



SARCC Strategy for Newlyn

Opportunities to make greater use of Nature-Based Solutions in managing flood and coastal erosion risk



Environment
Agency

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SARCC

European Regional Development Fund

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Introduction

PURPOSE OF THIS REPORT

This report has been produced to outline the opportunities and intent to explore nature-based solutions (NBS) around Newlyn, and the Environment Agency's commitment to promoting greater use of NBS as either stand-alone or hybrid schemes in long-term flood and coastal risk management and collaboration with other risk management authorities.

THE ENVIRONMENT AGENCY

The Environment Agency is an executive non-departmental public body, sponsored by the Department for Environment, Food & Rural Affairs (Defra). The Environment Agency works to create better places for people, wildlife and the environment, putting the climate emergency at the heart of everything the organisation does, and helping society adapt to environmental challenges such as flooding, drought, sea level rise and coastal change.

Under the Flood and Water Management Act (2010), the Environment Agency is responsible for taking a strategic overview of the management of all sources of flooding and coastal erosion. The Agency also has operational responsibility for managing the risk of flooding from main rivers, reservoirs, estuaries and the sea, as well as being a coastal erosion risk management authority (RMA). We collaborate with partners including other RMAs to ensure a coordinated approach to flood and coastal erosion risk management, seeking opportunities for partnership working to deliver multiple benefits.

As we work to move away from the narrow concept of protection from flooding and coastal change to a broader one of resilience, the Environment Agency is prioritising investments which deliver multi-functional benefits, using natural approaches wherever possible.

NATURE-BASED SOLUTIONS

The term Nature-based Solutions encompasses measures that use natural processes to manage risks from coastal flooding and erosion. NBS may be implemented in combination with more conventional coastal risk management practices or as a standalone solution, to deliver multiple benefits for communities and the environment. Wider benefits offered by NBS can include habitat creation to support biodiversity net gain, or carbon sequestration to progress toward carbon reduction targets.

Increasing use of NBS in coastal projects is showing that NBS approaches can not only manage flood risks, but also bring additional social and environmental benefits. NBS projects can also provide additional funding opportunities which would not be available using traditional hard engineered solutions.

Recently, UK government policy and strategies have put greater emphasis on the inclusion of NBS into flood risk management. The Environment Agency has developed a national Flood and Coastal Erosion Risk Management (FCERM) Strategy for England and Roadmap to 2026 which set out overarching ambitions that encourage the Agency and its Risk Management Authority partners to undertake practical actions to integrate NBS into flood and coastal erosion risk management.

Background

NEWLYN

Newlyn is a coastal town located in Mounts Bay, west Cornwall immediately to the southwest of Penzance, with a population of around 4,500 [1].

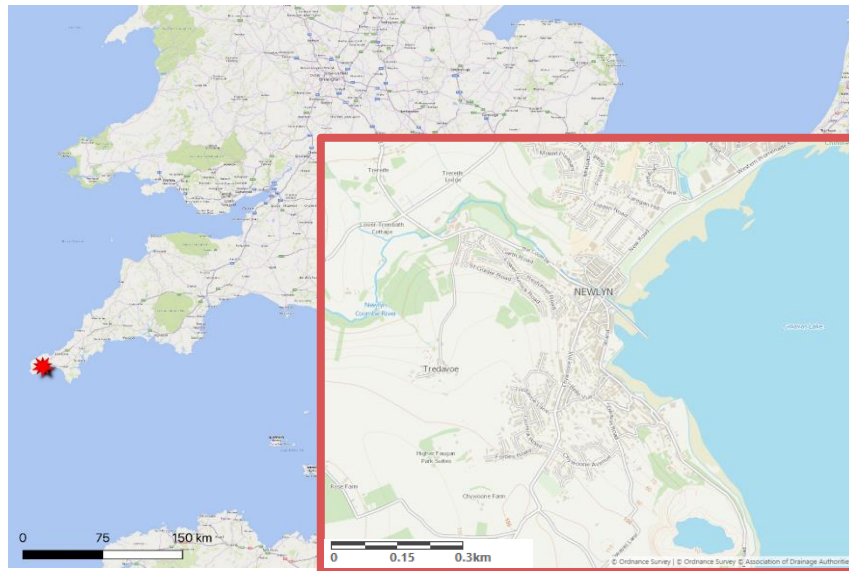


Figure 1: Newlyn Location map

Newlyn's coastline (outside of its harbour) is approximately 1.5 km long. Today, the frontage is highly modified and features harbour structures, channelised inlets, a rock armour breakwater and shoreline revetments. The remains of historic structures visible in the intertidal area along the Newlyn Green frontage provide evidence that the coastal environment has been shaped by engineering over a long period of time, although there is also evidence that in the past the shoreline featured greater areas of beach material.

