

Flood and Coastal Erosion Risk Management in Wales, 2016- 2019

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

Rev No: 1

Foreword



Natural Resources Wales has a statutory duty under section 18 of the Flood and Water Management Act 2010, to produce a report to Welsh Ministers about how flood risk and coastal erosion is being managed across Wales, including actions to raise awareness and increase the resilience of those who are at risk. Natural Resources Wales does this on behalf of all Risk Management Authorities who operate in Wales, which includes Natural Resources Wales, Local Authorities and Water and Sewerage Companies.

The report also provides an update on progress made towards implementing the Welsh Government's National Flood and Coastal Erosion Risk Management (FCERM) Strategy. This sets out national level priorities, policies and objectives to manage and reduce the impact of flood risk and coastal erosion both now and in the future.

This is the third report, covering the period April 2016 through to March 2019. It has been produced from information provided by Risk Management Authorities and reflects flooding that has occurred across Wales along with the activities and resource invested to manage the risks to people and properties from both flooding and coastal erosion.

During the three year reporting period, several large storm events have hit Wales resulting in significant flooding of homes in several areas and damage and disruption to key infrastructure including the road network and railways. It is anticipated that such storms will become more frequent and intense as a result of a changing climate. Flooding and coastal erosion is therefore an on-going threat to our communities. It is clear that continued action is needed to help improve resilience to risks both now and in the future for people who live, work or visit Wales.

A handwritten signature in black ink, which appears to read 'Claire Pilman', with a horizontal line underneath.

Claire Pilman
Chief Executive
Natural Resources Wales

Executive Summary

This report is a factual report which summarises the investment, key activities and achievements in managing flood and coastal erosion risks across Wales by Natural Resources Wales, Lead Local Flood Authorities and Water and Sewerage companies during the reporting period April 2016 to March 2019.

Over these 3 years, there has been several flooding events from rivers, surface water and the sea. These flooding events, combined with figures from sewerage flooding indicates that around 1500 homes and businesses have suffered from internal flooding, with significant disruption to infrastructure also occurring, including the closure of many roads and railway lines. Notably, analysis of historic records indicates that the magnitude of Storm Callum, which hit Wales in October 2018 has not been seen in Wales for 30 years. It has also been estimated that this single storm event caused over £5million in damages and recovery costs in Carmarthenshire alone.

However, continued investment and a robust maintenance programme of flood defences has meant that many areas at risk of flooding have managed to withstand significant rainfall and storm events experienced across Wales, with hundreds of properties protected from flooding. New data on the number of properties at risk from flooding shows the overall number of properties at risk from either fluvial, pluvial or tidal flooding as being around 245,000. This helps highlight how continued investment in flood risk management is effective in reducing risk, increasing resilience and improving the well-being of our communities across Wales.

Over the reporting period, Welsh Government has invested over £150million in flood and coastal erosion risk management, with a further £1.9million provided for emergency works. Major schemes completed include alleviation works in Newport, St Asaph, Beaumaris and Pontarddulais. A major upgrade of the spillway at Tre-Breddrod Reservoir was also completed, helping reduce the risk to the village of Furnace, near Llanelli. There has also been additional investment by water and sewerage companies operating in Wales to reduce flooding from their drainage network, including over 30 capital engineering schemes at locations including Cardiff Bay, Llanelli and Talgarth.

The report also highlights the importance of community engagement and awareness raising to help make communities more resilient to the risk and impact of flooding. There has been a shift in approach during the last 3 years with Risk Management Authorities increasingly seeking to support and empower individuals and communities to take their own preventative action. These activities are underpinned by the increased monitoring network of rainfall and river gauges, helping to improve flood forecasting capabilities and coverage of flood warning areas across Wales.

Some legislative changes were also introduced during the reporting period, including amendments to the Reservoirs Act (1975) and the Environmental Permitting Regulations (2016), and in 2019, Wales implemented Schedule 3 of the Flood and Water Management Act (2010), meaning that sustainable drainage schemes are now mandatory for the majority of new developments.

This is also the first report to benefit from the advice of the Flood and Coastal Erosion Committee, which was established under the Environment Act (Wales) 2016. The Welsh Government has asked this Committee to provide an overview of Section 18 reporting, complementing NRW's work.

New business case guidance has also been introduced and supports Risk Management Authorities in their scheme appraisal to ensure they align with the requirements of the Well-Being of Future Generations (Wales) Act 2015. It also supports the delivery of sustainable management of natural resources by mandating the consideration of natural flood management measures as part of a scheme design.

This report marks the end of Welsh Governments (WG) current National Flood and Coastal Erosion Risk Management (FCERM) Strategy, published in 2011. A revised strategy is being developed which will complement new WG legislation and policy. It will encourage greater collaborative working, a longer-term approach to flood risk management and support the increased use of nature-based solutions and green engineering to manage and mitigate risks both now and in the future.

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Chapter 1: Overview of Welsh Government's National FCERM Strategy, Key Changes and Publications

1.0 Introduction

There have been several changes in legislation and process, water company operations and the publication of key reports and data during the reporting period of April 2016 to March 2019. The reporting period has also seen the introduction of a new Flood and Coastal Erosion Committee. Many of these changes have supported the delivery of Welsh policy on flood and coastal risk management and have helped inform the drafting of Welsh Government's (WG) next National Flood and Coastal Erosion Risk Management (FCERM) Strategy (likely publication in 2019/20).

Amendments to the Reservoirs Act (1975) and the Environmental Permitting Regulations (2016), along with the implementation of Schedule 3 of the Flood and Water Management Act and the introduction of new business case guidance have impacted the way in which Risk Management Authorities (RMAs) in Wales operate and undertake their statutory duties.

1.1. National Strategy Objectives - overview

The WG's first National Strategy for FCERM¹ was published in 2011, which established the overarching framework, main objectives and sub-objectives for the management of flood risk and coastal erosion in Wales. Since its publication, RMAs have worked with key partners and communities to deliver and implement the National Strategy's key objectives. Of the 46 National Strategy sub-objectives, 37 are complete, with many of the actions now forming a core part of RMA's operational activities. 3 sub-objectives are partially complete, 5 are on-going and 1 has not yet started. Some of the sub-objectives are being carried forward as a revised measure within the next National Strategy, consulted on during 2019. An overview of progress against each sub-objective can be found in Appendix 1.

