

# SARCC – An Interim Approach to Nature Based Solutions for the Southend-on-Sea Shoreline

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# 1 Introduction

As part of Work Package 2, Urban Partners are expected to create a new long-term strategy to mainstream nature based solutions (NBS) into their coastal flood defence management and plans. The strategies will form long-term commitments to deploy NBS as stand-alone projects or integrate into existing grey infrastructure.

## 1.1 Nature Based Solutions

Nature Based Solutions (NBS) are utilised to enhance coastal structures or replace hard defence structures to work with natural habitats and features. NBS provide a range of benefits to the environment, people and the economy.

NBS can incorporate the following:

- Green-grey infrastructure – enhancing manmade structures with ecological features. This could include incorporating (either new or retrofitted) vertipools or bio-tiles into schemes.
- Blue-green infrastructure – enhancing natural habitats or landscapes. This could include using saltmarsh or sand dunes to increase the resilience to climate impacts<sup>1</sup>.

## 1.2 Southend-on-Sea

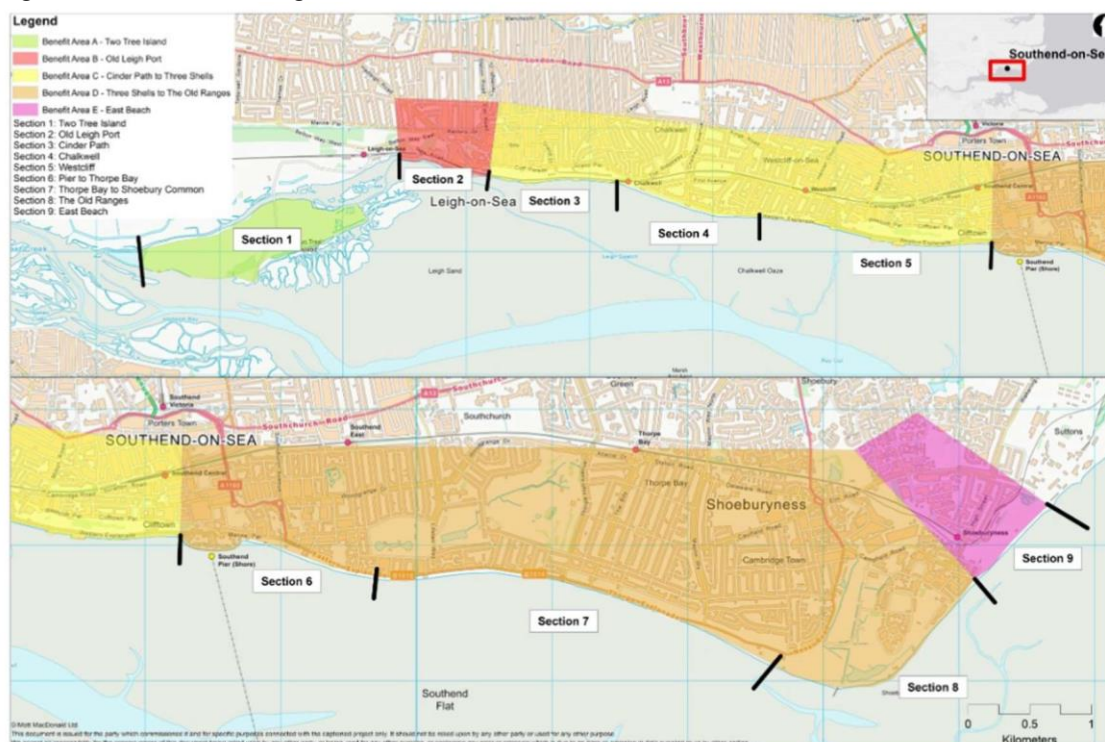
Southend-on-Sea is located in Essex on the north bank of the Outer Thames Estuary. The Southend-on-Sea coastline is approximately 12km long and extends from Two Tree Island in the west to East Beach in the east (see Figure 1.1). The coastal defences at Hadleigh Marshes located to the west of Old Leigh and running adjacent to Two Tree Island are not included within this Shoreline Strategy as these are under the management of the Environment Agency through TEAM2100. The eastern extent of the Shoreline Strategy is the submarine boom located at East Beach. To the north of this point, defences are managed by the Ministry of Defence and are covered by the Crouch and Roach Strategy.