The coastline is covered by two Shoreline Management Plan (SMP) policy units (PU); PU 21.2 covers Newlyn Green frontage and PU 21.3 immediately to the south covers Newlyn Harbour and the existing breakwater near the mouth of the Newlyn Coombe River. The SMP recommends a long-term policy of Managed Realignment for PU 21.2 and of Hold The Line for PU 21.3.

Newlyn's character is described as having a "strong sense of past social and economic vitality" in a town which grew up around a single industry centred around fishing. The town centre features a high density of Victorian-era terraced houses and industrial buildings many of which were built in connection with the fishing industry. The draft Penzance Neighbourhood Plan also highlights the importance of Newlyn's creative arts



Figure 2: Shoreline Management Plan policy units at Newlyn

sector, which the Plan seeks to protect and enhance. The role of tourism in the local economy is also noted.

SMP Policy Unit 21.3 – Newlyn

The historic Newlyn Harbour remains an important economic asset for the area. It is home to one of the UK's largest fishing fleets, Cornwall Inshore Fisheries and Conservation Authority's patrol vessels and the Penlee Lifeboat station. Over half of all employment in Newlyn is associated with the harbour. Piers within the harbour have been constructed on reclaimed beach material.

Newlyn Pier and Harbour Commissioners are an independent body which run Newlyn Harbour and have a programme for its refurbishment and development [2].

The draft Penzance Neighbourhood Plan (2019) describes an aspiration to develop a Maritime Engineering Zone for Mounts Bay in the area south of Newlyn Harbour at Sandy Cove. This area has benefitted from accretion as a result of the development of the harbour's South Pier and remains relatively stable.

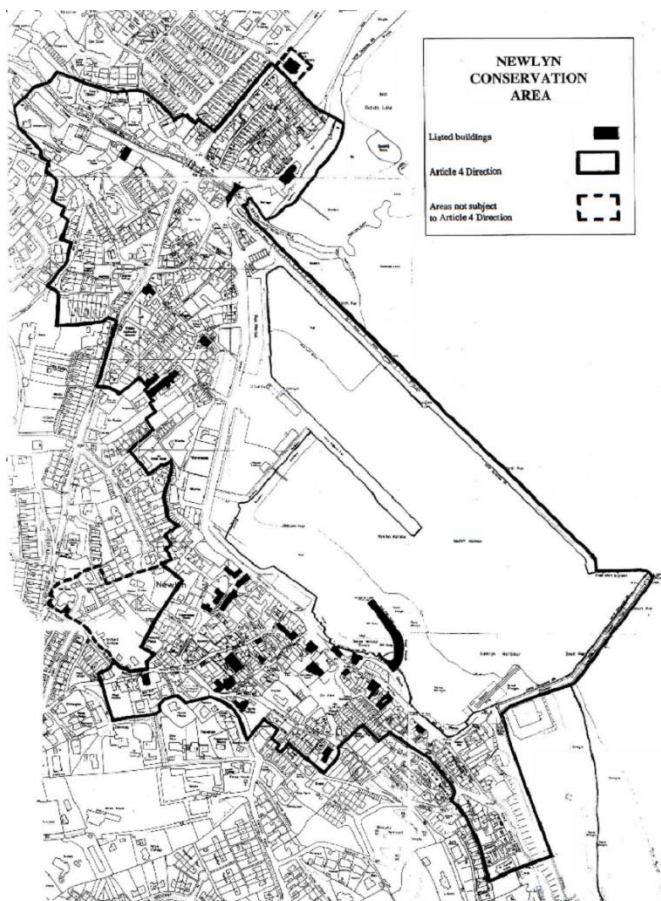


Figure 3: Extent of Newlyn Conservation Area (Giddens)

The area around the harbour is designated by the Local Planning Authority as a Conservation Area [3], which recognises Newlyn's architectural and historic character and which includes several listed buildings.

