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Flood and Coastal Erosion Risk Management in Wales, 2014 – 2016

**Report to the Cabinet Secretary for Environment and
Rural Affairs under Section 18 of the Flood and Water
Management Act 2010**

Executive Summary

Natural Resources Wales are pleased to introduce its second report on Flood and Coastal Erosion Risk Management in Wales, as required under section 18 of the Flood and Water Management Act 2010. It also provides an update to Welsh Ministers on progress made in implementing the Welsh Government's Flood and Coastal Erosion Risk Management Strategy.

The report is compiled from information provided by Risk Management Authorities (RMAs) operating in Wales¹ and provides an update of investment, key developments and operational improvements over the period April 2014 and March 2016.

During the reporting period, there were significant flood events across the UK and in 2015, Wales experienced the wettest December on record, with 1016mm of rainfall at Capel Curig, Conwy². However, despite the large quantities of rain, widespread flooding in Wales was not experienced.

Between April 2014 and March 2016, £116 million was invested by the Welsh Government in flood and coastal erosion risk management and resource in Wales, reducing flood risk to over 5000 homes and businesses as well as critical infrastructure. There has also been an increase in the use of technology, social media and digital services to communicate flood risk information. This has helped to improve public awareness and understanding of risk and has also supported individuals, homeowners and businesses to identify what they can do to reduce the impact of flooding and to minimise damage and long term disruption.

Since the last report, published in 2014, there have also been a number of legislative changes which will influence the way in which flood and coastal erosion risk is managed in the future. The Planning (Wales) Act 2015, the Well Being and Future Generations Act (2015) and the Environment (Wales) Act (2016) embed the principles of sustainable development and emphasise the need for collaborative working and early engagement.

In addition to providing an overview of flood and coastal erosion risk management, the report also summarises how RMAs are considering and introducing alternatives to traditional approaches in managing risk. Encouraged by changes in legislation, there is growing recognition that pressures such as climate change and the need to increase resilience within vulnerable communities could be better addressed by using a combination of flood mitigation measures, by joining resources and working collaboratively across all partners to achieve common goals.

¹ See 'Acknowledgements'

² Source: Met Office

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Chapter 1: Strategy & Policy update

1.0 Introduction

During the period April 2014 to March 2016 some key pieces of legislation have been introduced in Wales along with amendments to regulatory regimes. It is likely that these will influence the way in which flood and coastal erosion is managed across Wales.

1.1. National Strategy Objectives - overview

The Welsh Government's National Strategy³ for Flood and Coastal Erosion Risk Management (FCERM) sets out their objectives on flood and coastal erosion risk management and provides the policy framework to help public bodies, communities and other organisations work together to manage flood risk.

Risk Management Authorities (RMAs) in Wales have continued to deliver and implement the National Strategy's key objectives and sub-objectives during the reporting period. As of 31st March 2016, the Welsh Government consider 38 of the 46 sub-objectives to be complete. Many of these objectives are on-going, having been embedded within RMAs as part of core operational activities. There are 8 sub-objectives still in the development stage. The Welsh Government have advised these are to be carried forward into the next version of the National Strategy, due in 2017.

Overall, RMAs have advised that the National Strategy objectives, in conjunction with the requirements of the Flood and Water Management Act⁴ (2010), help prioritise their flood risk management activities. However, the majority report that there is distinct lack of 'public clarity' over responsibilities ('who does what'), particularly in relation to the management of coastal and surface water flooding. Funding mechanisms, the creation of sustainable drainage approval bodies and more defined parameters to trigger flood incident investigations have also been identified as areas where updated National Strategy objectives could help improve FCERM going forward.

Legislation Updates

1.2. Well Being & Future Generations Act 2015

The Well Being & Future Generations (WBFG) Act⁵ became law in April 2015. Its aim is to improve the social, economic, environmental and cultural well-being of Wales. To achieve this, the Act puts in place 7 well-being goals⁶. Public bodies must work towards these goals and will be required to demonstrate delivery. At the heart of the Act is the principle of 'sustainable development' and a more informed and better decision making process for Wales. Public bodies must consider the long term impacts of all their decision making and actions. There is also a duty to work better together - with each other and with communities - to enable a more joined up approach to preventing future problems.

³ <http://gov.wales/topics/environmentcountryside/epq/flooding/nationalstrategy/strategy/?lang=en>

⁴ <http://www.legislation.gov.uk/ukpga/2010/29/contents>

⁵ <http://gov.wales/topics/people-and-communities/people/future-generations-act/?lang=en>

⁶ <http://gov.wales/topics/people-and-communities/people/future-generations-act/national-indicators/?lang=en>

For FCERM, the Act should encourage more collaboration between RMAs to tackle flood risk from all sources. This will be beneficial in helping to achieve common flood risk goals that also deliver wider ranging and longer term benefits for Wales.

1.3. The Environment (Wales) Act (2016)

The Environment (Wales) Act⁷ (2016), became law in March 2016. It puts in place legislation to plan and manage the natural resources of Wales in a pro-active, sustainable and joined-up way. It also seeks to establish a more resilient Wales and provides the legislative framework to tackle climate change. Central to the Act is the need to manage Wales' natural resources in an integrated way to achieve long term sustainability and deliver multiple benefits for people and nature, both now and in the longer term.



The principles of the Act will guide the way in which all RMAs in Wales develop and plan their approach to FCERM. The principles of the Act will guide the way in which all RMAs in Wales develop and plan their approach to FCERM. Future schemes will need to consider where and how they can deliver other environmental, economic and social benefits and not just focus on flood. However the Act should also help facilitate opportunities for FCERM to influence and benefit from projects where other drivers, for example biodiversity or recreation is the lead, to ensure flood mitigation is also considered.

A new Flood and Coastal Erosion Committee is being created under the Act to advise on all elements of flood and coastal erosion risk management and link to wider environmental considerations (further detail at section 1.13).

1.4. The Planning (Wales) Act 2015

The Planning (Wales) Act⁸ (2015) forms part of the Welsh Governments wider programme for a positive, enabling and resilient planning system in Wales. It introduces the framework for a new national spatial plan and will enable the development of regional spatial plans to tackle issues that cross local authority boundaries. The Act places greater focus on a plan led approach (which will also be informed by the emerging National Natural Resource Policy⁹ and Area Statements falling from the Environment Act). It also encourages early engagement with the community and emphasises the need to consider local well-being plans. Furthermore, the legislation supporting the Act introduces a new requirement for formal pre-application discussions with identified statutory consultees for certain development types. Under the new legislation, applicants will be required, where appropriate, to consult NRW on certain forms of 'Major Development' proposed in Flood

⁷ <http://gov.wales/topics/environmentcountryside/consmanagement/natural-resources-management/environment-act/?lang=en>

⁸ <http://gov.wales/topics/planning/legislation/planning-wales-act-2015/?lang=en>

⁹ <http://gov.wales/about/cabinet/decisions/previous-administration/2015/jul-sep/environment/cs0793/?lang=en>

Zone C¹⁰. It is anticipated that pre-application consultation will help ensure that the need for a flood consequence assessment, and the adequacy of submitted assessments, are understood by the applicant before they submit a planning application.

1.5. Amendments to Reservoirs Act 1975

Amendments to the Reservoir Act (1975) were passed by the Welsh Government over Winter 2015/16. The amendments have been brought about to ensure the ongoing protection of public safety by reducing the risk of an uncontrolled release of water from large reservoirs and the potentially catastrophic flooding this would cause.



The 3 main changes are:

- The capacity of a regulated 'large raised reservoir' has been lowered from 25,000 to 10,000 cubic metres meaning that some reservoirs will be brought into regulation for the first time
- Some reservoir owners/ operators will benefit from reduced regulation; only those with responsibility for high-risk reservoirs will be subject to the full monitoring regime.
- Incidents that affect the safety of a reservoir must be reported to NRW.

1.6. Environmental Permitting Regulations (EPR)

Regulations on incorporating flood risk permitting into the wider Environmental Permitting Regime were commenced during spring 2016. Further detail is provided in Chapter 5.

1.7. Internal Drainage Boards

The administration, assets and staff of 3 Internal Drainage Districts (IDDs) - Caldicot and Wentlooge, Lower Wye and Powysland - were transferred from their Internal Drainage Boards (IDBs) to NRW at the start of April 2015.

The transfer process focussed on good practice from the incoming organisations with the majority of IDB staff joining NRW. To further ensure continued effective and efficient operation of the IDD, NRW organised independently chaired Advisory Groups comprised of members from the outgoing Boards. These stakeholder engagement groups ensure NRW operational staff (and contractors) are supported by local knowledge and enable collaborative working with local land owners, farming unions, local authorities and councillors.

¹⁰ Areas of floodplain based on NRW's extreme flood outline, equal to or greater than 0.1% (river, tidal or coastal)

Strategic Direction

1.8. Flood Risk Management Plans

The Flood Risk Regulations¹¹ (2009) set out a six year cycle through which RMAs are required to identify and map 'where' and 'what' is at risk of flooding, then establish flood risk management plans for the areas identified. In Wales, 11 flood risk management plans were published by March 2016. These plans identify the conclusions of what is at risk of flooding alongside the objectives and measures that are proposed to manage the risk of flooding to people, the environment and economic activity across Wales.

NRW produced three flood risk management plans at the River Basin District scale for the management of flood risk from main rivers, reservoirs and the sea. These plans cover the Western Wales River Basin District, the Severn River Basin District and the Dee River Basin District. The Severn and the Dee flood risk management plans were produced jointly with the Environment Agency in England.

