the cliffs, albeit at a slower rate. The detail of how this will be achieved will be presented as part of an updated SBM scheme which will be developed as part of the detailed design process.

10.5 Proposed Mitigation

As previously highlighted, **i**t is recommended that a Community Engagement Plan is drawn up by EDDC to ensure that once the final design and construction details are known they are clearly communicated to the immediate residents and business operators along the Esplanade. It will be important to ensure that these people understand the timings of all aspects of the work and the implications for the operations of their business interests as well as their everyday lives. Engaging with the local community early will ensure that people are aware of mitigation measures (such as specific choice of less noisy plant) and the potential options available for consideration e.g. reduced working hours on Saturdays and a longer overall programme vs longer working hours and shorter overall programme. Whilst this Plan would primarily be drafted with those people most directly affected by the proposed works, it would also form the basis of broader public communications in line with construction excellence best practice. An important element of this Plan would be to agree a method through which to distribute up to date construction activity schedules so that residents and business operators are aware of periods of increased activity close to their premises.

In additional to the establishment of a Community Engagement Plan, there are a number of 'best practice' measures that should always be implemented on construction sites so as to be a "good neighbour" and protect the amenity of nearby residential receptors. These include:

- Avoiding unnecessary revving of engines and switching off equipment when not required.
- Minimising the drop height of materials.
- Starting up plant and vehicles sequentially rather than all together.
- Audible reversing warning systems on mobile plant and vehicles should be of the types which, whilst ensuring that they give a proper warning, have a minimum noise impact on neighbouring receptors. The use of conventional audible reversing alarms has the potential to cause annoyance due to the tonal component. It should be noted that alternatives, such as "white-noise" type alarms, are available which are generally considered to be less annoying.
- Ensuring that vehicles are maintained regularly and kept in a good working order.
- Increasing the distance between plant and noise sensitive receptors is the most effective method of controlling noise. Whilst it will not be possible to do this when work takes place at a fixed location, stationary plant such as compressors and generators should be located as far away from noise sensitive receptors as possible.

- On sites where it is not possible to reduce noise by increasing the distance between source and receptor, screening may have to be considered. For maximum benefit, screens should be as close to the source as possible. Some examples are as follows:
  - site buildings such as offices/stores can be grouped together to form a substantial barrier separating site operations and receptors;
  - stacks of certain materials such as bricks, aggregate, timber or top soil can be strategically placed to provide a barrier;
  - areas which have been excavated below ground level can be used to position static plant such as generators, compressors and pumps;
  - earth bunds can be built to provide screening for major earth-moving operations and can be subsequently landscaped to become permanent features of the environment when works have been completed. This may also help to reduce operational noise when commissioned;
  - using rubber linings in, for example, chutes and dumpers to reduce impact noise;
  - as far as reasonably practicable, sources of significant noise should be enclosed. The extent to which this can be done depends on the nature of the machine or process and ventilation requirements; and,
  - maintenance of equipment. For example, rattling noises can be controlled by tightening loose parts and by fixing resilient material (such as rubber) between the surfaces in contact.

There are also a number of ‘best practice’ measures that should always be implemented to minimise vibration impacts while retaining productive efficiency. Examples include:

- Choosing alternative, lower impact equipment or methods wherever possible.
- Scheduling the use of vibration-causing equipment, such as jackhammers, at the least sensitive time of day.
- Routing, operating or locating high vibration sources as far away from sensitive areas as possible.
- Sequencing operations so that vibration-causing activities do not occur simultaneously.
- isolating the equipment causing the vibration on resilient mounts.
- keeping equipment well maintained.

It is recommended that the best practice measures identified above are captured within a CEMP which should form part of the documentation issued to the Contractors appointed to deliver the final design scheme in Sidmouth.

It should be noted: The CEMP would also be used to capture all mitigation measures proposed in this PIER.

11 Coastal Processes and Hydrodynamics

11.1 Introduction

This section of the PEIR provides an assessment of the potential changes to prevailing hydrodynamic processes (i.e. waves and tides) and sedimentary processes (i.e. erosion and accretion) arising as a result of the proposed SBM scheme. However, it should be noted that the purpose of a scheme is to influence coastal processes local to the area.

Additionally, the methods adopted to understand potential changes to coastal processes and hydrodynamics are different to those adopted for other sections of this PEIR. This is because the scheme will have effects (after completion of the works) on the hydrodynamic and sedimentary processes regimes, but these effects in themselves are not considered to be impacts; the impacts will be consequential effects of the changes to the regimes on other receptors such as marine ecology and geology.

For example, changes in the erosion rate will impact upon the habitats and species present on the cliffs at East Beach. Similarly, changes in hydrodynamic processes active close to the shoreline will alter the erosion and deposition patterns at Sidmouth. Therefore, this section focuses on the potential for changes/effects rather than impacts. The potential impacts on ecological receptors resulting from changes in hydrodynamics and sedimentary processes are considered in **Section 7**.

11.2 Baseline Environment

11.2.1 Wave climate

The coastal frontage of Sidmouth is orientated in a north east to south west direction. The waves approach the coastline from the south east, south and south west. The predominant wave regime along the coastline is south westerly waves, however south easterly storm conditions occur throughout the year for days at a time. **Figure 11.1** provides a wave rose for the offshore and transformed inshore waves.

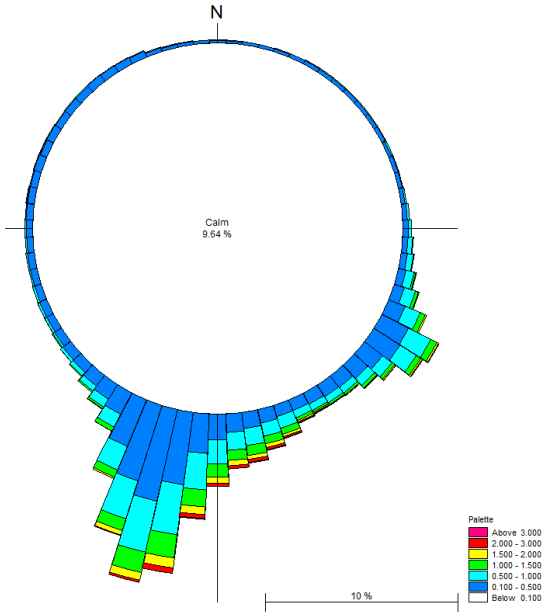


Figure 11.1 Met Office WaveWatch III Hindcast Wave Record

As illustrated in **Figure 11.2**, wave overtopping along the Sidmouth Town frontage occurs via waves running up the face of the promenade / seawall and over the crest. This type of overtopping is known as 'Green Water' overtopping. Wave overtopping also occurs when waves break seaward of the seawall and / or break onto its seaward face producing non-continuous overtopping and / or significant spray. Overtopping spray is carried over the wall either under its own momentum or driven / assisted by an onshore wind. This type of overtopping is often referred to as 'White Water' overtopping.

Figure 11.2: Wave Overtopping Along Sidmouth Town

Wave overtopping is the primary flood risk to Sidmouth Town and the impacts are likely to increase with sea level rise.

11.2.2 Tidal Currents

Within the wider Lyme Bay, flood-tide currents flow in a north-eastward direction and ebb-tide currents flow in a south-westward direction (SCOPAC, 2003). Tidal measurements taken during the Sidmouth Coastal Defence Scheme in 1992 indicate flows offshore to be quite slow not exceeding 0.25m/s during a spring tide. Near the Sidmouth outfall flow rates vary between 0.05m/s and 0.17m/s relative to high water. Post the 1992 Sidmouth Coastal Protection Scheme, tidal currents were predicted to reduce even further due to the offshore breakwaters. However, there is no data available on post scheme conditions.

