ice
Institution of Civil Engineers
South West

SOUTH WEST
INFRASTRUCTURE
PARTNERSHIP

Best practice in action

South West case studies

TAYLOR WOODROW

copper

Introduction

This document is a companion to the SWIP Action Plan 2030, supporting its ambition to turn long-term vision into practical action.

A key priority is developing the South West's knowledge and skills base through shared learning and collaboration.

As part of this, SWIP will be creating a series of playbooks initially focused on:

- Regional connectivity and transport planning
- Energy infrastructure delivery
- Leveraging natural assets and nature based solutions (NbS)

The case studies presented here provide a starting point for real-world inspiration.

Drawing on projects from across the region, they highlight the challenges and opportunities of each project, helping to translate theory into action.

This is an initial collection, which SWIP will expand over time to support shared learning across the community.

Connecting the Culm

Leveraging natural assets and nature based solutions

Connecting the Culm is a catchment partnership project in Devon, working to improve resilience to flooding and drought, while enhancing water quality, biodiversity, and wider river catchment health. The project is led by the Blackdown Hills National Landscape team, with core partners including the Environment Agency, National Trust, Devon County Council and Mid Devon District Council. These partners support delivery of nature based solutions like floodplain restoration, tree planting and attenuation ponds.

Wider stakeholders affected by flood risk, including Network Rail, are involved where their infrastructure is impacted by flooding. Their role is to share risk information and support catchment wide approaches that improve resilience and reduce downstream disruption.

Local farmers, landowners and communities are also key stakeholders, enabling delivery of nature based solutions on the ground.

Killerton floodplain (National Trust)

Challenges

The River Culm catchment increasingly experiences flooding and drought, driven by rainfall and water movement across the whole catchment, meaning problems in upstream areas affect places downstream like Hele crossing on the western mainline railway.

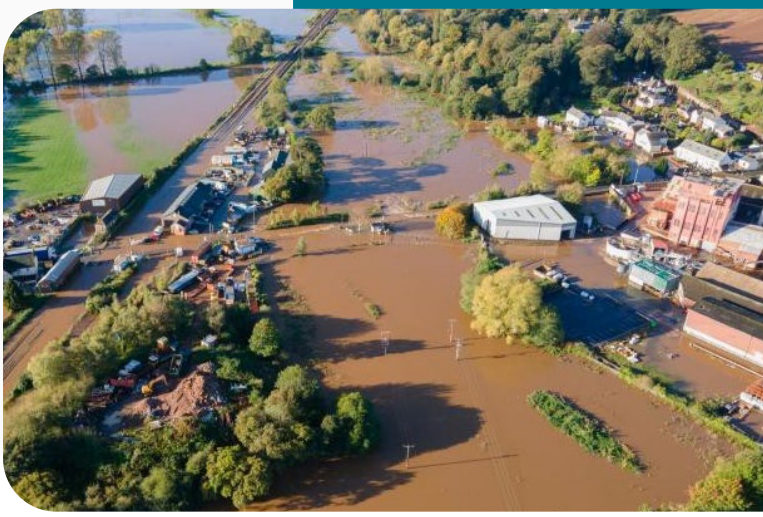
Flooding causes widespread disruption. It damages and interrupts key transport links, including significant delays on the rail network. It also affects local roads and access routes, making it harder for people, services and businesses to move around and do business.

For example, Network Rail experienced around 10,000 minutes of train delays between 2019 and 2024 due to flooding affecting the railway at Hele crossing. This shows how catchment-wide rainfall and runoff can directly disrupt critical national infrastructure.

More extreme weather events driven by climate change also impact farming, with waterlogged land or drought affected grasslands and crops reducing productivity.

At the same time, the river system faces environmental pressures such as poor water quality, sediment and loss of habitats, which reduce biodiversity and make the catchment less resilient to extreme weather.

Overall, these challenges show that flooding, infrastructure disruption, communities, agriculture, and environmental decline are all connected across the catchment, requiring joined up action to improve resilience, in order to help people and place better adapt to climate change.



Hele crossing: Warren Radmore, aerial dimensions

Opportunities

The Culm catchment has several clear opportunities for improvement because of its physical and social context.