Inland, the commercial centre of the town is focused around the Newlyn Coombe River. The river cuts through the town in a constricted, heavily modified channel crossed by several bridges. Upstream of the town centre the valley becomes steep-sided and narrow. The draft Neighbourhood Plan sets out an aim to maintain and develop Newlyn's commercial area, much of which is on low-lying land developed in the last 200 years.

The mouth of the Newlyn Coombe River is immediately north of the harbour. A short, granite breakwater was constructed near the mouth of the river in the early 1990s to offer protection from waves running up the harbour's North Pier and

into the mouth of the Newlyn Coombe River. A shingle beach with rocky outcrops extends east from Tolcarne, with sandy areas exposed at low tides.

To the east of the river, the Tolcarne area comprises mainly Victorian-era residential properties and mixed commercial buildings including a car showroom, The Tolcarne Inn and Newlyn Art Gallery which is adjacent to Newlyn Green.

SMP Policy Unit 21.2 – Wherry Town

Newlyn Green and the adjoining Foster Bolitho Gardens are at the western end of SMP policy unit PU 21.2. The gardens sit between New Road, which links Newlyn by road with the frontage at neighbouring Wherrytown and Penzance, and a seawall on the crest of which is a footpath that forms part of the South West Coast Path long-distance walking trail. The gardens form an important green space for the community in an otherwise densely built town centre.

FLOOD AND COASTAL EROSION RISK

Fluvial flood risk

Newlyn's low-lying commercial centre is focussed around the Newlyn Coombe River, which presents a fluvial flood risk to the town. Through much of the town centre the river channel is narrow and constrained by built structures on both banks and is spanned by pedestrian and road bridges. Past fluvial flood events have been associated with blockages under these bridges, causing overspill onto Coombe Road and flows into the main shopping street which can also impact residential properties. A reservoir upstream at Drift controls flows through Newlyn. The river mouth is close to the town centre, and tidal locking is also a factor which increases flood risk during times of high water.

Tidal flood risk

The exposed coastal frontage of Newlyn is at risk of coastal flooding, particularly when high spring tides and low barometric pressure combine with strong gale force south westerly to south easterly winds. These raised water levels and wave propagation can result in coastal inflow to the Newlyn Coombe River and in violent surge and overtopping of the Tolcarne bridge parapet, river banks and sea defences. These conditions present flood risk to properties, and danger to pedestrians and vehicles.



Figure 4: Wave overtopping at Tolcarne bridge, 2014

Coastal flooding has occurred frequently; recent major events include the 2014 Valentine's Day floods, and October 2004 event. Film footage of the February 2014 event suggests the breakwater at the mouth of the river was overwhelmed and that stop logs at the slipway had been deployed but were only partially effective. Both events caused property damage, with overtopping waves and airborne debris colliding with infrastructure and development. In 2004, 10 residential and 2 commercial properties were flooded.



Figure 5: Erosion storm impact at Newlyn Green

Coastal erosion risk

In addition to flood risk, the risk of erosion is an increasing problem for Newlyn into the future. The SMP identifies potential landward erosion of up to 85m along the adjacent Foster-Bolitho Gardens frontage from 2105 and historically, significant erosion events have occurred along Newlyn's frontage in response to storms.

EXISTING DEFENCES

At present, ad hoc property flood resilience measures are undertaken in Newlyn, including raised steps leading into properties, sand bags in proximity in preparation for deployment, and slots in front of doorways to allow for efficient installation of flood boards. These activities performed by homeowners are only temporary and the associated costs are unknown.



Figure 6: Property Flood Resilience at Tolcarne



Figure 7: Rock armour revetment in front of wall, Tolcarne Inn

Along the Tolcarne Inn frontage is a section of rock revetment in front of a masonry wall. The wall has a crest height around 14m AOD, defending low-lying land behind.

There are privately owned, ad-hoc property walls around the mouth of the Newlyn Coombe River

Further up the river mouth adjacent to Tolcarne bridge are structures in place that allow for the installation of stop logs across an opening on the right river bank.



Figure 8: Ad-hoc defences, mouth of Newlyn Coombe River



Figure 9: Rock armour breakwater

Available information indicates the Environment Agency's only coastal defence asset in the Newlyn area is a short rock armour breakwater constructed in 1992. The breakwater projects out from the seaward side of the North Pier of Newlyn harbour and is designed to break waves running up the harbour's North Pier and into the mouth of the Newlyn Coombe.

