

Flooding and Coastal Erosion

Research Briefing

September 2020



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1. 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 in Wales, and the Welsh Government invests an ***average of £53 million*** annually in flood risk management.

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 coastal communities can be lessened.

1.1. Brief legislative context

The ***Flood and Water Management Act 2010*** (hereafter, the Act) received Royal Assent on the 8 April 2010. The Act 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.

1.2. Welsh policy context

The Welsh Government published the current ***National Strategy for Flood and***

Coastal Erosion Risk Management in Wales (hereafter the National Strategy) in November 2011. It provides a framework for FCERM in Wales and contains four overarching objectives for managing flood and coastal erosion risk:

- Reducing the consequences for individuals, communities, businesses and the environment from flooding and coastal erosion;
- Raising awareness of and engaging people on flood and coastal erosion risk;
- Providing an effective and sustained response to flood and coastal erosion events; and
- Prioritising investment in the most at-risk communities.

The National Strategy states that implementing these objectives is the responsibility of the Welsh Government and the '**Risk Management Authorities**' – those responsible for FCERM **as defined in the Act**. The strategy is intended to support local decision making and engagement in FCERM, ensuring risks are managed in a coordinated way across Wales.

Reports on the progress of the National Strategy must be made by NRW to the Welsh Ministers under **section 18 of the Act**, including all aspects of FCERM undertaken by the Risk Management Authorities. To date, **three reports** have been prepared.

In 2019, the Welsh Government **consulted on a draft, updated National Strategy**. The new National Strategy was **laid before the Senedd in July 2020**, prior to its full publication and implementation, which is **scheduled to be in Autumn 2020**.

New legislation passed since the National Strategy was published, including the **Well-being of Future Generations (Wales) Act 2015**, the **Planning (Wales) Act 2015** and the **Environment (Wales) Act 2016** are incorporated in the draft strategy. The draft strategy has an overall aim to “reduce the risks to people and communities from flooding and coastal erosion” and contains five overarching objectives:

- Improving our 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.

2. Flood risk

2.1. 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.

2.2. 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.

2.3. Current flood and coastal erosion risk

In its most recent (2016-19) flood and coastal erosion report under **section 18** of the Act, **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)**. NRW says that 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.

The risk of flooding in these areas is considered significant and requiring further study “through the production of flood hazard and flood risk maps and flood risk management plans”.

The creation of **national flood hazard and risk maps** is a requirement of the 2009 flood risk regulations, 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.

Although these maps have no official status in planning or for insurance purposes, the **Welsh Government advises** that they should be used alongside **Planning Policy Wales** and **Technical Advice Note (TAN) 15** to direct new development in respect to flood risk.

The latest **National Coastal Erosion Risk Management Map** shows both the rate of coastal erosion and the cumulative distance of coastline location change for three different epochs: 0-20 years, 20-50 years and 50-100 years. Over the next 100 years, it is **estimated that over 2,000 properties** in Wales are at risk from coastal erosion, assuming there is no active intervention.

2.4. Managing flood risk

Traditionally FCERM approaches have been centred on the principles of drainage and defence. The Welsh Government's **National Strategy** says that Wales' urban environments are "protected from flooding by a combination of river defences in the form of embankments and walls and local piped drainage systems". It says that a "significant network of flood defences, coastal protection and drainage infrastructure" has been developed to help reduce the risk of flooding, aiming to keep floodwater away from vulnerable areas.

However, the National Strategy also recognises that the effects of climate change, with more extreme and unpredictable weather events occurring, mean that the pressure on existing infrastructure will increase significantly:

...no matter how efficient the drainage system, there is always a risk that its capacity will be exceeded, and no matter how big the defence structure, there is always a risk that it can be breached or over-topped. Therefore, there will always be a residual risk that drainage and defence alone cannot address.

The Welsh Government therefore says that it champions a focus on risk management, considering options to reduce the likelihood of a flood event occurring and the consequences from any flood event. The strategy recognises that a more holistic approach may be needed, alongside defence and drainage systems.

Natural Flood Management

By working with natural processes, **Natural Flood Management (NFM)** is a way of using nature-based interventions to manage flood risk. It is an alternative 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 characteristics 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 2016**.

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.

A 'key priority' of the Welsh Government's **draft updated National Strategy** is to "deliver more natural interventions and catchment approaches to help improve environmental, social and economic resilience" including NFM approaches. This "also aligns with the **Natural Resources Policy** and [a] move towards a low carbon based economy".

The **summary of responses** to the consultation on the draft updated National Strategy shows that the majority of respondents were supportive of more NFM and hybrid approaches, but cautioned that "they cannot always replace hard engineering solutions".

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.

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.

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.

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

The Welsh Government's **National Strategy** says that:

Defence has also played a key role in addressing coastal erosion, with the construction of sea walls, groynes and other structures designed to hold the line of the shoreline, retain the beach and to reduce the impact of tides and waves on the land.

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 in six areas**, aimed at improving Wales' resilience to coastal flooding:

- 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.

2.5. Recent flooding

Winter storms 2013 – 2014

The storms of **December 2013 and January 2014** ravaged many parts of the Welsh coast. A series of Atlantic low pressure systems generated significant storm surges and relatively powerful waves, which in combination with high tides caused considerable disruption. 315 homes were flooded and an estimated £8.1 million worth of damage was done to flood and coastal defences.

