

Flooding and Coastal Erosion Research Briefing

November 2023



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Research Briefing

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Contents

Introduction	1
Brief legislative context.....	1
Welsh policy context	2
Government commitments	2
Flood risk	3
What leads to flooding?.....	3
Responsibility for flood risk	3
Current flood and coastal erosion risk	4
Managing flood risk	5
Natural Flood Management.....	5
Urban flood management.....	6
Coastal defences	7
Warning systems	7
Flood response	7
Recent flooding	9
Storms Ciara and Dennis	9
Reviewing the response to the floods	9
Future flood risk.....	10

Funding 11

Welsh Government Budget..... 11

 Natural flood management funding 12

 Coastal risk management funding 12

Emergency flood relief funding..... 12

Key Sources 13

Introduction

The Flood and Water Management Act 2010 defines a flood as “any case where land not normally covered in water becomes covered in water”, and coastal erosion as any instance of the erosion of coast.

Flooding and coastal erosion are natural processes, but human actions can dramatically increase the risk they pose, a risk which is currently one of the highest priorities on the **UK’s National Risk Register**. It is estimated that **245,000 properties are currently at risk** of flooding from rivers, the sea and surface water, and around **400 properties are also at risk from coastal erosion**.

Coastal and estuarine communities and environments are **particularly susceptible to flooding**, and with 60% of Wales’ population living on or near the coast, flooding is an increasing risk for Welsh communities. Whilst it is not possible to prevent all flooding and coastal erosion, risks can be managed and in doing so, the impacts on vulnerable communities can be lessened.

Brief legislative context

The **Flood and Water Management Act 2010** (hereafter, the Act) received Royal Assent on the 8 April 2010. It updated existing legislation that governed flooding and coastal erosion in England and Wales, with a small number of provisions applying in Scotland.

The Act provides powers to, and makes requirements of, the Welsh Government, Natural Resources Wales (NRW) and Local Lead Flood Authorities (LLFA). It places a duty on the Welsh Government to produce a national strategy on flood and coastal erosion, and on NRW to report to Welsh Ministers on progress implementing the strategy.

The **Environment (Wales) Act 2016** amended the Act to replace regional flood and coastal committees with a new body; the **Flood and Coastal Erosion Committee**. The Committee is independent advisory body to the Welsh Ministers on all flood and coastal erosion risk management (FCERM) matters in Wales. Membership of the Committee represents a number of sectors and organisations, including NRW, universities, local authorities, and the Water industry.

Welsh policy context

The Welsh Government published its **National Strategy for Flood and Coastal Erosion Risk Management in Wales** (hereafter the National Strategy) in October 2020. It is the second iteration of the National Strategy, replacing the version published in 2011.

It provides a framework for FCERM, setting out how the Welsh Government intends to manage the risks from flooding and coastal erosion across Wales. It has an overarching aim “to reduce the risks to people and communities from flooding and coastal erosion”, to be delivered through five objectives:

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

The National Strategy states that these objectives are focused on the activities of the **‘Risk Management Authorities’** – those responsible for FCERM **as defined in the Act**. The **National Strategy** takes a:

... longer-term, strategic view, recognising the nature of flood and coastal erosion risk with respect to the challenges of climate change. In this way, it will work alongside other strategic plans for shoreline management, infrastructure and planning to set out the direction we want to take.

Under **section 18 of the Act**, NRW must make **reports on the progress of the National Strategy** to the Welsh Ministers. The reports must include all aspects of FCERM undertaken by the Risk Management Authorities.

Government commitments

The Welsh Government’s **Programme for Government** has commitments to:

- fund additional flood protection for at least 45,000 homes; and
- deliver nature-based flood management in all major river catchments to expand wetland and woodland habitats.

Additionally the **Welsh Government and Plaid Cymru Co-operation Agreement** includes joint commitments to:

- commission an independent review of the local government section 19 and

NRW reports into extreme flooding in winter 2020-21; (more on section 19 reports below) and

- ask the National Infrastructure Commission to assess how the nationwide likelihood of flooding of homes, businesses and infrastructure can be minimised by 2050.

Flood risk

What leads to flooding?

