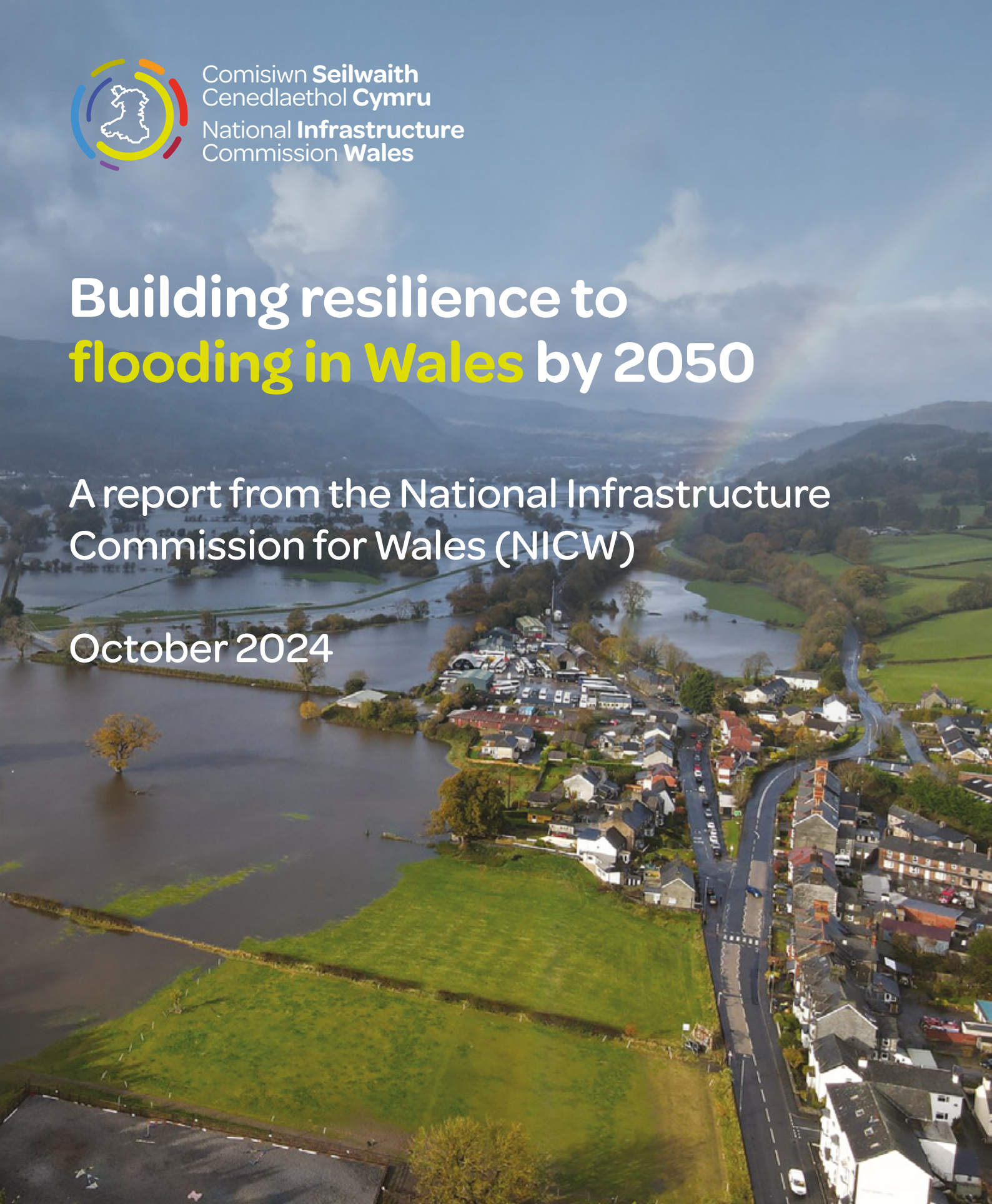
Comisiwn **Seilwaith** Cenedlaethol **Cymru**
National **Infrastructure** Commission **Wales**

Building resilience to flooding in Wales by 2050

A report from the National Infrastructure Commission for Wales (NICW)

October 2024



The National Infrastructure Commission for Wales (NICW) was established in 2018 as an independent, non-statutory, advisory body to Welsh Ministers.

Its key purpose is to analyse, advise and make recommendations on Wales' longer term strategic economic and environmental infrastructure needs over a 5–80 year period.

NICW conducts studies into Wales' most pressing infrastructure challenges and makes recommendations to the Welsh Government.

The advice provided by NICW will be impartial, strategic and forward looking in nature.

NICW is accountable to the Welsh Ministers for the quality of its advice and recommendations and its use of public funding.

Mae'r ddogfen hon ar gael yn Gymraeg hefyd / This document is also available in Welsh
Rydym yn croesawu gohebiaeth a galwadau ffôn yn Gymraeg / We welcome correspondence and telephone calls in Welsh

Cover image: Conwy Valley with Llanrwst in the foreground looking north

Our recommendations

Nature and community

Integrating nature and community as cross-cutting issues is crucial for creating sustainable and resilient solutions to flood risk management. Nature-based approaches, such as restoring wetlands and maintaining natural floodplains, enhance the environment's ability to absorb and mitigate floodwaters, reducing the impact on human settlements. These methods not only provide ecological benefits but also support biodiversity and improve water quality.

Meanwhile, involving the community ensures that flood management strategies are tailored to local needs and knowledge.

Community engagement fosters a sense of ownership and responsibility, leading to better preparedness, quicker response times, and more effective recovery efforts. By combining natural solutions with community involvement, flood risk management becomes more holistic, adaptive, and capable of addressing the complex challenges posed by climate change.

We believe that nature and community have been insufficiently considered within flooding policy and practice. These two themes are overarching themes throughout our report and should be considered as integral to the delivery of all our recommendations.

Conwy Valley, Llanrwst in foreground looking South

Our recommendations and Future Flooding Framework for Wales

Governance, Structure and Policy

Collaboration, Partnerships, and Community

Funding and Capacity

Awareness, Skills and Data

National

Water Commissioner

Recommendation 1
By 2026, establish a new Water Commissioner with sufficient powers to be able to implement our recommended outcomes

30 Year Strategy

Recommendation 2
By 2026, create a long-term 30-year national flood & coastal erosion resilience strategy, building on a 30-year vision for flood resilience

Wales Water Resilience Forum and Community Resilience Groups

Recommendation 6
By 2027, establish a new Water Resilience Forum for Wales along with community resilience groups

Climate Change Adaptation Fund

Recommendation 9
By 2026, set up a new cross-sector climate change adaptation and resilience fund

FCERM Investment Programme

Recommendation 10
Extend and align the current FCERM investment programme

Funding Sources

Recommendation 11
Explore and diversify funding sources to offer an alternative to conventional funding streams

Regional/Local

Catchment Partnerships

Recommendation 5
By 2026, pilot and set up regional/local catchment partnerships

Catchment Resilience Strategies

Recommendation 7
By 2026, streamline Flood and Coastal Erosion Risk Management plans into catchment resilience strategies

Land Use Planning

Recommendation 4
Avoid development on flood risk area

Community

Community Training

Recommendation 16
Provide training and support for local councillors, town councils, and community councils on flood resilience

Householder Grants

Recommendation 13
Welsh Government to provide subsidies to private homeowners with the least means to build flood resilience at the property level

Community Involvement

Recommendation 8
Involve communities in decision-making processes related to flood resilience

Curriculum and Public Awareness

Recommendation 14
Increase awareness of flooding and climate change impacts in schools via the curriculum; and with the public through a national education campaign

Enablers

Nature as a Stakeholder

Recommendation 3
By 2028, set up the mechanisms to incorporate nature as a key stakeholder within flooding

Skills

Recommendation 15
Support the development of blue skills and a new discipline for Water Environments and establish apprenticeships for the sector

Nature-Based Solutions

Recommendation 12
Set up a taskforce to explore how the uptake of nature-based solutions can be scaled and landscapes can be adapted to a future climate

Data

Recommendation 17
Establish open and transparent access to data allowing communities access to open-source data so they understand flood risk better

Contents

Abbreviations

Abbreviation	Meaning
CaBA	Catchment Based Approach
CCC	Climate Change Committee
DCWW	Dŵr Cymru Welsh Water
FCEC	Flood and Coastal Erosion Committee
FCERM	Flood and Coastal Erosion Risk Management
FWMA	Flood and Water Management Act (2010)
ICT	Information and Communication Technology
IDD	Internal Drainage Districts
LLFA	Lead Local Flood Authority
NICW	National Infrastructure Commission for Wales
NFM	Natural Flood Management
NRW	Natural Resources Wales
PAG	Project Advisory Group
PfaCCW	Prosperity for all; a Climate Conscious Wales
RMA	Risk Management Authority
SMP	Shoreline Management Plans
SFS	Sustainable Farming Scheme

Our vision for flood resilience in Wales by 2050

"The rapid innovations and changes of the late 2020s set Wales on a path to resilience that has marked it as a world-leader in community-led flood management Success is fundamentally driven by good communication and shared responsibility between government, business and communities that allows collective and clear ownership and decision-making. By empowering communities to voice and act on their own futures with the support of government, augmented by innovation, we have worked together to ensure a resilient, dynamic, and abundant future for generations to come".

Working collectively, alongside nature: a unifying vision and clear pathway helps create a vibrant partnership of society working together with nature to build resilience and adapt to the impacts of climate change.

Predictive data:
Emerging technology supports open and transparent access to data which those in Wales understand and helps to steward landscapes

Technology was harnessed to foster a systemic approach to predicting and managing flood risks across Wales. Cities are equipped with data-driven weather prediction models that provide real-time, hyper-localised forecasts of flood risks. Autonomous machines are deployed to monitor water levels, the structural integrity of flood defences and performance of Nature-based Solutions. Satellite data is freely shared between regions. This information is used daily by communities, businesses, the Government and emergency responders to help manage responses to flood events up and down the country.

Water environments:
Wales is a hub for flood resilience and adaptation, working alongside nature to enable resilience

The Well-being of Future Generations Act ensures Wales considers nature as a stakeholder, using the Nature Commons as a forward-looking approach of working alongside nature and water environments, developing a knowledge base and resources for the future communities to inherit and build on.

Adaptive grounds:
Our homes, infrastructure and landscapes are adaptable and water resilient

The turning point for the Welsh Government and communities working on flood resilience in the 2030s was the understanding that the pace of climate change far outgrew any previous planned investments in flood management. By implementing long-term policy and planning, which was supported by sustainable funding and financing mechanisms, Wales could prepare an adaptive response which considered sea level rise and precipitation changes over the next 100+ years. This supported the management of existing flood mitigation assets, the development of new flood mitigation schemes, and considered how to transition and adapt landscapes to a changing climate. The task was enormous, as the uncertainty around climate came from both coastal erosion and rising sea levels, as well as in-land rivers flooding rural and urban areas. However, national conversations, Citizens and Youth panels, shaped the plan and gave a sense of influence and hope even though there were hard decisions to be made.