The harbour's North Pier is around 575m long and has a crest height of 7.5mAOD. Within the harbour is a further section of revetment and a low wall with a crest height around 4.5mAOD. Behind the western edge of the harbour the land rises steeply, with ad-hoc defences. The harbour's South Pier has a crest height around 7.0mAOD

To the south of Newlyn harbour, Sandy Cove consists of a sandy shingle beach, the back of which is vegetated and has a maximum crest height around 6mAOD.

COMMUNITY ENGAGEMENT

Prior to the Interreg 2Seas SARCC project, the Environment Agency had undertaken little community engagement in Newlyn in recent years. The SARCC project provided a positive opportunity to meet with the community and discuss flood risk and NBS, as well as climate change and sea level rise.

Projected future risk and impacts

Newlyn, like many urban coastal areas around the UK is already at risk of coastal flooding, particularly when strong winds, spring high tides and storm surge occur simultaneously. The vulnerability of such urban areas will only increase in the future as sea level rises and weather becomes more extreme. Around the UK, sea level could rise by up to around 0.5 m in the next 50 years, increasing to around 1.4 m by 2120, according to the United Kingdom Climate Projections 2018.

For all West Cornwall watercourses, a 20% increase in peak flows is predicted during the next 100 years, due to climate change [4]. This is a further factor expected to contribute to increasing flood risk to Newlyn.

An assessment of existing defences indicates the ad-hoc property walls along the mouth of the Newlyn Coombe River have a residual life of around 10 – 15 years. The SMP identifies that failure to maintain defences would ultimately result in structural failure and some loss of Newlyn's harbour margins.

Policies and key documents

FLOOD AND COASTAL EROSION RISK MANAGEMENT

Recently, UK government policy and strategies have put greater emphasis on the inclusion of NBS into flood and coastal erosion risk management. Some key policies and documents relevant to coastal management at Newlyn are summarised below:

National Flood and Coastal Erosion Risk Management Strategy for England (2020)

The National Flood and Coastal Erosion Risk Management Strategy (2020) has been developed by the Environment Agency. This forms part of the organisation's responsibility for strategic overview of flood and coastal erosion risk in England, under the Flood and Water Management Act (2010). The National FCERM Strategy sets out a long-term vision for achieving "a nation ready for, and resilient to flooding and coastal change". It provides a consistent strategic approach to be taken by all RMAs and focuses on a move away from the narrow concept of protection to a broader one of resilience.

The FCERM Strategy works towards mainstreaming NBS in coastal flood risk management where possible. Specific measures to be taken include [5]:

- Measure 1.4.2: From 2021, risk management authorities will work with catchment partnerships, coastal groups, land managers and communities to **mainstream the use of nature-based solutions**
- Measure 1.4.5: From 2021 risk management authorities will work with Natural England and other partners as they develop Local Nature Recovery Strategies that **enable new and restored habitats to contribute to flood and coastal resilience**.
- Measure 2.2.1: From 2021 risk management authorities will plan all flood and coastal defence projects and programmes to **deliver biodiversity gain**, in line with the government's mandate, and seek to encourage other environmental benefits.
- Measure 2.2.2: From 2021 risk management authorities will work with developers and planners to maximise the opportunities for flood and coastal resilience as part of **contributing to environmental net gain** for development proposals.
- Measure 3.5.3: By 2030 the Environment Agency will work with its supply chain to develop world leading ways of **reducing the carbon and environmental impact** from the construction and operation of flood and coastal defences.

Flood and Coastal Erosion Risk Management Strategy Roadmap to 2026 (2022)

The Flood and Coastal Erosion Risk Management Strategy Roadmap to 2026 (2022) summarises the practical actions to be taken by RMAs to achieve the ambitions of the National FCERM Strategy. A specific objective in the roadmap states [6]:

- Between now and 2030 **risk management authorities will use nature-based solutions** and improve the environment through their investments in flood and coastal resilience.

To achieve this measure, the following relevant NBS statements have been issued as part of the roadmap:

- The Environment Agency and Natural England will jointly develop new approaches for the conservation of protected sites, species and natural landscapes that **enable adaptation to sea level rise and a changing climate**
- Risk management authorities will double the number of natural flood management projects delivered as part of the Flood and Coastal Erosion Risk Management Investment Programme. These

projects will **deliver multi-beneficial outcomes** including improving biodiversity, contributing to cleaner and healthier rivers as well as providing carbon sequestration.

