Written evidence for the Climate Change, Infrastructure and Environment Committee Flood Review

February 2025

Introduction

Natural Resources Wales (NRW) has been invited to give evidence to the Climate Change, Infrastructure and Environment Committee's inquiry into the impacts from Storms Bert and Darragh.

This written evidence is structured around the 6 themes that the Committee have indicated they will be considering:

1. Whether preparation, forecasting, warning, and alert systems were adequate.
2. The resilience of infrastructure such as water and sewerage systems, electricity distribution infrastructure, and transport networks to storm impacts, including flooding landslips, culvert damage and sinkhole formation.
3. The impact on communities, and the role of landowners, community groups, and third sector organisations.
4. The response of public and private authorities.
5. Whether relevant organisations have learnt lessons following previous winter storms, particularly Storm Dennis in 2020, and how these lessons inform the current approach.
6. Using the case studies of Storms Bert and Daragh to gain an overarching view of the current storm preparation and response framework in Wales, and identifying any gaps.

Background

Storms Bert (23-24 November 2024) and Darragh (7-8 December 2024) bought significant impacts to many parts of Wales. The consequences of flooding are truly devastating, not just the physical harm to people and property, but also the impacts on livelihoods, jobs, communities and on the environment around us. The effects can be long lasting too: it can be months, even years, before flooded properties can be inhabited again, and the effects on mental health can be deep-seated and long-lasting. Our thoughts and sympathies go out to everyone impacted during flooding, in this case particularly those impacted by Storms Bert and Darragh.

The risk from flooding affects many communities, and is increasing, and the nature of storms is changing. 273,000 properties in Wales, or 1 in 7, are at risk of flooding. Climate change impacts means that this figure is forecast to rise to 350,000 (a 28% increase) by 2120 – and this is before any new properties are built.

The causes of flooding are not down to a single source, and the powers for managing flooding rest with a range of Risk Management Authorities. NRW has a role for the strategic oversight of flood risk management in Wales, which means having a national understanding of the flood risks. This is important because of the multiple sources of flood risk, and the policy of Welsh Government to prioritise on a national level and on the basis of risk to life. NRW also has discretionary powers to manage flooding from main rivers, reservoirs and the sea. Powers for flooding from surface water and smaller watercourses rest with Lead Local Flood Authorities (LLFAs) – in Wales, these are the Local Authorities (LAs). Water companies have responsibilities for drainage and surface water arising from their assets. The cause of flooding is often from more than one source and so it is important that all partners, including NRW, LAs, Welsh Government departments, Water Companies and communities themselves, work together to tackle the issues.

NRW works within its budget and resources to make interventions to reduce the impacts of flooding. With more frequent and severe extreme weather events occurring, this work is becoming increasingly challenging. We are directed by Welsh Government to prioritise on a national all-Wales basis, and our investment decisions are taken in line with Treasury rules. This is important as local flood risk priorities, whilst clearly important locally, may not be a national priority.

We undertake a range of activities to reduce the impacts of flooding. This includes advising on planning applications and proposals in flood risk areas, mapping and modelling flood risk, building and maintaining defences, and warning and informing where and when flooding is expected.

We have a Ministerial Direction to operate a flood warning service. This covers flooding from main rivers and the sea, which aligns with NRW’s powers for these flood sources. Not all of Wales, and not all the areas at flood risk, are covered by the flood warning

service. There are remote and isolated areas at flood risk, and due to technical or prioritisation and cost reasons we are not able to operate a service in these locations. And even where a flood warning service is provided, take up levels are not always where we want them to be.

There are 89 sea flooding locations and 112 river flooding locations covered by a flood warning service in Wales. For many (but not all) of these areas, warnings are based on forecast models of our rivers. We do not have forecast models for all locations though, again this is a function of technical viability, resources, costs and priorities. In locations not served by forecast models, we rely on observed data and historic records to predict what is likely to happen. All types of warning, whether forecast or not, require specialist human technical expertise and experience.

Flood warnings are issued via our website, and direct to anyone who signs up to the free service should it be available in their area.

On the areas of focus for the Committee

1. Whether forecasting, warning, and alert systems were adequate

The Met Office, Flood Forecasting Centre (FFC) and NRW work closely together to forecast and warn for flooding. The Met Office forecast the weather and rainfall totals, distribution and duration. Weather forecasting is a complex science – forecasts change and there is inherent uncertainty. This uncertainty is particularly present the further out the forecast is made. The Met Office use the best science, computing and expert staff available to forecast and issue weather warnings to the public via their various outlets (e.g. web services and media broadcasts).