Rising resilience:
Leadership and integrated responses support a flood resilient Wales

As well as giving voice to nature through Nature Commons and river and sea spirits, an independent Water Environments Commissioner was instigated to provide clear ownership of the direction of travel and ambition for a future flood resilient Wales, acting in the interest of communities across Wales. In tandem, coalitions of experts and communities were organised by the Welsh Government through River and Coastal partnerships. These nation-wide government-hosted catchment and coastal zone platforms provide resources about flood resilience and connect multiple disciplines, technical experts, the government, and communities to make decisions about the future of their regions, access shared information and distribute funding.

Hailed as a huge success by once fragmented communities, the forums represent local management of rivers like Taff and Wye and coastlines across Wales. They bring together residents and organisations, allowing them to work together within a shared ecosystem. Following a radical restructure of the governance models by including the Nature Commons as a way of listening to nature, and appointment of a national Water Environments Commissioner, Wales is now considered a leader in resilient community infrastructure. Through national educational campaigns, new forms of funding that values nature, and an effort from the government to create River and Coastal Forums, the country is better prepared to tackle uncertainty around flooding.

Collective strength:
Representation and collective decision making supports community action and resilience

In 2050, transparency around planning for future climate resilience has increased and there is a better public understanding of how to be prepared for flood events. Wales uses River and Coast partnerships to represent voices from across the country, ensuring collective decision-making drives grass-roots innovation and improves communications between communities and the government. Tangible inclusivity and diversity in decision-making considers all demographics, including ethnic minority groups and vulnerable populations, ensuring that flood resilience measures are equitable and just. There are funded roles (e.g. 'Agents of Change') for individuals, or community groups to provide additional support to at risk communities, with additional roles from business and industry. They work with communities to build capacity, raise awareness and develop local scale or "grass roots" community flood resilience plans, drawing on a designated funding pot and pool of technical engineers and flood specialists for support.

Resilient roots:
Action is empowered through education, training and skills

'Working collectively alongside nature' is one of the national campaign slogans which drew attention to Wales' role in supporting planetary needs and developing climate resilience. Education and strengthening communities have become foundational. Schools regularly conduct flood preparedness exercises and include climate change in future skills required for generations to be resilient, embedding this knowledge from a young age. National campaigns make the experience of flooding tangible, ensuring every citizen and organisation understands flood risk and their role in it. Accountable government stakeholders and agencies build trust by working across sectors and communities to understand socioeconomic inequalities, tackle deprivation and improve flood responses in disadvantaged communities.

Farmers and land stewards have increasingly embraced diversification, with regenerative farming practices that restore natural ecosystems driving sustainable growth in Wales' rural economy. Communities have come together to thrive whilst agricultural land has begun to teem with wildlife not seen in such abundance for hundreds of years, as the soil, further underpinning ecosystems has been replenished with vital nutrients. This biodiversity has massively increased the sponginess of the soil further reducing the risk of flooding in a virtuous cycle of land, people and produce.

Welcome

Dr David Clubb

Chair

Flooding presents an increasing challenge to the people and communities of Wales.

We know that the public sector cannot protect every property. This knowledge should liberate us from the expectation that the state will 'do it all'. Instead, we should expect public bodies to enable more action from us as citizens, households, communities and business owners.

I believe that the Future Generations Act is a framework that can accelerate exactly this type of collaboration, improving outcomes and saving public expenditure in the long term.

In considering our response to the Welsh Government's call to consider flooding we have challenged our consultants to think radically.

Wales' challenges will only be solved by radical measures, implemented pragmatically, efficiently, and with sensitivity and understanding for those who will be hit hardest by climate change impacts.

Dr Eurgain Powell

Lead Commissioner

As we started this work at the end of 2022, the British Red Cross published *"Every time it rains"* which explores the lived experiences of communities impacted most severely by flooding in the UK. Although flooding can have a devastating effect on people's lives, it showed how awareness of flood risk, how to access information and support, and what actions to take to prepare and respond, remains very low. Even for people living in areas that are at risk of, and highly vulnerable to, flooding.

Our climate is getting warmer and wetter. In July the Met Office State of the UK Climate report highlighted that Wales has seen a 24% increase in rainfall (compared to the 1961–1990 average), and the UK experienced 7 named storms during 2023–24. But the UK Committee on Climate Change has warned repeatedly that the UK and Wales is not prepared for these impacts.

Our work has shown that we need a different approach – one that works with people and nature. It's critical that we come together, to help everyone understand the changes that are going to happen, and how we can work collectively to build more resilient communities.

Eluned Parrott

Lead Commissioner

According to data from Natural Resources Wales, 1 in 7 homes in Wales are at risk from flooding, and that figure will increase by more than a third as the impacts of climate change are felt.

As part of our work we visited some of the communities who have been affected by flooding in recent years, such as the Conwy Valley and Pontypridd. The impact of, in some cases, repeated flooding has been devastating, but there was also a strong sense that those communities are not content to be passive victims. We heard from people who are keen to be involved in the decisions that affect them, and who want to be part of the solution.

As we have conducted our work over the past eighteen months, it has also become increasingly clear that we cannot "concrete" our way out of the risks we face. We must adopt more holistic solutions, restoring the natural environment's ability to store water higher in river catchments, and empowering local communities to take action.

There must be a shared sense of purpose and urgency if we are to be ready for the challenges that climate change will bring. There is no time to be lost.

Bridge over the Afon Mawddach Estuary, Gwynedd

Background and context

One in every seven (300,000[1]) properties in Wales are at risk of flooding; with an additional 400 properties also at risk from coastal erosion. As the climate changes and with sea level rise inevitable, these risks and impacts are certain to increase, with more frequent and severe floods, rising sea levels and faster rates of coastal erosion.

We must address this increased risk by reducing vulnerability, managing consequences, and supporting communities and infrastructure to develop resilience against more frequent and severe floods and coastal erosion.

The flooding caused by storms Dennis and Ciara in 2020 highlighted Wales' vulnerability; infrastructure across Wales was badly affected, including road and rail closures, and landslides at coal tips[2]

How well prepared is Wales?

The Climate Change progress report for Wales, published in 2023, included the following areas of concern for flooding:

- Climate resilience is not embedded nor sufficiently enforceable within existing planning policy in Wales. Policies for new development in areas of flood risk are outdated and there is no recent data to evaluate trends.
- (There are) complicated roles and responsibilities and a lack of data to assess implementation. There is insufficient data to evaluate property-level adaptation to flood risk.
- There were some notable key gaps in available data. In some cases, data collection has been discontinued, for example, the proportion of planning permissions granted for new developments in flood risk zones is not available after 2019.
- The Sustainable Farming Scheme should incentivise practices to manage water flow across catchments and reduce flood risk.

The UK Climate Change Committee (UKCCC) also pointed to the following infrastructure issues:

- Gaps remain in adaptation planning for local road networks, with a lack of data to assess progress. A low proportion of critical road structures, such as bridges, are in good or very good condition, but there are promising early-stage plans to address climate resilience. There is limited evidence that interdependencies across infrastructure and transport sectors are being managed.
- The Welsh Government should review how the reporting power could be used to collect information on climate risks and adaptation actions across organisations such as local authorities, water companies, transport providers and other infrastructure owners and operators in Wales.
- *Prosperity for All: A Climate Conscious Wales* includes consideration of resilient infrastructure but lacks specific actions for telecommunications and ICT networks.

Flooding and climate change resilience is a complex long-term issue that requires collaboration and multi-disciplinary thinking and solutions.

1 www.bbc.co.uk/news/uk-wales-67984606

2 www.research.senedd.wales/research-articles/storms-ciara-and-dennis-bring-devastating-floods-to-wales/

Our remit

The 2021 Co-operation Agreement stated – "we will also ask the National Infrastructure Commission for Wales to conduct an assessment of how the nationwide likelihood of flooding of homes, businesses and infrastructure can be minimised by 2050". The Co-operation Agreement came to an end in early 2024, however the Commission has continued in its work to inform Welsh Ministers of its research and findings in order to inform future strategies, plans and projects.

From our core research (see below) and other NICW activity, our work programme collectively sought to achieve:

- A shared vision for 2050 and beyond on how we wish to enhance resilience and adaptation planning to the risks from flooding in the context of climate change given the increased impacts that we are going to see.
- A plan so that homes, communities, businesses and infrastructure are more resilient and adaptive to flood events and associated climate risks and are able to recover more quickly.
- Stakeholders understand the likely impacts and where responsibilities sit in terms of response/action.
- People (including those with protected characteristics) understand, feel prepared and able to respond to future flooding and climate risks.
- Suggested approaches to strengthen collaboration and partnership working amongst organisations and agencies as well as involvement of, and increasing resilience of, communities.

Treforrest Industrial Estate, after Storm Dennis, 2020

The current policy and operational framework

Figure 1: Current roles and responsibilities within the flooding sector in Wales

The overarching legislative framework for flood risk management in Wales is the Flood and Water Management Act 2010, the powers in which are largely devolved to the Welsh Ministers.
The 2010 Act provides for a national flood and coastal erosion risk management strategy in relation to Wales, and for local flood risk management strategies to be prepared.
The Environment (Wales) Act 2016 amended the 2010 Act to replace the former regional flood and coastal committees with a new body: the Flood and Coastal Erosion Committee (FCEC).
The Committee advises the Welsh Ministers on all flood and coastal erosion risk management matters in Wales, including raising awareness, preparation and community resilience to flooding.
They have been a key stakeholder in our research and have participated throughout the process.

Welsh policy and strategy can be found in the National Strategy for Flood and Coastal Erosion Risk Management in Wales. This strategy was published by the Welsh Government in October 2020. It outlines the strategic and legislative context for managing flood and coastal erosion risks in Wales.

Felinheli - pedestrian flood gate

The strategy emphasises improving understanding and communication of risk, preparedness and building resilience, prioritising investment to the most at-risk communities, preventing more people from becoming exposed to risk, and providing an effective and sustained response.

Natural Resources Wales produces national and regional Flood Risk Management Plans which outline the priorities and actions proposed to manage the risk of flooding at a national and local level. These plans also consider how to adapt and mitigate against climate change. They cover the risk of flooding from rivers, reservoirs and the sea. These plans are developed alongside Lead Local Flood Authorities (LLFAs) who publish their own strategies on how they deal with this type of flooding in their area.

Our report has the wide remit to cover all types of flooding in Wales. Given the complexity of the topic, our focus is to make strategic recommendations on the overarching frameworks that should be in place to address all aspects of flood risk management.

Risk Management Authorities (RMA) were established in the 2010 Act. In Wales, Risk Management Authorities include Natural Resources Wales, Lead Local Flood Authorities, Internal Drainage Boards, highways authorities and water companies.

Each financial year, the Welsh Government invites RMAs to bid for funding to deliver a programme of capital works to reduce the risk of flooding and coastal erosion to communities across Wales. The applications for funding submitted by RMAs are considered by the Flood and Coastal Risk Programme Board before being agreed by the relevant Welsh Minister. The funding is prioritised towards the communities most at risk of flooding, in accordance with the National Strategy, technical guidance, and grant conditions.