- Risk management authorities will work with partners on Local Nature Recovery Strategies to identify where actions for nature could benefit flood and coastal risk management. Risk management authorities will also identify where they can **contribute to nature recovery** through their investments, plans and strategies. This includes ensuring that Local Flood Risk Management Strategies, Flood Risk Management Plans and Shoreline Management Plans (SMPs) complement the actions in Local Nature Recovery Strategies.

South West Flood Risk Management Plan (2021 - 2027)

The South West Flood Risk Management Plan (2021 - 2027) is a statutory document prepared under the Flood Risk Regulations (2009). This plan delivers the National FCERM Strategy ambitions and includes measures that incorporate mainstreaming NBS into coastal flood management. Specific measures include [7]:

- By 2027, the Environment Agency will work in partnership to develop projects to **support an Adaptive Approach** based on recommendations in the Mounts Bay Strategy in Mounts Bay to reduce coastal erosion and flood risk in the Mounts Bay, South West Flood Risk Area.
- By 2027, the Environment Agency will work in partnership to demonstrate the wider benefits of **including low carbon, ecological enhancements within engineered structures** in Mounts Bay to support its inclusion in future projects to reduce coastal flood and erosion risk in the Mounts Bay, South West Flood Risk Area.
- By 2027, the Environment Agency will work in partnership to trial innovative coastal protection in Newlyn to test **low carbon solutions** for future coastal management and **enhance intertidal habitat** in the Mounts Bay, South West Flood Risk Area.

These measures are direct outcomes from the SARCC Interreg 2 Seas project and outline the Environment Agency's local ambition to include NBS in hard-engineered coastal management solutions in the wider Mounts Bay area.

Cornwall and Isles of Scilly Shoreline Management Plan (SMP2)

Shoreline Management Plans (SMPs) provide large-scale assessments of the risks associated with coastal change and recommend long-term management approaches to help sustainably manage coastlines to reduce risk to people and places.

The Environment Agency, alongside the Coastal Protection Authority, is a custodian of the Cornwall and Isles of Scilly SMP. The SMP is the primary driver for coastal management in Cornwall, in line with the national approach in England. This SMP adopted several key guiding principles to support nature conservation, adaptation and resilience including as follows [8]:

- To support existing nature conservation values and **minimise impacts upon habitats**, while allowing **adaptive response to natural change**
- To manage the risks to communities from flooding and support their **adaptation and development of resilience**
- To manage the risks to communities from erosion and **support their adaptation**
- To establish a long-term action plan which helps to minimise and **reduce the reliance on defences** in the future.

Newlyn's frontage sits within two SMP policy units (PU). The preferred management approach in PU21.3 is to Hold The Line through to 2105, acknowledging the significance of the harbour to Newlyn and the wider regional economy. PU21.2 has a preferred management approach of

Managed Realignment from 2055 but notes that solutions for managed realignment should be considered and progressed as soon as possible.

Cornwall Local Flood Risk Management Strategy 2020-2026

The Local Flood Risk Management Strategy is used to guide and help join up the policies and actions from different organisations and to link national plans and legislation with local plans and initiatives. Developed by Cornwall Council as the Lead Local Flood Authority in Cornwall, this strategy acknowledges the need to work with nature to become more resilient to the impacts of flooding which will result from climate change [9].

Penzance Neighbourhood Plan

The draft Penzance Neighbourhood Plan (2022) sets out a community-led vision and set of objectives for Penzance Civil Parish area including Newlyn, to encourage social and economic resilience to 2030. It sets out aspirations for regeneration of the area, noting the significance of further developing Newlyn's commercial centre around the Newlyn Coombe River, upgrading the South West Coast Path route and road transport route through the town centre. It also describes an aim to further invest in Newlyn Harbour and the fishing industry an aspiration to develop a Maritime Engineering Zone for Mounts Bay at Sandy Cove [1].

Cornwall Maritime Strategy

Cornwall Council have adopted an updated Maritime Strategy for Cornwall, to guide development of policy and Cornwall Council programmes covering the period 2019 to 2023. It sets out a vision for Maritime Cornwall to promote sustainable management of the maritime environment, diverse economic opportunities linked to the marine environment, resilient communities and a highly valued maritime heritage [10].