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<sup>1</sup> [Natural Resources Wales / Nature-based solutions for coastal management](#)

Figure 1.1: Southend frontage



Source: Southend Strategy 2020

The frontage sits within Management Unit J of the Shoreline Management Plan 2 and represents the southernmost management unit of the SMP2. Southend-on-Sea also sits within Action Zone 8 (Leigh Old Town and Southend-on-Sea) at the eastern extent of the TE2100 Plan (extending east as far as Shoeburyness only).

Existing coastal defences are currently in place along the full length of frontage. The coastal defence assets include a natural dune system, beaches, seawalls, embankments, and revetments. There are also several structures which extend onto the beaches including groynes, outfalls and slipways.

The shoreline is mostly highly developed. The seafront either side of the pier is largely dedicated to amenity and tourism related businesses. A promenade (designated in places as a Public Right of Way and National Cycle Path) runs adjacent to the existing coastal defences for much of the shoreline. The pier itself is designated as a Grade II Listed Building.

The natural environment, in particular the extensive intertidal habitat in the area, benefits from national and international designations. Two Natura 2000 sites exist; Benfleet and Southend Marshes and Foulness. These sites are also designated Ramsar sites and Sites of Special Scientific Interest (SSSIs). Also, within the Southend frontage, there are some habitats and species of local conservation importance as identified by the Essex Biodiversity Action Plan. Other important ecological features include the Leigh National Nature Reserve, Local Nature reserves and Local Wildlife Sites and two Important Bird Areas.

### 1.3 Purpose of report

This report will detail the interim proposal for a long-term approach to nature-based solutions in Southend with the intention of implementing a permanent, data-driven strategy post completion of the Environment Agency's (EA) Flood and Coastal Resilience Innovation Programme (FCRIP).

## 2 Background Information

### 2.1 Southend – policies and key documents

Southend City Council have a number of documents and policies that look at projects and development along the coastline. The key documents are presented in Table 2.1.

Table 2.1: Southend-on-Sea City Council Key Policies and Drivers

Policy Title	Description	Key Objectives
Southend 2050	<p>Southend 2050<sup>2</sup> is the city’s shared ambition for the future. It was developed in 2018 following extensive conversations with those that live, work, visit, do business and study in Southend.</p> <p>Southend 2050 includes 21 outcomes, which fit into six themes, each with associated outcomes. These themes provided a framework for their response to the COVID-19 pandemic and now inform their approach to helping local economic recovery.</p> <p>The six themes are:</p> <ul style="list-style-type: none"> <li>– Pride and Joy</li> <li>– Safe and Well</li> <li>– Active and Involved</li> <li>– Opportunity and Prosperity</li> <li>– Connected and Smart</li> <li>– Future Ways of Working</li> </ul>	<p>Locals being proud of the developments within Southend and championing what the city has to offer. E.g., the coastline.</p> <p>Locals feeling safe and well in all aspects of their lives, with the city acting as a green city with energy efficient and carbon neutral buildings.</p> <p>To have a thriving, active and involved community. For instance, initiatives for locals to enhance the natural environment.</p> <p>Southend to be a successful city with regeneration schemes such as seafront developments.</p> <p>To have world class, digital infrastructure, including clean and green transport.</p>
Shoreline Management Plan	<p>The SMP provided a foundation for sustainable coastal defence policies within a particular sediment cell and established objectives for future management of the shoreline.</p>	<p>The Essex and South Suffolk SMP (2010) covers from Felixstowe Port to Two Tree Island historic landfill. There is an overlap between the Thames Estuary 2100 project (TE2100) and the 2010 SMP between Shoeburyness and Two Tree Island. This was to ensure that “issues related to coastal/estuarine erosion could be looked at”. The policy for Southend-on-Sea (Management Unit J) is to ‘hold the line’.</p>
Shoreline Strategy	<p>The Southend-on-Sea Shoreline Strategy Plan was adopted in 2020. The Southend-on-Sea Strategy (the Strategy) covered 12km of frontage from Two Tree Island in the west to East Beach in the east. The strategy looked at the risk to the frontage from coastal flooding and erosion over the next 100 years. The Strategy recommends a Hold the Line (HtL) management approach for the entire frontage.</p>	<p>The Shoreline Strategy will aim to be sustainable into the future and therefore will consider as far as 100 years ahead. However, the Shoreline Strategy will be regularly reviewed as more information about future conditions becomes available. The Strategy has two primary and three secondary objectives:<sup>3</sup></p> <ol style="list-style-type: none"> <li>1. Maximise the reduction of coastal flood and erosion risk to properties and infrastructure at significant or very significant risk of flooding in light of coastal change over the next 100 years.</li> <li>2. Contribute to a functional, healthy estuary while maintaining and improving the integrity of designated</li> </ol>