- Applying a climate adaptation pathway approach, 'tipping points' have been established in the system (including Hele crossing) that are at risk from flooding. A catchment wide 'thinking outside the box' approach is essential to build resilience at these tipping points. Upstream actions like slowing water can reduce flooding downstream at places like Hele crossing.
- There is already strong community engagement, with volunteers and landowners involved in river and habitat restoration.
- The Culm Garden Village development offers a chance to build in sustainable drainage and green infrastructure from the start.
- The National Trust is restoring floodplain land, helping to store water during heavy rainfall, improve water quality and boost biodiversity.
- Across the catchment, partners are using nature based solutions at scale, like wetlands and tree planting, to slow water, improve water quality, and restore habitats.
- Overall, the catchment is well placed for a joined up approach that reduces flooding, improves nature, and strengthens resilience across communities, farmland and infrastructure.

A432 Badminton Road Bridge

M4 project case study

The A432 Badminton Road Bridge project, delivered by Taylor Woodrow as principal contractor on behalf of National Highways, represents a critical infrastructure intervention on the M4 near Bristol. The scheme has delivered an urgent replacement of an overbridge to reinstate a strategically important route. The project aligns closely with the ambitions set out in the SWIP Action Plan 2030, particularly in enhancing regional resilience, strengthening connectivity and fostering collaborative working.

The A432 route serves as a vital local connection across the M4, linking communities, supporting commuter movements and enabling economic activity in the wider Bristol area. While the bridge was closed to motor vehicles, the route was maintained for as long as possible for walkers, wheelers, and cyclists, recognising the importance of localised connectivity. Upon completion, the new bridge and connections will reinstate this important route, linking up communities on either side of the motorway corridor.

The project has demonstrated an award winning collaborative ethos, bringing together National Highways, Taylor Woodrow, supply chain partners of both organisations and local stakeholders, supported by ongoing engagement with South Gloucestershire Council and local communities.

Challenges

Resilience has been a core objective of the project. The original bridge, constructed in 1966, was a concrete post-tensioned structure designed at a time when long-term maintenance considerations were less prominent, with serviceability managed primarily through routine inspections.

In July 2023, a detailed structural inspection identified accelerated deterioration and cracking. As a result, a decision was taken to close the bridge to vehicular traffic, whilst maintaining access for walkers, wheelers and cyclists.

The project presented several complex challenges, not least being a series of full weekend closures of the M4 to enable trenching of critical services, demolition of the existing bridge and installation of new beams weighing approximately 360 tonnes. With the M4 regularly used by 3,000–4,000 vehicles every hour during peak weekend periods, some disruption was unavoidable. However, the overall impact was mitigated using comprehensive communication strategies, effective traffic management with diversion routes and precise hour-by-hour programmes to minimise impacts and safely reopen the motorway on time. South Gloucestershire Council reported the disruption as “less than expected”.

Overall, the challenge combines ageing infrastructure, the need to maintain connectivity and the complexity of delivering major works on a heavily used strategic road network.

Opportunities

The replacement bridge presents several opportunities to improve resilience and connectivity:

- The introduction of a new bridge with a design life of 120 years represents a significant enhancement in structural durability and resilience, future-proofing the crossing against increasing traffic demands and evolving climate challenges.
- The construction approach incorporates robust materials, improved drainage systems and design features that maximise longevity while minimising future maintenance requirements.
- Upon completion, the scheme will reinstate a vital connection across the M4, strengthening links between communities and supporting economic activity in the wider Bristol area.
- A strong collaborative approach, supported by the National Highways Scheme Delivery Framework, has enabled innovation together with cost and programme certainty, helping deliver the scheme in less than three years instead of the typical five to six years.
- Engagement initiatives, such as designated viewing areas and National Highways’ ‘Chatty Van’ with live CCTV feed, created opportunities for local communities to observe and engage with the project, ensuring concerns were proactively managed and benefits maximised.

Overall, the project demonstrates how a coordinated, collaborative approach can address infrastructure challenges while enhancing long-term resilience, improving connectivity and strengthening community engagement.

MOTT MACDONALD

Environment Agency

ICE South West Award Winner

Avonmouth Severnside Enterprise Area (ASEA) Ecology Mitigation and Flood Defence Project

Leveraging natural assets and nature-based solutions

More than 80 hectares of new wetland habitat (around 112 football pitches) have been created in the Avonmouth Severnside area as part of a coastal resilience project.

The project responds to two linked challenges: the loss of natural wetlands due to ongoing industrial and commercial development and increasing tidal flood risk driven by rising sea levels and climate change. These pressures are especially significant in the Severn Estuary, which supports internationally important bird populations.