Eight Welsh Lead Local Flood Authorities (LLFAs) had a legal obligation to produce flood risk management plans at the local scale for the management of surface water flood risk. These were produced by Merthyr Tydfil County Borough Council (CBC), Torfaen County Borough Council (CBC), Blaenau Gwent County Borough Council (CBC), Caerphilly County Borough Council (CBC), Rhondda Cynon Taf County Borough Council (CBC), Neath Port Talbot County Borough Council (CBC), City of Cardiff Council and City & County of Swansea. The remaining 14 LLFAs made a commitment to also produce flood risk management plans to build upon their Local Flood Risk Management Strategies.

All flood risk management plans produced identify the risks associated with flooding and set out ways in which RMAs and communities can work together to reduce the impact of flooding. All plans are linked to the Water Framework Directive and River Basin Management Plans to help improve the environment in Wales and the achievement of good environmental status and potential in Welsh waterbodies.

1.9. Shoreline Management Plans

Each of the four second edition Shoreline Management Plans (SMP2) for Wales were approved by the Minister for Natural Resources between October and December 2014.

Delivery and communication of SMP2s should ideally be done at a local level, with sensitive understanding of local issues and needs and by involving the local communities impacted. The Welsh Government can provide strategic direction and support, however decision making, planning and adaptation must be delivered locally.

It should be noted that the SMP2s are live documents and the policies within are subject to the latest scientific data. They therefore have the potential to change.

¹¹ http://www.legislation.gov.uk/ukxi/2009/3042/pdfs/ukxi_20093042_en.pdf

Fairbourne: Moving Forward project

During spring 2014, Gwynedd Council initiated the Fairbourne: Moving Forward project¹². The vision is “to ensure that the community of Fairbourne get the help they need in relation to matters affected by the SMP2” and for the project to “work on a multi-agency basis, facilitating access to the necessary information and resource required to guide and support the community of Fairbourne, over the next 40 years”. Phase 1 of the project aimed to address immediate problems such as communication, emergency response and planning procedures. It also considered the impact of the information provided by the SMP2 and the short term response to storms that occurred during the early part of 2014. The first Annual Report reflecting on progress made was published in May 2015.

1.10. Wales Coastal Flooding Review

Following extensive coastal flooding in December 2013 and during January 2014, the Minister for Natural Resources requested NRW to undertake a 2-phase Review¹³. This pulled together information from every local authority along the Welsh coast and other organisations responsible for coast management and farming unions.

Phase 1 identified the impacts incurred during the storms and Phase 2 explored what could be done to reduce the risk from similar future flood events, concluding with the identification of 47 individual Recommendations.

NRW published a Delivery Plan in January 2015 outlining how each of the Recommendations could be taken forward. Consistent progress was made during 2015/16, with 39 of the recommendations completed by the end of March 2016. This is a significant achievement by all contributing parties, particularly when considering the demands of fluvial flooding during the 2015/16 winter on Risk Management Authorities in Wales.

Of the 39 completed Recommendations, some tangible improvements are already benefitting the coastal risk management sector in Wales such as:

- Improvements made in supplying more local, longer-range flood forecast information to professional partners as and when required.
- Revisions to 40 flood warning thresholds and flood warning areas.
- Delivery of a programme of coastal risk management training courses to 90 members of staff from across RMAs, the Welsh Local Government Association (WLGA) and the Welsh Government in spring 2016.

Realisation of the full benefits from all Recommendations will require full commitment and resources from all parties, including the Welsh Government. There needs to be a sustained effort and continuous improvement to ensure the intended outcomes are fully delivered.

1.11. Flood Insurance

Since 2000, flood insurance has been available to residential properties at high risk of flooding due to a series of voluntary agreements between the UK Government and

¹² <http://fairbourne.info/>

¹³ <https://naturalresources.wales/our-evidence-and-reports/flooding-reports/wales-coastal-flooding-review-phase-1/?lang=en>

members of the Association of British Insurers (ABI). However these agreements did not cover the affordability of the home insurance provided. In response, a new 'flood re-insurance' scheme, known as Flood Re¹⁴, was established to enable insurance premiums and excesses to remain within affordable limits. The new scheme was developed by the UK Government with the ABI in consultation with the devolved administrations in Wales, Scotland and Northern Ireland.

The role of Flood Re in incentivising households and insurers to implement property level measures will be considered over the next two years.

Flood Re's modelling suggests that around 20,287 properties in Wales will benefit from the Scheme, although no data in terms of take up is as yet available.

Consultations & Guidance

1.12. SuDS Interim Standards

Schedule 3 of the Flood and Water Management Act (2010), (which is yet to be commenced), requires all new development to include Sustainable Drainage Systems (SuDS). In response to this requirement, in January 2016 the Welsh Government published interim recommended non-statutory standards and technical guidance¹⁵ for SuDS in Wales. These interim standards include details on the use of SuDS to make best use of different drainage techniques and the process for gaining SuDS approval. They also promote more efficient and environmentally sound design of schemes, ensuring maximum water quality, biodiversity and amenity benefit, a reduction in surface water flood risk and compliance with relevant environmental regulations.

The promotion of larger scale implementation of SuDS in Wales will help to create greener, cleaner and more sustainable communities both now and for future generations, thereby contributing to the delivery of the well-being goals prescribed under the Well Being and Future Generations (Wales) Act.

LLFAs agree that the introduction of interim SuDs standards for Wales is a positive step. However there is limited take up on voluntary adoption and many report further support is needed to tackle the issue of "retrofitting" SuDS to existing areas. LLFAs would also welcome guidance on the adoption, long term management, maintenance and funding of such systems. Overall, RMAs are fully supportive of the standards and are keen to fully commence implementation of Schedule 3 in Wales to ensure consistency of standards for long term surface water management.

1.13. Flood and Coast Investment Programme (FaCIP)

In December 2014, a consultation was launched on the way in which the Welsh Government allocates funding for flood and coastal erosion risk management in Wales, to ensure it focuses on those places at greatest risk. Further detail is provided in Chapter 4.

¹⁴ <http://www.floodre.co.uk/>

¹⁵ <http://gov.wales/topics/environmentcountryside/epq/flooding/drainage/?lang=en>

Chapter 2: Understanding Flood & Coastal Erosion risk

2.1. Flooding – the current risk

Data compiled in 2014 indicates there are currently around 208,500 properties (residential and non-residential) at risk of flooding from rivers and the sea in Wales. Some of these are also at risk of surface water flooding.

	High	Medium	Low	Very Low	Total at risk from flooding
Residential	11,100	25,600	110,500	950	148,150
Non-Residential	10,500	13,850	35,600	400	60,350
Total Properties	21,600	39,450	146,100	1,350	208,500

Table 1: Numbers of properties at risk of flooding from rivers & the sea in Wales (based on 2014 data).

The figures presented in Table 1 are from the Environment Agency’s National Flood Risk Assessment (NaFRA) modelling data. The figures have not been assessed since 2014, when NaFRA was last run including a Welsh dataset. The reported figures therefore remain static despite significant investment in FCERM between 2014 and 2016.

In the interim, investment in flood defences is reflected via quarterly amendments to the “Areas Benefitting from Defences” (ABD) layer on the NRW flood risk map¹⁶, which is available from the NRW website. Capital investment programming and reporting also reflect actual number of properties and businesses benefiting from investment for individual schemes.

In terms of properties at risk from surface water and coastal erosion, no recent analysis has been undertaken, however local data is available through the Flood Risk Management Plans. Current estimates of properties at risk remain the same as reported in 2014. These are presented below:

- surface water flooding risk: 163,000 properties (120,000 residential & 43,000 non-residential)
- coastal erosion risk: 2126 properties (1944 residential & 182 non-residential) by 2114 with no active intervention. This figure would reduce to 145 (126 residential & 19 non-residential) with full implementation of SMP2 policies.

2.2. Future risk

The key drivers influencing future flood risk are largely recognised as being climate change and socio-economic change. Climate change projections from UKCP09¹⁷ indicate that in addition to predicted sea level rise, there will be an increase in wave height and an increase in rainfall intensity. It is probable that flood events will become more frequent, putting an increasing number of people, businesses and infrastructure at risk. Preventing unsustainable and inappropriate development along with improving resilience will be key challenges to be addressed in future FCERM.

¹⁶ <https://www.naturalresources.wales/our-evidence-and-reports/maps/flood-risk-map/?lang=en>

¹⁷ <http://ukclimateprojections.metoffice.gov.uk/>

2.3. Communicating risk

There is growing awareness within government and by RMAs that the way in which flood risk and impacts are communicated needs to improve. Recent research¹⁸ has demonstrated that the general public find the language currently used as confusing and difficult to relate to. This can have the unwanted effect of a lack of belief, ownership or readiness should the worst happen.

NRW has supported an England and Wales wide public communication and engagement project led by Sciencewise, which explored the effectiveness of how flood risk is currently described and presented to the public. It also looked at how different methods of communication and the use of more consistent language may help improve public understanding of risk, increase engagement and prompt greater activity to improve community resilience.

The findings of this research, published in January 2016 has produced a list of actions, including the need to improve the language used and move away from talking about 'probability' and 'risk'. Other measures identified to help raise awareness and increase community resilience include better links between flood maps and flood warnings and a simple guidance document to help clarify roles before, during and after a flood.