Flooding can be broken down into three source categories:

- Pluvial (from surface water) – occurs when rain water is stopped from entering the ground, usually resulting from impermeable surfaces, steep slopes or saturated soil. Water is forced to pond, flow over land and gather in low lying areas;
- Fluvial (from river) - occurs when a watercourse can no longer hold the amount of water entering the system and it overflows; and
- Tidal (from the sea) – usually occurs when high tides combine with severe weather, causing storm surges and large waves.

The likelihood of flooding or coastal erosion occurring is dependent on a number of factors. Flooding is most dependent upon weather patterns, geology, topography, land use and the height of land above sea level.

Coastal erosion is mostly dependent on prevailing sea conditions, sea levels, wave height and intensity, frequency and severity of coastal storm events, the amount and type of material on a beach and the geology and topography of the coastal area. It normally occurs in response to the action of waves or tides, drainage, or the removal of sediments from the coastal area.

Coastal erosion can be long-term, resulting in permanent loss of rocks and sediment, or be short-term, resulting in temporary redistribution of coastal sediment.

Responsibility for flood risk

Section 6 of the Act defines the roles and responsibilities of 'Risk Management Authorities'. In Wales these are NRW, all 22 Welsh local authorities (who act as LLFA), highway authorities, and water and sewerage companies. There are other bodies

that have a non-statutory role in FCERM, including private landowners and owners of infrastructure assets such as Network Rail and the National Trust.

The Act also places a duty on local authorities to develop and implement Local Flood Risk Management Strategies. The local strategies set out objectives for managing local flood risk from surface water, groundwater and ordinary watercourses, and must align with the National Strategy.

Current flood and coastal erosion risk

NRW reports that 245,000 properties are at risk of flooding in Wales, and states that a number of these properties are at risk from more than one source of flooding.

The **EU Floods Directive (2007/60/EC)**, which has been transposed into UK law through the **Flood Risk Regulations (2009)**, requires 'flood risk areas' to be identified through **Preliminary Flood Risk Assessments (PFRA)**. These are "**areas where flood risk is significant to human health, the economy or the environment, including cultural heritage**". Working with the Welsh Government, the Welsh Local Government Association (WLGA) and LLFAs, NRW has identified **nine flood risk areas**:

- Monmouthshire;
- Newport;
- Cardiff;
- South Wales Valleys;
- Swansea Bay;
- Gwynedd;
- North Wales Coast;
- Flintshire; and
- Wrexham.

NRW has created **national flood hazard and risk maps**, which are used to inform the creation of **Flood Risk Management Plans (FRMP)**. FRMPs are currently published for the **period 2015-2021** on a river basin district scale by NRW, and on a local scale by each LLFA. **Updated FRMPs were consulted on in March 2023.**

The latest **National Coastal Erosion Risk Management Map** shows both the rate of coastal erosion and the cumulative distance of coastline location change for the

short-term (2005-2025), medium-term (2025-2055) and long-term (2055-2105). Over the next 100 years, it's **estimated that over 2,000 properties** in Wales are at risk from coastal erosion, assuming there is no active intervention.

Managing flood risk

Traditionally FCERM approaches have been centred on the principles of drainage and defence. However the **National Strategy** now takes a 'risk management approach' which,

...encourages wider resilience, prevention and awareness of risk so that better decisions can be made, both by the public and those with an influence on how land and water is managed.

One of the key changes in the current National Strategy is the promotion of natural measures and catchment approaches.

Natural Flood Management

The National Strategy has been developed in light of the **Welsh Government's Natural Resources Policy** and gives support to Natural Flood Management (NFM).

By working with natural processes, NFM is a way of using **nature-based interventions to manage flood risk**. It's an approach which takes a catchment-wide view and tries to enhance, restore, and mimic natural processes.

Examples of NFM include:

- Tree planting;
- Offline storage areas;
- In-stream obstructions;
- Sustainable drainage systems;
- Soil and land management;
- Dune and beach management; and
- Creation of new wetlands.

NFM may allow certain areas of the catchment to flood to reduce risk in other areas. This can be done by altering the catchment characterises to store water at certain locations, or slow the flow of water and reduce surface runoff. The importance of natural resources in tackling flooding is highlighted in the **State of Natural Resources Report 2020**.