The NICW approach

NICW works within frameworks aligned with public policy in Wales, applying them over the longer term. NICW aims to:

1. Provide radical, challenging and evidence-informed advice and guidance to a variety of audiences, but principally the Welsh Government, that will inform and future-proof decisions on infrastructure deployment from 2030–2100.
2. Use the frameworks of the Well-being of Future Generations (Wales) Act 2015, the climate and nature emergencies, and the socio-economic duty, to guide our deliberations.
3. Support initiatives, organisations or policies that aim to create and maintain resilient and adaptable infrastructure that delivers well-being until 2100 and beyond.

It carries out these aims, upholding its agreed values:

- **Inclusive:** creating a warm and friendly environment within which people feel supported and confident to express their views.
- **Transparent:** pushing the boundaries of reporting in near-real-time on our engagement, and demonstrating publicly how we deal with internal disagreements.
- **Radical:** Commissioners have committed to working out of their comfort zones; we aim to deliver advice, opinions and recommendations that diverge from 'business as usual' in order to alleviate the nature and climate emergencies and deliver on our remit.
- **Challenging:** The Commissioners challenge the status quo with the needs of future generations and an aspiration to do better for the future citizens of Wales.
- **Practical:** The Commission's work is focused on actionable recommendations that move us towards a more sustainable infrastructure for the needs of the people of Wales.

NICW began its work on flooding in late 2022. It commissioned a Scoping Report which sought to identify, from stakeholders and a literature review, where the gaps in current and ongoing approaches and implementation were. NICW used the scoping work to update Welsh Government on our work and the four research work streams we intended to take forward.

We established a flooding Project Advisory Group (PAG) in late 2022 to guide our work, act as a critical friend, and to provide further additional comment, advice and suggestions for action. The PAG group met several times during the course of the research phase to inform and advise as the work progressed.

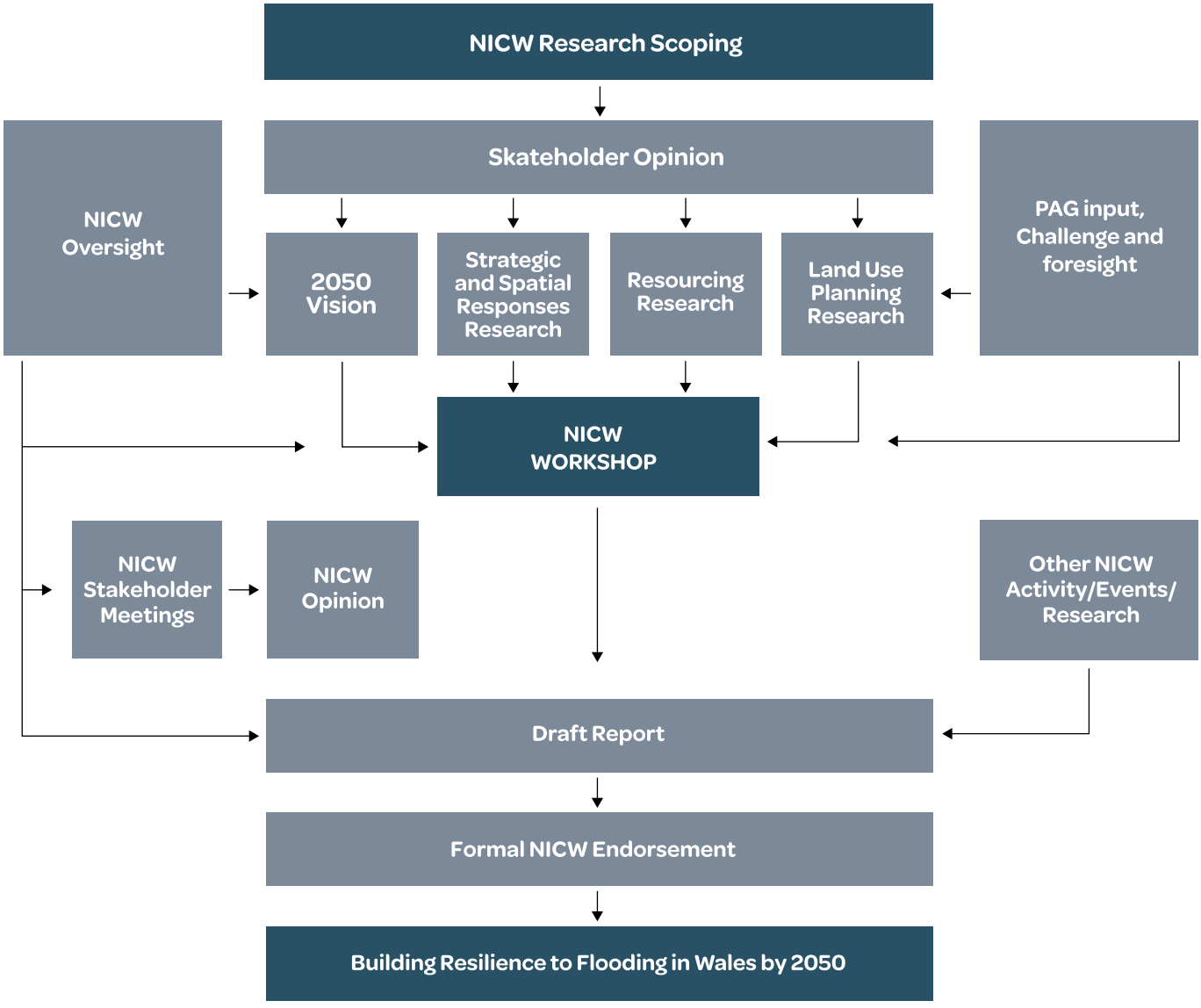
Before this report was written, and with some specialist support, we gathered the PAG and Flood Committee (FCEC) members together in an online workshop to identify common issues raised by the four research reports; to discuss the priority areas for us to focus on; and to debate potential radical recommendations that would support our vision for a more flood resilient Wales.

We would like to thank the members of the PAG, FCEC and other stakeholders for their valuable insight and opinions which have been fundamental both for our 4 research projects and our report. We would also like to thank our 4 research teams at Arup, JBA Consulting and Miller Research for their flexible and honest ways of working and their ability to take on the challenge to be radical in their thinking.

However, our recommendations should not be seen as an official endorsement of the PAG, the FCEC, the organisations represented by the members of the PAG or the organisations which have undertaken the primary research to inform this report.

This report has been endorsed by all Commissioners of the National Infrastructure Commission for Wales. No Commissioner has a conflict or declaration of interest with the project delivery or with the recommendations.

Figure 2: NICW Report development



Our research

Following the initial scoping work, NICW chose four workstreams on which to conduct primary research:

1. Developing a long term vision for flood risk management;
2. Exploring the options for coordinated strategic and spatial responses to flood management;
3. Funding and workforce requirements; and
4. Quantifying and analysing the land use planning issues associated with flooding.

These areas were identified as 'gaps' in existing activity where NICW could add value through further investigation. NICW awarded contracts to Arup, JBA Consulting (two contracts) and Miller Research to undertake these four areas of research. Our website contains further information on the background to each workstream.

Groynes, Cardigan Bay

A vision for a flood resilient Wales in 2050

Workstream 1, delivered by Arup, developed a vision for a flood resilient Wales that involved significant stakeholder input. By using futures methods their approach challenges our conceptions of our ability to significantly alter our own future by describing a person in 2050 looking back at 2024:

> *Thirty years ago, few people imagined that Wales would become a model for other countries and regions struggling to adapt systemically to a changing climate. Welsh infrastructure struggled to cope with increasingly likely flood events. Responses by the government and communities were fragmented and ineffective.*
>
> *It was time for a shift. The Welsh Government set out to create a flood resilient nation for thriving generations to come. It drew on the country's dynamism, its strong communities and a hopeful future vision to steer by.*
>
> *This vision marked a shift from 'working in silos, often not in tune with nature' to 'working collectively, alongside nature'. Encouraging long-term perspectives and policies – particularly around equality, justice and the sustainable use of natural resources – helped to reframe how Wales can thrive. It enabled organisations and businesses to continue to flourish today, in 2050.*

2050 Vision Personas December 2022


Vision Workshop, Pontypridd, December 2022

Through participatory world-building workshops, looking at future scenarios and using diverse character personas, four stories of the future emerged that were used to develop a Vision for 2050 based on six principles.

Embodying this 'future retrospective' approach should help empower all parts of civil society to make consistent efforts over the next thirty years in order to make that vision a reality. Our report makes recommendations to the Welsh Government and others to ease the pathway towards the vision.

We have developed a Vision website that should be read alongside this report.

The River by Prith B

Creative outputs

As part of this workstream creatives were commissioned to produce visual outputs inspired by or based on the discussion in the workshops and inputs from elsewhere.

Prith B is a painter and artist who was commissioned to create an artwork supporting the vision. She attended our South Wales workshop and drew inspiration from both workshop feedback as well as her own sense of what the vision for flood resilient Wales could look like. Inspired by the character of the river, she captured it as the essence of the Welsh landscape – water and landscape in harmony with people.

"I was asked to think about flooding and the future from different perspectives. I remember in the workshop everyone thought the river, as a character whose perspective we might consider, was a mistake because it wasn't a person. I thought – how can you ignore the river, which is so central to what we are discussing? So, the painting is all about the river, the trees, our interaction with the land and how we are all interconnected."

Prith B
Visual Artist
www.prithb-art.com

Strategic and spatial responses to flooding

The purpose of Workstream 2, delivered by JBA Consulting, was to examine why flood risk, mitigation and adaptation planning practices are not yet happening on a catchment and coastal-zone scale consistently across Wales and to make strong recommendations as to how spatial responses can be improved.

The work reviewed existing catchment planning and other spatial and strategic practices currently occurring across Wales and elsewhere to learn the lessons from existing partnerships. The research revealed the complex spatial distribution of organisations currently operating in the flood management sector in Wales. (See Figure 3 on following page).

The study aimed to pinpoint barriers and seek to make radical recommendations on how these may be overcome, and explore structures and resources (including learning from elsewhere) to better enable strategic, integrated partnership working at a catchment or coastal zone scale.

The report considers what strategic and spatial approaches to flooding would be suggested if we were to "start again". The recommendations presented in the report are therefore not necessarily all solutions that could be actioned in the short term; they outline alternative approaches to current structures that could require significant change. The report outlines the existing situation, identifies current issues and barriers and provides 11 recommendations for improvement.

Fishguard, Pembrokeshire

Figure 3: Spatial boundaries of plans, forums and strategies across Wales (JBA Consulting)

Funding and workforce requirements

The Workstream 3 report, delivered by Miller Research, synthesises the findings from the resourcing workstream.

The report acknowledges that the challenges and barriers facing Flood and Coastal Erosion Risk Management (FCERM) in Wales are multifaceted, spanning financial constraints, skills shortages, capacity limitations, and governance issues. Financially, the sector grapples with difficulties associated with annual funding cycles, the end of ring-fenced funding for flooding, and the inefficient allocation of resources, hindering long-term strategic planning and execution of flood management initiatives. This is exacerbated by a reliance on reactive approaches and grey infrastructure, requiring significant maintenance, stretching already constrained workforce capacities, and limiting the exploration of nature-based solutions to flooding.