The astronomical tidal elevations can be raised significantly by interaction with surge events influenced by global weather systems. **Table 11.1** presents the extreme water levels at Lyme Regis, the nearest tide data point to Sidmouth. Baseline extreme water levels were obtained from the Environment Agency's Coastal Flood Boundary Data study (CFBD) for the UK Mainland and Islands (Environment Agency, 2011) which has a base date of 2008. Output point 2410 fronts Sidmouth and was used for the assessment. UK Climate Change Impact Projections (UKCP09) 'Medium Emissions' scenario at the 95% level has been applied to sea levels. Extreme water levels are set to rise by approximately 0.7m over the next 100 years.

Table 11.1 Tide Levels for Lyme Regis, the Nearest Tide Data Point to Sidmouth

Tidal Condition	Tide Level (mODN) (UKHO, 2013)
Highest Astronomical Tide (HAT)	2.45
Mean High Water Spring (MHWS)	1.95
Mean High Water Neap (MHWN)	0.75
Mean Sea Level (MSL)	-
Mean Low Water Neap (MLWN)	-0.66
Mean Low Water Spring (MLWS)	-1.75

11.2.3 Sediment Transport

As noted above, there is limited information on tidal currents, although from what is known, it is widely believed that current strengths are low and likely incapable of moving gravel-sized sediment along the beach. Therefore, movement of beach material alongshore and cross-shore is determined by wave strength and direction. Sediment transport along Sidmouth is summarised in **Figure 11.3** and **Figure 11.4**.

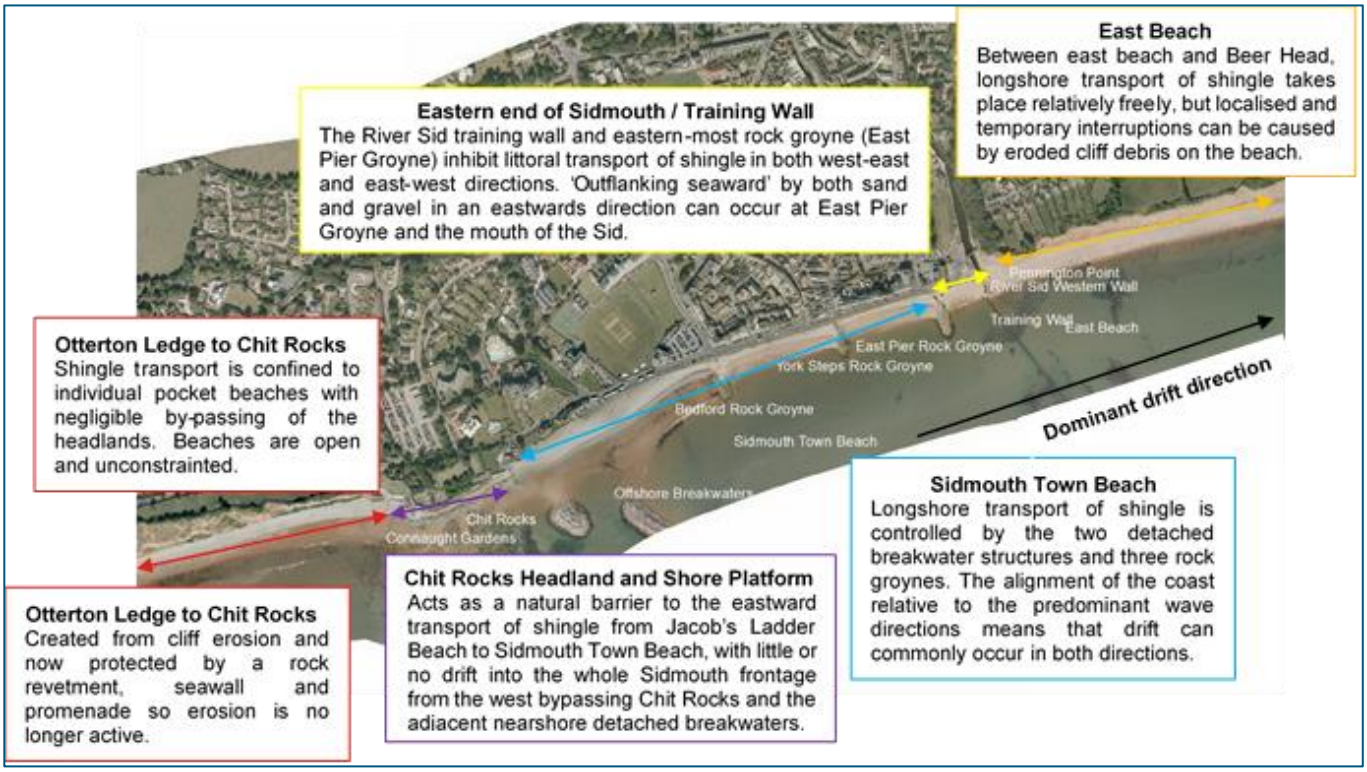


Figure 11.3 Sediment Movement 1

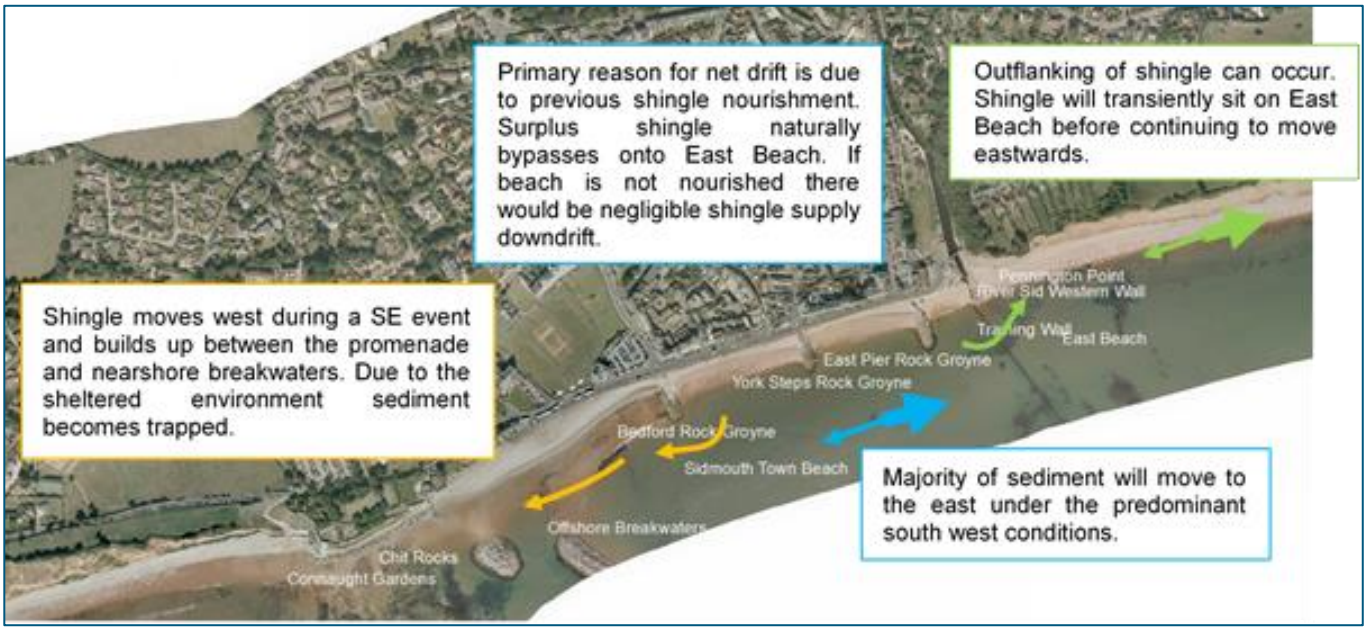


Figure 11.4 Sediment Movement 2

The beaches at Sidmouth are monitored annually by Plymouth Coastal Observatory using both surveyors and Lidar. Since 2000 data indicated that there has been no significant trend in loss of beach material, rather that the volume of beach material is variable. This can be seen on the beaches themselves following storm events before it recovers. This suggests that the beach is now in a state of dynamic equilibrium with little further loss of material occurring (although the material that was added as part of the 1990s scheme is no longer present).