<sup>2</sup> Southend 2050. Southend-on-Sea City Council. [online] Available at: <https://www.southend.gov.uk/southend2050-7>

<sup>3</sup> Southend Shoreline Strategy Report, 2018. [online] Available at: <https://democracy.southend.gov.uk/documents/s16665/Shoreline%20Strategy%20-%20Report%20of%20Deputy%20Chief%20Executive%20Place.pdf>

Policy Title	Description	Key Objectives
		<p>habitats. Aim to offset the impact of coastal squeeze and achieve a net environmental gain in support of the delivery of the Thames River Basin Management Plan.</p> <ol style="list-style-type: none"> <li>a. Support regeneration of Southend-on-Sea and the viability and sustainable development of the tourist industry in accordance with local development policy.</li> <li>b. Align with the objectives of TE2100 and Essex SMP2 to ensure a coherent approach to coastal flood and erosion risk in the region where appropriate.</li> <li>c. Develop a realistic implementation plan that favours options that reduce the whole life costs and liabilities to the tax payer and utilise partnership funding sources, subject to the consideration of wider community benefits.</li> </ol>
Flood and Coastal Erosion Risk Management (FCERM) guidance	The National Flood and Coastal Erosion Risk Management Strategy for England was produced in response to the Flood and Water Management Act 2010 and was adopted in 2020. The strategy sets out the objectives which will ensure that the nation will be resilient to flooding and coastal change until 2100.	<p>The FCERM appraisal guidance has been updated in 2022 to form a new technical guidance<sup>4</sup>.</p> <p>They key objectives are to support with an appraisal for an FCERM strategy or project in England, and how this information can be used to create a business case to support an application for FCERM funding in line with government policy.</p>
Thames Estuary 2100 (TE2100) Plan	The Thames Estuary 2100 Plan (2012) sets out recommendations for flood risk management within London and the Thames Estuary.	<p>The overall objectives of the Thames Estuary 2100 Plan are as follows:</p> <ul style="list-style-type: none"> <li>• Manage the risk of flooding to people, property and the environment.</li> <li>• Adapt to the challenges of climate change.</li> <li>• Ensure sustainable and resilient development in the floodplain.</li> <li>• Protect the social, cultural and commercial value of the tidal Thames, tributaries and floodplain.</li> <li>• Enhance and restore ecosystems and maximise benefits of natural floods.</li> </ul>

<sup>4</sup> FCERM appraisal technical guidance. Environment Agency (2022). Available at: <https://www.gov.uk/government/publications/fcerm-appraisal-technical-guidance>