To address this, the scheme has created new wetlands that compensate for lost habitat on previously agricultural land. While not tidally connected to the estuary, this land was already used by bird species associated with the Severn Estuary and was therefore considered supporting habitat. The newly created wetlands provide enhanced and managed habitat, including high-tide roosts for protected bird species, helping to maintain the ecological value of the wider estuary.

Alongside the environmental benefits, the project also strengthens flood defences. It is designed to protect more than 2,500 homes and businesses from flooding for at least the next 60 years. The scheme has also delivered improved access through new and upgraded footpaths, providing additional benefits for local communities and users of the area.

Challenges

The scheme operates within a highly dynamic and sensitive environment, where multiple pressures must be managed simultaneously. Ongoing industrial and commercial development within the Avonmouth Severnside Enterprise Area continues to reduce available habitat, creating a sustained requirement for large-scale ecological compensation.

At the same time, climate change presents a long-term challenge. Rising sea levels are increasing tidal flood risk and without intervention, areas would be at risk during extreme events.

The project must also respond to the extreme physical conditions of the Severn Estuary, which has one of the largest tidal ranges in the world and highly mobile sediment systems. These factors make both flood defence and habitat establishment more difficult to maintain over time.

In addition, strict environmental protections require that any development delivers equivalent or enhanced habitat for important bird populations, which rely on the estuary as a critical overwintering and migration site. This creates an ongoing need to balance economic growth with ecological integrity.

Outcomes

- Over 80 hectares of new wetland habitat have been created to provide ecological mitigation and support internationally important wildlife.
- Flood risk has been reduced for more than 2,500 homes and businesses, with defences designed to account for rising sea levels for at least 60 years.
- Around 12,000 new jobs will be unlocked, contributing an estimated £3.9 billion in economic benefits to the local area.
- 17 km of flood defences have been delivered using a mix of embankments, pre-cast units, sheet piles, glass panels, and flood gates.
- Improved footpaths enhance access and connectivity across the area, providing additional community benefit.
- The project achieved major carbon and cost savings, including a reduction of 5,000 m^3 of imported fill and 100,000 kg of CO_2, supported by innovative ground engineering trials.

ICE South West
Award Winner

South West Resilience Programme

Network Rail's South West Rail Resilience Programme (SWRRP) was developed after a 2014 storm severely damaged the railway and sea walls on a key route into Devon and Cornwall, cutting off connectivity and impacting the regional economy.

The programme aimed to deliver a long-term solution to protect the railway from coastal erosion, sea level rise and extreme weather, ensuring resilience for the next 100 years.

So far, four coordinated interventions as part of the five-phase SWRRP, have been delivered :

- **Phase 1**: higher and strengthened sea wall to the south of Dawlish Station, constructed by BAM.
- **Phase 2**: new sea wall adjacent and to the north of Dawlish Station, constructed by BAM.
- **Phase 3:** installation of the Parson's Tunnel rockfall shelter to protect the railways from falling debris, constructed by Morgan Sindall.
- **Phase 4:** cliff stabilisation works between Dawlish and Holcombe using soil nailing and netting, constructed by BAM.
- The fifth and final phase of SWRRP means addressing the risk from the cliffs between Parson's Tunnel and Teignmouth. Work is continuing on this phase with some ground investigations.

Together, these elements form a single integrated scheme designed to protect a live mainline railway carrying thousands of daily passengers.

BAM

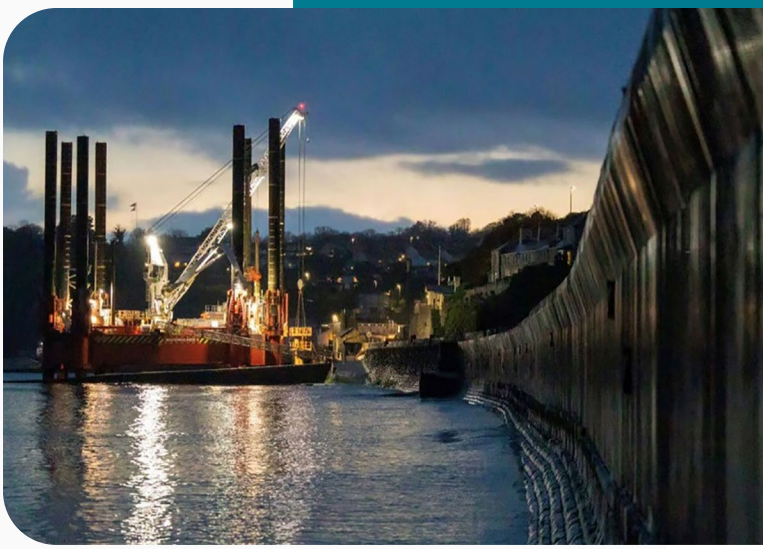
Challenges

The scheme presented a range of challenges, each contributing to the overall complexity.