There are very limited inputs of shingle into the Sidmouth frontage and the sediment source that originally supplied the beaches is now exhausted. Most of the sediment is in deep waters offshore beyond the influence of waves and currents. The primary supply of sediment to the Sidmouth frontage is through artificial nourishment. In 1992, 105,000m^3 of flint gravel was placed on the beach as part of the Sidmouth Coastal Protection Scheme followed by 6,000m^3 in 2000 between York Step Rock Groyne and East Pier Groyne. The cliffs either side of Sidmouth are a potential source of shingle, albeit relatively small.

It follows that there is limited supply of material to East Beach. This is evident by East Beach often being bare though occasionally some sediment may drift up following south easterly waves. There are potential sediment sources to the east and west of the Sidmouth frontage, however longshore inputs are inhibited at either end of the Sidmouth Town Beach frontage because of the existing groynes. Even if this were not the case the total supply of gravel from cliff erosion along the adjacent frontage would be very low.

Behind the current breakwaters, it is thought that there has been a slight build-up of material following the nourishment in the 1990s as the occasional south easterly events drive material in behind the structures which cannot then drift out.

11.3 Impacts during Construction

Whilst there could be temporary effects associated with the presence of rock stockpiles and equipment during construction of the various elements of the proposed SBM scheme, the most significant changes are likely to occur once the recharge and changes to the structures have occurred. This section therefore focuses on the operational phase (see below).

11.4 Impacts during Operation

11.4.1 Sediment Transport

The original BMP scheme was modelled using LITLINE. The purpose of the LITLINE modelling was two-fold:

- To develop a model that can accurately represent the coastal processes and hydrodynamic regime active along the SBM frontage.
- Assess the effects of different permutations of design for the preferred option to identify the most technically strong approach to achieving the objectives of the SBM scheme (see **Section 1.1**).

A detailed note providing information on the approach to modelling is included within the new OBC for the proposed SBM scheme. However, **further modelling will be undertaken during the detailed design phase of the project, although the outcomes of the model can be used to support the operational assessment of the new proposed SBM scheme**. The key points on the initial modelling are listed here:

- Once the baseline coastline was constructed in LITLINE a simulation of the how the beach behaved following the nourishment of the frontage after the construction of the 1990s scheme was undertaken; this provided an opportunity to confirm the accuracy of the model and understand how closely it resembled natural conditions at Sidmouth. This model run identified that:

- The influence of the existing groynes is limited when the beach is full and there is more natural by-passing of the structures.
- The existing breakwaters have a stronger influence on the beach when there is more sediment available and therefore drift rates are lower.
- When the beach in front of Sidmouth Town is 'full' there is more material travelling east and therefore supplying East Beach which supports a shoreline that is seaward of the existing scenario.
- Benefits of re-nourishment appear to be depleted by year 10.

Following further refinement (based on the test run described above), further model runs were carried out to investigate:

- Existing structures with re-nourishment at Sidmouth Town Beach.
- Effects of a single groyne at East Beach and re-nourishment at Sidmouth Town Beach.
- Effects of a single groyne at East Beach, re-nourishment at Sidmouth Town Beach and re-nourishment at East Beach.
- How the results of the above are altered with different groyne lengths.

These model results yielded the following key outcomes which have in turn informed the proposed SBM scheme, in particular the new long groyne and the preferred way ahead:

- The presence of a groyne on East Beach collects sediment travelling from the west; providing the groyne is long enough, it also prevents the by-passing of this sediment around the structure and away from East Beach.
- The benefit delivered in nourishing East Beach at the outset (as well as having the groyne in place) comes from protecting the cliff from the outset. In the absence of this initial renourishment, in the period between groyne instalment and the build-up of sediment (as it moves from west to east and collects in the groyne bay on East Beach) would be a period of time during which the cliff toe was not protected.
- Nourishing East Beach from the outset also allows any additional material moving east from Town Beach to bypass the groyne structure in the event that East Beach is 'full'.
- Ongoing nourishment of Town Beach and associated eastward drift of material maintains East Beach sufficiently to limit the need for renourishment at East Beach.
- A groyne shorter than 100m will not hold the design beach in place at East Beach with much of the material bypassing the structure and being lost to the east. This includes any re-nourishment placed on East Beach at the outset and material placed on Town Beach that may move eastwards.

Overall, **no impact** is predicted on sediment transport in relation to the operation of the new long groyne, and although there is potential for sheltering at the new breakwater and less transport of sediment across the cell, outside of the cell **no impact** is predicted on sediment transport in response to the operation of the breakwater.

11.4.2 Waves

Modelling was also initially carried out to understand the overtopping that occurs at Sidmouth and the need for any additional protection other than proposed SBM scheme in the face of climate change and a summary of the key findings is provided below:

- Under a Do-Nothing scenario where no further intervention works are undertaken and the beach becomes depleted, wave overtopping is significant.
- With a design beach in place (i.e. beach recharge), wave overtopping is reduced, however the reduction is not significant enough to prevent flooding to Sidmouth Town. For example, along frontage 4 for a present day 1:200 year event, wave overtopping is reduced from 2.69l/s/m to 2.04l/s/m.
- With the design beach in place combined with increasing the height of the splash wall to 1m, wave overtopping is significantly reduced. For example, along frontage 4 for a present day 1:200 year event, wave overtopping is reduced from 2.69l/s/m to 0.18l/s/m.
- **Table 11.2** and **Table 11.3** present the pre- and post-scheme modelled wave overtopping results along the road for the Sidmouth Town Frontage for both 2017 and 2117 respectively. As can be seen from the 2017 table there is a significant reduction in wave overtopping when the scheme is in place. This is further evident in 2117 but note that rising sea levels increase the level of overtopping.

Table 11.2 Pre-and Post-Scheme Wave Overtopping along Road in Meters - 2017

Level of storm event (one in X year event)	Frontage 1 (Frontage A)		Frontage 2 (Frontage B)		Frontage 3 (Frontage B)		Frontage 4 (Frontage B)		Frontage 5 (Frontage B)	
	Pre-scheme	Post-scheme	Pre-scheme	Post-scheme	Pre-scheme	Post-scheme	Pre-scheme	Post-scheme	Pre-scheme	Post-scheme
1	0.26	0.00	0.14	0.00	0.20	0.00	0.30	0.00	3.01	0.00
10	0.97	0.00	0.15	0.00	1.17	0.00	0.52	0.00	4.35	0.00
20	1.63	0.00	0.42	0.00	1.82	0.00	0.78	0.00	5.50	0.00
50	3.15	0.00	1.12	0.00	3.22	0.00	1.53	0.00	7.22	0.00
75	3.49	0.00	1.56	0.00	3.95	0.00	1.95	0.00	7.99	0.00
100	4.57	0.00	2.08	0.00	4.26	1.73	2.20	0.17	9.02	0.00
200	4.84	0.00	2.34	0.00	4.53	2.17	2.69	0.18	10.03	1.29
1000	8.52	0.00	5.00	0.00	8.18	4.48	6.00	1.32	15.98	1.35