In terms of skills, FCERM faces challenges in resourcing the broad spectrum of technical and 'softer' capabilities necessary for the evolving demands of flood risk management. Recruitment and retention are significant challenges, complicated by private sector offerings and the perceived lack of career progression within the public sector. Moreover, there is a critical gap between the skills provided by higher education and those needed in the workplace, leading to a reliance on external consultants, underscoring a need for targeted training and upskilling programmes.

Capacity issues are closely linked to these financial and skill-related challenges, with organisational capacity in key public sector bodies stretched. The situation is compounded by legislative constraints and limited coordination and prioritisation for flood risk management across various levels of governance, making collaborative and catchment-scale approaches challenging to implement effectively.

Governance challenges include inconsistent prioritisation of FCERM, leading to a reactive rather than proactive approach to flood risk management. The sector's governance is further hindered by a fragmented approach to regional and catchment working, with varying ambitions, structure, and levels of progress across local authorities. Adapting to climate change and its impacts, while recognised as a pressing need, lacks a coherent policy framework, impeding the development of effective green finance mechanisms and private sector investment.

Addressing these challenges necessitates a strategic shift across financial, skill, capacity, and governance domains. The report findings suggest incorporating long-term planning, diversified skill development, enhanced organisational and community capacity and resilience, and coherent governance frameworks to foster a more proactive, integrated, and collaborative approach to FCERM in Wales.

The report recommends a series of 22 strategic interventions across short, medium, and long-term horizons, aiming to foster collaboration, enhance community involvement, and reimagine Flood and Coastal Erosion Management in Wales.

Land use planning and flood risk

This research, carried out by JBA Consulting, sought to quantify the issue of flooding in relation to land use planning and make recommendations to NICW on this issue.

The study found that there is no reliable nationally consistent monitoring data for development consents in the floodplain.

Monitoring has previously been undertaken by the Welsh Government via National Indicator 32: number of properties at risk of flooding. However, the associated uncertainties with data collection and verification are extensive, resulting in no nationally robust quantification of development in flood risk areas. The latest data on properties at risk from flooding dates from September 2021, with the next update listed as 'unknown'[3].

Flooded garden of a house in Treforest after Storm Dennis, 2020

Additionally, Local Planning Authorities (LPAs) collate planning monitoring metrics on an annual basis in line with their requirements under Section 76 of the Planning and Compulsory Purchase Act 2004. However, a range of inconsistencies arise across the Annual Monitoring Reports from LPAs which result from misalignment of policy cycles on a national and local level. This renders LPA to LPA comparisons difficult and contributes to the associated uncertainties with the subsequent data.

Stakeholders have a general perception that there is too much new development consented in flood risk areas. However, many also acknowledged that there are limited places across Wales on which to build, and current strategic planning policies direct development towards existing growth areas, most of which are located in areas at flood risk. Many stakeholders also made key distinctions between issues surrounding the development of greenfield sites and redevelopment opportunities presented by brownfield sites, many of which are in our key urban centres.

Public opinion can be a powerful force shaping attitudes towards development in flood risk areas. However, the study found generally negative perceptions towards land use planning and flood risk. This was often influenced by sensationalist headlines within the media. Improved public understanding of resilience in relation to flood risk can increase community engagement, preparedness and responsibility; a shift in public perception to resilience would support the transition towards learning to live with water.

Their report concludes by providing five recommendations for NICW to consider in relation to the land-use planning system.

3 As of 26 August 2024

Summary of our findings: The issues

The final reports for all of these areas of work are published alongside this report; a summary of the recommendations are set out in Appendices. They contain a wealth of information and data that have been extremely valuable in providing the background, evidence and basis for our recommendations.

NICW invites the Welsh Government and other organisations with an interest in flood management and protection to note the contributory project reports and the individual recommendations. However, the formal NICW recommendations are those contained within this report.

As part of our work to produce this final report, the following issues were commonly identified when synthesising the four reports and from our conversations with stakeholders.

Community engagement and empowerment

- There is a strong emphasis on the need to involve communities in decision-making processes related to flooding to develop long term resilience.
- This includes promoting engagement through citizen assemblies or juries, fostering mutual engagement with clear communication, and empowering communities to actively contribute to resilience efforts supported by local community leaders.

Coastal sea defences near Pwllheli

Funding flood resilience

- With limited resources available, flood resilience and adaptation actions must be prioritised, recognising that in the future the impacts of climate change, population growth and ageing infrastructure assets will only increase the challenge.
- There is a need to realign currently fragmented and short-term funding streams, and seek opportunities to deliver collaborative approaches across flood resilience, environmental and regeneration programmes.
- There is a need to encourage private, philanthropic, crowdsourced community funding, along with local levies to supercharge long-term capital investment

Coastal Path flood warning near Tenby

Integrated approaches

- Collaboration between various stakeholders such as government agencies, technical experts, communities, and non-governmental organisations is essential but isn't enabled or encouraged within the current frameworks.
- Integrated catchment and coastal management, as well as cross-sectoral collaboration, are highlighted as crucial for effective resilience strategies.

Nature-based solutions

- Stakeholders demonstrate an ambition to shift towards nature-based solutions and sustainable practices in flood resilience strategies. This is done through incremental benefits by introducing solutions across agriculture, land management and planning. However this is currently ad-hoc within the sector, rather than systemic.
- Some stakeholders noted that nature-based solutions introduce uncertainty and ongoing liabilities compared with grey defences that may give short term confidence but present challenges in the long term. Changes in funding practices would be necessary to enable the longer-term investment necessary to deliver nature-based solutions.
- This includes promoting the use of natural assets, advocating for regenerative agricultural practices, and prioritising nature-based flood management solutions. For urban spaces, that must mean increasing the 'sponginess' of cities to allow them to be more resilient to flooding and change in climate.

Data accessibility and transparency

- Data and mapping must underpin policy, strategy and action.
- Open and transparent access to predictive data is emphasised, enabling communities to understand flood risks and warnings. This includes leveraging technology for better understanding of natural systems and providing accessible information to all stakeholders.

Long-term planning

- There is a need for a long-term, sustained and aligned approach to planning and flood resilience.
- This involves developing anticipatory cultures of futures thinking, continually shaping and challenging the vision for the future, and establishing strategic frameworks and policies for resilient land use planning and infrastructure development.

Burry Port

Education and awareness

- Education and training are essential components of flood resilience, both for current and future generations.
- There are currently significant shortages in all areas of "blue skills", and in particular, few obvious career routes into nature-based solutions.
- Short-term and project-focused funding makes delivery of apprenticeships – which typically cross three financial years – difficult.
- Wales could become a leader in flood resilience, learning from others globally and supporting efforts elsewhere within the UK.
- Flood resilience and climate change adaptation could be integrated as topics into school curriculums, as well as providing advanced education opportunities in relevant fields.

Governance, structures and policy

- There is confusion around current roles and responsibilities of the various public bodies involved in flood resilience and protection.
- The current landscape is seemingly complex and confusing especially to our communities, with lack of clarity in relation to roles and responsibilities.
- National strategies, local frameworks and funding must mesh together to deliver an effective strategic system that enables better collaboration and coordination across different levels of government and sectors.
- We believe that innovation in this sector is the exception rather than the norm. Participants in the flooding sector should regularly question whether their current structures and systems best serve an integrated approach to flood prevention, and whether good practice elsewhere can help drive innovation in Wales.

NICW recommendations

Governance, structures and policy

Recommendation 1

Establish a new Water Commissioner by 2026 with sufficient powers to:

- Provide national coordination and leadership and to develop strategic frameworks and policies for long term resilient land use planning and infrastructure.
- Establish and support a unified approach and framework for catchment planning and partnership delivery in Wales, with implementation being supported by NRW catchment coordinators.
- Support cross sector collaboration between agriculture, flooding, and environmental teams within the Welsh Government and also with external stakeholders (including the farming community, landowners, construction, industry, and local authorities).
- Ensure there is a strategic level connection to facilitate communication and coordination among various stakeholders, integrating efforts across different levels of government and organisations, such as Natural Resources Wales (NRW) and Dŵr Cymru Welsh Water (DCWW).
- Provide clarity, and simplify structures, roles, responsibilities for managing flood risk and the water environment by reviewing governing bodies and groups currently coordinating responses and supporting community action.
- Coordinate the commissioning of flood works and climate resilient infrastructure across Wales.
- Promote cooperation among local authority groups based on catchments, facilitating opportunities for collaborative funding and resource allocation.

Recommendation 2

Create a long-term 30 year national flood and coastal erosion resilience strategy by 2026, based on a 30-year vision for flood resilience and a catchment approach, to set out Wales' priorities to support and protect communities and infrastructure in the long-term. Developing this strategic approach will include reviewing and streamlining existing plans, strategies and forums across Wales to provide greater clarity whilst also prioritising response for most at risk areas.

Recommendation 3

Set up the necessary mechanisms to incorporate nature as a key stakeholder by 2028, giving nature a voice around the table and considering opportunities to enshrine natural assets in law, or updating the Environment Act 2015, to give rights to natural assets in decision making.

Recommendation 4

Ensure Planning Policy, as well as the latest TAN 15 (which should be published and implemented with no delay) avoids unnecessary development in flood risk areas and encourages appropriate spatial planning as well as more innovative development. It should also establish a new nationally consistent planning performance flood metric and new reporting framework which considers all sources of flooding.

Recommendation 5

Pilot and set up regional/local catchment partnerships by 2026 (to incorporate existing river and coastal forums) to support a systematic and integrated catchment and coastal management approach. The partnerships:

- Will bring together broad disciplines, through catchment teams, supported by inclusive public representation including large landowners, businesses and (housing) developers, to coordinate integrated catchment responses across the water environment.
- Will help establish positive collaboration with landowners and the farming community.
- Will support small-scale pilots to test and refine methods whilst also piloting a catchment approach akin to the Knepp Estate for the Brecon mega catchment. Use the pilots to exemplify the benefits of a different model for individuals, business, organisations, to build large scale long term resilience.
- Would use Citizens Juries, including a Youth Jury, to convene local groups to influence decisions about climate change adaptation for their community.

Cardiff Bay Barrage

Our research and engagement with stakeholders pointed to the need for change in the governance and policy structures and frameworks that exist across the Welsh public sector in order to address flood protection issues in a clear and transparent way and to support long-term resilience planning and delivery. The current situation lacks integration and communication between relevant departments, and so is preventing a cohesive, whole-system response to managing the water environment and mitigating flood risks.

Additionally, the current framework of governing bodies and groups involved in these issues appears overly complex, with a delineation of roles and responsibilities that could be more holistic. This lack of clarity is hampering effective action and accountability. Stakeholders across different levels of government, organisations, and external groups (e.g. farming community, construction industry) also seem to be working in isolation, without a strategic coordinating mechanism to integrate their efforts.