Although the National FCERM Strategy sets out the high-level policy for managing flood and coastal erosion risk in Wales, RMAs also consider it to be a useful framework to develop their local strategies to help meet national objectives, developing plans and prioritising activities at the local level to manage flood risk. However, some RMA's reported difficulties in delivering the objective "*raising awareness of and engaging people in the response to flood and coastal erosion risk*", partly due to limited resources, but also because of reluctance within communities to be involved unless they'd had direct experience of flooding.

1.2. Revised National Strategy

The second National Strategy has been developed considering new legislation and policies which affects the way RMAs work. Both the Well-being of Future Generations (Wales) Act 2015² and the Planning (Wales) Act 2015³ encourage partnership working,

¹ <https://gov.wales/sites/default/files/publications/2019-03/national-strategy-for-flood-and-coastal-erosion-risk-management-in-wales.pdf>

² <https://gweddill.gov.wales/topics/people-and-communities/people/future-generations-act/?lang=en>

³ <https://gweddill.gov.wales/topics/planning/legislation/planning-wales-act-2015/?lang=en>

collaboration and a long-term approach, whilst the Environment (Wales) Act 2016⁴, introduced the sustainable management of natural resources approach.

There has been a change to the overarching aim and objectives of the National Strategy, with an emphasis on improving the understanding and communication of risk, building resilience and preventing more people becoming exposed to risk. A revised set of measures to help steer the actions of RMAs are included, which reflect WG's long-term policy direction for managing flood and coastal erosion risk in Wales. Furthermore, in response to concerns regarding responsibilities, WG have sought to clarify the roles and responsibilities of RMA's in managing flooding and coastal erosion as well as outlining the funding and types of works which will be supported in reducing risk.

The public consultation on the revised National Strategy ran from June to September 2019 (after the reporting period for this document).

Legislation Updates

1.3 Amendments to Reservoirs Act 1975

Amendments to the Reservoirs Act (1975) came into force in April 2016. The amendments seek to ensure the ongoing protection of public safety by reducing the risk of an uncontrolled release of water from large raised reservoirs and the potentially catastrophic flooding this would cause. There are two main parts to the changes:

- Introduction of a new risk-based approach with full regulation only needed for high-risk reservoirs.
- Bringing into regulation smaller reservoirs that may pose a risk to people and property (lowering the threshold for regulation from 25,000m³ to 10,000m³).

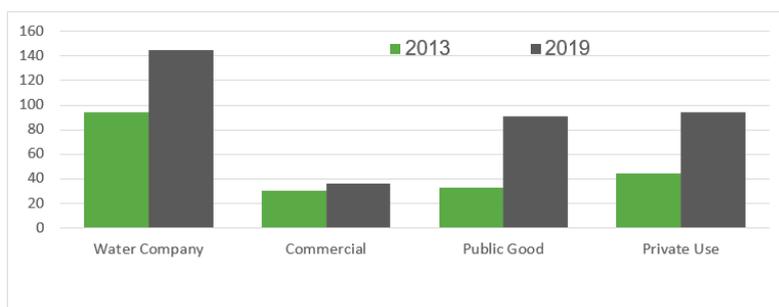


Figure 1: Representation of the increased number of reservoirs in Wales under each broad undertaker category

Figure 1 shows the number of large raised reservoirs registered in Wales before and after the implementation of the amendments.

For reservoirs regulated prior to 2016, Natural Resources Wales (NRW) have carried out Phase 1 of a risk designation process to identify reservoirs not considered to endanger human life in the event of failure. Consequently, 11% of these pre-2016 reservoirs have benefitted from reduced regulation.

Phase 2 of the risk designation process applies to newly registered reservoirs. To enable a robust designation, NRW have commissioned a project to provide reservoir flood maps to show the impacts of flooding from reservoirs. This information, along with a technical consideration by qualified reservoir engineers, will enable NRW to provide designations

⁴ <http://www.legislation.gov.uk/anaw/2016/3/contents/enacted>

that focus regulation on those reservoirs with the greater liabilities for the safety of people downstream. This mapping and designation exercise is likely to run throughout 2020.

NRW also considers the overall purpose of a reservoir structure. Where the primary use has become redundant, NRW will consider whether its removal is appropriate to remove ongoing liabilities, or whether it may be managed for some other purpose. For example, a redundant water supply reservoir may provide flood storage or conservation benefits that could be lost by its removal.

1.4 Implementation of Schedule 3 of the Flood and Water Management Act

The 7th January 2019, saw commencement of Schedule 3 of the Flood and Water Management Act 2010 in Wales. This makes sustainable drainage systems (SuDS) a mandatory requirement for all new development in Wales of more than one building and/or where the construction area is 100m² or more. The purpose of the legislation is to ensure SuDS are considered and implemented to improve the management of surface water in a more sustainable way. The SuDS must be designed and built in accordance with WG's Statutory SuDS Standards and approved by the relevant SuDS Approving Body (SAB), before any construction work begins.

The SAB is the local authority responsible for the evaluation and approval of drainage applications. In certain circumstances they may also be responsible for adopting and maintaining SuDS schemes. This is a new function placed on Lead Local Flood Authorities (LLFAs), with many reporting challenges in establishing the SAB and most delivering this service with no additional resource. NRW and Water Companies operating in Wales are a statutory consultee to the SAB providing advice where required. For NRW this includes commenting on environmental matters, focussing on water quality and biodiversity issues. NRW are currently developing a risk-based consultation process to support the development of good-quality SuDS schemes that maximise opportunities for multiple benefits.

Water company's advice will include comments regarding the impact of any direct or indirect connections or works near to their networks and assets. The requirement to secure Water Company consent to connect surface water to the public sewer network will still be required, but SAB approval must be obtained first.

1.5 Environmental Permitting Regulations

Amendments to the Environmental Permitting regime came into force on 6 April 2016, which extended its scope to include flood risk activities, replacing previous legislation dealing with flood defence consents. Further information is included in Chapter 4.

Strategic Direction

1.6 Flood Risk Regulations

The aim of the EU Floods Directive (transposed into UK law through the Flood Risk Regulations) is to identify areas at risk from flooding, and to develop plans to manage those risks. We are currently in the second cycle of the EU Floods Directive. The cycle

begins with the production of Preliminary Flood Risk Assessment (PFRA) reports which were published on the NRW website⁵ on 22nd December 2018.

In the first cycle, NRW was exempt (through legislation) from producing PFRA for main rivers, reservoirs and the sea, and only LLFAs produced PFRA for local sources of flood risk (surface water, ordinary watercourses and groundwater). For the second cycle, we have taken a consolidated approach to producing PFRA by working with WG, the Welsh Local Government Association (WLGA) and LLFAs to produce PFRA that cover all sources of flood risk in one place.