Riverside Management Strategy	The City of London's Riverside Strategy was created in response to the Thames Estuary 2100 Plan and establishes the flood resilience strategy for the area of Square Mile.	<p>The following objectives are set out by the strategy:</p> <ul style="list-style-type: none"> <li>● Raise flood defences to the recommended height, 6.35m AOD by 2100.</li> <li>● Setback development away from the river to provide space for maintenance, future raising of defence, and for the people and the environment.</li> <li>● Identify land required for flood defences and ensure it is available.</li> <li>● Ensure that the riverside serves the needs of its communities and the environment and provide integrated environmental, social and economic benefits.</li> <li>● Development should not be negatively impacted by flood defences.</li> <li>● Create intertidal habitat across the estuary.</li> <li>● Provide uninterrupted access to the riverside through the introduction of the Thames Path which will run continuously along the estuary.</li> </ul>
<b>Policy Title</b>	<b>Description</b>	<b>Key Objectives</b>
		<ul style="list-style-type: none"> <li>● The riverside will increase natural capital and support local authority growth whilst being delivered sustainability.</li> </ul>
Southend-on-Sea Local Flood Risk Management Strategy	The Southend-on-Sea Local Flood Risk Management Strategy (LFRMS) was adopted in 2015 and details the flood risk management policies for Southend-on-Sea.	<ul style="list-style-type: none"> <li>● Encourage future development to provide betterment to flood risk.</li> <li>● Pursue flood risk management measures using a risk-based approach that provide multiple social, economic, and environmental benefits to the borough.</li> <li>● Raise awareness of flood risk and available management measures to communities, residents, and businesses.</li> <li>● Continue to manage local flood risk and coastal flooding and erosion.</li> </ul>
South East Marine Plan	A marine plan is currently being prepared by the Marine Management Organisation (MMO) for the South East of England.	<p>The South East Marine Plan will:</p> <ul style="list-style-type: none"> <li>● Set out priorities and directions for future development within the plan area;</li> <li>● Inform sustainable use of marine resources; and,</li> <li>● Help marine users understand the best locations for their activities, including where new developments may be appropriate.</li> <li>● The marine plan will not establish new requirements, but will apply or clarify the intent of national policy in the South East marine area, taking into account the specific characteristics of the plan area.</li> <li>● It will act as an enabling mechanism for those seeking to undertake activities or development in the future, and providing more certainty about where activities could best take place.</li> </ul>

## 2.2 Environmental constraints

Within the Southend-on-Sea area there are various environmental constraints which need to be reviewed and included within any decision making. This section presents these potential constraints.

### 2.2.1 Water quality

Coastal water quality monitoring is undertaken by the EA for the purposes of The Bathing Water Regulations (2013) at eight locations in Southend-on-Sea. The most recent results from water quality assessments are presented in Table 2.2 below.

Table 2.2: Water quality assessments

Designated Bathing Water	Current Water Quality Classification (based on samples taken 2013 –2016)
Leigh Bell Wharf	Sufficient
Southend Chalkwell	Good
Southend Westcliff Bay	Excellent
Southend Three Shells	Good
Southend Jubilee	Good
Southend Thorpe Bay	Good
Shoeburyness	Excellent
Designated Bathing Water	Current Water Quality Classification (based on samples taken 2013 –2016)
Shoebury East	Excellent

### 2.2.2 Flora and fauna

#### 2.2.2.1 Internationally and Nationally Designated Sites

There is one internationally designated Special Area of Conservation (SAC) (Essex Estuaries SAC) and two Special Protection Areas (SPAs) which are also designated Ramsar sites (Benfleet and Southend Marshes SPA and Ramsar, and Foulness SPA and Ramsar) within the study area. The SAC and SPAs are also designated Sites of Special Scientific Interest (SSSIs). There is also one National Nature Reserve (NNR) (Leigh NNR) within the study area. The current status of the SSSI is approximately 1% of the Benfleet and Southend Marshes SSSI is in favourable condition, with approximately 91% in unfavourable (recovering) condition. The majority of the SSSI units within the study area of the Shoreline Strategy are in unfavourable (recovering) condition, except for two units on Two Tree Island, one of which is in favourable condition and one in unfavourable (no change) condition. Approximately 73% of the Foulness SSSI is in favourable condition. In addition, the Thames Estuary recommended Marine Conservation Zone (rMCZ) is located along the western end of the strategy shoreline, between Two Tree Island and Westcliff. The site has been recommended for the protection of smelt and the rare tentacled lagoon worm.

#### 2.2.2.2 Locally Designated Sites

There are three Local Nature Reserves (LNRs) and nine Local Wildlife Sites within the study area of the Shoreline Strategy (refer to the Environmental Constraints Plan in Appendix A).