The FFC is a joint enterprise between the Met Office, the Environment Agency (in England) and NRW (in Wales). The FFC takes the weather forecast from the Met Office and assesses what this is likely to mean for flooding, on a county/Local Authority level scale. NRW works alongside the FFC to produce the daily Flood Guidance Statement (FGS), with a 5-day forecast window (i.e. it provides information for the next 5 days). This information is the in the form of forecast *Likelihood* and *Impact* of flooding.

The 5-day FGS is shared with Civil Contingencies Act partner organisations (e.g. Local Authorities and emergency services) to enable preparations for flood events. A simplified version of the 5-day flood risk forecast is available to the public on NRW's website.

NRW takes the information from the Met Office and FFC and combines that with observed data from our network of river and rain gauges, to forecast flooding. In many locations (but not all), there are forecast models, which process the input data and

forecast what is likely to happen. As there will always be variability (that is, a range of possible outcomes) in the forecast rainfall and in the river response, then there will be a range of probabilities as to whether a location will flood or not, and when it is likely to happen; it is not a definitive (yes or no) science. The expertise of professional weather experts and flood warning staff are also a vital part of the chain that produces warning information.

Regarding Storm Bert, the Met Office were signalling significant forecast rainfall in their weather forecasts 5 days out. On Wednesday 20 November the Met Office issued a yellow weather warning for rain across south Wales, which was extended on the morning of Friday 22 November to cover more of northwest Wales and Anglesey. Met Office named the event as Storm Bert on the Thursday, 21 November. The FGS mirrored the weather warnings, signalling low likelihood of significant impacts from 5 days out (from the Wednesday 20 November). The low likelihood reflected the uncertainty in the forecast tracking and intensity but the significant impact potential was due to rainfall totals (up to 150mm possible in some places). This information was available to all partner agencies to assist them in their planning.

Throughout the period, as during any wet weather, NRW was taking the latest forecast rainfall data and running it through our forecasting models to assess the forecast (future) flood risk. We issued 65 Flood Alerts in the lead up to the storm event to warn residents that flooding was possible. We issued 68 Flood Warnings and 2 Severe Flood Warnings closer to the events when there was more certainty in the forecasts and locations. There was also extensive media messaging and coverage during the period.

Steep sided valley catchments like the south Wales Valleys, because of their very topography, respond very rapidly to heavy downpours. What we experienced in Storm Bert was very heavy rainfall that was very hard to forecast exactly where it was going to hit. The Taff catchment rivers responded incredibly quickly to the rainfall, giving short lead time for warnings to be issued. These extreme rainfall events and uncertainty on amounts and locations are a feature of climate change, and we are having to deal with these situations more and more often. The short lead time from rain falling to rivers rising and impacts happening, and the uncertainties, are all pushing the boundaries of forecasting and the human abilities to respond. We can issue more warnings on lower thresholds and confidence, but there would be many more false alarms if we call it too early based on low confidence data, and the forecast events do not materialise. There is a real risk of ‘crying wolf’ such that the public and partners think that impacts won’t happen, at the times when we are forecasting with more confidence, that they will.

It is also vitally important that individuals and communities know what the different types of flood warnings mean, how to access them, and what to do if a Flood Alert, Flood Warning or Severe Flood Warning is issued. There is a lot of information on our website on all these aspects.

In summary then, the forecasting warning and alerting systems in themselves worked well during these storms, but we are operating in very challenging times, with a shifting climate and more frequent and extreme weather events, and with uncertainties that sometimes results in shorter lead times. Investment in continuous improvements to systems, and in human expertise, is clearly needed if we are to keep pace with the changing climate and the increased risks.

2. The resilience of infrastructure to storm-related impacts, including water and sewerage systems, electricity distribution infrastructure, and transport networks?

Flooding is one of the top civil contingency risks in Wales, and as well as residential properties, there is inevitably a lot of infrastructure at risk. Our modelling information shows that there are 4,385 key services at risk of flooding across Wales. This includes services such as schools, hospitals, emergency services bases, railways stations and utilities.

As directed by the Welsh Government policy, NRW prioritises primarily based on risk to life and risk to residential properties, as typically the greatest risk to life occurs in a flood situation when people are in their homes. There is definitely a need though, across a range of public and private sector bodies, to continue to address the impacts on infrastructure from the ever increasing risks. Co-ordination and co-operation between authorities takes place, including through the Local Resilience Forum structures. Infrastructure providers need to continue to take responsibility for the risks of flooding to their assets.