The establishment of a Water Commissioner is essential to provide centralised leadership and coordination for long-term resilience planning in Wales. The Commissioner would need to have sufficient powers to deliver the recommended outcomes. This recommendation stems from the need identified in our research for a dedicated authority to drive strategic frameworks and policies related to flood risk management and infrastructure development.

Our research on spatial approaches highlights the need for cross-government action and calls for a Climate Change Ministry to be established: *"to encourage cross-sectoral approaches as required by the WBFG Act"* with a "*core coordination role for mitigating and adapting to climate change"* (page 45).

Recent history demonstrates that Ministries can be created and disappear as part of the normal political process. In order to maintain continuity our recommendation of a new Commissioner takes a Wales-wide and overarching approach to the management of water into an independent body, facilitating engagement with community, businesses, public bodies and third sector organisations.

Empowering a Water Commissioner, supported by a national water resilience forum to encourage community involvement (see below), will ensure a unified approach to catchment planning, foster cross-sector collaboration, and streamline governance structures. Sufficient powers should ensure that this role comes with the weight to make decisions and will help ensure that action is taken as swiftly as possible in the interests of the climate and nature emergencies. This central figure will enhance communication and coordination among stakeholders, facilitate cross-government collaboration, and clarify roles and responsibilities, thereby promoting effective decision-making and efficient implementation of flood resilience measures.

"I hope by 2050 and hopefully a lot earlier (we are experiencing the impacts of climate change and increased flood risk now) that we are multidisciplinary in our approach to managing and reducing flood risk in communities across Wales. We need to involve public bodies, the private sector, the voluntary sector, academia and importantly those affected by flooding in the public in the process of making Wales a resilient nation in the face of flood risk."

2050 Vision Survey Respondent

The call for a 30–year national flood resilience strategy based on a catchment approach arises from the recognition of the need for a comprehensive and forward-looking plan to address flood and coastal erosion challenges in Wales. This recommendation aligns with stakeholders emphasising the need for longer term planning than currently exists and the identification and prioritisation of high-risk areas for long term action. Our research concludes that the current 10 year strategy is not long enough to take the necessary longer term decisions on flood risk management. The layering of existing plans is potentially complex and provides a challenge in their alignment.

"...there is frustration from stakeholders regarding the timescales the plans are developed within. For example, the National FCERM Strategy is refreshed every 10 years, local authorities are working on a 1–3 year programme, and DCWW is on a 5–25 year programme. This makes aligning plans even more challenging. There have been previous attempts and interest in developing single 'joined up' flood risk management plans from NRW, Welsh Local Government Association (WLGA), Welsh Government and Local Authorities. Unfortunately, however, after initial progress, the plans fell away due to RMAs feeling that they had to deliver separate statutory FWMA 2010 and Flood Risk Regulations duties first. This led to a lack of capacity and hence appetite to carry it through."

Workstream S2 Report, page 8

Millennium Bridge, River Taff

Developing a strategic and long-term resilience strategy will allow Wales to identify priorities, streamline existing plans, and provide clarity on resource allocation. By adopting a catchment-based approach, the strategy can effectively protect communities and infrastructure while enhancing coordination and response mechanisms for sustainable flood management.

The recommendation to consider nature as a key stakeholder reflects the recognition of the intrinsic link between natural ecosystems and flood resilience. Our research indicates that the importance of integrating nature-based solutions and environmental considerations into governance frameworks is currently not as rapid or systemic, and therefore effective, as it could be.

Our Vision workshop gave us a taste of what we might expect in this scenario, by using the River Taff as one of the personas for participants to think about in terms of the future. This was a very powerful way of envisioning a scenario where, beyond carrying out assessments on behalf of nature, we take on the role of nature and actively advocate for it in our decision making.

> "As a river, I sense the shift from communities who are using renewable energy, biodiversity, and flood plans to create a sustainable future for the generations to come. Old canals have been opened, teeming with life, and I now have rights to inform every development decision. The voices of ethnic minorities ripple through land justice debates. I watch as sustainable builds rise, with nature-based solutions thriving. This unity of purpose promises a future where all elements of the landscape, including myself, can be balanced."
>
> **River Taff Persona, 2050 Vision**

By giving nature a voice in decision-making processes and exploring legal mechanisms to protect natural assets, Wales can enhance its resilience to floods while promoting sustainable environmental practices. Embracing nature as a stakeholder also aligns with our wider goals of moving towards an ecosystem-based approach to flood risk management. This recommendation ensures that nature is taken into account at the highest possible level.

Sea wall, Aberystwyth

Case Study | Nature on the Board at Faith in Nature

Faith In Nature started out as one of the UK's original eco-brands, with a belief that business could and should try to be a force for good. Nearly 50 years on, their core belief remains the same. But faced with the scale of current environmental challenges facing the world, they recognised that more needs to be done and businesses need to think harder and more creatively about how they can play their part.

So, they asked themselves the question – what would it mean if Nature really was the boss? What would it mean to truly put the needs of Nature first? The conclusion they came to was that Nature has to have a real voice. And how could they give them this? By making them a director on the board – ensuring that every business decision they make considers the needs of the natural world.

Nature is represented on the board through a proxy role whereby a human who is legally bound to speak on behalf of the natural world, acts on behalf of Nature (much as a guardian acts on behalf of a child in the courts of law). The presence of this representative for Nature fundamentally impacts how the company does business and ensures that Nature has a voice and a seat at the table on major business decisions.

The core idea is for the interests of Nature to be represented in business decision making. This means that wherever decisions with an impact on Nature are discussed, Nature (through its representative) should be present and involved in decision making.

As part of the arrangement, Faith in Nature is required to prepare an annual report to Nature, outlining all they have done for the natural world. This is about a narrative shift, so in that sense, it's a piece of storytelling. But it's also a piece of governance that changes the company's constitution and carries actual structural change. That's what makes this more than storytelling, and why this really matters.

You can find out more about this process on the Faith in Nature website.

The emphasis on ensuring that our planning system avoids development in flood risk areas is driven by our research findings on the need to enhance spatial planning and mitigate vulnerabilities to flooding. This recommendation aims to align development practices with flood resilience objectives and regulatory frameworks. The revision of TAN15 has taken far too long to be published and, notwithstanding the political difficulties associated with the revised policy, has caused major uncertainties and delay across the development sector, in some of our most important areas for growth. The consensus of opinion appears to be that the policy needs to be settled and implemented as soon as possible to provide certainty on the policy framework.

However, there is a wider strategic point on aligning national spatial policies with flood risk. Future Wales, the National Development Framework, currently highlights many areas of Wales within high flood risk zones as growth areas. There is an inherent tension between these two issues with one acting as a constraint on the other. Stakeholders highlighted in the JBA Workstream 4 report in particular:

> *"Conflicts were identified between national/regional planning policies and the drive to support growth and regeneration of historic centres can conflict with the desire to focus development outside of flood risk areas. It was also commented upon that we need to allow for places to change and adapt in the face of climate change."*
>
> **Workstream 4 Report, page 41**

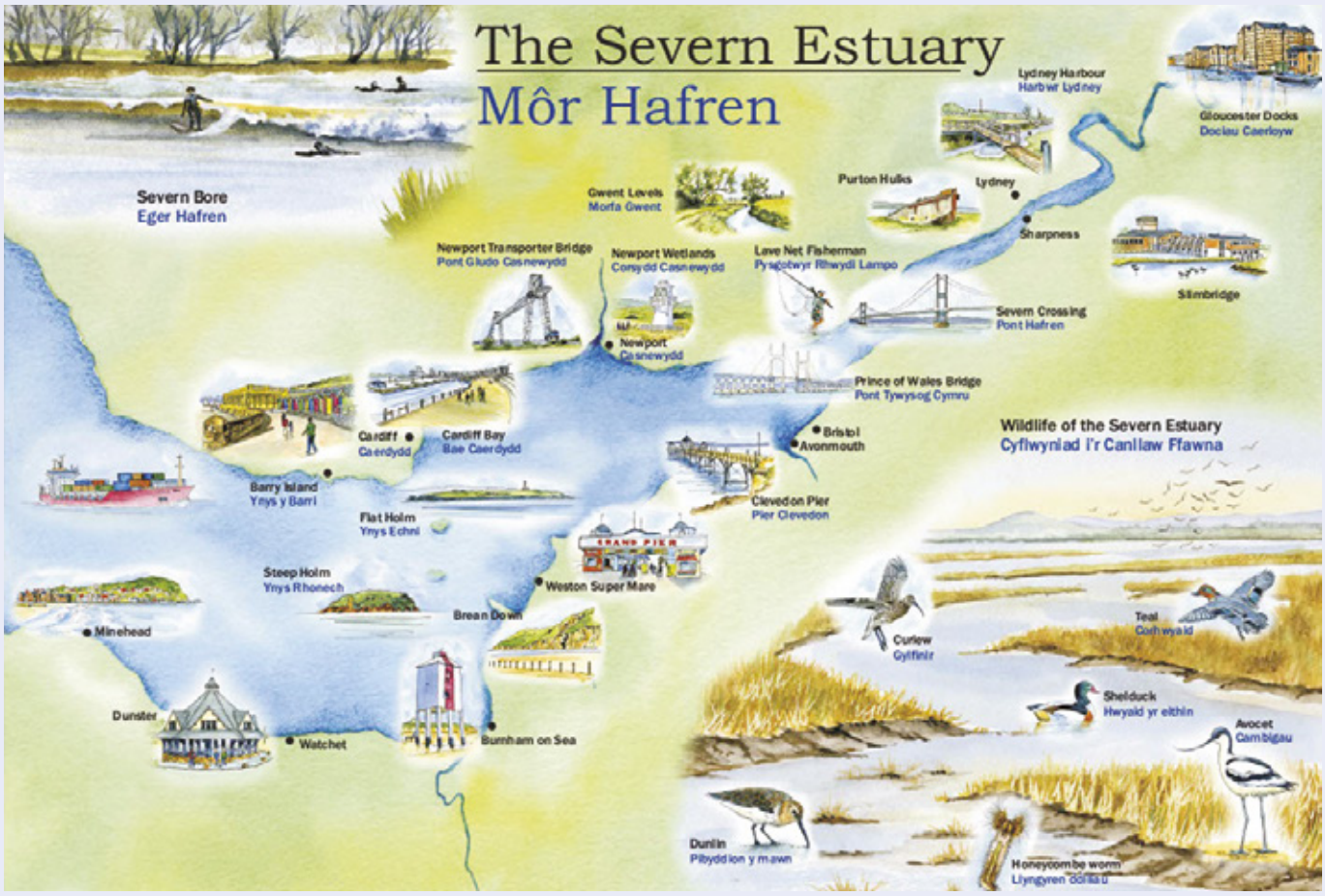
We recommend that the new TAN 15 be implemented immediately; but with due consideration of the impact of this on local authorities. The reduced ability to develop in flood-risk areas must be reflected in reduced Welsh Government (or other) targets for economic development and housing.

Our research into Annual Monitoring Reports from Local Development Plans shows that **1,574** developments were consented in areas at risk of flooding between 2011 and 2023. According to Sustainable Development Indicator 4, from 2013–14 to 2018–19, a total of **2,628** residential units were consented in areas at risk of flooding. Whilst these figures are not directly comparable, they convey uncertainty and unreliability in current methods of collection. A consistent, national approach is needed and this should be done as a matter of urgency in order to monitor the implementation of the new TAN15 and future changes to planning policy.