Table 11.3 Pre-and Post-Scheme Wave Overtopping along Road in meters - 2117

Level of storm event (one in X year event)	Frontage 1 (Frontage A)		Frontage 2 (Frontage B)		Frontage 3 (Frontage B)		Frontage 4 (Frontage B)		Frontage 5 (Frontage B)	
	Pre-scheme	Post-scheme	Pre-scheme	Post-scheme	Pre-scheme	Post-scheme	Pre-scheme	Post-scheme	Pre-scheme	Post-scheme
1	5.00	0.00	1.48	0.00	8.57	0.00	1.85	0.00	10.92	0.00
10	8.89	0.00	5.91	0.00	21.54	0.00	5.07	0.00	18.13	0.00
20	10.34	0.00	7.67	0.00	21.89	0.00	5.11	0.00	18.96	0.00
50	12.57	0.00	11.68	0.00	25.97	3.23	9.44	0.00	24.45	1.36
75	13.00	0.00	13.54	0.00	29.84	4.38	10.68	0.00	23.51	3.55
100	13.41	0.00	14.36	0.00	30.64	5.14	14.38	3.47	30.55	4.68
200	22.87	0.00	15.56	0.00	36.52	6.06	15.55	3.57	31.54	5.84
1000	27.34	0.00	20.95	0.00	51.46	12.90	25.87	7.52	47.30	12.04

The results of the wave overtopping modelling indicates a clear requirement for raising the level of the existing splash wall to ensure ongoing protection of Sidmouth Town from coastal flooding. From initial modelling undertaken for the original BMP scheme, it can be seen that increasing the splash wall to 1m in height significantly improves the standard of protection offered to Sidmouth during storm events. Post-scheme overtopping is not predicted to occur until a 1 in 75 year storm event (in 2017) and this reduces to a 1 in 50 year storm event over the next 100 years. Increasing the splash wall height further would offer an even greater level of protection however given the prominent location of the splash wall on the promenade, it is recognised that it is important to achieve a balance between delivering flood protection whilst minimising impacts on the amenity use of this space.

The wave overtopping calculations also indicate that the design beach and splash wall do not fully prevent overtopping during more extreme events. Waves are still able to run up the beach and onto the promenade during storm events and are reflected seaward by the splash wall as illustrated in **Figure 11.5**.

Parallels to this can be drawn along the East Beach frontage where with the presence of the design beach alone (i.e. along with the absence of a raised splash wall), wave run up will continue to reach the base of the cliffs during storm events, however, wave energy will be lower due to the presence of a beach. This can be seen in **Figure 11.6** for a 1 in 1 year storm and **Figure 11.7** for a 1 in 200 year storm.

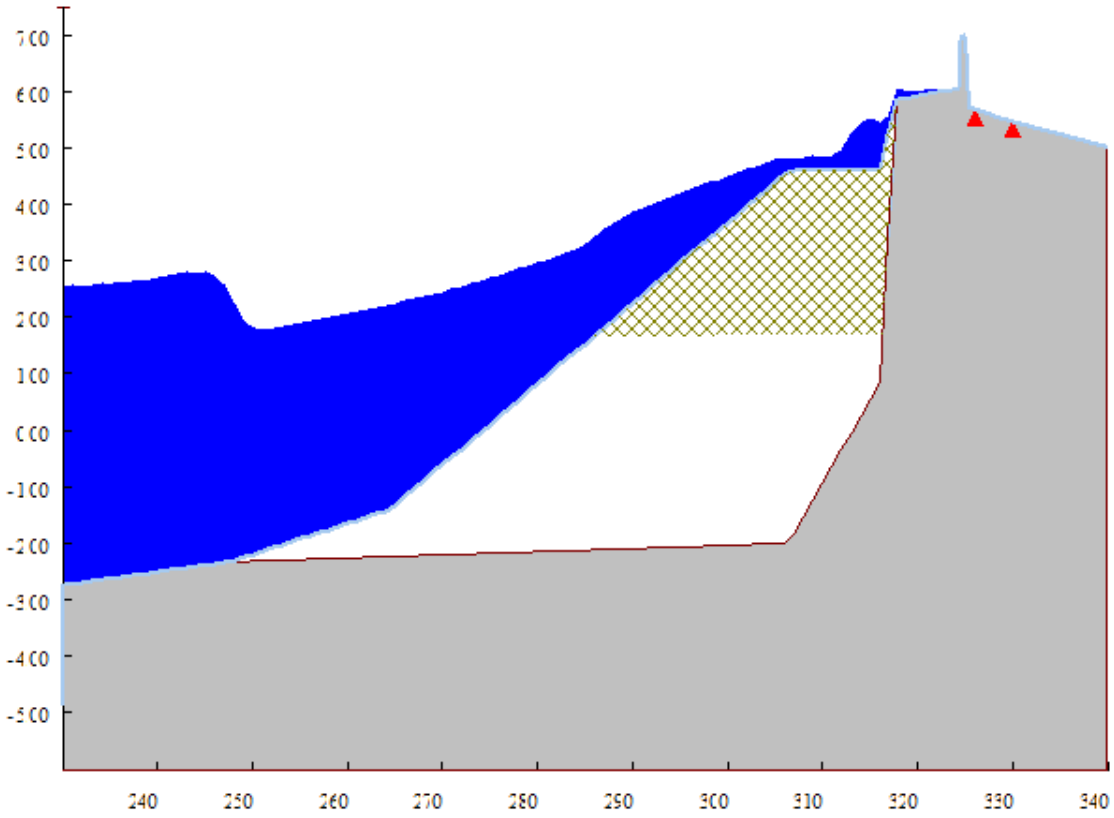


Figure 11.5 Model Output Illustrating Continued Overtopping of Town Frontage with the Design Beach and Splash Wall in Place

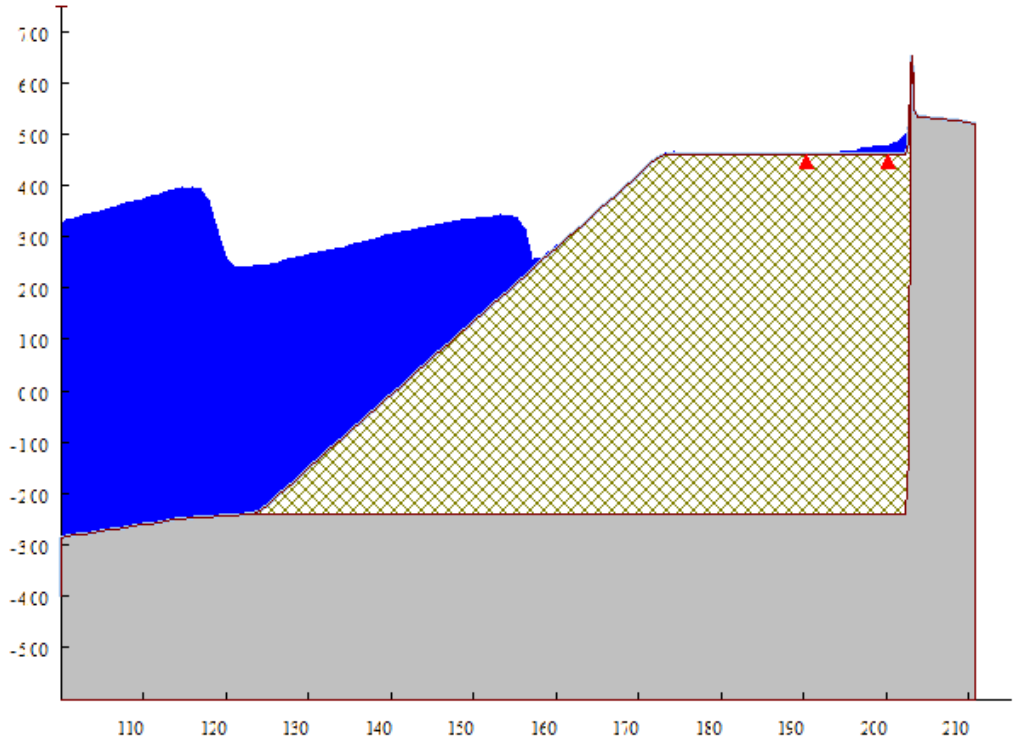


Figure 11.6 Wave Run Up During a 100% AEP (1 in 1 year) Storm Event on East Beach Indicating Very Low Levels of Water Reaching the Toe of the Cliff.