¹⁸ <http://www.sciencewise-erc.org.uk/cms/public-communication-and-engagement-on-flood-risk/>

Chapter 3: Responding to Flooding: Monitoring, Forecasting, Warning and Community Engagement

3. Introduction

It is not possible to completely prevent flooding or coastal erosion from happening. Community engagement is therefore vital to ensure appropriate action is taken with regard to information made available before, during and after a flood event. NRW and RMAs monitor weather forecasts in order to provide essential and timely information in relation to adverse weather conditions that may result in a flood event occurring. This chapter highlights the progress made during the reporting period to help inform and prepare communities to take action when information is made available through forecasts and warnings.

3.1. Flooding in Wales

Winter 2015 was very wet throughout the UK but despite December 2015 being the wettest on record, Wales did not see the impacts or experience the same level of flooding as England and Scotland. Isolated property flooding was reported, as was disruption to major infrastructure with the A55, A5 and A487 in North Wales all experiencing closures. During December 2015 alone, NRW issued 55 Flood Warnings and 178 Flood Alerts. To put this in context, throughout the report period, NRW issued 135 Flood Warnings and 559 Flood Alerts. Figure 1 shows the distribution of Flood Alerts and Flood Warnings issued. Despite some high profile storm events, no severe flood warnings were issued.

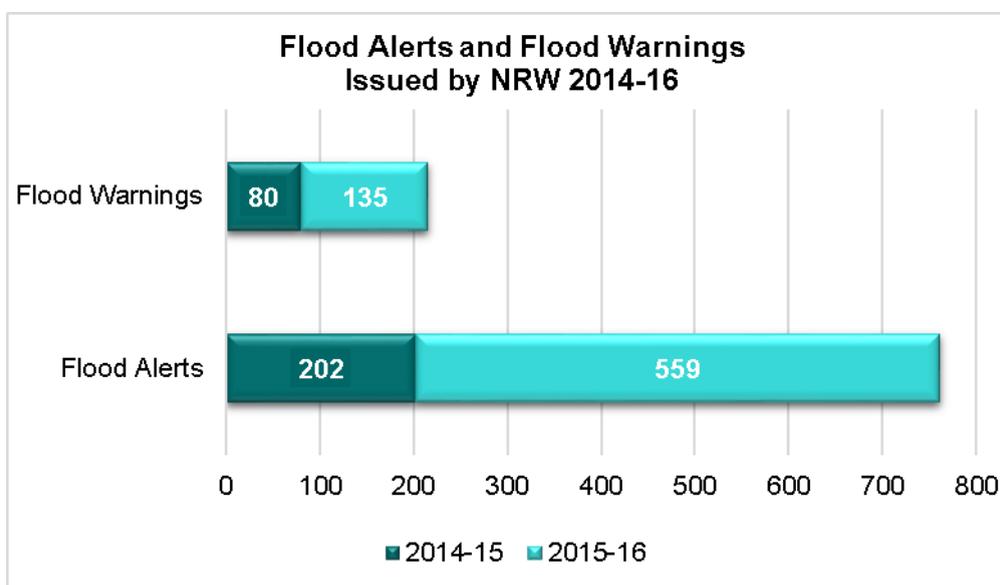


Figure 1: Flood alerts and Flood Warnings issued from 1 April 2014 to 31 March 2016

There were reports of over 800 properties (residential and commercial) being affected by flooding during this reporting period. This covers flooding from all sources (excluding sewer flooding) and includes reports of internal property flooding as well as to residential gardens and garages. The number reflects properties affected by flooding that has been reported to RMAs only.

There were also 513 reports of internal sewer flooding incidents and 14,896 external sewer incidents during the reporting period, which include flooding of all causes from the sewer network.

Flooding in Cwmbran

On the 22nd May 2014, 33mm of rain fell in just 25 minutes on Cwmbran, Torfaen CBC from a severe cloudburst event. This led to localised but severe, surface water flooding. In total, 198 properties were reported to have flooded from either the Dowlais Brook, surface water flooding or sewer flooding.



Figure 2: flooding from Dowlais Brook. (Credit- Torfaen CBC, S19 Flood Investigation Report)

Torfaen CBC produced a Section 19 report detailing the flood event and impacts experienced. The report made five recommendations including improving community and council awareness, improving riparian owner's awareness of responsibilities, encouraging SUDs designs for new developments and to undertake detailed investigations.

Monitoring, Forecasting and Warning

3.2. Monitoring

NRW has continued to improve the coverage and capability of its rainfall and river gauge network, which is used for monitoring, forecasting and warning of flooding as well as modelling longer term flood risk. Over the last 2 years NRW has installed 5 new river level gauges. These new gauges have enabled NRW to increase the coverage of its flood warning service and the quality of information available to communities at risk during a flood.



Figure 3– new telemetry rain gauge installation at Blaen Ogwr on high ground draining to Ogmore, Taff and Afan river catchments

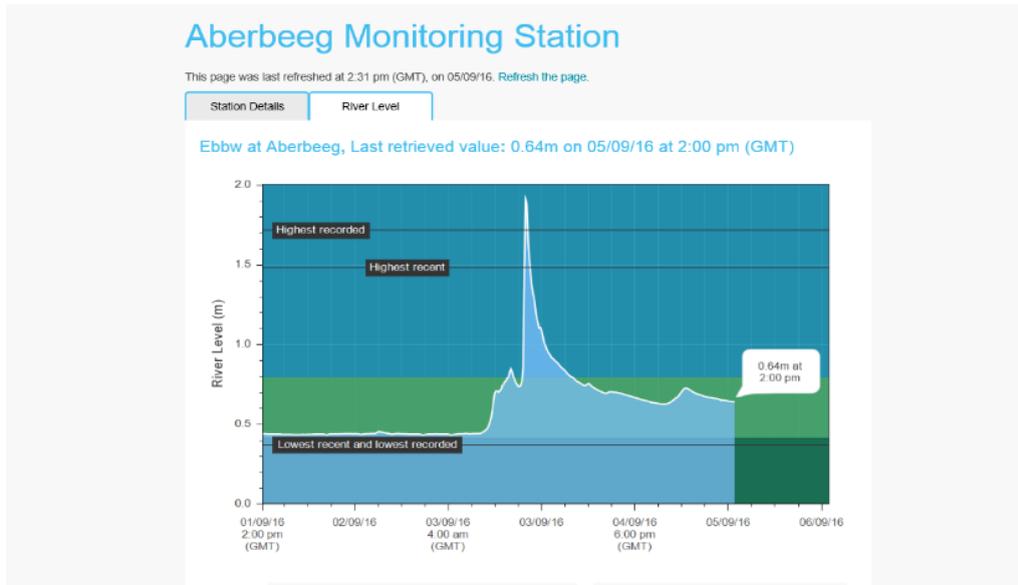


Figure 4: Example river level data from the River Levels Online service - available on the NRW website

Some RMAs (for example Rhondda Cynon Taf CBC) also improved their hydrometric network during the reporting period to improve live information during rainfall events. This helps to direct operational response staff where they need to attend on site in response to any impacts or potential impacts. Dwr Cymru Welsh Water (DCWW) also worked with NRW and Ceredigion County Council (CC) through the Cardigan Technical Flooding Group to develop an emergency contingency plan. This is used to both predict and proactively manage flooding caused by high tides and heavy rainfall via the positive intervention of emergency pumps.

3.3. Flood Forecasting

NRW has continued to improve coverage of its coastal and river forecasting service. Over the last 2 years, new river models have been introduced for the Usk, Glaslyn, Ogmere and Ewenny catchments providing forecasts for 16 new locations along these rivers. Since the end of March 2016, NRW has had the ability to forecast flooding for 174 locations across Wales (93 river and 81 coastal).

NRW has made improvements to existing models to provide more accurate forecasts, increase the coverage, timings and accuracy of its flood warning services, and improve the quality of information available for flood warnings. NRW are also making use of improved rainfall, wind, surge and wave forecasts from the Met Office to extend forecasting models out to 5 days, identifying possible severe weather events sooner.

3.4. Warning

NRW provides a free Flood Warnings Direct service to people at risk of flooding from main rivers and the sea. By the end of March 2016, there were 93,818 people registered to receive flood warnings. This service is provided where feasible through a network of river and sea level monitoring that is manned round the clock and activates flood alerts, flood warnings and severe flood warnings to homes and businesses.

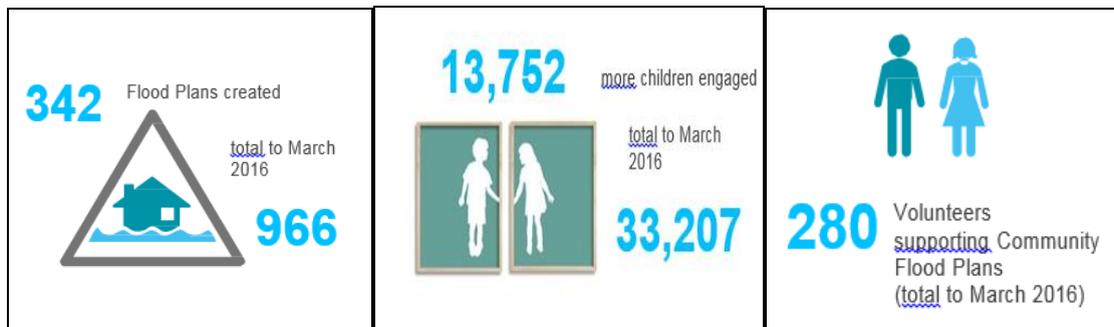
During the period of the report, new Flood Warning areas were introduced for the following communities: Pwll, Capel Bangor, Talybont (Ceredigion), Dolybont, Borth, Prestatyn, Rhyl, Kinmel Bay, Barmouth, Fairbourne, Llanyrafon, Dinas Powys and Rhymney.