#### 2.2.2.3 Biodiversity Action Plan Habitats

The following Biodiversity Action Plan (BAP) habitats occur within the Southend-on-Sea Borough, as identified in the Southend-on-Sea Local Wildlife Site Review (SBC,2011) and the Multi-Agency Geographic Information for the Countryside (MAGIC) (Defra, 2017):



- Coastal saltmarsh;
- Coastal vegetation shingle;
- Intertidal mudflats;
- Coastal and floodplain grazing marsh;
- Coastal sand dunes (in a much-modified form, the typical vegetation of their habitat survives at Shoebury, both at Shoeburyness and East Beach, within the Foulness SSSI);
- Hedgerows;
- Lowland meadows;
- Lowland dry acidic grassland;
- Good quality semi-improved grassland;
- Lowland mixed deciduous woodland;
- Ponds; and, ● Reedbeds.

### 2.3 Urban constraints

Conservation Areas are designated by Local Planning Authorities (LPAs) as areas of special architectural or historic interest, the character or appearance of which it is desirable to preserve or enhance. These areas are distinguished by their architecture, landscape, and history, creating an attractive environment that is often the product of several different eras. They usually contain listed buildings, but this is not a prerequisite of designation. There are 15 Conservation Areas in the Borough of Southend-on-Sea, as shown in Table 2.3.

Table 2.3: Southend-on-Sea Conservation Areas

Conservation Area	Year of Designation
Chapmanslord	2004
Eastern Esplanade	1989
Leigh Cliff	1981
Prittlewell	1995 (and later extended)
The Kursaal	1989
Cliff town	1968 (and later extended)
Hamlet Court Road	2021
Leigh Old town	1977
Shoebury Garrison	1981 (extended in 2004 and 2022)
The Leas	1981 (extended in 2010 and 2022)
Crowstone	1990
Leigh	1971 (and later extended)
Milton	1987
Shorefields	1981

Warrior Square

1990

Additionally, the most important archaeological sites are designated Scheduled Ancient Monuments by the government's Department of Culture, Media and Sport (DCMS), on the advice of English Heritage. These are protected under the Ancient Monuments and Archaeological Areas Act, 1979<sup>5</sup>. Ancient Monument Consent is needed from the DCMS for any works or activities, such as metal detecting, digging, and ploughing, that will affect the site.

There are six scheduled ancient monuments situated within Southend:

- Prittlewell Camp
- The “Danish Camp”
- Prittlewell Priory
- Southchurch Hall
- Cold War Defence Boom
- World War II Caisson (Mulberry Harbour)

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## 2.4 Tourism

Southend on Sea is estimated to have over 7million tourists visiting per year<sup>6</sup>. Southend has an aim to be the number one coastal destination in the country<sup>7</sup>. Over previous years the increase in tourism has been due to the development of new hotels, leisure facilities and a growing creative and cultural sector. Within the Southend-on-Sea tourism strategy this increasing trend in visitors is expected to continue.

## 2.5 UK Biodiversity Net Gain

Biodiversity Net Gain (BNG) is defined as “development that leaves biodiversity in a better state than before” and an “approach where developers work with local governments, wildlife groups, landowners and other stakeholders to support their priorities for nature conservation”. The Environment Bill received Royal Assent on 9 November 2021 and introduced mandatory BNG to the planning process for new developments and Nationally Significant projects must deliver and maintain a minimum of 10% biodiversity net gain for a period of at least 10 years. The gain can be provided in three ways: on-site habitat improvements; off-site habitat improvements; and biodiversity credits sold by the Secretary of State.

## 2.6 25 Year Environment Plan

The 25 Year Environment Plan (25YEP)<sup>8</sup> sets out a comprehensive and long-term approach to protecting and enhancing the environment in England for the next generation. The main objectives of the 25YEP focus on supporting and implementing nature recovery and outlining ambitions for environmental

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<sup>5</sup> Ancient Monuments and Archaeological Areas Act 1979. Available at:

<https://www.legislation.gov.uk/ukpga/1979/46>

<sup>6</sup> [www.southendtp.co.uk](http://www.southendtp.co.uk)

<sup>7</sup> [Destination Southend 2017 final.indd](#)

<sup>8</sup> 25 Year Environment Plan. Defra 2018. Available at: <https://www.gov.uk/government/publications/25-year-environment-plan>

sustainability and resilience. Such objectives aim to incorporate natural capital within decision-making and support net gain for the environment, at the landscape and catchment levels.

### 2.6.1 Environmental Improvement Plan 2023

Following the development of the 25 Year Environmental Plan the Environmental Improvement Plan is the first revision of the 25 Year plan. The report builds on the visions and how communities, businesses and landowners can deliver the goals for improving the environment.