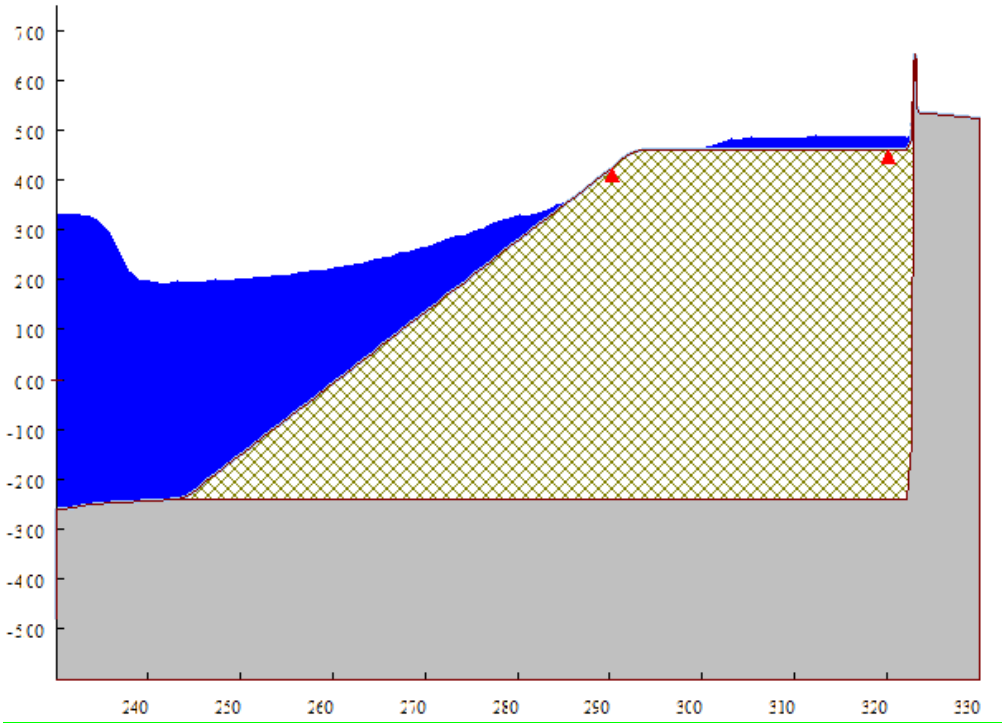


Figure 11.7 Wave Run Up During a 0.5% AEP (1 in 200 year) Storm Event on East Beach Showing More Water Reaching the Cliff

Overall therefore, the initial model demonstrated that there will be **no impact** on the wave climate and that waves are still able to run up the design beach proposed for the SBM scheme.

11.4.3 Tidal currents

For tidal currents it is anticipated that there would be no change to present conditions given that there are already beaches present along the frontage of Sidmouth. Additionally, the lowering of the River Sid training wall will allow currents to move more naturally. Tidal currents may vary slightly due to the introduction of the new long rock groyne and breakwater, though this is unlikely be a noticeable effect. Only a **minor impact** is predicted, with a beneficial change associated with the removal of the seaward end of the River Sid training wall.

11.5 Proposed Mitigation

No proposed mitigation required other than those already previously described which may be relevant to coastal processes and hydrodynamics, such as mitigation by design.

12 Geology and Geomorphology

12.1 Introduction

This section of the PIER builds on the information provided in **Section 11** and considers the potential effects of the proposed SBM scheme on geology and geomorphology. Specific consideration is given to the Geological Conservation Review (GCR) sites and the Sidmouth to Beer Coast SSSI, all of which are designated for geological interest. Additionally, the cliffs on both sides of the town lie within the UNSESCO Dorset and East Devon World Heritage Site ('Jurassic Coast') designated for its geological importance. This designated site is, however, considered in **Section 9 – Archaeology and Cultural Heritage**.

12.2 Baseline Environment

The area contains two GCR sites, Ladram Bay to Sidmouth (GCR 3215) and Sidmouth (GCR 3143). The GCR was designed to identify those sites of national and international importance to show all the key scientific elements of the Earth heritage of Britain. These sites display sediments, rocks, fossils, and features of the landscape that make a special contribution to the understanding and appreciation of Earth science and the geological history of Britain, which stretches back over 2,800 million years. After over two decades of site evaluation and documentation, over 3,000 GCR sites were selected for around 100 categories (GCR 'Blocks'), encompassing the range of geological and geomorphological features of Britain. The aim of the Geological Conservation Review Series is to provide a public record of the features of interest and importance at localities already notified or being considered for notification as SSSIs. The sites selected – GCR sites – form the basis of statutory geological and geomorphological site conservation in Britain.

Chit rocks to the west of the SBM scheme frontages forms part of GCR 3134, yielding fossilised remains of internationally rare Middle Triassic fossil fish, amphibians and reptiles. The same GCR includes the cliffs and foreshore of Pennington Point, which also yields these rare fossils.

Parts of the study area lie between the Sidmouth to Beer Coast SSSI, which has been designated for both its geological and biological interest. The cliffs expose Foxmould Sands and Chert Beds (Upper Greensand) of particularly good quality. The site also contains some of the most westerly major Upper Cretaceous exposures in England, which are of great stratigraphic importance (Natural England, 1989).

Ladram Bay to Sidmouth SSSI is designated as an important site for coastal geomorphology. There are a series of well-developed cliffs, stacks and shore platforms which have been cut into the red sandstones which are one of very few assemblages of such forms in southern Britain.

The interest features of the Sidmouth to West Bay SAC are also linked to the geology of the area with vegetated sea cliffs (an Annex I habitat) a primary reason for designation. The mosaic of niche habitats provided by the variety of geological features present along these frontages and the continuing exposure of them underpins the presence of the vegetation colonising the sea cliffs.

The coastal processes active in this area are heavily influential in maintaining and continuing to expose the geological and geomorphological features in and around Sidmouth. Connected to this is the rate of erosion that occurs along these frontages, particularly on East Beach. Given the importance of cliff erosion to the geology and geomorphology of the area, this aspect of the baseline is explored in more detail below. It should be noted that the relevance of these processes for the ecology of the area is explored in **Section 7**, whilst implications for the heritage features of the area (including the World Heritage Site) are discussed in **Section 9**.

12.2.1 Cliff erosion

The continuing erosion of the cliffs at Sidmouth and in particular at East Beach are a key feature in supporting the designated sites in this location. To assess the degree to which the proposed SBM scheme works will impact on the geology of the area, it is important to understand the processes already active on the cliffs and the way these processes can lead to cliff recession. A cliff can cut back due to several mechanisms:

- Instability of slope due to over steepness -if a cliff is over-steep it is likely to continue to 'fall' or 'shallow back' until it is stable. This will be influenced by ground water levels and rainfall levels with higher levels of both increasing the instability in the cliff and making it more likely to slip. This process is not influenced by the presence of a beach at the toe of the cliff.
- Erosion through weathering e.g. wind, rain, freeze thaw action – the cliffs at Sidmouth are primarily comprised of sandstone and as such are vulnerable to erosion through weathering.
- Coastal erosion - waves reaching the cliff toe can cut away or erode the base of the cliff. There are two mechanisms of coastal erosion acting along the Sidmouth frontage:
  - The first mechanism is from 'wave attack' whereby waves directly impact the cliff toe, causing undercutting of the cliff and subsequent failures. Failures cause a sudden release of shingle and fines which over time are washed away. When the beach is washed away the platform beneath becomes exposed and eroded causing lowering. Weathering of the platform takes place along planes of weakness. The erosion is irreversible and when the beach returns during calmer conditions, it does so over a lowered surface.
  - The second mechanism relates to beach material sediment erosion whereby when there is less sediment entering than leaving the system sediment levels become depleted.