DCWW have a mass text facility available to inform customers if there is a large scale flooding event that may impact them. Flood Warning systems for surface water flooding are yet to be developed.

Community engagement and partnership working

3.5. NRW

NRW's Flood Awareness Wales officers, in partnership with LLFAs, work with local residents and other partner organisations to develop and test local community flood plans. These plans aim to increase community resilience before a flood and improve response and recovery during and after. There are 280 volunteers supporting community flood plans across Wales, which enable communities to locally own their flood risk, making this more effective and sustainable for the future. Overall, Flood Awareness Wales has facilitated the development of 342 flood plans during the reporting period, made up of community flood plans and plans tailored for various at risk groups, such as schools and businesses, caravan parks and farms.



During the report period, NRW, in conjunction with over 50's networks in Wales, Local Authorities and Local Resilience Forums, developed specific flood advice for Older People. Age Cymru shared this flood advice on their website as well as verbally through local groups (Gwynedd). This has helped add value to NRW messages as they come through a trusted existing network. Older and possibly vulnerable people will receive specific advice allowing them to take actions to prepare themselves and their homes for flooding.

In addition, NRW engaged with the Young Farmers Rural Affairs team and the British Horse Society magazine to publish an article to raise awareness and provide practical advice for land and livestock owners who are at risk of flooding which reached over 4,500 people in Wales.

3.6. Other RMAs

LLFAs reported a range of community engagement events undertaken during the reporting period. This includes: improved use of messaging through social media (City of Cardiff); flood advice shared through environment days; a flood awareness event in Kinmel Bay; a community awareness drop-in at East Rhyl (Conwy County Borough Council (CBC), awareness raising campaigns in Pwllheli, Porthmadog, Bangor, Abersoch and Bontnewydd (Gwynedd Council); and ward drop in sessions (Torfaen CBC).

Many RMAs partner NRW for the purpose of delivering community engagement and supporting the production of community flood plans. Caerphilly CBC, Carmarthen County

Council (CC), Ceredigion County Council (CC), Pembrokeshire County Council (CC), Rhondda Cynon Taf CBC, City & County of Swansea, Torfaen CBC and Wrexham County Borough Council (CBC) in particular have undertaken engagement exercises with NRW during the report period. DCWW also regularly partner LLFAs and NRW at public flooding meetings, for example the joint exhibition regarding the flooding experienced at Porthmadog and Tremadog in December 2015.

Blaenau Gwent CBC, Conwy CBC, Denbighshire County Council (CC), Merthyr Tydfil CBC, Carmarthen CC and DCWW have all undertaken awareness-raising in schools during the reporting period. An example of which is talking to primary school children about flooding and its impacts.

3.7. Identification of vulnerable individuals

All individuals that are at risk of flooding are vulnerable. Within this, there are individuals that need more help to take action when needed. The majority of RMAs take steps to identify which communities are at risk of flooding. Most RMAs then use community flood plans (where available) to assist the community to identify individuals who require additional action or support should a flood happen. Most RMAs are using this approach in addition to any lists that are already held and maintained through social services and emergency planning departments.

Pilot volunteers network events: Swansea (5 Nov 2015) and Llandudno (28 Jan 2016)

Two volunteer network events run by NRW aimed to improve volunteer's local flood risk management; encourage better consideration by volunteers of health and safety matters, enable sharing of good practice; promote greater understanding of roles and responsibilities and provide a chance to create a network of volunteers across Wales.

Both pilot events delivered against the intended outcomes and demonstrated tangible outputs which include;

- Attendees who met at the event staying in touch post event;
- Increased promotion and use of the FAW Facebook page;
- Greater understanding of roles and responsibilities, before during and after a flood – between professionals and public;
- Strengthened relationships including 'resource myth-busting' between professional partners and the public at local level.



Figure 5: Photo of attendees at the November 2015 volunteer network event

Chapter 4: Investment & Funding

4. Introduction

Understanding flood and coastal erosion risk and prioritising investment is a fundamental principle of the Flood Risk Regulations 2009, the Flood and Water Management Act 2010 and the National Strategy for FCERM in Wales.

Prioritising investment in the most at risk communities is one of the four key objectives of the National Strategy, with a sub-objective stating that the Welsh Government should: "Develop a National Programme of Investment for flood and coastal erosion risk management". In addition to this requirement, the need for a simpler, yet robust approach to assess FCERM project bids was also identified during the report period.

4.1. Flood and Coast Investment Programme (FaCIP)

In 2014, work began on a national programme of investment with the launch of a consultation on the proposed approach. The Flood and Coast Investment Programme (FaCIP) aims to develop a methodology for prioritising funding to those areas at highest risk. The intention is to create a clear, objective way of directing funds to places at risk from all sources of flooding and coastal erosion through a nationally consistent methodology.

The FaCIP working group, consisting of representatives from the Welsh Government, NRW, WLGA, Local Authorities and DCWW, is undertaking work to deliver a trial prioritisation methodology. Amongst other improvements, this includes streamlined mapping products and a National Assets Database. It is anticipated that 2017/18 funding allocations will be undertaken using trial methodology outputs from FaCIP.

4.2. Investment Programme

Between April 2014 and March 2016, over £116 million was invested by the Welsh Government in flood and coastal erosion risk management across Wales. This investment includes the construction of new defences, maintenance of existing structures and the delivery of environmental enhancement and mitigation works. It also includes improvements in flood modelling and forecasting capabilities, as well as awareness raising. Investment has also been made by RMAs to develop and implement tools to better monitor, capture and record flood data, helping to prioritise investment and target delivery of FCERM in those areas most at risk.

The significant investment made in FCERM during this time has reduced the risk of flooding to over 5,200 homes and businesses across Wales, improved resilience to the effects of flooding and helped to raise public awareness of flood risk and impacts.

4.3. Income & Investment Figures

A key priority for all RMAs from Welsh Government income and investment is the implementation and delivery of schemes and measures that reduce the level and frequency of flooding and coastal erosion. Investment in resources is essential to maintain and enhance the capability of RMAs to manage the increasing risks of flooding and coastal erosion. During the reporting period this was supplemented by funding from the European Regional Development Fund (ERDF) and Wales Infrastructure Investment Plan (WIIP).

Tables 2 and 3 provide a breakdown of capital and revenue funding invested in Wales between April 2014 and March 2016.

Capital Funding			
Natural Resources Wales		Lead Local Flood Authorities	
GIA	£37,563,996	GIA	£12,139,530
ERDF	£566,762	ERDF	£5,135,816
WIIP	£11,150,000	WIIP	£219,553
Overall Total Investment £66,775,657			

Table 2: Capital funding between April 2014 and March 2016

Revenue Funding			
Natural Resources Wales		Lead Local Flood Authorities	
GIA	£42,791,195	GIA	£6,539,120
ERDF		ERDF	
WIIP		WIIP	
Overall Total Investment £49,330,315			

Table 3: Revenue funding between April 2014 and March 2016

4.4. Emergency Grant Funding

Following the winter storms in 2015, all 22 LLFAs were offered the opportunity to bid for grant funding from the Welsh Government to carry out repairs to damages experienced. The first round of funding became available in January 2016 for works to be completed by March 2016. A second round became available in April 2016 to fund works during the current financial year.

In total 101 schemes across 10 Local Authorities received nearly £2.5 million in grant funding for emergency works required in response to the winter storms and subsequent flooding. For example Isle of Anglesey were awarded £80K for work to make repairs at Treaddur Bay and £40K for culvert repairs and Conwy Council were awarded £80K for trash screen repairs.

4.5. Single Revenue Grant

The Single Revenue Grant, provided under the Welsh Government's Environment and Sustainable Development Directorate was implemented during the 2015/16 financial year. This provides local authorities with the opportunity to bid for revenue funding in addition to their core grant for a number of activities, including flood risk management. Eligible work must support the goals set out in the Well-being Future Generations (Wales) Act 2015 and demonstrate wider multiple benefits for the local community, the environment and the local economy. Local Authorities are encouraged to identify the delivery of wider benefits and look across departments to identify where linkages can be achieved.

Applications were received from all 22 Local Authorities for the 2015/16 financial year with all those requesting funding for flood risk management works being successful. It is anticipated that these grants will help build capacity and create lasting change rather than focus on short term deliverables, proving multiple benefits and better value for money.

During the 2015/16 financial year, £1.576 million funding was allocated to local authorities for revenue activities including awareness raising, maintenance, asset inspection, flood incident reviewing and meeting the requirements of the Flood and Water Management Act 2010.

4.6. New Structures & Assets

Through its capital investment scheme, NRW has reduced the risk of flooding to 1,123 properties during the reporting period. Table 5 provides a summary of the locations where flood alleviation schemes have been completed through capital investment and the number of properties benefitting.

2014/2015		2015/2016	
Location	No of properties benefitting	Location	No of properties benefitting
Swansea Vale	290	Newton Sea Defence	26
Rhymney Embankment	12	Dolgellau	310
Mwldan Weir	23	Ffordd Isa	40
Penclawdd	142	Caldicot Levels	280
Total	467	Total	656

Table 4: NRW Flood Alleviation Schemes completed between April 2014 and March 2016

During the reporting period significant development work has also been undertaken for schemes including at St Asaph, Crindau(Newport) and Roath(Cardiff).

LLFAs have also delivered enhanced flood protection to over 4,160 properties (including homes, businesses, a community centre and school), as well as improving resilience to key highway infrastructure and local access through their programmes of investment.