A move towards integrated regional/local catchment partnership working will be accompanied by a cultural shift in which the public expect a leading role in local decision making and informing resilience and recovery efforts. These partnerships would be similar to those established in 2013 by the UK Government in the Catchment Based Approach (CaBA) policy framework.

The UK framework provides a range of ideas and suggestions to encourage collaborative working across the catchment, rather than being a prescriptive method for setting up local initiatives, which we believe should be followed in Wales. Funding would be allocated to each catchment to support the establishment of the partnership, and our proposed Water Commissioner would be able to step in should there not be a 'local offer to work at the catchment scale' to ensure all partnerships were implemented.

Case Study | Severn Estuary Partnership



The Severn Estuary is the UK's largest coastal plain estuary. It has over 110 fish species, a winter-feeding ground for 100,000 birds, is nature-protected in designated areas, and has the largest tidal range in Europe, all surrounded by iconic landscapes.

The Severn Estuary Partnership (SEP) is an independent initiative that is hosted by Cardiff University. It was set up in 1995 to work with local stakeholders in promoting a sustainable approach to the planning, management, and development of the Severn Estuary for all who live and work around the estuary. The partnership's aims include:

- Establishing and embedding a set of 'common principles' for sustainable estuary use via Partners' strategies, policies and action plans
- Acting as a coordination body to assist the effective and efficient delivery of agreed estuary-wide actions
- Adding value and filling gaps in effective estuary management, providing extra capacity when required
- Facilitating effective communication across and between organisations, individuals and borders
- Promoting and publicising the estuary at local, national and international levels

- Identifying and delivering project work that contributes to the evidence base for decision-making and supports those who have an interest in the Severn Estuary

The SEP is an independent, non-statutory organisation which relies on the support and active participation of its members as well as a range of individuals and other organisations. The partnership approach was first outlined in the first Severn Estuary Strategy, published in 2001. This set out a practical framework for collaborative working.

The SEP has evolved, bringing the relevant groups, organisations, and local authorities into the discussions for the Severn Estuary. There is one team working collectively on issues, factoring in the priorities of different groups and collaborating on project development for stakeholder engagement. The SEP acts as an umbrella for estuary-wide partnerships working across both sides of the border.

The SEP's independent status means they can facilitate the necessary discussions, on topics including marine planning and biosecurity. There is a small team behind the partnership which meets weekly which ensures everyone is aware of what is happening across the estuary and the partnership. This means that everyone is automatically linked into estuary-wide discussions.

Severn Estuary

Collaboration, partnerships and community

Recommendation 6

Establish a new Water Resilience Forum for Wales by 2027 to encourage multi-agency working and support communities to both manage flood events and develop long term resilience. The Forum will:

- Support the creation of community resilience groups by 2028.
- Explore what funded, independent roles for 'Agents of Change' could look like in communities. Their role would be to work with communities at risk to build capacity, raise awareness and develop "grassroots" community flood resilience plans, drawing on a designated funding pot and pool of technical engineers and flood specialists for support.
- Investigate the provision of independent home flood assessments, offering advice on flood resilience adaptations and plans to householders.
- Establish a national resource sharing mechanism by 2027 that will support and scale pilot projects and examples, learning from successful case studies and current catchment projects such as the Conwy Catchment to demonstrate integrated approaches.

Recommendation 7

Streamline FCERM plans into catchment resilience strategies by 2026.

Recommendation 8

Involve communities in decision-making processes related to flood resilience. Explore the establishment of Citizen Juries or Citizen Assemblies by 2027 to provide a framework for new governance models, empowering communities to assemble and actively contribute to resilience efforts.

- Working with community representatives, review how to ensure inclusivity and diversity in decision-making around resilience and adaptation and information sharing to consider all demographics, including ethnic minorities and vulnerable populations, ensuring that flood management practices are equitable and just.
- Communities should be empowered and enabled to play a monitoring role by engaging in citizen science.

The sentiment coming across throughout our research points to the situation that the current way of managing floods involves separate efforts and fragmented plans, leading to inefficiencies and a lack of collaboration to deal with flood risks effectively. The existing FCERM plans are also not well coordinated, making it more challenging to respond to flooding events.

However, the proposal to create partnerships of different groups based on catchments by 2026 offers a new way of working. By working together, sharing knowledge, and coordinating actions, these partnerships can improve flood resilience in Wales.

Furthermore, the absence of a national forum to promote cooperation among local authority groups and other organisations based on river catchments is creating missed opportunities for collaborative funding and resource allocation. This is a significant barrier to delivering the climate resilient infrastructure projects that are needed across Wales. Such Forums already exist in Scotland and England and we believe that this model could be adopted in Wales.

Presently, community-led efforts for flood resilience lack structured support and dedicated funding, resulting in varying levels of preparedness across regions. In contrast, the recommended establishment of community resilience groups with allocated funding and technical support can empower communities to develop customised resilience plans, fostering a more unified and proactive approach towards mitigating flood risks.

The Workstream 3 report comments that: *"these groups should focus on empowering communities to actively participate in resilience building and risk mitigation efforts. The Pembrokeshire Coastal Forum's innovative approaches, such as using QR-coded posts for real time environmental monitoring, exemplify how community engagement can significantly contribute to understanding and managing local environmental challenges".*

Setting up a national mechanism for sharing resources and good practice in FCERM by 2027 highlights the importance of collaboration and learning from each other. This forum could spark innovation, promote learning, and expand the reach of flood management efforts. Through shared knowledge and collective efforts, stakeholders can better tackle flood resilience challenges.

There are already current models for this existing in Wales. Our Workstream 3 report comments that they could build: "on the success of platforms such as The Flood Hub, and its Knowledge Hub, established by the North West Regional Flood and Coastal Committee, which provide a model for effectively pooling and disseminating valuable FCERM resources and information. Initiatives could be led by the Welsh Government with support from the Welsh Local Government Association." (Workstream 3 report, page 42 refers).

Merging Flood and Coastal Erosion Risk Management plans into catchment resilience strategies by 2026 signals a shift towards more organised and effective planning than we currently witness. This alignment of plans can lead to better resource management, enhanced collaboration and coordination, and increased readiness to face flooding risks. The move towards integration promises a more streamlined and strategic approach, replacing disjointed practices with a unified strategy for resilience.

Our Workstream 2 report examined this process in detail and explored how this might work in practice:

Following the proposed update and delivery of a Flood and Coastal Erosion Resilience Strategy, NRW, LLFAs, DCWW, IDDs and Local Planning Authorities should work in partnership to produce collaborative, strategic catchment-level strategies that address all sources of flood risk. These would be at the Water Framework Directive Management Catchment Level.

The size of these catchments in Wales is large enough to add strategic value but small enough to create a meaningful plan that will encourage and support local engagement and action. There are 19 Management Catchments in Wales. These plans should align with the national resilience strategy, setting out a plan to improve resilience to flooding over the long term (50–100 years), considering the impacts of climate change and other pressures within catchments. Some of the catchments cross the English/Welsh border, and therefore as per the FWMA 2010, cooperation with the Environment Agency and LLFAs in England would be required to ensure the whole catchment is considered.

The Catchment Resilience Strategies would replace local flood risk management strategies that the FWMA currently requires. The changes from current flood risk management will need to be reflected formally in a change to the FWMA. This is crucial to the success of these strategies, as previous attempts have been thwarted by RMAs not having the capacity due to catchment-level plans being required in addition to their statutory responsibilities.

The existing process of Strategic Flood Consequences Assessments should be incorporated into the catchment resilience strategies from the outset to maximise compatibility and alignment with local plans. Shoreline Management Plans (SMP) should remain separate documents, but the FWMA should require that SMPs and the Catchment Resilience Strategies are aligned and give due regard to one another in the sections addressing tidal flooding. This will be particularly crucial in catchments such as the Severn and the Rhymney, where there are significant tidal effects on rivers and estuaries. There could be an opportunity to absorb SMPs into the Catchment Resilience Strategies in the future, however, initially, they should be kept separate to avoid them becoming too unwieldy.

RMAs should then each develop delivery programmes aligned with the catchment resilience strategies and in accordance with their statutory responsibilities. These will outline key schemes and initiatives that deliver on the resilience objectives set out in the catchment strategies. Progress should be monitored and reported through NRW's Section 18 reports, which are subject to review by the FCEC. Catchment partnerships, key landowners and the farming community should be key partners in the development of the overall strategies and the subsequent delivery programmes.

Workstream 2 Report, page 33

Moreover, the lack of inclusivity in decision making processes related to flood resilience efforts poses a challenge as community representation may be limited, potentially neglecting the perspectives of vulnerable populations. In contrast, the proposal to establish Citizen Juries or Assemblies aims to empower communities to actively participate in resilience efforts, ensuring diverse voices are heard and leading to more equitable and impactful decision making processes that consider the full range of community viewpoints.

Workstream 1 examined this work and commented that forums could "bring together broad disciplines supported by inclusive public representation to co-ordinate integrated catchment responses across the water environment. This could include the use of Citizens Juries, including a Youth Jury, to convene local groups to influence decisions about climate change adaptation for their community." Our research included the example of a community jury on climate change in Bude. Our work in 2024–25 will investigate these concepts further, including the possibility of using them to communicate the impacts of climate change to communities.

Nantgarw, after Storm Dennis, 2020

Funding and capacity

Recommendation 9

Set up a new cross-sector climate change adaptation and resilience fund by 2026 with a focus on nature-based solutions to:

- Fund and establish the Water Resilience Forum for Wales.
- Provide funding to community groups to invest in flood resilience.
- Support NRW to develop a national approach to catchment partnership funding including large public and private sector estates, infrastructure providers and green finance initiatives.
- Integrate with the new funding approach for the Sustainable Farming scheme (SFS).

Recommendation 10

Extend and align the current FCERM investment programme by 2026, scaling up investment in Natural Flood Management (NFM) schemes whilst also maintaining ring-fenced funding for flooding. Long term funding and resource needs to:

- Address current funding shortfalls, align flood resilience efforts with other government departments, and move towards 5 year budgets. Cycles to better fit long term environmental and resilience needs.
- Support sustained funding increases in staff, capital and maintenance funding for Welsh Government, NRW and local planning authorities to meet current and future requirements and challenges.
- Explore a range of funding such as implementing local levies through taxation to fund flood risk management efforts (local Levy and Drainage Districts are existing mechanisms, but wider application in Wales is novel and politically complex).

Recommendation 11

Explore and diversify funding sources by 2030 to offer an alternative to conventional funding streams:

- Pilot crowdsourcing and philanthropic funding, aligning with local levies, to supercharge long-term capital investment in flood resilience measures.
- Develop a business case for investment in flood risk management through Corporate Social Responsibility (CSR) and Environmental Social and Governance (ESG) initiatives.
- Introduce the concept of Nature Finance (biodiversity/carbon) credits to support flood resilience efforts. Explore a potential role for the Development Bank for Wales in funding and supporting flood resilience and related projects.
- Collaborate with the insurance sector to explore flood risk mitigation funding for the most vulnerable communities.