An analysis of cliff recession was undertaken as part of the development of the SBM scheme. For East Beach cliffs, the long-term rate of head scarp recession from historical maps indicates an average recession rate of 0.19m/year at the cliff top and 0.15m/year at the cliff toe. The analysis suggested a phase of rapid cliff recession from the 1890s to 1950s, with less change from that point to 1991 as presented in **Table 12.1** and **Table 12.2**.

Table 12.1 Cliff Erosion Rates Calculated from Historical Ordnance Surveys. Values m/year.

Average Short Term Cliff Top				Average Long Term Cliff Top	
1890-1906	1906-1938	1938-1963	1963-1991	1890-1991	1890-1991
-0.38	-0.30	-0.68	-0.36	-0.19	-0.15

Table 12.2 Cliff Erosion Rates Calculated from Historical Aerial Photography. Values m/year.

Average Short Term Cliff Top						Average Long Term Cliff Top		Average Long Term Cliff Toe
1946-1950	1950-1988	1988-2006	2006-2009	2009-2012	2012-2015	1946-2015	1950-2015	1946-2015
-1.54	-0.08	-0.31	-2.64	-1.18	-1.03	-0.27	-0.19	-0.25

It is worth noting that the original BMP erosion rates have been updated to include more recent data, as cliff erosion appears to have accelerated in the past decade. With the revised rate of -2.1m / year between year 0 to 20 years and 0.6m / year between year 20 and 100, the cliff is estimated to retreat by 92.5m over 100 years.

Based on revised erosion rates and predicted sea level rise, the cliffs at East Beach are predicted to continue to recess over the next 100 years (**Figure 12.1**). This will expose the eastern end of Sidmouth to flooding through outflanking and overtopping of the River Sid Western Wall. Indeed this is a key factor underpinning the requirement for the BMP.

The continuing erosive action is also, however, fundamental in maintaining the geological and geomorphological features of the area. The ongoing erosion ensures the continued exposure of the different rock types and therefore the stratigraphy, sedimentology, palaeogeography and palaeontology of the geological periods evidenced in this location.

Figure 12.1 Cliff Recession Predictions for 100 Years at East Beach

12.3 Impacts during Construction

Due to the nature of the works along much of the frontage it is not anticipated that the construction phase is likely to result in significant impacts on the geology. In sections where more extensive works are required i.e. the boat ramp at Port Royal, there is potential for impacts through construction. Note that bedrock excavation for the new rock groyne is not required and therefore geological impacts associated with this structure are not predicted.

In constructing the proposed boat ramp it will be necessary to excavate shingle to install the framework and concrete. The construction activities will be relatively short term and the area impacted will be small. Overall therefore, the impact of the construction phase on geology is anticipated to be minor and temporary and therefore of a **negligible impact** is predicted.

12.4 Impacts during Operation

As part of the design development for the for the original BMP scheme , cross shore beach and wave movement was modelled along the frontage of Sidmouth Town and East Beach. The model demonstrated that there will be **no impact** on the wave climate and that waves are still able to run up the design beach. Tidal currents may vary slightly due to the introduction of the new long groyne and breakwater though this is unlikely be a noticeable effect.

12.4.1 Impacts on sediment transport

The introduction of additional material in to the system will not result in significant volumes of material moving further east as the new long groyne will prevent this. As there is currently no transport of material to the east, the introduction of a groyne will not have an effect on current supply. As a result, **no impacts** on sediment transport are predicted.

12.4.2 Impacts on cliff erosion

The introduction of a beach at the toe of East Beach cliff, particularly made of shingle, would act to dissipate the wave energy so that any waves (whether during a storm event or during ordinary conditions) reaching the toe of the cliff do so with less energy whilst and erosive power. The continued occasional impact of waves on the cliff will mean that some erosion will still occur. However, the rate will be reduced below present day rates, although erosion will continue to occur during stronger weather conditions when larger waves reach the toe of the cliff. This approach ensures the continued erosion of East Cliff (which is essential to preserve the conditions necessary to maintain the environmental and heritage features along this frontage) reducing the erosion rate sufficiently to decrease risk of outflanking and exposure of River Sid wall and increase the protection to property and other material assets in Sidmouth and on Cliff Road. Overall therefore, the impact is anticipated to be minor and long term and therefore a **minor adverse impact** is predicted.

12.4.3 Impacts on designated sites

Given the minor effects on the various geological processes, and the commitment of EDDC to monitor beach levels (and therefore the potential for increased impact on erosion rates) effects on the CGR and SSSI designated sites are not anticipated.

A detailed assessment of impacts on the World Heritage Site is presented in **Section 4** and relevant elements related to the geological features of the Jurassic Coast are captured therein.

12.5 Proposed Mitigation

No proposed mitigation required other than those already previously described which may be relevant to geology and geomorphology, such as mitigation by design.

13 Water Environment

13.1 Introduction

This section of the PEIR provides a summary only of the assessment undertaken on the potential changes to WFD water bodies associated with the proposed SBM scheme as provided in **Appendix 2 Water Framework Directive Compliance Assessment**.

13.2 Approach and Baseline Environment

An assessment to consider the proposals against the WFD compliance criteria has been undertaken. This has been carried out in line with the Clearing the Waters for All guidance (Environment Agency, 2016) found at https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters.

1. Removal and replacement of the Splash Wall at key locations along the Esplanade (including River Sid training wall works).
2. New breakwater and long groyne at East Beach.
3. Beach recharge at Sidmouth Town and East Beach.
4. New maintenance ramp.

For the operational phase, the following activities are considered:

5. Presence of shingle berms.
6. Presence of new breakwater and rock groyne.
7. Presence of new access ramp.

Given the limited changes to the current footprint of the works at the Splash Wall, these activities were considered to give rise to the same operational effects as those existing prior to the works being completed. As a result, the operational phase of these two activities was not considered further in the assessment. Additionally, the removal of 10m of the River Sid training wall will restore the area back to a more natural baseline and therefore the operational effect of training wall removal was also not considered further in the assessment.

The works extent is shown against the WFD water body outlines in **Figure 13.1**. The relevant WFD water bodies are the Lyme Bay West Coastal water body (GB650806420000, currently in Moderate WFD Status) and the Sidmouth and Honiton Mercia Mudstone Groundwater body (GB40802G802800, currently in Good WFD Status). For the River Sid training wall works the River Sid waterbody (GB108045009160, currently in Moderate WFD Status) could be impacted and therefore this water body was also screened in for assessment. The information for these water bodies was collated from the Environment Agency's Data Catchment Explorer (Environment Agency, 2022) found at http://environment.data.gov.uk/catchment-planning/ and is presented in **Appendix 2**.

Table 13.1 considers the activities against each WFD water body identified to enable the scoping stage to be focussed on only those activities where pathways for impacts on the WFD water body could potentially exist.