One of the key aspects of producing a PFRA is the requirement to identify Flood Risk Areas. These are areas where flood risk is significant to human health, the economy or the environment, including cultural heritage. For this cycle, there are nine flood risk areas across Wales. They are Monmouthshire, Newport, Cardiff, South Wales Valleys, Swansea Bay, Gwynedd, North Wales Coast, Flintshire and Wrexham. These are the areas where the risk of flooding is considered as significant and requires further study through the production of flood hazard and flood risk maps and flood risk management plans.

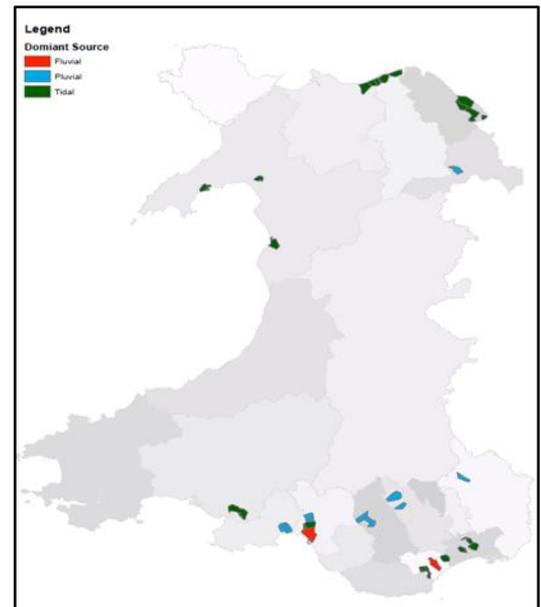


Figure 2: Identified Flood Risk Areas in Wales by dominant source

1.7 Revised FCERM Business Case Guidance

In June 2018, WG published new business case guidance to RMAs to be used when developing FCERM schemes. Further information is provided in Chapter 3.

1.8 Influence of Well Being of Future Generations Act (2015) and Environment (Wales) Act 2016

An overview of these two pieces of Welsh legislation was provided in the last report and outlined the likely influence the overarching aims would have on FCERM in Wales.

Since their introduction, RMAs have been adjusting the way they undertake their activities to support delivery of legislative requirements. This has included seeking opportunities to work collaboratively and identifying ways in which they can deliver wider social, economic and environmental well-being benefits through the work that they do. It is still relatively early days and as such difficult to quantify how successful RMAs have been at changing their approach to flood risk management. The new business case guidance and revised National FCERM Strategy should support RMAs in working with the principles of sustainable management and maximise their contribution to the well-being goals.

1.9 FCERM Research and Development Programme

The England and Wales FCERM Research and Development Programme is jointly run by the Environment Agency, Defra, WG and NRW. The programme aims to serve the needs of

⁵ <https://naturalresources.wales/evidence-and-data/research-and-reports/reports-evidence-and-data-on-flooding/preliminary-flood-risk-assessment/?lang=en>

all flood and coastal operating authorities in England and Wales and provides evidence to help inform more sustainable and efficient ways to reduce flood risk. Information on specific projects is included throughout the report.

Other Changes

1.10 Water Company changes

On 1st July 2018, a new water company, Hafren Dyfrdwy was formed bringing together all Welsh customers previously served by Severn Trent and Dee Valley Water. This change will help provide a more local focus for Welsh customers who will also benefit from an enhanced service with a full 24/7 customer care line in operation. For the purposes of this report, the information provided is as if Hafren Dyfrdwy existed for the full report period.

1.11 Flood and Coastal Erosion Committee

The Flood and Coastal Erosion Committee (FCEC) was established under the Environment Act (Wales) 2016. The full appointed membership was announced on 26 March 2019.

The purpose of the Committee is to facilitate communication between all those involved in flood and coastal erosion risk management in Wales and the Welsh Ministers. Through its links with risk management authorities, research institutions and other key stakeholders, the Committee will provide high level advice on flood and coastal policy, including awareness raising and community resilience to flooding.

It is envisaged that the Committee will establish its own programme of advisory activity reflecting national priorities and identifying both immediate and longer-term research needs, as well as highlighting best practice in Wales and elsewhere.

1.12 Commitment for the FCEC to review the S18 report

The National Assembly for Wales Public Accounts Committee made a recommendation in their 2017 Coastal Flood and Erosion Risk report for another body to provide an oversight role in the preparation of Section 18 reporting. In response, WG have asked the FCEC to provide this overview and introduced a duty on them in the FCEC for Wales Regulations 2017 to advise on:

- the National Strategy for Flood and Coastal Erosion Risk Management; and
- work being carried out by flood and coastal erosion risk management organisations.

The WG consider providing this oversight role to the FCEC to be an appropriate way to separate NRW's duties as a RMA and its legislative role to review the implementation of the National FCERM Strategy in Wales.

1.13 Flood Re

Flood Re, a joint initiative between the UK Government and insurance companies, began operating in 2016 to help people living in areas at risk of flooding access more affordable building and contents cover.

Flood Re's modelling suggests that around 20,287 properties could benefit from the scheme in Wales. Take up of Flood Re backed policies in Wales has been steady, with

figures reported to Welsh Ministers in 2018 indicating that over 9,500 households have benefitted from the scheme. Furthermore, 93% of people who have made prior flood claims can now receive quotes from 5 or more insurers⁶. Prior to Flood Re, only 9% of households with prior flood claims could get 2 or more quotes and none could obtain 5 quotes.

However, media coverage of recent flooding in Wales (October 2018), illustrated that awareness of Flood Re is still limited, with many affected householders interviewed saying they are not sufficiently covered due to insurance excess and premiums being too high⁷.

Shoreline Management Plans and update of the Coastal Flooding Review

1.14 Shoreline Management Plans

Following publication of the four second generation of Shoreline Management Plans (SMPs) covering the coastline of Wales, the focus during the reporting period has been on facilitating implementation of the preferred policies. NRW has completed a quality assurance exercise of SMP2 policy GIS spatial data to correct inaccuracies identified and a revised data layer is now available on the Lle portal⁸ for public use and to assist coastal planning and management.

Of the 473 policy units relevant to Wales, there is no planned change for 359 of them over the SMP epochs. However, the approach at some parts of the coastline could be amended where a policy may no longer be practical or acceptable over 100 years. Examples include:

- where defences have a limited lifespan,
- improvements cannot be economically or environmentally justified,
- or where new approaches are required to manage future risk⁹.