A number of major flood and coastal erosion schemes were completed during the reporting period, including for communities in Rhiwbina, Traeth Crugan, Talgarth, Borth, Swansea, Beaumaris and West Rhyl.

Beaumaris Flood Alleviation Scheme

A new £1.4m coastal flood defence scheme at Beaumaris in Anglesey has been completed. The scheme, which comprises of a new sea wall near Beaumaris Green and the re-construction of the sea wall along the A545 into the town centre, provides benefits to 100 homes and 45 businesses who have historically flooded from high tides and wave action.

The new defences have already been put to the test and performed well during the winter storms of December 2015. Flood waters rose above the previous flood defence levels on Beaumaris Green, meaning that without this significant investment, flooding would have occurred.

Rhiwbina Flood Alleviation Scheme

Over 200 residential properties and businesses in Rhiwbina, Cardiff have benefited from an environmentally sensitive scheme aimed at reducing the risk of fluvial flooding from the Whitchurch Brook. The works, completed in March 2015, involved the construction of low level flood walls, earth bunds, micro-piling techniques to retain a long established hawthorn hedge, coir rolls and green screens to widen the water course where possible and the construction of a large attenuation pond with associated downstream drainage works to capture peak flows during periods of heavy rainfall.

The scheme was recognised at the 2016 Institute of Civil Engineering Wales Cymru Awards for its adoption of environmentally sensitive measures and for the extensive consultation and liaison with property and landowners to address their needs.

West Rhyl Coastal Defence Scheme

Phase 3 of the West Rhyl Coastal Defence Scheme was completed in October 2015, helping to reduce the risk of flooding to over 2,700 properties from coastal flooding. The scheme, costing more than £15 million provides a new coastal revetment and wave walls, a widened promenade and reclaims an area of land for landscaping. In addition to flood protection, the project has opened up the area for future regeneration, providing a boost to the local economy and helping to attract a greater number of visitors to the town.



Fig 6: West Rhyl coastal defence scheme (Credit: Welsh Government)

Dolgellau Flood Alleviation Scheme

310 homes and businesses in Dolgellau have seen their risk of flooding reduce following the completion of a £4.9 million flood alleviation scheme in Autumn 2015. The scheme involved building new defences and improving existing ones along the left bank of the river Wnion. Similar improvement works were carried out on the banks of the Afon Aran and a weir was removed downstream of Pont yr Aran. The capacity of the floodplain was also increased to create space for more water when needed.

As part of the overall scheme, additional community and environmental improvements were made including landscaping works, a new play area for Ysgol Feithrin the installation of bat and bird boxes and improvements to a fish pass. The works have already prevented flooding in the town when river levels in the Wnion reached a point higher than the previous defences during December 2015.

4.7. Property Level Protection

Property Level Protection (PLP) measures, have been implemented by NRW and a number of LLFAs as an alternative means of providing flood protection at selected locations. Since March 2014, 152 properties have benefitted from PLP, including for communities in Deiniolen, Solva, Swansea, Bridgend, Carmarthen, Barry and Conwy. Protection measures have included flood gates, sandbags and drain covers.

4.8. Surface and Sewer Flooding

DCWW have continued to invest in essential infrastructure improvements to alleviate the risk of residential flooding. Targeted investment and proactive interventions to minimise the risk of flooding has achieved a continuous reduction in the number of properties at the highest risk of sewer flooding across Wales.

Investment to increase the capacity on the sewerage network and improve performance during periods of heavy rain includes £1.4 million in the villages of Mancot and Pentre in Deeside and £1.3 million within the St Helens area of Swansea. In addition to large capital investment, DCWW are looking at ways to minimise flood risk through its minor works

programme. This has included small scale surface water removal work in Llanberis and a programme to remove siphons (recognised as a risk in creating blockages) from the sewer network in Cardiff. DCWWs 'Resilience Project' to improve the condition and reliability of pumping station failures has also continued. This has seen a reduction in properties internally flooded due to pumping station failures from 42 in 2013/14 to just 2 during the reporting period.

4.9. Rainscape

DCWWs RainScape programme aims to address root cause of surface water issues at the catchment level rather than looking at problems in isolation. It also aims to work with LLFAs to develop innovative solutions for managing surface water that also maximise wider social, economic and environmental benefits, such as increased access to green space, habitat creation, improved community cohesion and reduced sewer flooding. In May 2015, DCWW started work on a new £2 million scheme in Burry Port, to help reduce the risk of sewer flooding and pollution incidents by diverting rainwater run-off from the combined sewerage network to the local harbour. DCWW have also launched a new customer website (<http://rainscape.co.uk>) which provides information on RainScape but also provides information to customers on how they can manage surface water in their own homes.

4.10. Maintenance of structures /watercourses

A key objective of the National Strategy is for there to be an established programme of flood risk asset inspection and maintenance. Asset integrity and performance is monitored by RMAs as part of their operational work programmes to ensure that they continue to provide the required standard of protection.

All LLFAs have a regular inspection and maintenance regime in place, however there is no standardised system of prioritisation and frequency. A single oversight of all assets was a key recommendation of the Coastal review and some LLFAs have reported their intention to implement a more formalised system in conjunction with a move of asset data to a bespoke single asset management system.

4.11. Maintenance /Improvement Works

Maintenance projects undertaken by LLFAs during the reporting period include widespread cleaning, repair and upgrading of culverts, highway drainage improvements, removal of debris from watercourses and bankside re-enforcement works. There has also been significant coastal maintenance works, including at Barry, Westcross (Swansea), Beaumaris, Newgale and Little Haven. For example, during the reporting period, Pembrokeshire invested £124,000 in coastal maintenance works at around 19 locations, where local flooding to residential properties on an annual basis is experienced. In addition, the Welsh Government has allocated a number of small scale grants to local authorities for maintenance work. During the reporting period 11 local authorities received a total of £664,210 which funded 35 small maintenance schemes.

Rhondda Cynon Taff CBC, has deployed a monitoring system to priority culverts where overtopping has occurred in the last several years. A series of water monitoring devices and CCTV equipment have been installed to improve the maintenance regime including the establishment of early warning alarms set within the watercourse.

NRW owns and maintains 3906 flood risk assets, consisting of 511km (319 miles) of linear defences. The number of NRW assets has reduced from that previously reported. This is due to a data clean-up exercise and a review of the asset criteria used.

NRW has spent over £11 million during the reporting period maintaining its flood risk assets and main river watercourses. Flood risk capital funding is also used for large scale maintenance works to NRW defences and structures. Investment in asset maintenance is essential to ensure properties continue to benefit from flood protection to an agreed standard, it is estimated that 73,000 properties benefit from these flood defences in Wales.



Fig 7: Examples of NRW maintenance

Schemes undertaken by NRW during the reporting period include at Llyn Tegid (gate maintenance), Glanwern (Chamber & Outfall repair) and Glanllynau (Sea Defence repair). Routine and capital maintenance programmes are publicly available on the NRW website¹⁹. This provides an opportunity for the public to find out what flood risk management works are planned for their particular locality.

Dwr Cymru Welsh Water and Severn Trent Water have rolling asset and maintenance inspection programmes in place, which they report on delivery every 5 years.

Newgale coastal adaption & resilience scheme

The coastal adaptation and resilience scheme at Newgale, currently in its development stage will help ensure the St David's peninsula continues to be an attractive viable, safe and well connected community. The scheme is important to sustain the local economy and allow for long term future employment prospects. It is also working to meet the requirements of the WCFG Act well-being goals. New Biodiversity Action Plan priority habitat will be created to enhance the health of a functioning ecosystem and help support ecological resilience. There will be benefits to the local economy from sustainable opportunities for outdoor pursuits and activities, which in turn will help improve people's health and well-being.



Fig 8: Flooding at Newgale (Credit: Pembrokeshire County Council)

¹⁹ <https://naturalresources.wales/flooding/managing-flood-risk/flood-risk-management-programme/?lang=en>

4.12. Reservoirs

Amendments to the Reservoirs Act provide new directions which supervising and inspecting reservoir engineers may use to help the ongoing surveillance of reservoir safety and maintenance matters.

The number of regulated reservoirs is expected to increase from 228 to around 330 across Wales, and across a variety of organisations, i.e. water companies, industrial, local authority, NRW and private landowners. This is due to the new requirement to register reservoirs with a capacity of 10,000 cubic metres or more, held above natural ground level.

4.13. Green Engineering & Sustainable Management of Natural Resources

Climate change, often attributed to more frequent and severe flood events, along with changes in domestic legislation and uncertainty over future funding and resource, is putting more focus on alternative means of managing flood risk, particularly those that work with nature to deliver wider social and environmental benefits. A sustainable management of natural resources (SMNR) approach and collaborative working towards multiple goals could help absorb reductions in resource, whilst still delivering flood mitigation.

RMAs in Wales routinely use green engineering techniques and urban drainage solutions such as SuDs to complement traditional flood mitigation measures. For example, a recent development at Trelewis (Merthyr Tydfil CBC) included three large attenuation ponds as part of the drainage scheme and across Monmouthshire, the use of willow /timber structures is often used to address river erosion concerns.

As part of its capital and maintenance programme, NRW also incorporates green engineering measures wherever feasible. For example rock rolls and matting made from natural materials was used to re-instate 110m of flood bank and reduce soil and river bank erosion along the Afon Bawddwr in Llandovery. Deposited material was also re-used as backfill to help return the flood bank back to its original design and to complement the natural environment.