## 2.7 Sustainable development goals

The 2030 Agenda for Sustainable Development (UN, 2015), adopted by all United Nations Member States, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At the centre of this agenda lie the 17 Sustainable Development Goals (SDGs). The key goals for Southend include:

- Goal 9: Industry, innovation and infrastructure;
- Goal 11: Sustainable cities and communities;
- Goal 12: Responsible consumption and production;
- Goal 13: Climate Action; □ Goal 14: Life below water; and
- Goal 17: Partnerships for the Goals.

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## 2.8 Take Home Messages from Nordic Countries

Nordic countries have been developing numerous NBS in recent years. For instance, the Nordic Co-Operation's Vision 2030 is to make the Nordic Region the most integrated and sustainable region in the World by 2030. To help reach this goal, The Nordic Council of Ministers (NCM - the official body for inter-governmental co-operation in the Nordic Region) has allocated 26 million DKK to a programme consisting of five projects on NBS. The aim is to further develop and mainstream NBS for biodiversity and climate change adaptation and mitigation. This involves working with solutions that increase and maintain land and sea-based carbon sinks<sup>9</sup>.

To summarise, the key take home messages and recommendations from the Nordic countries for successful NBS integration are as follows<sup>9</sup>:

- Clear political prioritisation is needed to mainstream NBS into policy and practice
- Appropriate institutional structures, procedures and policy instruments at all governance levels are essential to facilitate NBS implementation
- The need for better funding structures for NBS
- The need to develop common standards, long-term monitoring, and better cost-benefit evaluations of NBS
- The knowledge base in all phases of NBS projects needs to be strengthened.

## 2.9 Stepping stones to aid NBS implementation

Researchers have found that there are key elements, or 'stepping stones', that can help aid

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<sup>9</sup> Sandin et al. (2022). Working with Nature-Based Solutions. Synthesis and mapping of status in the Nordics. Nordic Council of Ministers. Denmark: Copenhagen. Available at: <https://pub.norden.org/temanord2022562/#121936>

NBS implementation within cities and urban areas<sup>10</sup>. For further details, see Table 2.4.

Table 2.4: Stepping stones for NBS implementation

Stepping Stone	Example / Description
Aligning NBS with urban strategic priorities	Emphasising those NBS with climate benefit could benefit a city's health ambitions.
Generating partnerships	Barcelona's Urban Ecology Directorate was established to bring together different departments (Environment, Planning and Mobility) for policymaking, and to create the city's climate-change plans, in which urban greening plays an important role
Creating intermediaries	The 'Unburdening Arrangement' established by the Netherlands' building-agenda policy programme which incentivises individual actions on implementing naturebased solutions towards urban sustainability by organising single contact points to coordinate implementations of sustainability solutions
Improving data and monitoring banks or insurance firms and other businesses	To prove the effectiveness of NBS – this can be led by
Advancing valuation models	The 'Green Benefit Planner' (GroeneBaten Planner), a valuation tool developed in the Netherlands, providing an
Stepping Stone	Example / Description
Establishing demonstration projects	estimate of the monetary value associated with NBS, increasing consideration of NBS in investment decisions In response to flooding, the UK Environment Agency invested in a large project in natural flood management, complementing existing expertise in grey infrastructure engineering
Providing a public mandate	Through tender and procurement policies – such as Stockholm's 'Green Space Factor' which stipulates a certain proportion of green space in new development projects
Providing economic incentives	Such as Hamburg's green roof subsidies
Building co-finance arrangements	Such as the local crowdfunding platform created in the Netherlands for financing local NBS
Developing practitioner expertise	Such as the Federal Government of Germany's Green and White Paper on urban green spaces.

Source: Xie, L., Bulkeley, H. and Tozer, L. (2022) Mainstreaming Sustainable Innovation: Unlocking the potential of nature-based solutions for climate change and biodiversity. *Environmental Science and Policy*, 132: 119–130.

<sup>10</sup> Xie, L., Bulkeley, H. and Tozer, L. (2022) Mainstreaming Sustainable Innovation: Unlocking the potential of nature-based solutions for climate change and biodiversity. *Environmental Science and Policy*, 132: 119–130.