Figure 13.1 Works Extent Against the WFD Water Bodies

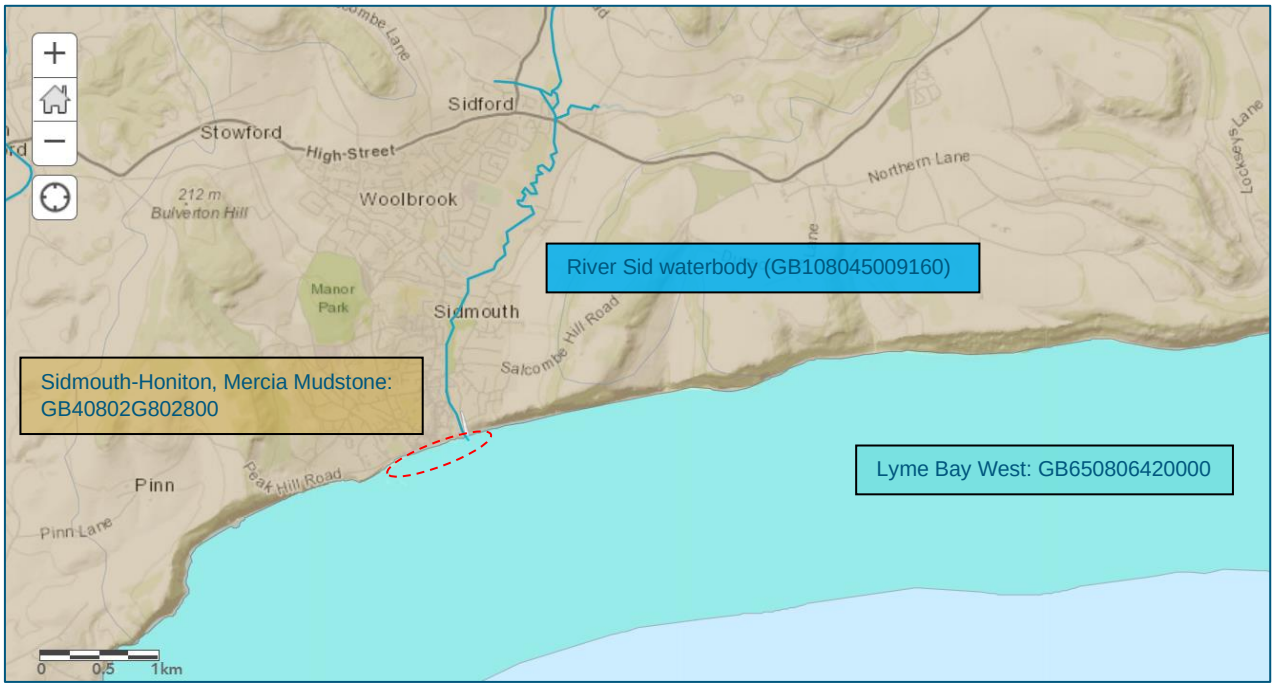


Table 13.1 Summary of Activities and Potential Pathways for Effects on WFD Water Bodies Screened in for Consideration

Phase	Number	Activity	Lyme Bay West	River Sid	Sidmouth and Honiton Mercia Mudstone
Construction	2	Removal and replacement of the Splash Wall along the Esplanade (including training wall works)	✓	✓	✓
	3	New breakwater and long groyne at East Beach	✓	×	×
	4	Beach recharge	✓	✓	×
	5	Access ramp	✓	×	✓
	6	Presence of recharge material	✓	×	×
Operation	7	Presence of new breakwater and long groyne at East Beach	✓	×	×
	8	Presence of new access ramp	✓	×	×

In regard to bathing waters, the Sidmouth Town water sampling point has been monitored since 1988 in line with the Bathing Water Directive, (1976) and also with the Water Framework Directive, (2003) after 2006. In 2021 the results of the water sampling at “Sidmouth Town” and “Sidmouth Jacobs Ladder” recorded a measure of excellent based on samples taken from 2017 through to 2021; and as such, the bathing waters of Sidmouth currently meet the 2006 Bathing Water Directive standards.

13.3 Overall Construction and Operation Impacts

The WFD compliance assessment presented in **Appendix 2**, considered each stage of the required process. Stage 1 identified eight activities to be considered (five during the construction phase and three during the operational phase) that required consideration and three WFD water bodies as follows:

- Lyme Bay West Coastal water body (GB650806420000)
- Sidmouth and Honiton Mercia Mudstone Groundwater body (GB40802G802800).
- River Sid waterbody (GB650806420000)

Stage 2 (scoping) identified that there was a potential risk to hydromorphological parameters for the presence of the new breakwater, long rock groyne, new ramp and berms created by the shingle recharge however further assessment concluded that significant permanent impacts would not occur. The scheme has committed to the mitigation measures as outlined in **Section 13.4** and will lead to the removal of 10m of the River Sid training wall returning the sea/river bed back to its natural state. No risk of cumulative impacts was identified. As a result the scheme is considered to be compliant with the requirements of the WFD.

13.4 Proposed Mitigation

The following mitigation measures will be implemented to reduce the potential for effects on WFD compliance parameters as far as possible:

- Implementation of a CEMP to be drafted in consultation with the relevant regulators. This will include all measures to prevent pollution of the surrounding environment associated with construction and will cover water quality, air quality and noise for example.
- Implementation of a waste management plan (to include the requirement that all demolition material to be collected and removed from site). This could be included as a component to the CEMP.
- The commitment to the reinstatement of the site once works have been completed.
- Commitment to use shingle from a reputable source with minimal fines for all beach recharge episodes.

14 Cumulative Effects

A search of the MMO's public register and the EDDC planning portal revealed no major current projects which could potentially lead to cumulative effects on the environmental parameters outlined above. However, prior to the submission of any applications for consent, this aspect of the EIA will be updated to take account for any new projects which may have become relevant in the intervening period.

15 Summary

This PEIR has been prepared in support of the OBC for the Environment Agency's internal application for funding and technical approval for the proposed SBM scheme. This report therefore aims to identify and describe the environmental issues, constraints, and opportunities relating to the SBM where information exists and recommend where possible, actions required to further assess or manage any environmental impacts during subsequent phases of implementation.

Whilst noting the detailed content of the initial scoping advice received from EDDC and the MMO, it has not been possible to address all concerns at this outline stage of the project. A number of issues will require further attention (specifically the detailed design of the splash wall, offshore breakwater dimensions / location); and it is anticipated these will be addressed through the production of a full Environmental Statement to be submitted in support of any consent application once funding is secured and the full scheme design is confirmed.

Further to this, and subsequent to funding being secured for the scheme, an operational plan will be developed to set out EDDCs approach to maintaining the effectiveness of the SBM scheme. This will include details around monitoring commitments. It is anticipated that following completion of the works, beach profiles will be monitored as part of the South West Regional Beach Monitoring Programme led by Plymouth Coastal Observatory. Through this, baseline monitoring surveys are carried out annually and post-storm surveys are also carried out after the winter.

The re-nourishment regimes described above will be reviewed in response to the beach monitoring regime and adapted as necessary. If beach crest levels increase significantly above the design beach profile it is likely that the EDDC will reduce levels as appropriate. This is particularly relevant at East Beach to ensure the continued erosion of the cliffs, albeit at a slower rate. The detail of how this will be achieved will be presented as part of an updated SBM scheme which will be developed as part of the detailed design process.

16 References

Ash Futures Ltd (2015). Dorset's Environmental Economy; Placing an Economic Value on the Jurassic Coast.

BMAPA and English Heritage (2005). Protocol for reporting finds of archaeological interest. Prepared by Wessex Archaeology. Available at URL: https://www.wessexarch.co.uk/sites/default/files/field_file/Protocol_document_english.pdf

British Geological Survey (2014). Lithostratigraphy of the Sherwood Sandstone Group of England, Wales and south-west Scotland. Geology and Regional Geophysics Directorate Research Report RR/14/01.

Coull, K.A., Johnstone, R., and Rogers, S.I (1998). Fisheries Sensitivity Maps in British Waters. Published and distributed by UKOOA Ltd., Aberdeen, 58 pp.

Defra (2018). 25 Year Environment Plan.
25 Year Environment Plan - GOV.UK (www.gov.uk)

Environment Agency (2011). Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities.

East Devon AONB (2021). East Devon AONB Partnership Plan - Delivery Plan 2021-2022.

East Devon District Council. (2019). Annual status report (ASR) on air quality.

Ellis, J.R., Milligan, S., Readdy, L., Taylor, N and Brown, M (2012). Spawning and nursery grounds of selected fish species in UK waters. Sci. Ser. Tech. Rep., Cefas, Lowestoft, 147: 56 pp.