A combination of policies may therefore be proposed for the duration of the SMP2. In locations where there is a change in policy, sensitive planning and management involving the local communities impacted will be required.

1.15 SMP Action Plans

SMP Action Plans aim to assist implementation of SMP2 plan policies which may include consideration of future strategies, outline future schemes, coastal monitoring and studies. They may also provide the basis for future changes in regional and coastal policies and set out how they can be achieved.

NRW has created a common format for reporting on progress which has been shared with the Coastal Groups across Wales.

A recent update on the status of SMP actions in Wales (2019), indicates:

- 13% of SMP2 Actions are 'complete'

⁶ <https://www.floodre.co.uk/>

⁷ <https://www.bbc.co.uk/news/uk-wales-45874046>

⁸ <http://lle.gov.wales/catalogue/item/ShorelineManagementPlan2/?lang=en>

⁹ Defra. 2006. Shoreline management plan guidance Volume 1: Aims and requirements. Defra, London. Available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69206/pb11726-smpg-vol1-060308.pdf

- 8% are 'planned and programmed'
- 25% 'progressing'
- 23% of actions are 'on-hold'¹⁰

The status at the time of reporting was 'unknown' for the remaining 11% of actions. Challenged actions¹¹ represents 20%. The status of SMP actions is presented in figure 3. These will need to be discussed further by the Wales Coastal Groups Forum and relevant Coastal Groups to determine the appropriate course of action.

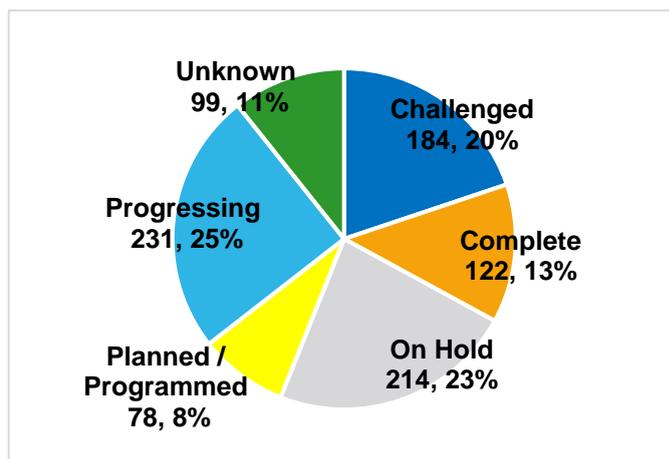


Figure 3: 2019 Status of SMP Actions for Wales; (928 actions in total)

1.16 SMP Major Policy Change Process Guidance

The Wales Coastal Group Forum has issued guidance on the SMP2 Major Policy Change Process in Wales¹². Major changes are: '*Changes to a policy, or epoch in which a policy is to be implemented, or changes to the action plan that are likely to result in this*'. A major policy change may be considered if new evidence emerges that suggests a change could be justified. The process is initially overseen by the relevant coastal group, followed by the Wales Coastal Group Forum, who provide recommendations on whether the proposed policy change should be accepted or not. WG is informed of the recommendation and Welsh Ministers may become involved where a policy change requires consideration and approval of the Statement of Case (incorporating Imperative Reasons of Overriding Public Interest (IROPI)) where necessary.

1.17 Wales Coastal Monitoring Centre

A new Wales Coastal Monitoring Centre (WCMC)¹³ was established in 2018 to deliver a strategic approach to coastal monitoring in Wales, providing a standard, repeatable and cost-effective monitoring programme to support FCERM decisions. Led by a collaboration between Conwy, Vale of Glamorgan and Gwynedd Local Authorities and supported by NRW and the WLGA, the programme aims to collect coastal monitoring data from across Wales and develop a long-term dataset to highlight changes to high risk areas in Wales. It is hoped this will facilitate a better understanding of the processes impacting the Welsh coastline and provide information that can be used for the development of SMPs, coastal defence schemes and the operational management of coastal protection and flood defence.

1.18 Wales Coastal Flooding Review

Since the Wales Coastal Flooding Review Delivery Plan was created (January 2015) RMAs have worked collaboratively to progress the recommendations identified and significant progress has been made which has helped to improve the resilience of coastal flooding and erosion risk management for the communities of Wales. The

¹⁰ the action can't be Planned / Programmed due to resource / funding / delivery constraints

¹¹ Coastal groups consider the action to be unclear, there is a need to edit the text, the lead partner is incorrect, or action is 'business as usual'.

¹² Wales Coastal Group Forum. 2019. Shoreline Management Plans, Guidance to Major Policy Change Process in Wales.

¹³ <http://www.welshcoastalmonitoringcentre.cymru/eng/>

Closure Report, published in December 2017 reported 42 of the 47 recommendations as 'complete' with 5 recommendations requiring ongoing development¹⁴. This has included the provision of new information on techniques/tools, updated datasets, and research outputs.

¹⁴ <http://naturalresourceswales.gov.uk/evidence-and-data/research-and-reports/reports-evidence-and-data-on-flooding/?lang=en>.

Chapter 2: Understanding, Communicating and Responding to Flood & Coastal Erosion Risk

2.0 Flood Risk Assessment Wales

Between December 2017 and April 2019, NRW developed a new national-scale Flood Risk Assessment for Wales (FRAW). This project replaces or updates several key flood data sets and provides a replacement to the previous National Flood Risk Assessment (NaFRA), which was an important dataset for WG and RMAs, helping to target and prioritise investment. It was also widely used by external stakeholders, including the insurance industry. However, the complexity of how the data was compiled, coupled with infrequent updates meant that NaFRA was no longer considered accurate for many locations in Wales. The new information will be used to underpin decision-making and steer investment across flood and coastal risk management activities in Wales. It also provides an up-to-date and comprehensive representation of risk across Wales.

2.1 Flooding: Properties at Risk

Through FRAW, updated figures have been produced for the numbers of properties at flood risk in Wales. The data shown in Table 1 reports the number of properties at risk by source (fluvial, tidal and pluvial). It should be noted, that if a property is at risk from more than one source (e.g. fluvial and pluvial) it would be counted twice in the data.

NRW has been able to identify around 46,000 properties are double/triple counted in FRAW (i.e. at risk from more than one source). By extracting this total from the numbers shown against each source in table 1, provides a figure of around 245,000 properties at risk from flooding in Wales (when double/triple counting is excluded). NRW will be updating these figures on an annual basis in line with the objective set out in WGs draft National FCERM Strategy, they are therefore subject to change.