NRW has produced **maps to identify potential areas for working with natural processes** to reduce fluvial risk. The maps identify areas for:

- Floodplain reconnection;
- Run-off attenuation features and gully blocking; and
- Woodland planting covering floodplain planting, riparian planting and wider catchment woodland.

Urban flood management

The **Pitt Review** (on lessons learnt from the 2007 floods) recommended that all new development should be managed by sustainable drainage systems ('SuDS'). SuDS are a form of NFM, designed to reduce the impact of development on surface water drainage by working with natural processes to drain away surface water run-off. This is done by collecting, storing, and cleaning water before allowing it to be released slowly back into the environment.

Flood defences are **conventionally designed to withstand** 1:100 or 1:200 year flooding events (1% or 0.5% likelihood of flooding in a year). However **SuDS are typically designed to withstand 1:33** (3.33% likelihood) events.

The Welsh Government's approach to SuDS is set out in its 2015 **Water Strategy for Wales**. Since January 2019, through **Schedule 3 of the Flood and Water Management Act 2010**, there has been a **mandatory requirement for SuDS** on developments containing more than one building and/or a total size greater than 100 square metres.

The Welsh Government has **reviewed the implementation of the SuDS requirements**, and made a **number of recommendations**. One key recommendation is to amend the national SuDS standards for biodiversity, delivering the **Programme for Government** commitment to "legislate to strengthen the requirements for the use of sustainable drainage systems that provide wildlife habitat".

Examples of SuDS includes **Greener Grangetown**; a partnership between Cardiff City Council, Dŵr Cymru and NRW, which prevented water being pumped 8 miles by creating planted areas that to help absorb rainwater, increase biodiversity and provide public green space.

Coastal defences

Following **storms in December 2013 and January 2014** the then Minister for Natural Resources and Food, Alun Davies, asked NRW to undertake a major review of coastal defences.

The **review consisted of two phases**: the first assessed the impact of the flooding, and the second made 47 individual recommendations aimed at improving Wales' resilience to coastal flooding, grouped in six areas:

- sustained investment in coastal risk management;
- improved information about coastal flood defence systems;
- greater clarity regarding the roles and responsibilities of agencies and authorities;
- assessment of skills and capacity;
- more support to help communities become more resilient; and
- delivery of locally-developed plans for coastal communities.

The review was closed in December 2017 with five ongoing actions, which include the development of local adaptation 'toolkit', to assist communities predicted to experience coastal change.

Warning systems

The **Water Resources Act 1991** makes provision for flood warning systems. In Wales these are provided by NRW and give advance warning of the potential risks from river and coastal flooding. NRW's free **Flood Warning Direct** service provides warnings by phone, email or text message, has over **120,000 registered properties**, and covers 348 areas at risk of flooding from main rivers and the sea.

Flood response

The generic response to flooding is summarised in the Welsh Government's **Flood Response Framework**. This document sets out the local, regional and national advice, guidance and key policies on flood response in Wales, acting as a single point of reference for those involved in flood response and the general public.

The Framework is produced by the Wales Flood Group on behalf of the **Wales Resilience Forum**, and is said to be a 'living document' which is reviewed every two years or following lessons learned from incidents. At the time of writing the document was last updated in 2016.

The framework details the arrangements for organisations responding to flood events from a local level up to a national scale. As previously mentioned this is a generic response and is therefore adaptable for local circumstances. Most flooding events are local, and Local Authority flood plans are activated with agreed local arrangements as set out in the plans.

The decision on whether to activate the Pan-Wales Response Plan (as opposed to a local response) is taken by the Welsh Government and category 1 and 2 responders as set out in the framework:

Category 1 responders:	Category 2 responders:
Police Forces	Electricity distributors and transmitters
British Transport Police	Train Operating Companies
Fire Authorities	Airport Operators
Welsh Ambulance Service NHS Trust	Harbour Authorities
Local Authorities	Water and Sewerage Undertakers
Port Health Authorities	Network Rail
Health Boards	Gas distributors
Public Health Wales	Telephone Service Providers
Natural Resources Wales	Trunk Road Agents

NRW has information for the public on [**what to do before, during and after a flood**](#). It says that it issues three types of flood warnings to help people prepare for flooding:

- Flood Alert - Flooding is possible, be prepared;
- Flood Warning - Flooding is expected, immediate action required; and
- Severe Flood Warning - Danger to life.