South West Inshore and South West Offshore Marine Plan (2021)

The South West Marine Plan has been developed by the Marine Management Organisation to provide a framework to guide decision-making around the marine environment of the South West, with an aim to ensure effective and sustainable use of available space and resources. The Plan includes the objectives [11]:

- The marine environment and its resources are used to **maximise sustainable activity**, prosperity and opportunities for all, now and in the future.
- People appreciate the **diversity of the marine environment**, its seascapes, its natural and cultural heritage and its resources and can act responsibly.
- The use of the marine environment is benefiting society as a whole, contributing to **resilient and cohesive communities that can adapt to coastal erosion and flood risk**, as well as contributing to physical and mental wellbeing.
- The marine environment plays an important role in **mitigating climate change**.
- **Biodiversity is protected**, conserved and, where appropriate, recovered, and loss has been halted.
- Healthy marine and coastal habitats occur across their natural range and are able to support strong, biodiverse biological communities and the functioning of **healthy, resilient and adaptable marine ecosystems**.

Cornwall Environmental Growth Strategy

Produced by the Cornwall and Isles of Scilly Local Nature Partnership consisting of individuals from a variety of private and public sector bodies, the Environmental Growth Strategy provides a long-term framework for the conservation, enhancement and growth of nature. The strategy outlines key ambitions including the following [12]:

- Encourage **landscape-scale restoration** and reintroduction of species
- Embed **environmental growth and biodiversity net gain** in the planning system
- Increase the percentage of our inshore waters that are actively managed to **deliver environmental growth**
- Support the use of new land management approaches to develop **climate solutions that work with natural processes**

Further to these national, regional and local documents, the overarching principles behind FCERM work carried out by the Environment Agency have shifted from a focus on defending our coastlines toward a more sustainable approach of building resilience and capacity for adaptation. The Environment Agency is prioritising investments which deliver multi-functional benefits, using natural flood management approaches wherever possible. Our purpose, priorities, culture and values are described in the following document:

Environment Agency: EA2025 creating a better place (2020)

EA2025 is the Environment Agency's action plan to achieve 3 long-term goals:

- A nation resilient to climate change
- Healthy air, land and water
- Green growth and a sustainable future

It sets out aims to be met by 2025 to achieve these goals, including the following [13]:

- By 2025 we will have created more **climate resilient places** and infrastructure, by ensuring the nation is prepared for flooding, coastal change and drought
- By 2025 we will be a stronger leader on climate adaptation and resilience, encouraging others to act now on the climate emergency and **invest in adaptation**
- By 2025 rivers, lakes, groundwater and coasts will have **better water quality** and will be better places for people and wildlife
- By 2025 **nature and land will be better protected and enhanced**
- By 2025 we will achieve **cleaner, greener growth** by supporting businesses and communities to make good choices, through our roles as a regulator, adviser and operator
- By 2025 we will be on track to deliver our sustainable business commitments, including **to be net zero by 2030**

Flood and Coastal Erosion Risk Management at Newlyn

WORK TO DATE

Mounts Bay Strategic Assessment of Adaptive Frontages (2015)

A strategic assessment of the Newlyn frontage produced a long list of management options and informed more detailed appraisal, leading to a preferred approach being identified for Newlyn.

Fluvial and Tidal Options Appraisal reports (2019)

An appraisal of options for both fluvial and tidal flood risk management, with modelling of a short list of options to address risk focussed around the mouth of the Newlyn Coombe River. All shortlisted options include maintaining existing defences and either extending the existing breakwater or constructing an additional breakwater. A preferred option has been identified, to raise and extend the existing breakwater to increase wave attenuation and the standard of protection to the Tolcarne Bridge area.

Sustainable And Resilient Coastal Cities pilot

As an Urban Partner in the Interreg 2Seas Sustainable And Resilient Coastal Cities (SARCC) project, the Environment Agency implemented an NBS pilot at Newlyn and engaged with the community and coastal decision-makers. SARCC aims to mainstream NBS at urban coastal locations. Through participation in this project the Environment Agency has built capacity to deliver NBS and benefitted from cross-border learning from best practice across the 2Seas region. The NBS pilot uses innovative, low carbon eco-blocks designed to function as coastal armour whilst providing new intertidal habitat and a potential carbon sink. 88 eco-blocks have been deployed in an apron around the existing rock armour breakwater and are being monitored for structural and ecological performance.