Figure 9: flood bank work on the Afon Bawddwr

Similar works have been carried out at Ferryside, Carmarthenshire where 69 properties are at risk from combined fluvial and surface water flooding from the Cwm Mill Stream. Rock rolls and erosion control matting were used to repair 40m of eroded embankment. The works, completed in September 2015 held up well during recent high flood events, including those of December 2015.



Figure 10: Cwm Mill Stream, Ferryside

RMA's are increasingly exploring ways to work with nature to retain water at source and 'slow the flow'. Whilst many RMA's have not yet embarked on such schemes, LLFAs including Conwy CBC, Carmarthenshire CC and Gwynedd Council report that they are actively exploring SMNR to both reduce flooding and achieve wider benefits for their local areas. Flintshire County Council (CC) have also commissioned a Feasibility Study on Natural Flood Risk Management opportunities at Swinchiards Brook.

Furthermore, RMA's are developing partnerships both internally and across organisations to identify opportunities where SMNR could be implemented. For example, Neath Port Talbot Talbot CBC have set up a natural resource management working group to identify opportunities where multiple benefits including flood risk, could be delivered and Pembrokeshire CC are working with NRW to identify potential areas for integrated natural resource management schemes with a view to progressing a joint initiative.

NRW is also progressing a SMNR approach, which has been piloted through three 'Area Trials' (Rhondda, Tawe, Dyfi). For example, upland restoration works and woody debris dams have been installed at Cwmparc, Rhondda to provide flood attenuation, reduce the energy of the river and trap sediment as well as helping to restore the area for wildlife.



Fig 11: Brushwood fascines, holding water and trapping sediment at Cwmparc.

Studies have also been commissioned to assess the potential for natural interventions to reduce flood risk within the catchments of the River Clwyd and Elwy in North Wales. These initial studies identified optimum locations where interventions such as tree planting, land use changes and drain blocking could be used to reduce the peak flow in summer and winter flood events. The studies are now part of a wider DEFRA/EA Flood & Coastal

Erosion Risk Management Research & Development²⁰ project on catchment processes to looking at where and how such measures could be used to reduce flood risk. NRW is now working with Coed Cymru and Bangor University to secure funding for implementation of measures through the Welsh Government Sustainable Management Scheme project.

4.14. National Habitat Creation Programme (NHCP)

NRW delivers the National Habitat Creation Programme (NHCP) on behalf of the Welsh Government to provide compensatory habitat and mitigation measures required to offset losses which result from coastal flood risk management and the implementation of SMP strategies.

In addition to addressing adverse impacts of FCERM, the programme provides an opportunity to deliver natural coastal protection to manage flood risk (protecting people and properties) whilst delivering a range of additional ecosystem benefits. For example, saltmarsh is recognised for its function as a carbon sink and may also help manage impacts associated with sea level rise and climate change.

Overall, during the reporting period NRW invested over £650,000 through NHCP providing biodiversity gains of around 15.3Ha. This included investment in managed realignment, start-up of habitat creation projects and opportunity appraisal which could result in around 80Ha of habitat improvement and creation over the next 100 years.

Working in collaboration with a range of stakeholders, including local authorities, landowners and Network Rail, NRW is continuing to develop habitat creation opportunities across Wales. The overarching aim is to progress best options for the environment, land owners and local communities, to enable on-going coastal flood protection that meets statutory requirements.

4.15. Partnership Working

There is a strong emphasis on partnership working in the National FCERM Strategy and this is further strengthened by the requirements of the WBFG Act and Environment Act.

Partnership working has been undertaken by RMAs across Wales to develop Flood Risk Management Plans, deliver schemes, share information, raise awareness and participate in multi-agency flood response exercises. RMAs have reported a number of benefits to partnership working for example: shared costs and time; alignment of Policy- e.g. provision of sandbags; and monitoring and reporting improvements. Anecdotal evidence also suggests that providing a joint approach to flood risk management encourages a sense of trust and participation within targeted communities.

NRW has worked closely with LLFAs to deliver Flood Risk Management Plans and to advise on Strategic FCAs. A number of flood and coastal risk management schemes are also being delivered in partnership between NRW and LLFAs, for example in St Asaph, the Coldbrook Catchment in the Vale of Glamorgan and the combined Denbighshire and Flintshire Barkby Beach to Point of Ayr coastal flood risk management strategy.

The Lower Swansea Valley flood scheme, which officially opened in November 2014 demonstrates how RMAs can work together to reduce the risk of flooding, protect local

²⁰ <http://evidence.environment-agency.gov.uk/FCERM/en/Default/FCRM.aspx>

businesses, enhance the local environment and provide opportunities to improve people's health and well-being. The £7m scheme delivered by the City & County of Swansea and NRW, has improved flood protection for 280 businesses and 20 homes as well as delivering many other benefits for the local community, including an upgraded cycle route, a new footbridge and a new green area, converted from a former industrial site.

SMNR Partnership Projects

During the reporting period, Rhondda Cynon Taff CBC has worked with the South East Wales River Trust and NRW to deliver the river restoration project 'Clean the Clun²¹'. The overarching aim is to tackle poor water quality within the Clun Catchment, however targeting site management issues on council owned land and maximising open space through planning agreements, has also helped increased opportunities for SuDs potential within the Clun planning catchment.

NRW and Swansea CC have embarked on a trial Sand dune project in Swansea Bay. By working to stabilise the dunes, it is hoped that a number of social and environmental benefits will be delivered, including for flood risk.



Fig 12: dune stabilisation works, Swansea

Swansea CC are also working Coed Cymru to explore greener/softer engineering opportunities within the Local Authority area to deliver flood mitigation.

Torfaen CBC have been working with Social Landlords to help inform and advise their tenants of the level of help and assistance available both during and after a flooding incident and in Conwy engagement work has been undertaken with residents, local businesses and the community council in Llandudno to look at flood risk management and the wider social-economic and environmental effects.

Carmarthenshire CC have worked closely with the Highway Agency at Llanddowror to re-profile a carriageway upstream of the village to prevent water flowing down the road into the village.

DCWW also work closely with LLFAs across Wales, including Isle of Anglesey County Council (CC), Conwy CBC, Gwynedd CC, Neath Port Talbot CBC, Powys County Council (CC) and Monmouthshire county Council (CC) to identify opportunities for removal of surface water from the combined sewerage network. High profile schemes include 'Greener Grangetown' in Cardiff and 'Rainscape' in Carmarthenshire. Greener Grangetown included collaboration with NRW, the Land Fill Community Fund and City of Cardiff Council, where both the decision making process and financial contributions were

²¹ <http://www.sewrt.org/clean-the-clun>

made by all parties involved. DCWW are also working with NRW to identify opportunities to collaborate on capital programmes to deliver the most effective joint solutions.

The Wales Coastal Flooding Review delivered during the reporting period is also an example of successful partnership, with RMAs working collectively to complete 39 of the Review's 47 Recommendations between April 2014 and March 2016.

Reservoir Emergency Awareness in Dyfed Powys

The recent change to reservoir legislation prompted a reservoirs emergency awareness day within the Dyfed Powys Local Resilience Forum area. This was attended by a variety of organisations, including NRW, LLFAs and water companies such as DCWW and Severn Trent Water. The event focused on reservoir legislation, the legal ramifications of response, on-site and off-site emergency plans, as well as examples of recent reservoir emergencies and the importance of effective and resilient multi-agency response to reservoir incidents.

The day has helped highlight the importance of having measures in place to manage reservoir flood risks.

4.16. Flood Incident Response

RMAs across Wales have continued to develop and test flood incident response plans during the reporting period, which is a key objective of the National Strategy and demonstrates the importance of strong partnership working to manage flood risk.

Exercise Megacyma

In March 2015, a large scale evacuation exercise (Exercise Megacyma) was held to test Wales's capacity to respond to widespread coastal flooding and large scale evacuation by a sub group of the Wales Flood Group. The group included representatives from the Welsh Government, local authorities, NRW, Met Office and the Joint Emergency Services Group.

The exercise was designed to look at a number of priority areas and, using a major coastal flood scenario, analyse any gaps in current planning and mitigation.

This was a strategic exercise with both tactical and practitioner input. Although the South Wales and Gwent Local Resilience Forum's (LRFs) were the main players there was heavy involvement from utility companies, 3rd Sector, Dyfed Powys LRF, the Welsh Government, South West England LRFs, Cabinet Office and the Department for Communities and Local Government.

The exercise was run as a table-top exercise in the run up to a potentially significant coastal flooding event with play centering on Strategic Co-ordinating Group (SCG) meetings in South Wales, Gwent and the South West of England. In parallel with these meetings there were Wales Civil Contingencies Committee meetings and representatives from Cabinet Office were available to simulate COBR play. A table including utility and infrastructure companies also took part in the exercise to consider their response and be available for engagement with the SCGs.

The exercise was helpful to test the existing command, control and communication arrangements for widespread flooding in Wales and to use the outcomes to enhance future response arrangements.

Exercise Elwy

In October 2014, St Asaph was the setting for a major multi-agency emergency exercise to practice response to a major flood event. Carried out over 2 days, it brought together NRW, emergency services, the council and community flood wardens to test flood plans and put theory into practice.



Fig 13: NRW officers erecting demountable defences.

Officers from the emergency services and Denbighshire County Council acted out a simulated flood scenario, while NRW issued Flood Alerts and Warnings and installed demountable defenses along the banks of the River Elwy. A table-top exercise was also carried out, where volunteer flood wardens were able to practice their response to flood alerts, disseminate information and discuss how best to manage emerging scenarios during a serious flood event.