Recommendation 12

Set up a taskforce by 2027 to explore how the uptake of nature-based solutions can be scaled and landscapes can be adapted to a future climate – this could include the exploration of how funded landowner partnerships or catchment-scale land-use strategies could be created to enable landscape scale adaptation.

Recommendation 13

Welsh Government to provide subsidies to private homeowners who are in receipt of benefits to build flood resilience at the property level including:

- Incentives for installing flood resilience measures in homes and businesses (eg discounts on insurance premiums, VAT-free schemes, group-purchase discounts in Business Improvement Districts).
- NEST-type scheme for flood resilience modifications, such as installing air vent covers, doorway barriers and water butts in homes, targeted at private rented and socially rented homes, and/or those on low incomes in high risk zones.

Our recommendations on funding, capacity and implementation of flood resilience measures are designed to address the complexity of the current funding situation around flood management in Wales and seek to provide practical solutions on these issues to make the situation fit for the future. We have found that there is an overall lack of funding for flood management schemes, with too many different funding pots which are difficult to combine, available on a short-term basis and are not set up to promote the delivery of nature-based solutions.

A lane near Pontypridd

Establishing a cross-sector fund encourages collaboration across different sectors, leveraging expertise and resources to address flood risks more effectively. A dedicated nd would ensure that resources are available to support the collective effort of adapting to climate change. This fund could address the significant need for financial and human resources by providing a steady stream of investment for long-term nature-based solutions.

A new fund would support this by pooling resources from various sectors. Coordinated efforts at various levels are crucial, and funding initiatives that promote integrated management can help tackle flood risks comprehensively. Current funding gaps can be filled by a dedicated fund, ensuring continuous support for necessary infrastructure and initiatives. Integrating funding with sustainable land use practices promotes nature-based solutions that contribute to flood resilience.

Long-term, consistent investment is needed to achieve the goal of a flood-resilient future. Aligning the FCERM investment programme with other government initiatives ensures a cohesive strategy, maximising the impact of investments. Extending the programme with a focus on resource needs could help to address current funding shortfalls.

"Financially, the sector grapples with difficulties associated with annual funding cycles, the end of ring-fenced funding for flooding, and the inefficient allocation of resources, hindering long-term strategic planning and execution of flood management initiatives. This is exacerbated by a reliance on reactive approaches and grey infrastructure, requiring significant maintenance, stretching already constrained workforce capacities, and limiting the exploration of nature-based solutions to flooding".

Workstream 3 Report

Achieving long-term goals requires sustained financial support, and extending the FCERM programme will ensure ongoing investment. Scaling up natural flood management schemes is crucial, and this recommendation ensures increased funding for such schemes while maintaining funds for traditional flood management. Moving towards multi-year budget cycles allows for better planning and resource allocation. It also enables the development of skills and allows people to build careers by making long-term employment in the sector more achievable. Aligning investment programmes with land use planning promotes sustainable development that is resilient to future flood risks.

Crowdsourcing and philanthropic funding can provide additional resources for flood resilience schemes. Piloting new funding models can attract diverse investments and provide proof-of-concept for scaling successful initiatives. Engaging with green finance initiatives can support large-scale projects. Collaborating with the insurance sector to explore funding for flood risk mitigation ensures financial resources for vulnerable communities.

A taskforce focused on scaling nature-based solutions would ensure that they are implemented effectively across different regions. Targeted efforts to promote nature-based solutions are necessary, and a taskforce can coordinate these efforts effectively.

Identifying good practices and overcoming barriers to implementation are crucial, and a taskforce can facilitate this process. A taskforce can ensure that resources are effectively allocated to projects offering the greatest benefits. Integrating nature-based solutions into land use planning requires coordinated efforts, and a taskforce can facilitate partnerships and strategies to adapt landscapes to future climate challenges.

Golf Club in Clydach, Swansea, September 2023

Case Study Rainscape

RainScape is DCWW's approach to managing surface water and reducing sewer flooding by separating rain water from the existing system, slowing down the rate it enters the network and by redirecting it to local rivers and watercourses, and in some cases, removing it completely. It helps reduce sewer flooding and pollution.

The RainScape work was particularly needed in Llanelli as the area sees almost as much storm water in its network as Swansea, despite the fact that Swansea serves three times the number of properties, and three times the area compared with Llanelli.

With the help of contractor partners, 36 RainScape projects have been completed in the Llanelli area since the project was launched in 2012. This has involved laying around 14 miles of new pipework and kerb drainage, tunnelling just under one mile underground to create rainwater sewers and planting almost 10,000 plants and trees in swales, planters and basins.

RainScape catches rainwater and slows down the speed at which it goes into our sewer network.

Basins and planters
Shallow basins, often filled with plants, catch and clean the water that runs from roofs and road.

Swales
Long, shallow channels, often filled with plants and trees, catch, slow down and clean rainwater.


Parkview Terrace, Llanelli

Porous paving
Paving with lots of tiny holes which allow water to pass through and soak into the ground, rather than running straight into our sewers.

Grass channels
Long strips of grass that can be put on streets to help absorb rainwater.

Underground storage
Underground storage boxes which catch water during heavy rainfall before either soaking into the ground or slowly running it into our sewers.

www.corporate.dwrcymru.com/en/community/environment/our-projects/rainscape/rainscape-llanelli

The need for nature based solutions, that go wider than traditional methods of flood management, was highlighted in the Workstream 3 report.

> **The traditional emphasis placed on the construction of grey infrastructure has contributed to a compartmentalised view of flood risk management as solely a civil engineering issue. Shifting towards nature-based solutions and viewing flood management within the broader context of climate adaptation opens funding avenues and the possibility for cross-sectoral coordination. An example of this is reflected in the FCERM funding criteria which NRW noted offered a narrow view of "benefits", focusing primarily on the protection of homes, which constrained potential funding for alternative schemes. Stakeholders recommended that wider or multiple benefits should receive greater weighting in the funding criteria, as they currently receive a lower rank, reflecting this narrow view of 'benefits'.**
>
> **Workstream 3 Report, page 17**

Subsidies for private homeowners least able to afford flood prevention measures encourage the adoption of resilience measures, building flood resilience at the property level. These would work in a similar way to which current home insulation schemes are currently run and would be able to target the most vulnerable in our society with the means to help protect themselves from flood damage. Similarly, mechanisms to protect vulnerable residents in private and socially rented homes should be explored to ensure that flood resilience measures are equitably available to all.

A future view of how different funding models could work in practice is given in our 2050 Vision for resilient roots, which suggests that:

> *"One of the pioneering methods was using autonomous construction systems and reskilled labour paired with open-source, low-cost resilient techniques, allowing local communities to build and retrofit their homes with property flood resilience measures using government support schemes and crowdsourced, Eco DAMs backed, funding."*
>
> **Workstream 1 Report, page 28**

Corwen, close to the River Dee

Awareness, skills and data

Recommendation 14

Increase awareness of flooding and climate change impacts by identifying opportunities to integrate flooding and climate adaptation and resilience into the school curriculums via the Curriculum for Wales. This might include incorporating flood and climate adaptation into the specification of relevant GCSE and A Level courses. In tandem, implement a national education campaign to raise awareness across Wales about flood resilience and adaptation and why it matters to all, providing education on the interconnectedness of agriculture, flooding, and environmental management.

Recommendation 15

Support the development of blue skills and a new discipline for Water Environments by 2028, which captures expertise related to flood and drought resilience and water quality, with a dedicated institute leading research and innovation in this field. This should include the establishment of advanced education 2-year diplomas or degree apprenticeships in climate resilience/FCERM, providing opportunities to retrain people with technical skills in other industries.

Recommendation 16

By 2028 provide training and support for local councillors, town councils, and community councils providing them with the knowledge and skills on flood resilience and enabling them to play a crucial and effective role in representing and engaging with their respective communities.

Recommendation 17

Establish open and transparent access to data by 2028 that are in line with open data governance standards allowing organisations and communities access to open-source data so they understand flood risk better, including:

- Enable technological changes and early-warning systems to be used to alert communities and businesses in areas of potential risk.
- Create accessible data through storytelling, digital platforms and portals, designed to facilitate education, open dialogue and collaboration.
- Create and maintain a register of vulnerable residents locally, linking with other service providers.
- Set up open data repositories for all public data, unless there are overriding reasons why this is not in the public interest.
- Undertake a review to identify river health, biodiversity, and water quality information can be hosted in a central space and communicated/shared with communities and organisations across Wales (e.g. data is accessed through apps or on public interfaces like billboards and information boards).
- Provide an opportunity to monitor TAN15 at a local level.

Porthgain Harbour, Pembrokeshire

The integration of flood resilience education into the Curriculum for Wales and the launch of awareness campaigns are crucial steps in raising public awareness and fostering a culture of resilience. By equipping individuals with the knowledge and skills to address environmental challenges effectively, these actions can lay the foundation for a more informed and proactive approach towards flood mitigation in Wales.

There is a crucial challenge of varying levels of skills across the sector in order to bring about change.

Workstream 3 commented that:

> *"As risk management shifts from traditional grey infrastructure to a more holistic approach, the demand for a broader range of skills, including 'soft' skills, has become increasingly evident. While technical skills in civil engineering remain crucial for constructing and maintaining flood defences, the evolving nature of FCERM requires additional competencies that facilitate collaborative work and community engagement."*
>
> **Workstream 3 Report, page 2**

Nantgarw, after Storm Dennis, 2020

Workstream 1 suggested that there needs to be:

> *"an intergenerational skills & education strategy to support a range of broader life-long skills and apprenticeship models related to stewarding nature, adapting to a changing climate and systems thinking. This could include water system management, regenerative systems, bio-design, biomaterials, AI nature systems, autonomous machines engineering, climate modelling science, resilience expertise, regenerative farming."*
>
> **Workstream 1 Report, page 33**

Part of this strategy will require the Welsh Government to commence funding apprenticeships in this sector. With so many aspects of the built-environment in Wales lacking personnel, skills or thinking about succession planning for future generations, we believe this needs to be grasped quickly to avoid a generational shortage of skilled professionals in Wales.

Furthermore, the absence of specialised training for local representatives in flood resilience hampers their ability to effectively advocate for community needs in flood management strategies under the existing framework. By providing targeted training for local representatives, the proposed actions seek to enhance their knowledge and skills in flood resilience, enabling them to engage more actively and proficiently with communities, thereby driving resilience initiatives at a grassroots level.

Public engagement and the need to address false or misleading information is also raised within the Workstream 4 report. The report cites many incorrect stories in the media which seem to:

> *"love a bad new story" and therefore will represent flood risk in as sensationalist a light as possible. Stakeholders suggested that media coverage also aims to "put the blame on the housebuilder or the Local Authority" for any perceived issues across new development sites, including flood risk.*
>
> **Workstream 4 Report, page 50**

Workstream 4 also gives a unique case-study into how the media mis-repesents good flood protection measures in action:

Penwyllt in Bannau Brycheiniog

Case Study | The Waterfront, Barry Docks – March 2023

High tide leaves huge Barry Docks development partly under water

Worrying pictures showed very high water levels at the sprawling estate on Saturday morning

NEWS By Ryan O'Neill Senior reporter

17:09, 25 MAR 2023 | UPDATED 14:50, 26 MAR 2023

Bookmark

Pictures on Saturday at 9am showed part of the huge Barry waterfront housing development under water (Image: Beautiful Barry)

The headline and associated image suggests that the development site has flooded during construction.