- The work on the sea wall at Dawlish was constrained between the railway and the sea, with limited access through a low-clearance underpass, short three to four-hour tidal working windows and frequent storm conditions affecting construction.
- The cliff stabilisation works between Dawlish and Holcombe involved working on steep, unstable cliff faces up to 40m high, requiring roped access techniques and careful installation of thousands of soil nails in a harsh marine environment.
- At Parson's Tunnel, construction of the rockfall shelter had to be undertaken over an operational railway, within a highly constrained site between cliffs, tunnel infrastructure and the sea, with limited construction access and high safety risks.

Across all elements, a key challenge was maintaining continuous railway operations, requiring careful sequencing of works, innovative construction methods and strict safety controls while working in tidal, coastal and geotechnically complex conditions.

The scheme also faced programme and financial pressures, requiring collaboration and value engineering to deliver all elements within budget and tight deadlines.



Coast Cams

Outcomes

- The delivery of the sea wall, cliff stabilisation work and rockfall shelter has provided a resilient defence system for the railway corridor.
- The sea wall protects against coastal flooding and wave action, while cliff stabilisation reduces the risk of landslips and the rockfall shelter safeguards the line from falling debris.
- Together, these measures provide protection against 1m sea level rise and extreme storm events, securing a vital route linking over 50 towns and cities.
- Innovation across the scheme delivered over £7 million in savings, alongside improved safety and efficiency, with sustainability embedded through low-carbon materials and environmental enhancements.
- The railway remained operational throughout, maintaining 12,500 daily journeys and minimising disruption.
- Overall, the scheme contributes to a long-term, future-proof solution, protecting a nationally important railway and the communities it serves.

Supported by Balfour Beatty

ICE South West Award Winner

Hinkley Point C

Powering the transition to secure, low carbon energy through innovation, skills, and collaboration

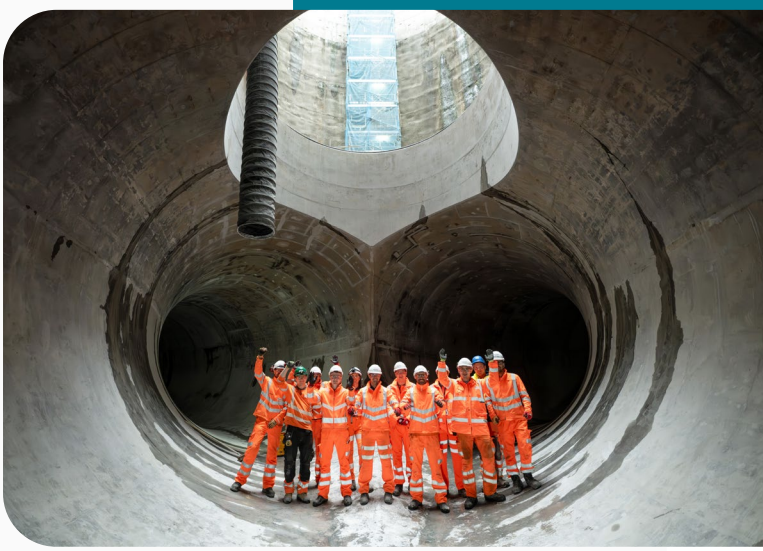
Hinkley Point C (HPC) is the first new nuclear power station to be built in the UK in more than 20 years and one of Europe's largest infrastructure projects. The site near Bridgwater in Somerset will provide low carbon electricity for around six million homes.

The scheme includes two nuclear reactors and a wide range of supporting infrastructure, including major tunnelling and marine works. Central to this is a cooling water system beneath the Bristol Channel.

Challenges

The project presents significant engineering and logistical challenges on an unprecedented scale:

- Working in the Bristol Channel with one of the highest tidal ranges in the world to deliver complex marine works, such as positioning 5,000-tonne intake heads with the highest precision, within narrow tidal windows.
- The construction of miles of tunnels and shafts beneath the seabed has required careful management of ground conditions, water pressure and safety requirements.
- In parallel, the project has coordinated a large, multi-disciplinary workforce while building new skills in the region and providing long-term investment in communities.