The exercise helped improve understanding of the risks that could be faced during a flood. It was also a vital test of flood plans, and demonstrated how well agencies and volunteers work quickly and efficiently with each other to protect people in an emergency. It also highlighted the value of flood wardens on the ground to help warn of an approaching threat, particularly among the most vulnerable in the community.

Chapter 5: Development Planning, Permitting & Consenting

5. Introduction

The Planning (Wales) Act (2015), along with changes to secondary legislation, policy and guidance is helping to support the Welsh Government's improvement programme to deliver a positive, enabling and resilient planning system in Wales. In terms of flood risk, the overarching policy aim is to direct new development away from areas at risk of flooding. Legislative changes to flood defence consenting is also helping to ensure activities undertaken along watercourses or its floodplain do not cause or exacerbate flood risk.

5.1. Strategic Planning

There is a statutory requirement on all Local Planning Authorities (LPA) in Wales to prepare a Local Development Plan (LDP), outlining the proposals and policies to control development within their local area. Four LDPs have been adopted during the report period, all of which include policies specific to managing flood risk.

As part of the LDP process, the majority of LPAs have undertaken a Strategic Flood Consequence Assessment (SFCA) to assist and inform the selection of strategic site allocations for development. LPAs report that they have used the SFCA to determine appropriate land allocations and ensure wherever possible allocated sites, particularly those intended for "highly vulnerable" development such as housing, are located outside of flood risk areas. SFCAs have also been referred to when developing LDP policies to ensure flood risk is not increased. Some LPAs also report that the SFCA has been helpful in identifying opportunities to reduce levels of flooding, thereby helping to manage the overall consequences of flood risk.

LPAs that have not undertaken a SFCA advise that areas of flood risk have been scoped out as being unsuitable for development. In a minority of cases, LPAs report that where site allocations have been made that are potentially at flood risk, a full assessment has been undertaken to ensure future development can be justified, is necessary to promote regeneration and is considered able to comply with national policy concerning flood risk (TAN15).

5.2. Development Planning Advice

In March 2016, NRW became a named specialist consultee on flood risk for all development in Flood Zone C2²² and for highly vulnerable development in Flood Zone C1²³. There is now a statutory requirement for LPAs to consult NRW on development proposals that fall within this category and for NRW to provide a substantive response.

NRW is continuing to work closely with the Welsh Government and with LPAs to further refine and improve advice on flood risk and development planning. Recent areas of work includes providing technical advice into guidance on revised climate change allowances for use in Flood Consequence Assessments and providing comment and technical support to the Welsh Government to help shape the forthcoming update to TAN15 and its Development Advice Maps.

²² Areas of the floodplain without significant flood defence infrastructure

²³ Areas of the floodplain which are developed and served by significant infrastructure, including flood defences

Safeguarding weather radar

Between 2014 and 2016 NRW worked with the Met Office and Welsh Government to secure a Planning Direction within Wales that requires local planning authorities to consult with the Met Office on any planning proposal within specified zones near the Crug-Y-Gorllwyn radar. Crug-Y-Gorllwyn radar is part of the UK weather radar network operated by the Met Office.

It provides real time observations of meteorological conditions that underpin forecasting of severe weather by providing information on rainfall distribution and intensity. Natural Resources Wales depends on weather radar data for flood forecasting and warning, enabling it to plan response and issue earlier and more accurate warnings. If certain types of development are located near to the weather radar, there is the potential to impact the quality of radar data.



Figure 14

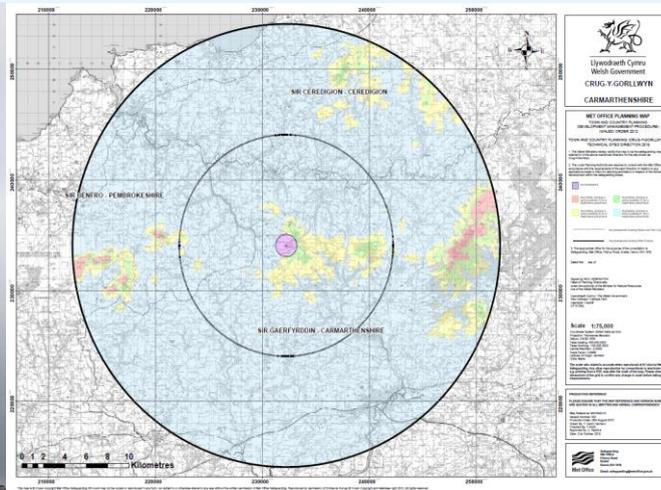


Figure 15

Figure 14: Crug-Y-Gorllwyn weather radar, Carmarthenshire

Figure 15: Safeguarding map for planning application consultations near to Crug-Y-Gorllwyn radar, Carmarthenshire

To avoid any impact on the Crug-Y-Gorllwyn radar, a safeguarding Technical Site Direction²⁴ was signed in February 2016 by Welsh Government. The Direction is supported by a certified safeguarding map (see Figure 6) and pre-application guidance available on the Met Office website. The Direction enables any concern over impacts on the weather radar to be identified at an early stage by the Met Office and for amendments or mitigation measures to be proposed and considered as part of the planning application determination.

LLFAs provide advice to the LPA on matters relating to surface water flood risk and its management. During the reporting period, some LLFAs have instigated measures to create efficiencies and improve the planning advice provided. For example, Flintshire CC have published a supplementary Planning Guidance Note to make developers aware of surface water requirements for new development. Cardiff CC have also commissioned a consultant to develop a potential technical standards document for sustainable drainage, with a view to the Council adopting SUDS constructed in accordance with the document.

²⁴ <http://www.metoffice.gov.uk/learning/library/publications/safeguarding>

Customer Survey

At the start of 2016, NRW carried out a survey with LPAs to gain a better understanding of the influence NRW advice has on strategic development plans and on individual planning applications. This included advice provided on flood risk and its consequences. Over 80% of LPAs who responded agreed that NRW advice had been a determining factor in their decisions and felt that NRW's advice added value to the process of determining planning applications. Data provision rated especially highly, suggesting that NRW's evidence is particularly valuable in this context.

Water Companies operating in Wales also support the planning process, providing advice to LPAs at the strategic planning level, for example on network capacity, as well as responding to planning applications and enquiries. For areas serviced by Severn Trent Water, where developers wish to connect to the sewerage network, full detailed modelling investigation may be required. Where this indicates that connection of additional flows will adversely affect flood risk, investment projects are promoted to work with the developer to ensure a solution is in place before properties are occupied.

5.4. Water Company Business Plans

DCWW remains committed to reducing the risk of sewer flooding and in June 2014, it produced and endorsed its 'Flooding Reduction Strategy' for 2015 and beyond. This links together different components of the business to ensure an integrated approach and better understanding of 'at risk' assets.

In June 2015, DCWW announced a record £1.7 billion investment programme over a 5-year period, promising to deliver significant benefits to customers whilst also safeguarding the environment. Investment will include:

- £33.2m to target and remove 365 properties from its 'Flooding Register' (properties at highest risk of internal flooding).
- Further expansion of 'RainScape', to tackle urban surface water flooding.
- Development of a new 'smart network' to help predict more accurately where blockages and bursts might occur on networks, and so reduce the likelihood and associated cost of this happening.
- Continued roll out of 'Stop the Block' awareness campaign.

During the reporting period, Severn Trent Water have increased focus, both in terms of investment and operational performance, in reducing the number of flooding incidents caused by operational issues. Key activities undertaken include:

- Completion of a series of 'Sewerage Management Plans' to help understand risk locations and to prioritise investment. Through this process a new flood risk mapping tool was developed to map predicted sewer flooding and the maps used to better understand flooding mechanisms, flood risk and in particular the consequences of sewer flooding.
- Investment in cleaning and repairing sewers to ensure they continue to operate as designed and reduce the risk of flooding due to build-up of unwanted material and pipe collapses.
- Identifying customers at potential risk of sewer flooding - if they call to report a blockage, attendance is prioritised to resolve the issue before it turns into a flooding incident.

- Flood risk register improvements to flag properties at risk of surface water flooding and/or fluvial flooding.

Water Companies also report that asset resilience is a key priority area identified in future business plans and Severn Trent Water has recently published a Climate Change adaptation report²⁵ 2015 to 2020, which describes its climate change risk assessment, how its increased resilience over the past 5 years, and the adaptation actions for the next 5 years.

Stop the block

DCWW's 'Let's stop the block' campaign, which aims to transform behaviours and encourage people to take personal action to reduce the risk of pollution and sewer flooding to homes has continued during the reporting period. Blocked sewers are a major problem, resulting in flooding to homes and businesses across Wales on average every 2 days. In February 2016, the campaign gained the boost of national exposure, with the identification of a 3ft 'fatberg' blocking a main sewer in Cardiff city centre. Raising awareness of the problems caused by 'sewer abuse' such as flushing wet wipes and cotton buds down the toilet and disposing of fat, oils and grease in sinks and drains, has seen positive results with a 31% reduction in incidents since 2013/14.

²⁵ <https://www.stwater.co.uk/environment/adapting-to-climate-change>.

Chapter 6: Future Look

6. Future Impacts to FCERM

6.1. Legislation

Changes to domestic legislation is one of the main drivers for the need to rethink the way in which flood risk is managed in the future. The Environment (Wales) Act, the WBFG Act and the Planning Act emphasise the need to think more about the long term impacts of actions on the people and natural resources of Wales. There is also a duty on RMAs to maximise contributions to the 7 well-being goals that underpin the WBFG Act. These goals are interlinked and seek to create a more resilient Wales and a Wales that is better able to adapt to pressures such as climate change. Key to this will be collaborative working to deliver shared multi-beneficial outcomes.