The flood alerts cover large areas, whereas the flood warnings are more local and community focused alerts. NRW also provides information on how to report flooding and where to get further local information.

Recent flooding

Storms Ciara and Dennis

In February 2020, Wales saw some of the **worst flooding on record from Storms Ciara and Dennis**. The Met Office reported that it had been the **wettest February on record** for Wales.

On 9 February **Storm Ciara** caused flooding across north Wales, **particularly affecting Llanrwst** in the Conwy valley. Winds reached 93mph at Aberdaron on the Llŷn Peninsula, and several sites in Snowdonia saw 50-75% of their monthly rain in 18 hours.

The following weekend of the 15 and 16 February **Storm Dennis hit the UK**. The most affected areas were south Wales and the West Midlands in England. At the peak of the storm there were **61 Flood Alerts, 89 Flood Warnings and two Severe Flood Warnings** in force across Wales. On the morning of 16 February, the River Taff reached its highest levels in 40 years at Pontypridd. The River Wye at Monmouth was 70cm higher than the previous record.

The flood waters resulting from the storms impacted **3,130 properties** across Wales.

Reviewing the response to the floods

Following the storms, NRW reviewed its response and published the **results on 22 October 2020**. Local authorities, acting as 'Lead Local Flood Authorities' (LLFAs) are required to undertake investigations and publish results in line with **Section 19 of the Act** - 'Section 19 reports'.

These investigations help Risk Management Authorities understand the full extent of impacts and can inform improvements to manage risk in a community, including new schemes to reduce the likelihood of further flooding.

In its **updated Programme for Government** (as a result of the Co-operation Agreement), the Welsh Government committed to commission an independent review of reports into extreme flooding.

The **Independent review of the local government section 19 and Natural Resources Wales reports into extreme flooding in winter 2020-21** was published on 31 August 2023. In a **written statement accompanying the report**, the Minister says:

This desk-based review highlights both strategic, policy and practical changes that could strengthen the flood investigation process whilst recognising the limitations within the current framework.

In a **Plenary statement the Minister explained** the review “focused specifically on understanding the investigation process currently in place” and how it was applied in the context of the 2020 severe flooding events. The review identifies area for improvement, and broadly finds a lack of necessary clarity for LLFAs to understand the purpose of a section 19 flood investigation, finding it **subjective and open to interpretation**.

Future flood risk

In April 2019 the then Minister for Environment, Energy and Rural Affairs, Lesley Griffiths MS **declared a climate emergency in Wales**. In the UK, **sea levels continue to rise**, and **extreme weather events are becoming more intense and frequent**, presenting an increasing risk to communities and the natural environment.

Responding to climate change is integral to the **Well-being of Future Generations (Wales) Act 2015** and all of the wellbeing goals. The **resilience goal** specifically highlights the need to adapt to climate change:

A nation which maintains and enhances a biodiverse natural environment with healthy functioning ecosystems that support social, economic and ecological resilience and the capacity to adapt to change (for example climate change).

The risks to communities from all sources of flooding and sea level rise are a research priority in the Welsh Government’s 2019 **Prosperity for all: A climate conscious Wales**, which says that some communities may become unsustainable due to projected sea level rise in the long term.

In June 2021, the UK Committee on Climate Change (UK CCC) published **Progress in adapting to climate change**. It explained that, even with ambitious global emissions reduction efforts, further climate change is inevitable.

An **Independent Assessment of UK Climate Risk** (Welsh summary) also published by the UK CCC in 2021, identifies 26 risks from climate change in Wales that have increased in urgency since the previous **UK Climate Change Risk Assessment** (2017). These include:

- the risk of climate change impacts, especially more frequent flooding and coastal erosion, causing damage to our infrastructure services, including energy,

transport, water and Information and Communication Technologies (ICT);

- increased severity and frequency of flooding of homes, communities and businesses;
- the impact on coastal businesses due to sea level rise, coastal flooding and erosion; and
- disruption to the delivery of health and social care services due to a greater frequency of extreme weather.

The Welsh Government's **Adapting to Climate Change: Guidance for Flood and Coastal Erosion Risk Management Authorities in Wales** is a guide for developers to consider climate change within the development of all FCERM projects or strategies "which should consider credible and reasonable climate change impacts".