The figures produced by FRAW differ to those presented in previous 'Flood and Coastal Erosion Risk Management in Wales' reports, which were derived from NaFRA. This is due to a more comprehensive assessment of available data, along with improved hydrology estimates and modelling capabilities. Because of significant changes to the underlying datasets used, it is difficult to compare the revised figures with earlier property counts produced by NaFRA, therefore "like for like" comparison is not possible.

	Residential	Non-residential	Total
Fluvial	77,850	12,300	90,150
Tidal	62,300	8,750	71,050
Pluvial	115,700	14,100	129,800
Overall total of properties at risk in Wales (including double/triple counting)			291,000
Overall total of properties at risk in Wales (excluding double/triple counting)			245,000

Table 1: FRAW 'at risk' property counts against source (rounded to the nearest 50)

2.2 Properties within a ‘Defended Area’

As part of the FRAW project, a ‘Defended Area Polygon’ was produced. This uses information provided by NRW and LLFAs regarding areas benefitting from defences. The layer produced shows the total known number of properties that benefit from the national network of flood defence infrastructure. The total number of properties contained within the dataset is shown in Table 2. The data is based on fluvial and tidal sources only as there are no pluvial defended areas. It is anticipated this dataset will be updated yearly, which will help improve the understanding of how FCERM investment is helping to reduce the risk of flooding across Wales. Please note, that at the time of publication, not all LLFAs have provided information on their Defended Areas. As such the figures presented should be used with caution.

	Residential	Non-residential	Total
Fluvial	42,400	6,500	48,900
Tidal	56,000	7,700	63,700
Sum of Properties within ‘defended areas’ at risk in Wales			112,600

Table 2: FRAW Defended Area Property Counts against source

An example of flood risk in Wales is presented in figure 4. The red and blue dots represent properties at risk in the undefended and in the defended scenarios respectively. The blue properties are shown to be within a hatched area. This shading indicates the change in risk band in the defended scenario to the blue properties (e.g. a change from ‘high’ risk in the undefended scenario, to ‘low’ risk due to the presence of defences).



Figure 4: Example location of property points and defended areas

2.3 Flood Warning Map

NRW host a live flood warning map, which is updated every 15 minutes to show flood alerts and warnings in place. For example, during Storm Callum, 55 flood alerts and 40 flood warnings were issued. This service helps communicate the current level of flood risk and can help people better prepare for flooding and take appropriate action. Table 3 shows NRW issued a total of 1136 flood alerts and warnings across the reporting period. This compares to 904 alerts and 232 warnings issued during the previous reporting period (2014-2016). Despite significant storm events occurring, no severe flood warnings were issued.

	2016/17	2017/18	2018/19	Total
Flood Alerts issued	215	323	366	904
Flood Warnings issued	58	80	94	232
Severe Flood Warnings issued	0	0	0	0

Table 3: Flood alerts and Flood Warnings issued from 1 April 2016 to 31 March 2019

2.4 Floodline Warning Service

The National FCERM Strategy notes that the resilience of communities to flooding can be improved if they are more prepared and understand what action they can take to reduce the potential impacts and damage that may be caused.

Under the Water Resources Act 1991, NRW provides a flood warning service to the public, which provides advance warning of the potential risks from river and coastal flooding. NRW's free Flood Warning Direct service now has over 120,000 registered properties. Warnings are provided by phone, email or text message, with the service covering 348 areas at risk of flooding from main rivers and the sea. Since April 2017, there has been a marked increase in registrations from 94,127 to 120,348. This increase is due to three mobile operators being added to the service (EE, O2 and Three). It is anticipated these figures will increase again, when Vodafone is added to the service during 2019. The graph in figure 5 shows the annual take up for Flood Warning Direct from a baseline date of April 2013.

NRW is currently developing and testing ideas to make it easier for customers to register and update their Flood Warning Direct accounts.

NRW are also using Twitter¹⁵ to send critical warning information to its customers about significant risks to life or the environment because of flooding or environmental incidents. For flood risk, this may include warnings about:

- imminent flooding to homes and businesses
- failures of waterway structures presenting a hazard to the public or property.

Dwr Cymru Welsh Water (DCWW) have a mass text facility available to inform customers if there is a large-scale flooding event that may impact them. This system is also used on a smaller scale to advise customers known to be at risk when bad weather alerts are issued, with recommendations to utilise any flood defence (e.g. close their flood gates etc) as appropriate.

¹⁵ @NatResWales on Twitter.

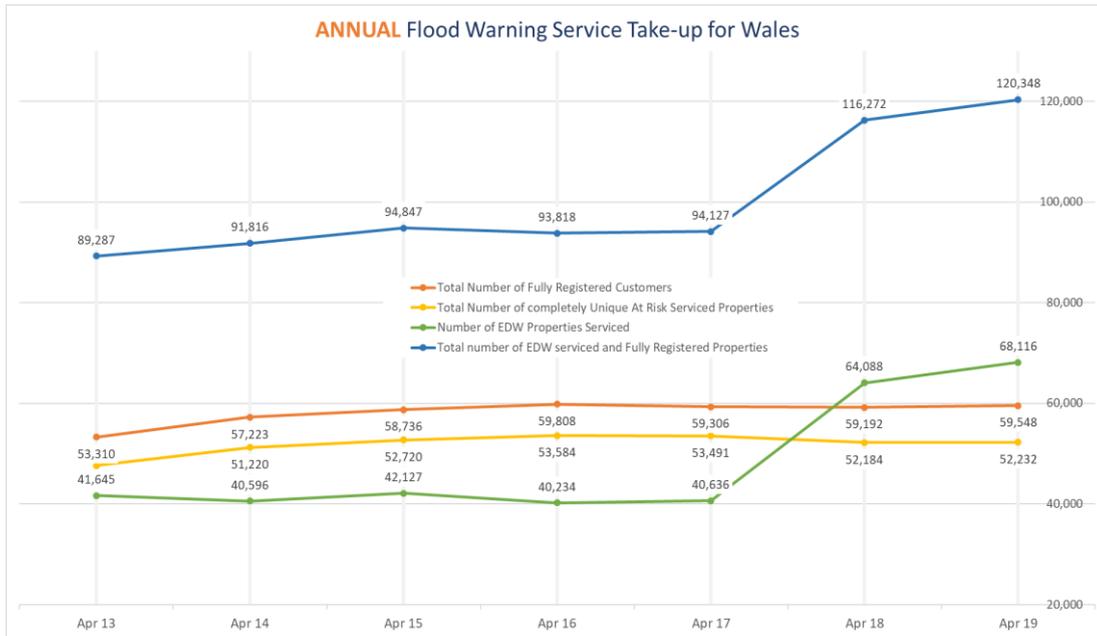


Figure 5: Annual Flood Warning Direct¹⁶ Service take-up (April 2013 – April 2019)

2.5 Floodline

In addition to delivering automated flood warnings to registered properties, NRW also handles direct calls via 'Live Agents'. These call handlers are available all year around and respond to both flooding calls and non-direct flood calls (for example, insurance requests). Part of the service includes IVR (interactive voice response), which provides callers with additional information when flood alerts and warnings are issued.