However, NRW estimated that in December 2013 and January 2014 respectively, around 24,000 and 50,000 properties that had the potential to flood did not, meaning that **less than 1% of the properties potentially at risk actually experienced flooding**. NRW says this was due to the many years of investment in, and maintenance of, the coastal defences.

Following the storms, in addition to the review of coastal defences mentioned above, NRW conducted **an assessment of environmental change**, which aimed to further understand the potential environmental consequences of such storm events. The assessment concluded that such major flooding events “may be responsible for long-term species population declines and local extinctions”, but also that the full extent of the impact may not be fully understood for years to come.

Storm Callum

In October 2018, **Storm Callum** caused around £5m of damage across Wales. It was the most damaging storm that had been seen in Wales for 30 years, causing 80 properties to flood across south west Wales.

NRW reported that the River Teifi at Llandysul reached its highest level since records began in 1971 and the Tywi above Carmarthen was at its highest since 1987. Before and during Storm Callum NRW's flood pages received more than half a million-page views, while warning and informing messages on social media reached over 110,000 people

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 Minister for Environment, Energy, and Rural Affairs, Lesley Griffiths MS **confirmed on 25 February** that more than 1,000 homes and 300 businesses across Wales had been directly impacted by the flooding.

2.6. 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.

2.7. Future flood risk

It's widely accepted that **climate change is happening**, and in April 2019 the 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 the natural environment and communities.

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 Welsh Government's 2017 '**Future Trends Report**' states there is an "overwhelming consensus" that the science underpinning climate change is sound. The risks to communities from all sources of flooding and sea level rise are a research priority in the Welsh Government's **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.

The 2017 **UK Climate Change Risk Assessment** (Welsh summary) published by the UK Committee on Climate Change (UK CCC) identified areas for priority action, including flooding. The assessment says that more action is needed to "improve the condition of water bodies and to encourage the wider uptake of management practices that help to reduce the impacts of low and high flows". It also stresses that flood risk is being exasperated by land management practices, with degraded and compacted soils increasing the speed of rainwater run-off. It says that there is a need to better understand the scale of land management practices that exacerbate downstream flood risk, stating that:

Agricultural land covers 88% of Wales's land area, which means that the way in which it is managed can have a profound effect on the wider impacts of flooding. Flood walls and embankments routinely protect what would be the natural floodplain from inundation, forcing water downstream into built-up areas where much more significant damage can be caused.

Further future risks identified include inundation of salt water during storm surges which can cause significant damage to agricultural crops and grassland, and risks to wildlife in the coastal zone from coastal flooding and storm surges. It states that around 15% of the Welsh coastline is protected by hard engineering structures which prevent natural adjustment of coastal systems to a rising sea level, and says that more effort is needed to allow for a dynamic readjustment of coastal landforms and habitats.

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".

3. Funding

3.1. Welsh Government Budget

During the Fourth Assembly, the previous Welsh Government **invested around £245 million** in managing flood and coastal erosion risk. This Welsh Government has **committed to deliver £350 million** of flood risk management activity over this Senedd term.

Between **April 2014 and March 2016**, the Welsh Government invested over £116m in FCERM, and **NRW reports** that this investment reduced the flooding risk for 5,200 homes and businesses. Between **April 2016 and March 2019**, the Welsh Government invested £150m in flood risk management. The average annual investment in flood risk management (both capital and revenue) over the **last seven financial years has been £53m**.

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 2020/21, the Welsh Government has announced it is **investing £55.7 million in the Flood and Coastal Risk Management Programme**, which includes:

- £28 million capital for developing and building schemes; and
- £27.7 million revenue which helps support wider flood and coastal risk management activity.

The Minister for Environmental and Rural Affairs announced in her **Written Statement of 3rd April** that the 2020-21 Flood and Coastal Risk Management Programme will include at least **£1m of funding for Natural Flood Management Schemes**. The fund is currently scheduled to run for 2 years from April 2020 to March 2022.

From 2019, the FCERM funding will be boosted by the **Coastal Risk Management Programme**, which will provide an additional £150m, designed to support local

authorities in responding to climate change and implementing their **Shoreline Management Plans**. **NRW's 2016-19 report** says that around £4.67m has been invested so far.

A Wales Audit Office 2016 report into **Coastal Flood and Erosion Risk Management in Wales** found that the Welsh Government's annual funding for flood and coastal erosion risk management had been broadly stable, with some variation in EU funding from year to year.

3.2. 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**.

In the **Welsh Government's final budget 2020-21** there is a reference to the £10 million provided for **emergency flood relief**, stating that some of this spending could continue into 2020-21. As such there is no change to funding linked to the recent flooding in the final budget. However, the costs associated with the damage from flooding in the longer term is expected to be significant. Any further financial support would be announced subsequently and included in a future supplementary budget.

4. 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](#)
- [Draft National Strategy](#)
- [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 management in Wales, 2011-2014](#)
- [Flood and coastal erosion risk in Wales, 2014-16](#)
- [Flood and coastal erosion risk management in Wales, 2016-2019.](#)
- [Preliminary Flood Risk Assessments](#)
- [National flood hazard and risk maps](#)
- [Flood Risk Management Plans](#)
- [River Basin Management Plans 2015-2021](#)

Miscellaneous

- Wales Audit Office - [Coastal Flood and Erosion Risk Management in Wales](#)
- UK Committee on Climate Change - [UK Climate Change Risk Assessment](#)