During Storm Bert more than 700 homes across Wales experienced flooding. A landslip occurred at Cwmtillery, Blaenau Gwent, with a disused coal tip partially collapsing, forcing the evacuation of around 40 homes due to rock and mud flowing onto residential streets. In addition, a large sinkhole opened on a residential street in Merthyr Tydfil after an underground culvert was damaged by boulders.

However, flooding impacts stretch much further than residential properties, with people, their livelihoods and businesses all affected, causing a significant knock-on effect to the economy in Wales.

As a result of Storm Bert, flooding and infrastructure damage led to widespread disruption of railways, including the closure of the Heart of Wales and Marches lines. Many roads were also closed due to flooding and landslides, including the A479 in Powys and the A4042 in Monmouthshire.

Public services including education were also impacted by both Storm Bert and Storm Darragh with schools across Wales being forced to close.

The destructive winds caused by Storm Darragh significantly damaged power infrastructure with more than 259,000 homes without power at the peak of electricity network disruption.

As a result of the storms, the Welsh Government Woodland Estate (which NRW manages on behalf of Welsh Government) experienced significant damage with hundreds of thousands of cubic meters of timber on the ground. The clear-up process is of course time consuming and costly, with an increased need to replant trees over 2-5 years, stretching the resources and funds available for this work. Our Land Management Teams worked closely in the aftermath of the storms with partner agencies to conduct welfare checks on residents living on the NRW woodland estate, as well as to clear roads so that critical infrastructure remained accessible.

3. The impact on communities, and the response role of community and third sector organisations

The impact on communities from flooding can be devastating and long-lasting, particularly if they have previously been affected by flooding. If property, belongings or vehicles have been damaged, navigating an insurance claim can be hugely stressful, especially for residents who have been displaced from their homes. Concern about future insurability of homes also adds to uncertainty. Taken together all these issues have the potential to significantly impact livelihoods and mental health.

There will always be properties in Wales at risk from flooding, so it is vital that communities are prepared as best they can be, ahead of time. That is why we encourage local communities to develop their own community flood plans so that they are aware of flood risk in their area and have planned what they will do in the event of flood to reduce harm to themselves and their property. Resources are available on our website to assist communities with this work. NRW works with third sector organisations such as the National Flood Forum, British Red Cross and the Wales Council for Voluntary Action, who themselves provide guidance for community flood groups, offer courses and help with access to funding.

We must be realistic about the risk of flooding on local communities and in doing so empower local people to play their part in preparations for flood events to ensure that the impact on people and property is as limited as is possible. NRW has lots of useful information available to the public, in addition to community flood plan templates, on our website which can help households in preparing for flooding. One key aspect is advocating that households sign up to receive Flood Alerts and Flood Warnings via the free Flood Warning Service so that they are alerted that flooding is expected and can take action to protect themselves and their property. Sign up levels in many parts of

Wales are not as high as we would want them to be, and education and awareness about these resources is important.

There is also live river and sea level information on our website, and we receive lots of feedback that this is a very useful resource for many communities. In high flood risk areas, householders may wish to consider property level protection to minimise the future flood damage, but of course this may not be financially feasible for many residents. Properties should not be built in high risk areas, but where there are in flood risk locations, they should be made as flood resistant as possible by the developers.

4. The response of public and private authorities

Storms Bert and Darragh posed significant challenges both individually but also collectively as they hit within in the space of two weeks, bringing flooding, landslides and wind damage. All agencies involved in flooding performed well but were clearly stretched by the events.

Within the collective efforts from a range of organisations, NRW staff worked tirelessly throughout this period, using their skills and experience to professionally respond to events. Our staff worked to track forecasts, issue warnings, ensure flood hydrometry assets were operating properly, fix repairs, post up to date information on our website and social media pages, handle media interviews and queries and support other incident responder organisations including Local Authorities, emergency services and utility companies.

The arrival of Storm Darragh only two weeks after Storm Bert brought destructive 90mph winds leading the Met Office to issue a rare red warning for wind and the UK Governments to issue an emergency alert by phone to those in affected areas. While rainfall totals were not as high as those experienced during Storm Bert, further heavy rain on already saturated ground meant rivers levels could rise quickly and posed a threat.

NRW’s forests and trails were closed to visitors and the public messages included to stay away from seafronts and promenades due to the likelihood of large, powerful waves.

NRW staff worked tirelessly in the days and weeks following to inspect assets and make repairs. On the flood risk side, our staff continue today to deal with a log of complaints and queries from the event, attend many public meetings and requests from elected members to understand the issues in their communities, and to inspect and maintain the assets that were tested during the storms. Work also continues on the damages experienced in forests and nature reserves across Wales, with widespread areas of

trees felled and many kilometres of forest roads, walking trails and mountain bike routes obstructed by debris. Recovery takes a considerable amount of time, and effort.