Additionally, future FCERM will need to consider the forthcoming National Natural Resources Policy required under the Environment Act. This will set out Welsh Ministers' priorities for sustainable management of natural resources in response to evidence presented to them. To help implement National Policy, the key risks, priorities and opportunities across Wales will be set out via Area Statements. Still in the scoping stage, the scale and ambition of these Statements will influence where and how flood risk is addressed.

A new Flood and Coastal Erosion Committee, to be brought in through legislation during 2017, will also enable a more collaborative and engagement based approach in line with the WBFG Act.

The changing legislative climate presents a unique opportunity to take a fresh approach to the way in which we manage flood risk across Wales. There is a variety of alternative options available, including direct interventions primarily aimed at slowing the flow and those which are less tangible such as peat bog restoration and changes to the way in which land is used. It is likely that a hybrid approach, combining traditional defence measures with softer, more natural interventions will be key to future flood risk management.

6.2. Flood and Coastal Erosion Committee

Under the Environment (Wales) Act 2016, a Flood and Coastal Erosion Committee will be established in Wales during 2017. This will replace the Flood Risk Management Wales Committee which will be abolished at the same time.

The current Committee has the responsibility to scrutinise and approve NRW's flood programme. However, since the creation of NRW, this responsibility has been taken up by its Board.

The intention is for the new Committee to exercise a wider advisory role for Welsh Ministers, covering all flood and coastal risk management in Wales. A wide range of stakeholders including Network Rail, private landowners and crucially, the voluntary sector and the public also have a role in minimising flood and coastal risk as well as Welsh Government, NRW, Local Authorities, and Dŵr Cymru/ Welsh Water.

6.3. Evidence, Research & Development

Flooding and what is being done to reduce the risk and impact is often the focus of media attention and public interest. The requirement for greater awareness and understanding of “what does and doesn’t work” is also important for RMAs. Accurate data, evidence and information is therefore vital to help inform future decision making and prioritisation.

Evidence, such as that presented in the State of Natural Resources Report (SoNARR) includes information on flood risk and the ability to continue managing that risk under increasing pressures. There is also a wide range of data being generated by existing schemes and projects, including upland management measures, urban drainage schemes and the 3 Area Trials led by NRW.

The Joint FCERM Research & Development Programme, supported by the Welsh Government and NRW, is helping to improve understanding, and develop tools and techniques to help RMAs better manage flood risk in the longer term.

It is recognised that there is still limited knowledge about the impacts of flooding on health, but we know that people who have flooded report a range of health concerns, some of which persist long after the floods have subsided. This is a developing area of research within the UK and has clear links to the well-being goals under the WBFG Act, to which all RMAs in Wales must work to achieve.

6.4. New online flood risk maps

On 1 July 2016, NRW published the first of its new GIS mapping viewers on-line. This service allows people to check flood risk, view which areas benefit from flood defences and see which areas can receive flood warnings. It is hoped these easy to use maps will help NRW customers to better understand the flood risk in their area.

During 2017, NRW will also take on responsibility for publishing the Development Advice Map, which will sit alongside the Flood Risk Maps for better ease of use.

6.5. Flood Data

In September 2015, NRW made LidAR data available, and in April 2016, NRW made flood map and flood risk data available under the Open Data Licence on Lle.

In July 2016, NRW made live flood data feeds (including flood alert and warning information and the five day flood forecast) available through a new Application Programming Interface. This will enable app developers and web designers to display NRW data, for example, NRW are currently engaging with British Red Cross who are developing their Emergency app to include flood warnings for Wales.

6.6. National Flood Risk Assessment (NaFRA)

NRW is currently developing a replacement NaFRA which will produce bespoke datasets for Wales. This will include up to date ‘at risk’ figures and figures within each risk category. Once available, the figures should reflect the reduction in risk delivered as a result of FCERM investment since 2014. The project is within the pilot phase with delivery aimed for April 2017. The main phase of the project is expected to be complete by April 2018.

6.7. Flood Warning System (FFWS)

NRW are working in partnership with the Environment Agency on a new flood warning system (FFWS) to replace Floodline Warnings Direct, which is the system currently used to issue flood warning messages to customers and partners through phone, SMS and email. The new system is expected to be ready for operational use after mid-December and will reduce operating costs while creating a platform that enables NRW to exploit emerging communication technologies and use of social media.

6.8. Information capture & recording

LLFAs including Blaenau Gwent CBC, Caerphilly CBC and Flintshire CC are developing new systems for monitoring and capturing flood data and for improving flood defence consent records to assist with enquiries. Many LLFAs are also looking to improve their data capture and recording databases which is hoped will help with spatial analysis to improve understanding of 'at risk' locations to inform investment decisions.

Investment is also being made by LLFAs, including Merthyr Tydfil CBC, Ceredigion CC and Neath Port Talbot CBC in telemetry systems, water level sensors and monitoring systems, particularly for vulnerable culvert intakes. It is anticipated this investment will help create efficiencies and reduce long term maintenance costs.

6.9. Asset Management Systems

Asset maintenance data is also recognised as important in managing flood risk and all LLFAs have a system in place to record and monitor information in line with section 21 of the Flood and Water Management Act (2010) and the National FCERM strategy.

NRW is continuing to improve its asset management system (AMX). Functionality for routine asset management operations and integration with other NRW corporate systems is live and further development during 2017/18 will integrate other NRW asset management tools, such as Telemetry and Mechanical structures.

RMA's have been invited to provide asset data to help inform the AMX system to develop a single oversight of all assets, including location, ownership and condition across Wales. LLFAs, including City of Cardiff Council, Denbighshire CC, Gwynedd Council, Monmouthshire CC, Pembrokeshire CC, Rhondda Cynon Taff CBC and Vale of Glamorgan Council have invested or are looking to invest in AMX to capture, record and manage their assets. The invite to provide asset data for AMX was also extended to Network Rail. Other LLFAs are looking at alternative systems, for example, Newport City Council's Flood Risk Inspector has recently received a new mobile data collection device that allows for in situ information to be obtained, recorded and actioned if required.

6.10. Flood and Coastal Erosion Risk Management Project Appraisal Guidance

The Welsh Government have engaged consultants to consolidate and improve existing project appraisal guidance. The aim, developed in conjunction with RMA's is for there to be a single document used in Wales which helps to promote FCERM schemes that deliver wider social and environmental benefits and that also align with the principles of the Wellbeing of Future Generations Act.

6.11. The Coastal Risk Management Programme (CRMP)

The Welsh Government is working with local authorities across Wales on a £150 million programme of capital investment in coastal risk management projects. The programme

focuses on the risks we face from coastal flooding and erosion as a result of climate change.

Investment and construction is planned to run between 2018 and 2021. This investment will be co-financed with Welsh Government contributing 75% and Local Authorities 25% of costs. The programme will make use of the borrowing powers, investing in infrastructure and making use of low interest rates.

Welsh Government is supporting local authorities with grant funding for the necessary project appraisal and design and development work to enable projects to be developed between now and 2018.

Local authorities have commenced preparatory work on more than 40 potential projects from across Wales. Welsh Government are reviewing these to decide which should be taken forward for further appraisal and business case development as part of the programme.

Chapter 7: Summary

Flood and coastal erosion risk management remains a key priority for Wales.

Over £55m has been earmarked for 2016/17 financial year to reduce risk and maintain existing assets. This includes the commencement of major new work in St Asaph, Roath, Boverton, Newport, Porthcawl and the A55 at Tal-y-Bont (Gwynedd). Work on this final scheme, which suffered flooding on Boxing Day 2015, has already commenced and will be completed by the end of the 2016/17 financial year. Once completed, these schemes will reduce risk from flooding to over 3500 properties.

However, the increasing impacts of climate change and sea level rise, means that future investment will need to consider all options to reduce risk; we cannot continue to rely on traditional hard defences. Opportunities for green infrastructure and natural interventions will need to be increasingly identified and implemented, either to reduce localised flood risk or help extend the longevity of traditional schemes downstream.

Improved awareness raising and resilience amongst communities is also vital, increasing the understanding of risks faced and what they can do to increase their resilience and be better prepared should the worst happen. Continued investment in flood mapping and forecasting capabilities will help to support this.

Support will also need to be prioritised to those schemes that align with recent legislative changes including the WCFG Act and the Environment Act. Schemes will need to demonstrate delivery against the well-being goals, helping to create better places to live and provide wider environmental and social benefits, as well as reduce flood risk and improve resilience to future flood events and to the impacts of climate change.

It's clear that FCERM interventions can provide wider benefits across many different areas including health, tourism, regeneration and transport. By aligning RMA work programmes, pooling resources and working together can only lead to wider benefits being achieved and delivering more for the people of Wales.

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 - Bridgend County Borough Council
 - Caerphilly County Borough Council
 - Carmarthenshire County Council
 - Ceredigion County Council
 - Conwy County Borough Council
 - City of Cardiff Council
 - Denbighshire County Council
 - Flintshire County Council
 - Gwynedd Council
 - Isle of Anglesey County Council
 - Merthyr Tydfil County Borough Council
 - Monmouthshire County Council
 - Neath Port Talbot County Borough Council
 - Newport City Council
 - Pembrokeshire County Council
 - Powys County Council
 - Rhondda Cynon Taff County Borough Council
 - City & County of Swansea
 - Torfaen County Borough Council
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