Balfour Beatty HPC Marine & Tunnels

Opportunities

- **Low carbon energy:** The completed nuclear power station will supply reliable, low-carbon electricity for at least 60 years, strengthening the nation's energy mix and security.
- **Innovation in engineering delivery:** HPC has included one of the world's most complex marine projects, including installation of six offshore heads weighing up to 5,000 tonnes and construction of three subsea tunnels totalling around 9 km. These projects have used digital modelling, simulation, trial lifts and collaborative design reviews to improve constructibility, optimise logistics and reduce risk.
- **Creating skills and regional growth:** Thousands of jobs have been supported, with a peak workforce of 8,000 people. More than 1,300 apprentices have been trained and thousands more upskilled, creating a lasting skills legacy that the region can build on for the future.
- **Community and supply chain impact:** Significant investment in the South West economy, supporting local businesses and supply chains. Local employment and training initiatives have improved access to opportunities.
- **A model for future infrastructure:** A 'build and repeat' approach is delivering increased efficiency and providing a blueprint for future nuclear schemes in the UK.

Environment Agency

ICE South West
Award Winner

Lower Otter Restoration Project

The Lower Otter estuary in East Devon was under growing pressure from climate change, rising sea levels, and more extreme weather. Alongside past human activity, these factors created an unsustainable system that could no longer adapt effectively.

In response, the Environment Agency's Lower Otter Restoration Project aimed to create a more sustainable and resilient landscape by reinstating natural processes. This involved reconnecting the river estuary and floodplain, enabling the system to better adapt to future environmental change. The scheme also included restoration of Budleigh Brook, a main river previously confined within a concrete channel above the floodplain, with 3.8km reopened to eel and fish passage.

Environment Agency

Challenges

Climate change pressures, including sea level rise and extreme weather, and increased flood risk required a solution that could adapt over time.

The site is environmentally sensitive with protected species, which restricted when and where construction could take place, requiring careful ecological management. During construction, beavers on site received Protected Species designation. The team worked closely with regulators to develop and implement new organisational licensing arrangements, employing national specialists while upskilling project members to ensure the species was appropriately protected.

There were also significant engineering challenges, including relocating infrastructure, managing landfill contamination risks, maintaining access for communities and working in a tidal, flood-prone area. Programme constraints added pressure, with limited construction windows, repeated flooding and the need to meet key deadlines and secure funding.

Kier

Outcomes

The project delivered a sustainable and resilient solution benefiting both the environment and local community:

- **Socio-economic impact:** The project delivered over £11.4 million in socio-economic benefits, improved public access and recreational value, and an extensive outreach programme enabled over 1,758 students to participate in site visits and workshops.
- **Environmental enhancement:** Benefits include planting over 23,000 trees, enhancing hedgerows, improving passage for eel and fish species, restoring Budleigh Brook and increasing biodiversity, with new and rare species recorded.
- **Carbon reduction:** The project reduced whole-life carbon and created long-term carbon sequestration potential.
- **Climate adaptation:** Resilience was significantly improved through these interventions, ensuring infrastructure and communities are better protected and able to adapt to future change.
- **Infrastructure resilience:** Extensive works moved infrastructure out of the floodplain or made it resilient to flooding. This included mitigating risks from a former landfill, removing over 1.5km of overhead power cables, relocating a cricket club, directionally drilling a sewer outfall 550 metres beneath the estuary, raising over 500 metres of road 2.5 metres above the floodplain, and constructing a new 30-metre road bridge.
- **Floodplain reconnection:** A key outcome was the reconnection of the estuary to its floodplain, restoring natural processes and creating 55 hectares of intertidal habitat to offset losses from sea level rise, including a 70m breach in the estuary embankment and a 6km purpose-dug creek network. A new footbridge now reconnects communities across the restored landscape.

Overall, it provides a nature based, future-proof solution, recognised by its designation as a National Nature Reserve shortly after completion.

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The South West Infrastructure Partnership is a cross-sector infrastructure community established in 2017 by the Institution of Civil Engineers (ICE) South West to create lasting value for the region by breaking down silos, sparking collaborative conversations and bringing people together to create an informed, coordinated regional voice on infrastructure.

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