Through engagement with the local community the value and additional benefits to coastal communities which can be achieved through NBS have been highlighted and support for these approaches has been promoted. In particular, the Newlyn SARCC pilot demonstrates an approach which may be taken elsewhere to hybridise existing grey infrastructure and deliver wider benefits such as habitat creation and carbon sequestration. The outcomes of ongoing monitoring of the eco-block pilot will provide evidence which could support use of this technology elsewhere in Mounts Bay.

Mounts Bay Coastal Resilience Strategy

A Coastal Resilience Strategy for Mounts Bay including Newlyn is being led by Cornwall Council, in collaboration with partners including the Environment Agency. This work aims to bring together all previous studies and relevant work, identify where further work is needed to ensure a consistent level of understanding of risk and a joined-up approach to management throughout Mounts Bay. This will support the alignment of community engagement and implementation of FCERM activities. Objectives of the strategy include:

- To maintain and support the social and economic viability and core values of the coastal settlements within Mount's Bay by preventing or minimising economic losses through reducing coastal erosion and coastal flooding to residential, commercial and industrial property to a level of no residual risk, or **supporting adaptation and resilience** where protection is not possible or where this allows more sustainable forms of defence.

- To **work with natural processes** wherever possible in order to minimise the extent and scale of coastal flood and erosion management measures.
- To prevent or minimise coastal management interventions that have an adverse impact on the geomorphological processes and geological interest, while supporting interventions that work with these issues, particularly with respect to the supply, distribution or **retention of coastal sediment**.
- To **protect and enhance the biodiversity** within Mount's Bay and where possible support existing habitats and species to adapt or respond to climate change.

POTENTIAL FOR FUTURE NBS

The term Nature-based Solutions encompasses measures that use natural processes to manage risks from coastal flooding and erosion. NBS may be implemented in combination with more conventional coastal risk management practices or as a standalone solution, to deliver multiple benefits for communities and the environment. Wider benefits offered by NBS can include habitat creation to support biodiversity net gain, or carbon sequestration to progress toward carbon reduction targets.

Increasing use of NBS in coastal projects is showing that NBS approaches can not only manage flood risks, but also bring additional social and environmental benefits. NBS projects can also provide additional funding opportunities which would not arise using traditional hard engineered solutions.

Constraints

Spatial

The frontage at Newlyn features predominantly hard engineered defences, many of which have been in place for a century or more. This fixed line of defence leaves a narrow zone within which land-based shoreline management can be carried out. The proximity and significance of the harbour limits options for FCERM along much of the frontage, particularly NBS which often occupy a larger footprint than hard defences such as seawalls. However new eco-engineering technologies could be used to hybridise existing grey structures and deliver benefits including habitat creation.



Figure 10: Vertipools, living seawall, eco-blocks and ecoformliners to provide habitat where hard defences are still needed

Newlyn Green's frontage presents an opportunity for managed realignment as recommended by the SMP. The green space immediately behind the current seawall extends inland around 40m. Managed realignment could involve a set-back line of defence to manage erosion while maintaining the adjacent road link to Penzance. The existing green space is seen as a key asset to the community, so public engagement around any planned future realignment and resulting potential habitat creation and re-establishment of a natural beach transition in this area will be crucial.

Design confidence and funding

NBS are often not considered by policy-makers in detail due to the perceived risks around costs, potential for success, requirements for immediate protection and uncertainties regarding future change. A knowledge gap exists across coastal local authorities to deploy NBS to reduce future coastal flood risk and economic damage.

Opportunities

Carbon reduction

Reducing the carbon footprint of flood and coastal risk management is a key goal for the Environment Agency and partners, including Cornwall Council who declared a Climate Emergency in 2019. Embodied carbon commonly used FCERM materials such as steel and traditional concrete mixes have been identified as significant contributors to the Environment Agency's organisational carbon footprint. NBS present opportunities for reducing embodied carbon by using natural materials and processes, and for carbon sequestration through habitat creation, encouraging growth of organic matter.