NRW clearly took a lot of actions to make sure our operational duties were maintained, and public were informed of the risks. It is also vitally important that all partners work together to manage the risks. The Local Resilience Forums, where key partners come to together to planning for and response to flooding and other emergencies, are a key part of the picture.

5. Whether relevant organisations have learnt lessons following previous winter storms, particularly Storm Dennis in 2020, and how these lessons inform the current approach

It is clear that we operate in very challenging times. In 2024, according to the Met Office, the UK saw records broken in almost every season, plenty of named storms and an abundance of weather warnings – the year included the UK's 8th wettest winter and 6th wettest spring on record. Met Office analysis conducted for the period October 2023 – October 2024 showed that there was 20% more rainfall, and that rainfall was 15% more intense due to climate change, and with 2024 the first calendar year exceeding the Paris Agreement target of 1.5°C, it is safe to assume that these extreme pressures on our natural world will continue.

The climate science says that floods are going to happen more frequently in future. They are also often going to be more widespread and more severe in their nature. More people and properties will be at risk of flooding. Flooding is a complex, natural process for which there is no one single solution. As such, we need to continually adapt and improve our thinking and our practices. This is very challenging though, particularly given the rate of climate change and the current economic climate and where there are competing demands on public sector priorities and resources.

A range of key partners need to work together to tackle the issues such as Local Authorities, Water Companies and Welsh Government departments as well as from communities themselves. It is vital that we plan for and invest in range of tools and techniques, as we and society respond to the rapidly changing climate and the impacts it will bring.

Following every significant flood and storm event, we carry out a review to ensure that we can learn any lessons from the experience and use those learnings to make improvements. We are in the processing of doing that with the learning from Storms Bert and Darragh.

After Storm Dennis in February 2020, we undertook an extensive review of our response and published the findings and recommendations on our website in October 2020. We

implemented a programme approach to ensuring recommendations were followed up on, and improvements delivered. We made significant improvements in our procedures and in our guidance, to ensure there is even greater clarity and prioritisation on what duty officers do during flood and other incidents. We made improvements to our website so that it could cope with greater traffic and improved the resilience of our incident rotas so that we now have more staff to call on during incidents. In July 2024, we implemented our new Flood Warning Information System for Wales, a considerable capital investment of £5m, which makes the issuing of warnings a quicker and more resilient process. We are also in the process of replacing our telemetry systems, with a £5m project on this running to expected completion in June 2025. We also made improvements to the tools and equipment used by our staff during incidents e.g. mobile phones and vehicles. We have also continued with our capital investment programmes, which has delivered new or enhanced flood defences schemes across communities in Wales.

We operate in challenging times though, and the scale and pace of climate change is challenging all organisations. As well as the climate emergency, the nature emergency is also a clear and pressing issue. Policies, investment and adaptation actions need to keep pace with the growing risks. There is no one solution that will fix it all and a range of interventions is needed. We can and must work towards building greater resilience to the impacts from the climate and nature emergencies.

6. Using the case studies of Storms Bert and Daragh to gain an overarching view of the current storm preparation and response framework in Wales and identifying any gaps.

Storms Bert and Darragh brought significant impacts to many parts of Wales, with many affected in what were multi-hazard storms. We will get similar, and unfortunately worse, storms in the future. They will be not unprecedented or once in a generation storms, they will be the new norm. We ignore or downplay the risks at our peril.

The systems of flood risk management in Wales and in the UK are amongst the best in the world, but we cannot be complacent for a moment. There is a need for continuous improvement and innovation in all areas. We must learn from all flooding events, and make improvements, and we need to test and stretch our thinking to prepare for even worse events on the future.

There is no one single answer to the risks posed by flooding, it will take implementation of the full range of interventions to manage and lower the risks. It requires strong land use strategic planning, management of whole water catchments, advances in forecasting and warning capabilities, skilled workforce, properties built that are flood resilient, communities that are engaged with managing the issues - and a whole lot more. It will also clearly need partners to continue to work together.

We cannot stop the weather, and we cannot stop all floods, but we can take actions to lower the impacts and create resilience to flooding. This will take significant investment and time, but studies show the investment needed is lower than the damages that would be incurred if we don't act.

In our view, it is not so much a case of there being significant gaps in our preparation and response framework, but more a case of the need for continuous and impactful improvement and innovation, and at pace.