Funding

Welsh Government Budget

During the previous Senedd term, the Welsh Government **invested £390 million** in flood and coastal erosion risk management. In 2022 the Welsh Government **announced its "largest ever" investment** in flood protection – "more than £214 million over 3 years".

Funding for flood protection has a 'ring-fenced' budget. It delivers a number of areas, including; the coastal risk management programme, small-scale works grant, natural flood management programme and the coal tip safety programme.

The Welsh Government **provides grants to Risk Management Authorities** for expenditure in connection with FCERM. All schemes that receive funding must show that they are "reducing risk to life by reducing risk to homes".

The Flood and Coastal Risk Programme Board assesses the programmes, and provides advice to the Welsh Government on the allocation of budgets and prioritisation of schemes and funding. Funding decisions are made on a case-by-case basis, based on an assessment of the business case.

An announcement is made each year to confirm the projects receiving funding. For 2023/24, the Welsh Government has **announced it is investing £75m** in the **Flood and Coastal Erosion Risk Management Programme**.

Natural flood management funding

The Welsh Government encourages Risk Management Authorities to pursue Natural Flood Management (NFM) interventions. The **Flood and Coastal Erosion Risk Management (FCERM) Business Case Guidance** mandates the consideration of NFM for all schemes.

Between 2020-2023 the NFM Programme provided 100% grant funding to local authorities and NRW to undertake NFM schemes to reduce the risk of flooding to properties. The Welsh Government **invested £3.1 million in the NFM pilot programme**, designed to further understand how NFM works and how NFM schemes can be delivered. The **programme contained 15 projects across Wales**, which are expected to reduce flood risk to **1100 properties on completion**.

In October 2023 a two-year **Natural Flood Management Accelerator Programme was announced**. The £4.6m investment will fund 23 projects across eight different Risk Management Authorities, and is expected to reduce flood risk for around 2,000 properties.

Coastal risk management funding

Between April 2019 and March 2023, FCERM funding has been supplemented by the **Coastal Risk Management Programme**. The programme has been extended to March 2024, after which it will close. It is designed to support local authorities in responding to climate change and implementing their **Shoreline Management Plans**. The programme will **invest over £200m** in key coastal infrastructure, reducing risk to over 15,000 properties.

Emergency flood relief funding

The Welsh Government provides **funding to support repair works to FCERM assets following a flood event**. However, emergency funding is only provided with sufficient evidence and only to reduce risks to homes and businesses, works to reduce risk to roads or other infrastructure are ineligible for emergency funding, as are costs associated with recovery and clean up.

Following Storms Ciara and Dennis, the Welsh Government made **£10m available to help meet the costs** of the initial response. Every household affected was able to claim £500, with an additional £500 available for those without flooding insurance. The Welsh Government provided local authorities and NRW with **100% of the funding required to repair damaged defences and culverts**.

Key Sources

Legislation

- [Flood and Water Management Act 2010](#)
- [EU Floods Directive \(2007/60/EC\)](#)
- [Flood Risk Regulations \(2009\)](#)
- [Well-being of Future Generations \(Wales\) Act 2015](#)
- [Environment \(Wales\) Act 2016](#)
- [Water Resources Act 1991](#)

Welsh Government

- [National Strategy for Flood and Coastal Erosion Risk Management in Wales](#)
- [National Coastal Erosion Risk Management Map](#)
- [Natural Resources Policy](#)
- [Flood Response Framework](#)
- [Future Trends Report](#)
- [Prosperity for all: A climate conscious Wales](#)
- [Flood and coastal erosion risk management: grant memorandum](#)

Natural Resources Wales

- [Flood and coastal erosion risk in Wales reports](#)
- [Preliminary Flood Risk Reports](#)
- [National flood hazard and risk maps](#)
- [Flood Risk Management Plans](#)
- [River Basin Management Plans](#)

Miscellaneous

- Audit Wales - [Coastal Flood and Erosion Risk Management in Wales](#)
- Audit Wales - [A Picture of Flood Risk Management](#)
- UK Committee on Climate Change - [Adapting to Climate Change: Progress in Wales](#)
- UK Committee on Climate Change - [Independent Assessment of UK Climate Risk](#)