Gallois, R.W. (2004). The type section of the junction of the Otter Sandstone Formation and the Mercia Mudstone Group at Pennington Point, Sidmouth. Geoscience in south-west England, vol. 11, pp. 51-58.

Hammond, P.S., Lacey, C., Gilles, A., Viquerat, S., Börjesson, P., Herr, H., Macleod, K., Ridoux, V., Santos, M.B., Scheidat, M., Teilmann, J., Vingada, J and Øien, N (2021). Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys.

Heinänen, S and Skov, H (2015). The identification of discrete and persistent areas of relatively high harbour porpoise density in the wider UK marine area, JNCC Report No. 544, JNCC, Peterborough, ISSN 0963-8091.

Historic England (2017). The Setting of Heritage Assets. Historic Environment Good Practice Advice in Planning Note 3 (Second Edition). Available at: https://content.historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/heag180-gpa3-setting-heritage-assets.pdf/

Jurassic Coast Trust (2020). Jurassic Coast Partnership Plan: 2020-2025.
https://jurassiccoast.org/what-is-the-jurassic-coast/world-heritage/looking-after-the-jurassic-coast/jurassic-coast-partnership-plan/

Ministry of Housing, Communities and Local Government (2018). National Planning Policy Framework
National Planning Policy Framework - Guidance - GOV.UK (www.gov.uk)

McLennan, D., Noble, S., Noble, M., Plunkett, E., Wright, G and Gutacker, N (2019).
The English Indices of Deprivation 2019. Ministry of Housing, Communities and Local Government.

Paxton, C,M., Scott-Hayward, L., Mackenzie, M., Rexstad, E and Thomas, L (2016). Revised Phase III Data Analysis of Joint Cetacean Protocol Data Resource JNCC Report No.517.

Popper, A.N., Hawkins, A.D., Fay, R.R, Mann D.A., Bartol S, Carlson T.J, Coombs S, Ellison, W.T., Gentry R.L, Halvorsen M.B., Lokkeborg S., Rogers P.H., Southall B.L, Zeddies D.G. and Tavolga W.N (2014). Sound Exposure Guildeines for Fishes and Sea Turtles: A Technical Report prepared by ANSI-Accredited Standards Committee S3/SC1 and registered with ANSI, ASA S3/SC1.4 TR-2014.

Reid, J.B., Evans, P.G.H and Northridge, S.P (2003). Atlas of Cetacean distribution in north-west European waters, JNCC, Peterborough, ISBN 1 86107 550 2.
Turner, Dr. S.C. (2005) Devon Historic Landscape Characterisation Phase 1 Report, January 2005. Available at: https://new.devon.gov.uk/historicenvironment/the-devon-historic-environment-record/historic-landscape-characterisation/

SCOPAC, (2003). Lyme Bay and SE Devon Sediment Transport Study. Otter Ledge to Beer Head. Report produced for the Lyme Bay and South Devon Coastal Group.

The South West Research Company (2014). South West Coast Path Monitoring and Evaluation Framework; Year 2 (2012) Key Findings Summary.
.

Appendix 1

Habitats Regulations Assessment

Royal HaskoningDHV

Appendix 2

Water Framework Directive Compliance Assessment

Royal HaskoningDHV

Appendix 3

Stakeholder Engagement Plan

Royal HaskoningDHV

Appendix 4

Engineering Reports

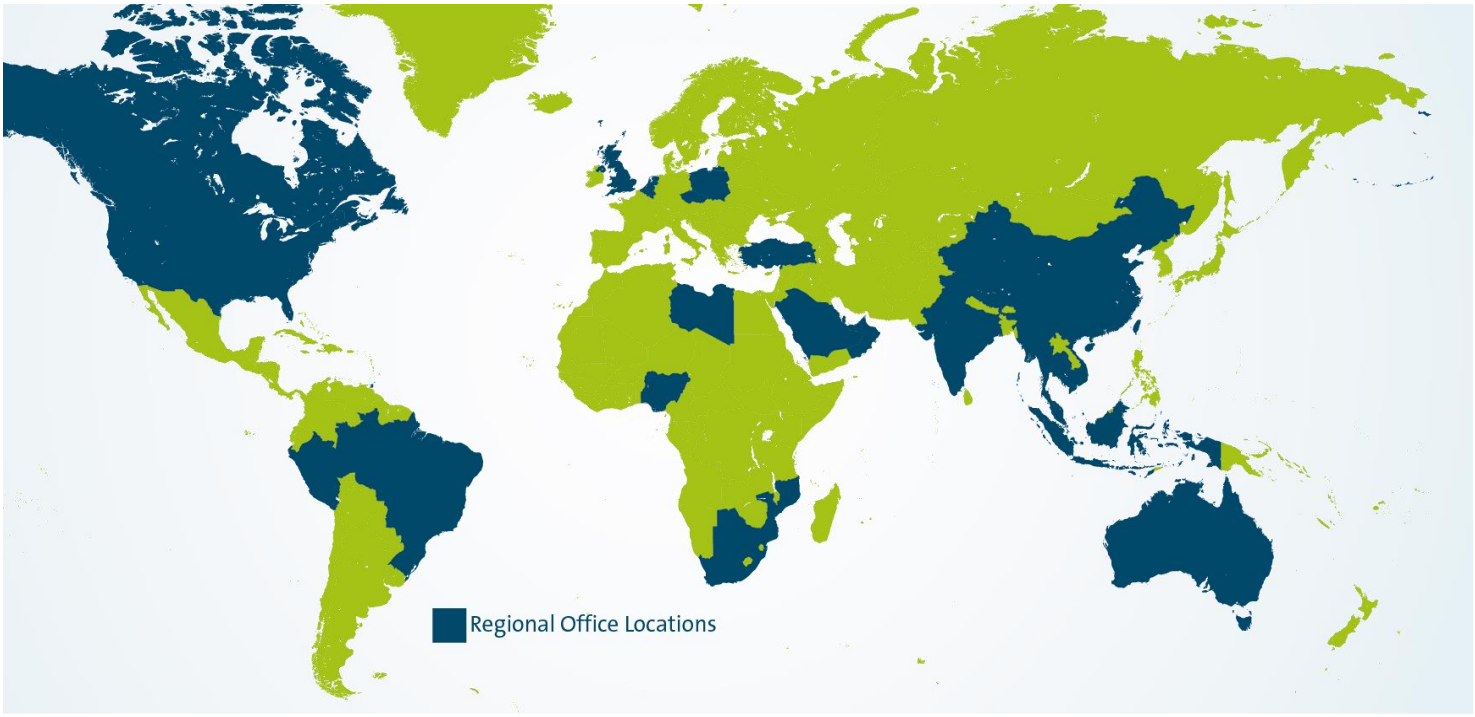
Royal HaskoningDHV

Appendix 5

Archaeology and Cultural Heritage Plates

Royal HaskoningDHV

Royal HaskoningDHV



With its headquarters in Amersfoort, The Netherlands, Royal HaskoningDHV is an independent, international project management, engineering and consultancy service provider. Ranking globally in the top 10 of independently owned, nonlisted companies and top 40 overall, the Company's 6,000 staff provide services across the world from more than 100 offices in over 35 countries.

Our connections

Innovation is a collaborative process, which is why Royal HaskoningDHV works in association with clients, project partners, universities, government agencies, NGOs and many other organisations to develop and introduce new ways of living and working to enhance society together, now and in the future.

Memberships

Royal HaskoningDHV is a member of the recognised engineering and environmental bodies in those countries where it has a permanent office base.

All Royal HaskoningDHV consultants, architects and engineers are members of their individual branch organisations in their various countries.

Integrity

Royal HaskoningDHV is the first and only engineering consultancy with ETHIC Intelligence anti-corruption certificate since 2010.

ETHIC Intelligence CERTIFICATE ANTI-CORRUPTION COMPLIANCE SYSTEM

royalhaskoningdhv.com