Table 4 shows the number of flood related calls handled by this service over the reporting period. Unfortunately, we have been unable to obtain flood related call volume figures from other RMAs to include within the report.

Date		Number of Calls	
From	To	IVR	Live Agent
Apr-16	March -17	1913	1043
Apr-17	March -18	1275	914
Apr-18	March -19	1247	832

Table 4: Flood calls received by Floodline between 1 April 2016 to 31 March 2019

NRW have also been able to extract the number of calls handled during two significant storm events, Storm Callum and Storm Gareth. The volume of calls is presented in Table 5 and equates to 37% of the total calls and IVR responses by NRW during April 2018 and March 2019.

¹⁶ EDW is 'Extended Direct Warnings'.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/85943/EFWD-report-summary.pdf

Peak Number of Calls		Flood Event Name
IVR	Live Agents	
241	157	Storm Callum (October 2018)
256	108	Storm Gareth (March 2019)

Table 5: Floodline calls during Storm Callum and Storm Gareth

Monitoring and Forecasting

2.6 Flood Forecasting

Over the reporting period, NRW have improved its flood forecasting capability by establishing their own flood forecasting system. Prior to this, although forecasting was run within NRW, it relied on systems hosted by legacy organisations. Developing and implementing their own system (taking advantage of world leading technology and hosting it in a cloud computing environment) has enabled NRW to tailor future improvements and enhancements of the system in line with NRW's flood warning service.

NRW have also updated existing models to utilise improved modelling software. This has helped provide more accurate forecasts to key locations across Wales at risk from flooding and improved the quality of information available for flood warnings.

NRW are also making use of improved rainfall, wind, surge and wave forecasts by working collaboratively with the Met Office, updating data feeds to utilise the best available data. Currently NRW has the ability to forecast flooding for 180 key locations across Wales (99 fluvial and 81 coastal). Whilst there has been some increase of coverage, the focus over the reporting period has been to develop standalone capability and improve the quality of the forecasts available for those sites most at risk from flooding.

2.7 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. During the 3-year reporting period, NRW have installed 3 new sites and telemetered 11 further sites to make the data available in real time (for use



Figure 7: A new level gauge at Glasbury, Powys. The old kiosk was situated below the 1 in 100 year flood level and powered by mains electricity. NRW relocated the kiosk so that at an appropriate level and adapted to run on solar power.



Figure 6: A rain gauge in St Davids, Pembrokeshire which has been telemetered to support the development of improved flood forecasting in the area.

in operational flood forecasting and flood warning). They have also upgraded a further 18 sites. These new and upgraded 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.

2.8 Flood Estimation Research & Development

Two research projects completed within the reporting period through the England and Wales FCERM Research and Development Programme, have been used to help inform and update flood estimations in Wales. These are:

- **Making better use of local and historic data and estimating the uncertainty in FEH design flood estimation**¹⁷ – the outputs from this project have been used to update **guidance on the use of local data in flood estimation**¹⁸ which in turn facilitates more accurate flood estimations.
- **Review of methodology for Estimating Flood Peaks and Hydrographs for small catchments**¹⁹ this project provides improved flood estimation for small catchments, with reduced uncertainty and clearer methodologies.

Flooding in Wales

2.9 Flooding in Wales

During the reporting period, Wales has experienced some significant rainfall and storm events, including the ‘weather bomb’ Storm Brian in October 2017, Storm Bronagh in September 2018, where around half a months worth of rain fell on Sennybridge, Powys in 24hrs, and Storm Callum in October 2018 where flooding in parts of Carmarthenshire has been shown through historical records as being the worst for 30 years.

During the reporting period, LLFAs have recorded over 750 properties (residential and commercial) impacted by internal flooding from rivers, the sea and surface water. In addition, they reported over 1000 properties effected by flooding to ancillary areas, which included gardens, driveways, sheds and other outbuildings.

It should be noted that the figures presented are not a true reflection of the scale of flooding experienced in Wales over the reporting period. This is due the variation in the way in which RMAs record such data. Furthermore, many LLFAs were unable to provide figures on the number of properties who saw disruption through flooding to their ancillary areas.

In addition to property flooding, some LLFAs provided figures to demonstrate the impact and disruption flooding caused to infrastructure in their locality, notably the road network. This shows over 1100 incidents of infrastructure flooding, including significant flooding to the A4087 Caernarfon Road in Bangor, the A499 in Pwllheli and the A487 at Newgale. Impacts on infrastructure is not routinely recorded by the Highways Departments sitting

¹⁷ <http://evidence.environment-agency.gov.uk/FCERM/en/Default/FCRM/Project.aspx?ProjectID=a2d6fc45-c6f8-48c7-a3e0-9e202849050f&PageID=25ed1548-e755-452a-9d94-f2fc7d984e56>

¹⁸ <https://naturalresources.wales/media/684119/gn008-flood-estimation-technical-guidance.pdf>

¹⁹ http://evidence.environment-agency.gov.uk/FCERM/Libraries/FCERM_Project_Documents/SC090031_summary.sflb.ashx

within the Local Authority, therefore this figure only provides a small snapshot of the impacts.

As well as the personal impacts of flooding, it also comes with significant economic cost for those areas affected. This includes direct costs for clean-up, repair and recovery following a flooding event. Estimated costs from LLFAs include an average of £150k per year on clean-up and recovery (Denbighshire), £165k in costs over the reporting period from Neath Port Talbot County Borough Council (NPTCBC), over £500,000 in costs following a single flood event in Anglesey (November 2017) and an estimated £5million worth of damages and costs for Carmarthenshire post Storm Callum (Oct 2018).

On 22nd November 2017, Anglesey suffered from extreme rainfall resulting in widespread flooding across the island causing significant damage to roads, drainage systems and properties. Emergency works were undertaken during the night to ensure the safety of residents and several people in Llangefni had to be evacuated from their homes.