It is thought the dwellings across the site did not, in reality, flood as a result of the high tide. However, the perception and angle of the article photograph makes it appear as though flood water entered the properties.

The article reports that local residents are concerned about water levels across the docks, relating this to naturally high spring tides.

The planning application for the site is accompanied by a Flood Consequences Assessment demonstrating that the site complies with the tests as set out in TAN-15.

The FCA was prepared in 2009, setting out the modelled design water levels across Barry Docks for the lifetime of the development (100 years of climate change).

Across the development proposed dwellings are predicted to be flood free in all design events, whilst areas of open public space are permitted to flood during high tide events.

Engagement with stakeholders and research into the associated planning approval provided additional information to give further context to this flooding event.

In reality, the development reflects a design which addresses a need for housing and regeneration of a post-industrial area, whilst incorporating the amenity value of waterside development, historic structures and future climatic conditions.

The development provides an opportunity for revitalising a historic location and brownfield site, contributing to housing needs in a sustainable way.

The media coverage of this event is likely to contribute to negative public perceptions of developments in flood risk areas, as opposed to taking the opportunity for education and awareness training.

Concluding Remarks

This report highlights the critical importance of building resilience to flooding in Wales by 2050. Sustainable and resilient solutions to flood risk management will only be achieved by integrating nature and community as cross-cutting components of a long-term strategic approach. Nature-based approaches and community engagement will also better enable flood management strategies to be tailored to local needs, leading to better preparedness, faster response times, and more effective recovery efforts. We consider these two themes to be integral to the delivery of all our recommendations.

Our report also emphasises the need for strategic and spatial responses to flooding; for adequate funding and workforce requirements; and for effective land use planning to mitigate flood risk. The evidence we collected demonstrates that collaboration, partnerships, and community engagement are essential for successful flood resilience strategies. By fostering collective decision-making and inclusivity, communities can participate in a meaningful way to build resilience and adapt to the impacts of climate change.

Collectively our recommendations envision a future where Wales is a centre of excellence for flood resilience and adaptation. Wales will be a leader in the use of predictive data and emerging technology, with transparent access to data supporting effective flood risk management. Education, training, and skills development will play a crucial role in empowering action and building resilience at both individual and community levels. By investing in education and strengthening communities, Wales can create a sustainable and resilient future for generations to come.

Our report underscores the importance of collective action, innovative solutions, and proactive measures to address the challenges of flooding in Wales. By implementing our recommendations, we can work together towards a more resilient future.

Conwy Valley with Llanrwst in the foreground looking north

Appendix A: Testing the Recommendations against our Framework

We have qualitatively tested the recommendations against our framework which consists of:

- The Well-being of Future Generations Goals
- The Nature Emergency
- The Climate Emergency
- The Socio-Economic Duty
- Long-term considerations.

The well-being goals within the Well-being of Future Generations Act

We have not carried out an in-depth impact analysis of our recommendations on each of the Well-being Goals, but we note the following contributing factors.

Goal	Assessment
Prosperous Wales	Developing skills to respond to current and future climate risks is highlighted within our recommendations. Acting on climate change and recognising the limits of the global environment is a key element of our work.
Resilient Wales	Nature is an overarching theme of our report highlighting the need to move towards natural flood management to support long term resilience. Enabling communities and places to become resilient to flooding will support this goal by supporting "healthy functioning ecosystems that support social, economic and ecological resilience and the capacity to adapt to change".
More Equal Wales	Supporting communities to become resilient, and being sensitive to their socio economic circumstances, is a key element of our report.
Healthier Wales	There is evidence that flooding is leading to increased anxiety and mental health issues in communities. Although our report doesn't specifically consider this goal, our recommendations should positively support people's physical and mental well-being.

Goal	Assessment
Wales of Cohesive Communities	Our flooding recommendations aim to enable safe, viable, resilient communities supported by resilient infrastructure. Communities are at the heart of our recommendations and, alongside nature, are at the cornerstone of our proposals.
Wales of Vibrant Culture and Thriving Welsh Language	We have sought to engage Welsh communities bilingually in our work and have enlisted the support of creatives to help express our vision in a visual way.
Globally Responsible Wales	Our recommendations will mean that Wales will be ready to adapt to the risks of a changing climate and these changes can be shared with the world. We are also always looking for experiences from elsewhere to inform our work.

Nature Emergency: The use of nature as an overarching theme recognises the critical role it plays in supporting communities and infrastructure resilient to impact of climate change. We have encouraged the use of nature-based solutions wherever possible and, by thinking about flooding in a holistic, catchment-based way, can help to address the current siloed approach to thinking. If our recommendation on Nature being a stakeholder or board-member are carried forward, this will become the remit of every public sector organisation in Wales, to make nature integral to all decision making.

We therefore consider that our recommendations are strongly consistent and support addressing the nature emergency..

Climate Emergency: Flood risk is one of the key risks faced by communities and infrastructure as a result of a changing climate, which means that flood risk management is one of the key methods by which the people and communities of Wales are able to adapt to the changes occurring due to climate change. We believe that our recommendations are directly aimed at tackling the climate emergency which we all face.

The socio-economic duty: The socio-economic duty requires public bodies to ensure equality of outcome, rather than just equality of opportunity.

We believe that our recommendations are linked to supporting this duty, through our support for community integration into the decision making process, as well as our support for community development, partnerships, information sharing and training.

Long-term considerations: A number of our recommendations are specifically aimed at addressing current short-sightedness of policy and regulation within flood management, particularly on the strategic approach to flooding in Wales, and the long term coordination of funding and collaborative working. The NICW vision seeks to set out our goals for the flooding framework in Wales by 2050, with many of our recommendations requiring action in the short term to embed this framework by that date to ensure we are ready for these future challenges.

Appendix B: Workstream 1 Recommendations – The 2050 Vision Report

This report was produced by Arup.

Overarching Recommendations:

- Wales should develop an anticipatory culture of futures and systems thinking in the government and across communities. We need capacity to think about the long-term impacts of near-term decisions, understand future uncertainties around climate, and adapt strategically through imagining what alternative futures could look like. Understanding the root causes of flood risk and lack of resilience will be key and ensuring a just transition that supports all communities.
- Demands for resources and skills will ever increase. Success will rely on long-term, sustained support, implemented at pace.
- The government and agencies should empower all communities to contribute actively, build a culture of mutual engagement with easy-to-follow language, creative forms of engagement, transparent planning for the future and processes like citizen assemblies or juries. This will enable communities, alongside government and organisations, to shape and plan better for their future.
- The Welsh Government should build upon this work to challenge, refine and continually shape a nationwide vision for a future Wales for 2100 and beyond. Shaping futures is an iterative, multi agency effort, with wide-ranging resourcing needs. It should be pursued in a structured way, following the Wellbeing of Future Generations Act as a guide.

Appendix C: Workstream 2 Recommendations – Strategic and Spatial Responses Report

This report was produced by JBA Consulting.

1. Develop a National Flood & Coastal Erosion Resilience Strategy.
2. Streamline FCERM plans into catchment resilience strategies.
3. Set up a framework for catchment partnerships.
4. Establish a Ministry of Climate Change.
5. Set up a cross-sector climate adaptation fund.
6. Extend and align the FCERM Investment Programme.
7. Review and declutter plans, strategies and forums across the spectrum in Wales
8. Strengthen the role of existing regional flood groups and coastal groups
9. Create NRW catchment coordinators
10. Create a national catchment partnership body/hub
11. Enable positive collaboration between FCERM and the farming community

Beddgelert, Gwynedd

Appendix D: Workstream 3 Recommendations – Resources Report

This report was produced by Miller Research.

Short term (1–2 years)

1. Maintain ring-fenced funding for flooding.
2. Issue climate adaptation and flooding guidance for local authorities.
3. Review terms of reference for three regional working groups to support deeper collaboration.
4. Establish an FCERM resource sharing forum.
5. Gather evidence of efficacy of nature-based solutions for different types of flooding.
6. Ensure development/planning payments cover the cost of flood mitigation work.
7. Support the creation of community resilience groups.
8. Review legislation around power and responsibilities over flooding.
9. Assess council tax contributions to start a local levy for FCERM.
10. Compile a list of projects completed, projects deferred and future projects to understand the scale of infrastructure funding, including anticipated maintenance costs.
11. Provide funding to community resilience groups to invest in community flood management.
12. Empower local authorities to compel private owners of assets to maintain or upgrade them.

Medium term (2–5 years)

13. Underpin collaboration established in short-term section with legislation to ensure adequate prioritisation.
14. Make climate change adaptation a statutory duty, and link directly to flooding.
15. Develop a National Adaptation Policy which includes resilience measures and framework.
16. Support NRW to develop a national approach to partnership funding including, large public sector estates, large private sector estates, infrastructure providers and green finance initiatives.
17. Integrate FCERM and climate change adaptation into the school curriculum.
18. Create, or utilise an existing, multi-functional land use framework for Wales. Use the land use framework to coordinate land use decisions and ensure an adequate supply of public funding contributions to flood protection between different sectors.
19. Welsh Government to provide subsidies to private homeowners to build flood resilience and management at the property level.
20. Establish advanced education 2-year diplomas or degree apprenticeships in climate science/FCERM.

Long term (5–10 years)

21. Prioritise nature-based solutions and natural flood management to reduce the exponential growth of infrastructure development and maintenance.
22. Collaborate with the insurance sector for flood risk mitigation funding.

Appendix E: Workstream 4 Recommendations – Land Use Planning

This report was produced by JBA Consulting.

1. The current approaches to collecting planning performance statistics for flood risk is inconsistent and often lacks verification. The implementation of the new TAN-15 provides the ideal opportunity to establish a new nationally consistent planning performance flood metric which considers all sources of flooding. Alongside this, it may be beneficial to introduce changes to the planning application forms to simplify and provide consistency in data capture.
2. To simplify the process and improve data quality and consistency, utilise existing OS AddressBase products to quantify new development within the flood risk areas.
3. Align work to quantify new development in flood risk areas with similar work currently undertaken for National Wellbeing Indicator 32, and other climate change indicators, to provide greater consistency and efficiency in flood risk metrics.
4. Opportunities should be sought for collaborative working, led by NRW in their strategic oversight role, to raise awareness and understanding of flood risk and resilience; with the aim of positively reshaping public perceptions and encouraging engagement with flood risk activities.
5. Welsh Government should consider the benefits and value of determining an All Wales cost to the public purse of responding to flood events. It is suggested that relevant data to inform the calculation of an All Wales cost could be sought through the Section 19 flood investigation obligations held by Lead Local Flood Authorities.