## 3 Current Nature Based Solution Projects in Southend-on-Sea

### Nature Based Solutions

Nature Based Solutions along the coastline will allow SCC to primarily reduce coastal erosion and provide flood risk management. There are also co-benefits for including NBS in schemes which include:

- Climate resilience
- Biodiversity and ecology
- Health and Wellbeing
- Landscape and amenity
- Water quality
- Air quality
- Education
- Reduced reliance on traditional coastal defences

Typical examples of NBS on the Southend coastline could include:

- Beach nourishment
- Green seawalls
- Vertipools
- Bio-tiles
- Vegetation planting on the dunes and beaches
- Restoration of coastal habitats, such as saltmarsh

### 3.1 Sustainable and Resilient Coastal Cities (SARCC) project

The Southend SARCC project was funded by the European Regional Development Fund and is part of a collection of pilot schemes to trial nature-based solutions on urbanised coastlines. The project consists of 14 partners across Europe with our Southend-on-Sea City Council as the lead partner. The key aim of the SARCC project was to work together to trial new techniques, methods, and practices, and to share knowledge, the project aims to help mainstream naturebased solutions into coastal management and policymaking ([www.sarcc.eu/introduction](http://www.sarcc.eu/introduction)).

Southend-on-Sea was identified as an ideal location for a pilot site. The approx. 15km-long coastal frontage is key to Southend's identity as an urban seaside city. The varied coastline, consisting of beaches, mudflats, sand dunes, and hard defences, underpins recreational and economically important activities for residents and tourists alike. Owing to the ecological importance of their shoreline, Southend City Council worked in a holistic way to manage their coastal frontage, consciously manage natural resources and work with nature.

Given the numerous environmental constraints, several NB hybrid solutions to were developed to enhance and regenerate existing assets.

- Vertipools & piling habitats

- Two different models for pre-cast concrete basin-like units were attached to existing hard standing coastal defences to create artificial rockpools in the intertidal range. • Dune regeneration
- Historically, pedestrian access to the natural dunes has occurred. This has led to the trampling which has resulted in sparse vegetation cover and blown-out sections. We will revegetate the dune system using carefully selected species that can survive the dry and salty conditions. Southend City Council are working to grow their own seeds from native plants.
- Green Seawalls
  - The majority of the defences in along the Southend frontage are hard standing concrete coastal defences, in need of repairs of non-standard construction in need of repairs. The integration of various plant media within the structure allows for colonisation by intertidal vegetation, while maintaining the asset’s performance and structural integrity and reducing the requirement for patch and repair works. • Climate Resilient Garden
  - To include climate adaptive planting, and an accessible boardwalk for access to Chalkwell Beach.

To capture the benefits of the scheme and allow for sharing of knowledge and lessons learned, a monitoring scheme will be implemented following completion of the works and closure of the SARCC project.

The benefits are expected to be varied, ranging from increases in biodiversity due to the creation of new habitat, increased performance due to the addition of vegetation in retaining beach material and resisting wave loadings, as well as increased awareness of climate change and the benefits of nature-based solutions.

At the commencement of the project, it was identified that there was a difficulty in obtaining the required number of native plants for NBS on the coast. As a solution, the decision was taken to propagate a supply of suitable plants from either seed collected along the Southend shoreline or via purchased plug plants. As part of the SARCC pilot, SCC Parks Team are growing the required plants within their nursery to meet the shortfall in supply.

Figure 3.1: Plants from the Southend-on-Sea City Council Nursery



Source: SCC, 2023



### 3.2 Catchment to Coast

The FCRIP, Catchment to Coast Project will be a flagship nature-based solution project for SCC and nationally. Catchment to Coast will strengthen SCC's understanding and commitment to the integration of nature-based solutions within coastal erosion and flood risk management.

Southend-on-Sea and Thurrock are high-growth development areas with Southend recently becoming a city and Thurrock defined as a freeport. Both have experienced, scattered, multisource flooding events over the years primarily resulting from intense rainfall combined with high tides, raised river levels, overland flows from saturated catchments and sewer overload.