Storm Callum during October 2018 also had a significant impact across Wales, with Carmarthenshire, Ceredigion and Powys worst affected. Flood defences along the River Towy in Carmarthen breached for the first time since they were built almost 30years ago. Many homes and businesses were inundated with floodwaters and key routes were shut including the A470 Merthyr bypass, the A40 in Carmarthenshire and the A4042 between Abergavenny and Pontypool. A number of bridges crossing the River Teifi in Ceredigion also had to be closed due to safety concerns.



Figure 8: The Riverside Cafe at Newcastle Emlyn in Ceredigion was overwhelmed as the River Teifi burst its banks (courtesy Facebook/ riverside café).



Figure 9: A van drives through the flood water as the River Towy defences at Carmarthen are breached (BBC News)

In November 2018, Pembrokeshire and Carmarthenshire saw significant flooding to homes and businesses due to widespread flash and surface water flooding. Pembrokeshire reported severe impacts to 2 communities, with homes in Milford Haven under 10ft (3m) of floodwater resulting in evacuation procedures being implemented and a number of road closures in place.



Figures 10, 11 & 12: flooding in Pembrokeshire during November 2018 (courtesy of Pembrokeshire CC) houses in Milford Haven; flooding in Tenby

2.10 Water Company Flooding

There were 740 reports of internal sewer flooding incidents and over 11,000 reports of external flooding to residential curtilages during the reporting period. This includes flooding caused by hydraulic overloading of the sewerage system, which is generally attributed to weather conditions. In addition, the water companies Dwr Cymru Welsh Water (DCWW) and Hafren Dyfrdwy (HD) reported 3930 incidents of sewerage flooding that impacting the road infrastructure.

Year	No of properties flooded (internal)		No of properties flooded (external curtilage)		Flooding of road infrastructure	
	DCWW	HD	DCWW	HD	DCWW	HD
2016 -2017	251	7	3422	37	1477	31
2017-2018	248	6	3617	30	1279	18
2018-2019	224	4	3916	36	1108	17
Total	740		11,058		3,930	

Table 6: reported incidents of sewerage flooding between April 2016 and March 2019

Both companies record and verify sewer flooding incidents and carry out investigations to determine the root cause and best solution. This helps to identify problem areas and the causes and provides required evidence to target future action and investment needs, for example reactive intervention, awareness raising (where the cause is a build-up of fats, oils and/or wet wipes), or improvement to the network through planned schemes.

Flood Incident Response

2.11 Risk Management Authority Action

RMAs undertake a variety of actions to reduce both the risk of flooding and its impacts. These include making routine inspections of culverts and gulleys to clear blockages (as reported by Blaenau Gwent, Caerphilly and Denbighshire) and undertaking emergency works to clear blocked watercourses and drainage systems during flooding events (reported by Caerphilly and Monmouthshire). Many LLFAs operate an out of hours call out service, inspect and monitoring critical flood assets and provide sandbags, where it is set out in local policies (reported by Bridgend, Denbighshire, Gwynedd, Monmouthshire, Neath Port Talbot and Swansea). All RMAs provide support and assistance to impacted

communities, for example implementing emergency evacuation plans and deploying pumps to relieve flooding.

Some LLFAs, including Gwynedd and Pembrokeshire, report that they arrange or support public meetings post flooding to discuss at the community level what went well and to learn and understand where improvements could be made.

To further improve flood incident response, exercises have also been carried out to test emergency evacuation procedures. For example, in December 2017, NRW carried out a flood defence exercise to test the contingency flood defence plans in place that protect 147 properties in the village of Abergwili, Carmarthenshire. The aim of the exercise was to test how quickly and effectively the secondary defence plans, including demountable flood defences, could be implemented should the main defences fail.

Under Section 19²⁰ of the Flood and Water Management Act, LLFAs investigate and report on incidents of internal flooding, but only where it meets the criteria set by each individual LLFA. The threshold for a Section 19 report ranges from internal flooding of a single residential property, to an investigation only once 200 properties have been flooded. The revised National FCERM Strategy may help regulate reporting thresholds as it includes a new measure to develop a process to standardise immediate reporting of flooding to properties and erosion events. It also proposes a threshold for Section 19 reports.

2.12 Wales Flood Response Framework

WG have developed a Wales Flood Response Framework²¹ to provide information and support for those who respond to flooding emergencies, including the emergency services NRW and LAs. Published in December 2016 it brings together in a single document, local, regional and national guidance and key policies on flood response in Wales. It also establishes key thresholds for emergency response arrangements and information on flood forecasting, warning and emergency planning. The purpose of the framework is to provide an information resource for government, responders and other key external partners to help plan for flooding emergencies.

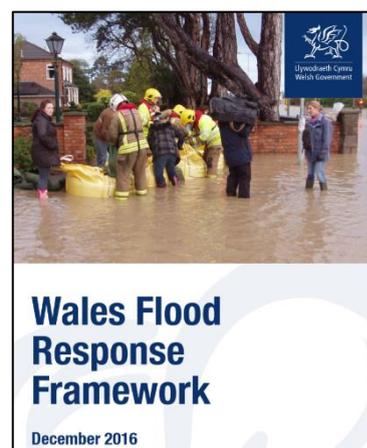


Figure 13: WGs Wales Flood Response Framework

Awareness Raising & Community Engagement

2.13 Awareness Raising

As it is not possible to prevent all flooding or coastal erosion from happening, working with communities remains an important way for RMAs to raise awareness of the risks and target specific audiences. This is also a helpful way for RMAs to provide advice on the measures and actions people can take to prepare for flooding, minimise the impact and help improve their response and recovery should a flood occur. This section highlights some of the awareness raising work RMAs have undertaken during the reporting period.

²⁰ <https://www.legislation.gov.uk/ukpga/2010/29/section/19>

²¹ <https://gweddill.gov.wales/docs/desh/policy/170118-wales-flood-response-framework-en.pdf>

RMA's reported a variety of community based awareness raising activities during the reporting period, including school visits (Carmarthenshire and Merthyr Tydfil), public meetings and targeted public drop-in sessions in areas of most acute flood risk (Denbighshire, Gwynedd, Torfaen & DCWW) and to promote and advise on FCERM scheme design or progress (Bridgend, Isle of Anglesey & Gwynedd). NRW have also undertaken a series of door to door campaigns (for example in Bridgend, Aberkenfig and Resolven) to raise awareness of flood risks, encourage people to sign up to the flood warning service and to provide practical advice and information to the public on how they can prepare and respond quicker in the event of a flood.