Biodiversity Net Gain

Biodiversity Net Gain (BNG) will soon be mandated for most new developments requiring planning permission in England. There will be a requirement to deliver and maintain at least a 10% net gain in biodiversity relative to the existing site conditions.

Social and economic benefits

NBS have the potential to deliver wider benefits beyond their FCERM function. Benefits may include improved air and water quality, provision of food, amenity value, increased biodiversity and carbon sequestration. Compared to hard grey infrastructure, NBS can therefore provide a wide range of positive impacts for people and the environment, with the potential to bring greater wellbeing, social and economic benefits.

Ongoing and future work

Mounts Bay Coastal Resilience Strategy

Work on the Mounts Bay Coastal Resilience Strategy is ongoing. Concepts being explored include sandscaping further east in Mounts Bay. Investigation of this option has identified potential impacts which need to be assessed before a recommendation for a sustainable strategic approach is made.



Figure 11: SARCC eco-block NBS pilot

SARCC pilot monitoring

Monitoring of the SARCC pilot will continue, with a 5-year programme of ecological surveys to assess colonisation potential of the eco-blocks, and an ongoing programme of asset inspections to monitor their structural durability. The Environment Agency will share results from this monitoring to promote increased understanding of eco-block technology and further opportunities for their use. It is

anticipated this pilot will demonstrate the wider benefits of nature inclusive engineering as a coastal management approach to support its inclusion in future projects to reduce coastal flood and erosion risk in Mounts Bay.



Figure 12: Preferred option for future breakwater extension

Proposed extension of Newlyn breakwater

Extension of the rock breakwater has been identified as the preferred option for managing coastal flood risk around the Newlyn Coombe River. If funding can be secured to proceed with this work, it is hoped to make further use of eco-blocks within the design.

Community engagement

Community engagement carried out for SARCC including activities with local schools has identified support for the multiple benefits offered by NBS, particularly habitat creation and carbon reduction. It is hoped to continue to promote awareness and understanding of flood and coastal risk management and NBS in Newlyn, to further build community resilience.



Figure 13: Community engagement

Newlyn Harbour Development Plan

The independent Board of Commissioners that runs Newlyn Harbour have developed a plan to regenerate and upgrade the harbour facilities over the next 10-15 years. The plan details aspirations to provide additional quayside and a boatlift, renovate the North Pier and further develop Sandy Cove [2]. Newlyn Pier and Harbour Commissioners have been an Observer Partner in the SARCC project, and further engagement around results of the eco-block pilot could promote consideration of hybrid NBS being incorporated in plans for the harbour structures.

Penzance Promenade Wave Modelling and Optioneering

This 2D hydrodynamic modelling will assess the impact of various conceptual measures which might be adopted as part of an overall adaptive approach to managing flood risk at Penzance, which could influence future approaches taken at neighbouring Newlyn. These measures include nearshore submerged reefs, spur breakwaters, and beach recharge. It will examine whether, at a conceptual level, these adaptation measures can sufficiently attenuate wave energy reaching the promenade and thus reduce overtopping and minimise the flood risk to the wider area. This will also incorporate allowances for climate change over the next 100 years.

References

- [1] Penzance Council, "A Neighbourhood Plan for Penzance Parish 2020-2030," 2022.
- [2] Newlyn Pier & Harbour Commissioners, 2023. [Online]. Available: <https://www.newlynharbour.com/>.
- [3] K. Giddens, "Newlyn Conservation Area Statement," Penwith District Council, Penzance.
- [4] Environment Agency, "West Cornwall Catchment Flood Management Plan," 2012.
- [5] Environment Agency, "National Flood and Coastal Risk Management Strategy for England," 2020.
- [6] Environment Agency, "Flood and Coastal Erosion Risk Management Strategy Roadmap to 2026," 2022.
- [7] Environment Agency, "South West river basin district flood risk management plan," 2022.
- [8] Royal Haskoning, "Cornwall and Isles of Scilly Shoreline Management Plan (SMP2)," 2011.
- [9] Cornwall Council, "Local Flood Risk Management Strategy," 2020.
- [10] Cornwall Council, "The Cornwall Maritime Strategy," 2019.
- [11] HM Government, "South West Inshore and South West Offshore Marine Plan," 2021.
- [12] Cornwall Council, "Cornwall Environmental Growth Strategy," 2022.
- [13] Environment Agency, "Environment Agency: EA2025 creating a better place," 2020.