Major flood events occurred in summer and autumn of 2013 and 2014, January 2021 and localised flooding in October 2021 and February 2022. Flooding impacted properties internally and externally, blocking local access roads and key highway link routes. It is believed that the increasing frequency of floods, sea level rise and rates of erosion have been caused by climate change which has caused increased durations of heavy rainfall, a risk identified in UKCP18 (UK Climate Projections).

The FCRIP programme provides the Catchment to Coast project and its partners with the necessary opportunity to take a holistic, catchment approach to mitigating against flooding and coastal erosion within the project areas whilst affording the ability to utilise innovative measures and processes to gain meaningful, data driven learning, capacity and skills to implement future projects and also instigate planning policy changes.

For this purpose, the objectives of the project are:

- Long-term, dynamic catchment management of water - capture in periods of excess, treat and store for times of need, at both a community and property level.
- Use of complementary, nature-based solution across the upper, middle and lower catchment; site specific and cumulative impacts will be monitored and evaluated.
- All measures will be strategically aligned, cross administrative boundaries, be adaptive to a changing climate and provide community resilience; all measures to provide secondary benefits to both the environment and communities.
- All nature-based solutions will be innovative, or traditional NBS will be used in an innovative way or combination.
- Build strong relationships with local stakeholders and partners to reduce flood poverty across the project area.
- Use evidence gained to bring about change to national and local policies, including funding mechanisms.

### 3.3 Lessons learnt from SARCC

There have been a number of lessons on learnt from the SARCC schemes in Southend, these being:

- Vertipools - challenges during the design included limited information around optimal installation heights for environmental biodiversity and, managing H&S risks to the public, and the requirement for bespoke installation techniques due to the structure's construction type and current condition. Monitoring of the structures will be undertaken in 2023 to understand species colonisation patterns.
- Low carbon concrete, - a number of local suppliers were unable to deliver the small quantities of low carbon concrete that were required. A review of schemes in the area should be undertaken to see if the volume could be increased.

- Planting of seeds & coastal plant availability- there are limited places that can grow and supply the coastal seeds required. Plants do not grow to a timescale!

## 4 Next Steps

The construction of the SARCC project will be completed in March 2023 and the monitoring period will continue beyond the SARCC project with learning incorporated into Catchment to Coast.

During the SARCC project Southend-on-Sea City Council was responsible for growing native coastal plants within their nursery. The nursery was successful in growing plants for use on the frontage. A review of the plant growing will be undertaken with the Southend-on-Sea Parks team to understand if this is something that could be repeated for the Catchment to Coast project and the lessons learnt. A community ‘Seed gathering Sunday’ event will become a regular event to ensure a continuous supply of native coastal plants.

Catchment to Coast, which is currently in the design phase, will be trialling a number of naturebased solutions (as discussed in Section 3). The monitoring phase of this project is due for completion in 2027. The outputs for this project will include:

- Two officers from Southend City Council leading National resilience action working groups for Nature based solutions and Investigate policy challenge areas
- Integrated water management solutions
- Nature based solutions
- Enhanced flood warning systems
- Investigate policy challenge areas

### 4.1 Updates to local plans and legislations

Following the completion of Catchment to Coast and the other 24 national FCRIP projects in 2027, a review of the outcomes will be undertaken by the Department for Environment, Food and Rural Affairs (Defra). This review will focus on providing an improved evidence base for the costs and benefits of innovative resilience actions and demonstrate how different actions work together across geographical areas.



The projects will also allow Defra to review the evidence and learning identified to inform future approaches to, and investments in, flood and coastal erosion risk management. Until this review is undertaken all schemes will be required to follow the existing FCERM appraisal guidance and environmental legislations which could mean that additional funding is required to be found from Third parties to support the NBS schemes where the benefit cost ratio is less than 1 to allow Government funding to be sought.

Southend-on-Sea City Council have a coastal strategy that was completed in 2018 which defines the management of the coastline for the next 100 years. At the time of development NBS and biodiversity net gain were not a widely identified as best practice. Southend-on-Sea City Council are in the process of updating their Shoreline Management Strategy - Implementation Plan, which will incorporate elements of NBS where appropriate and deliverable during the interim period. The national update to policy and funding will then be used as the driver and guidance for all future coastal erosion and flood risk management projects within Southend.