NRW in collaboration with many LLFAs have also worked closely with communities to establish Community Flood Groups and support the production of Community Flood Plans (e.g. within Caerphilly, Carmarthenshire, Pembrokeshire, Swansea & Torfaen), which has helped to raise awareness and improve community resilience to flooding. Caerphilly advised that in future, they intend to work independently of NRW in those areas not associated with main river flooding to develop similar flood plans for at risk communities, and Torfaen aim to extend the flood plan model to commercial areas identified as being at high risk.

RMA's are also promoting personal and community flood awareness by providing information and guidance on dedicated flood pages on the website (Caerphilly, Monmouthshire, Swansea, NRW, DCWW). Such information includes advice on how to write household emergency plans, information on flood risk and riparian ownership responsibilities (Neath Port Talbot, NRW) and the potential causes of sewerage flooding (DCWW, Hafren Dyfrdwy).

Many RMA's have reported that working directly with communities at risk to raise awareness remains a particular challenge, with Carmarthenshire noting that it was only those communities recently affected by flooding "who were keen to engage in Emergency Planning and Response".

2.14 Single Source of On-line Flood Information

The current National FCERM Strategy includes a measure to create a single source of information on flood risk. Currently, all RMA's provide or signpost to flood related information and advice via their respective websites. In March 2017, NRW led on the scope of a project to make all relevant flood information to the public available from a single on-line source. The report covered online information provision that is currently split between all RMA's operating in Wales. It provided evidence regarding the type of information users need and want, current information gaps and proposed options for future delivery in both the short and longer term. This included a single source of online and digital public flood information.

Following the publication of the report in 2018, NRW have made improvements to the flood information on their website. This has included creating new pages to replace PDF documents and improving links and signposting for the public. NRW are now developing a single 'Flood Map' for Wales, which will integrate current mapping data, for example risk of flooding from rivers and sea, surface water and the development advice map for planning purposes.

2.15 Social Media

In the last report, it was noted that the way in which the risks and impacts of flooding are communicated needed to improve, with a general feeling by the public that the language and terminology used is confusing and difficult to relate to. NRW is using social media to try and break down some of these barriers and reach a wider audience.

Social Media during Storm Callum, October 2018

During Storm Callum, NRW used social media to provide regular updates on flood warnings, issue safety messages and highlight the work of their staff on the ground working hard to check defences and keep people safe. Using Twitter, Facebook and Instagram, NRW were able to quickly share live updates and post videos from their incident response teams. Between updates on the flood situation, NRW shared images of their staff pumping water, checking defences and helping communities in Carmarthenshire and Talsarn.

Facebook proved to be a useful means of communicating safety messages, with NRW data showing that one post alone on the dangers of flood water was shared over 400 times and reached over 71,000 people.

Instagram is a relatively new communication tool for NRW, but by using #StormCallum, tagging the locations of flood response activities and uploading regular updates from flood response teams on the ground meant NRW were able to reach more people and target their audience.

More people than ever visited NRW's website to check flood warning information in the lead up to, and during Storm Callum. There were over half a million-page views (540,313) during this period with the most visited pages being:

- Check flood warnings
- Flooding
- Check river levels
- Long term flood risk maps
- 5 day flood forecast



Figure 14: Most shared NRW Facebook posts during Storm Callum (#StormCallum)

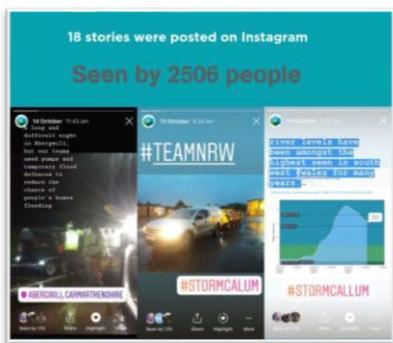


Figure 15: Two of the most shared NRW Twitter feeds during Storm Callum (#TeamNRW)



Figure 16: 3 of the 18 Instagram 'stories' posted on Instagram during Storm Callum



Figure 17: images from social media during Storm Callum

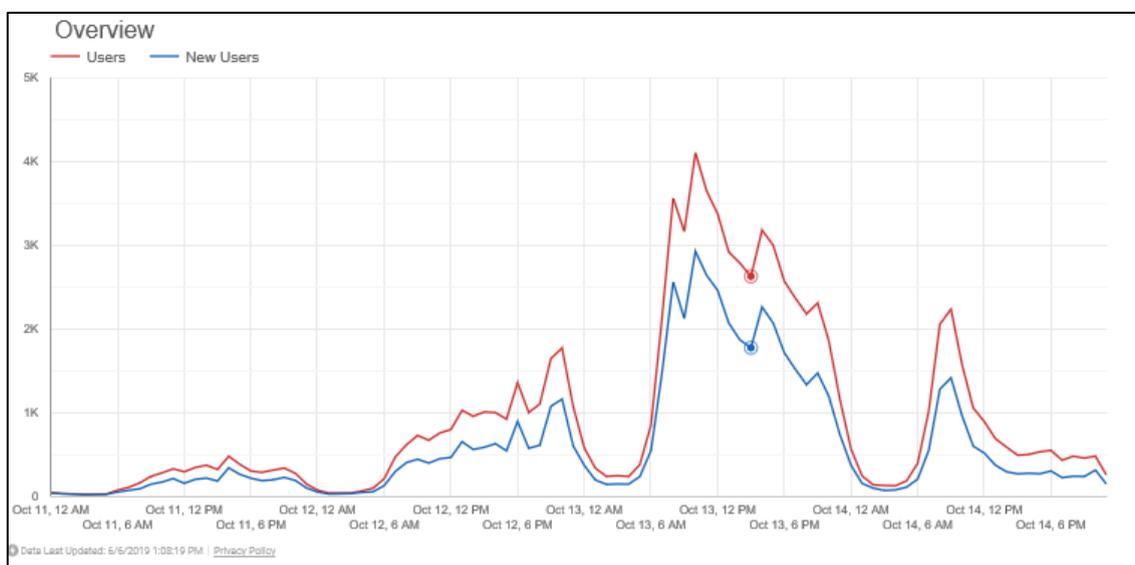


Figure 18: summary of NRW website activity during Storm Callum

2.16 Sustainable Communities Pilot Study

Following an independent review²² into the effectiveness of community engagement element of NRW's Flood Awareness Wales (FAW) programme, NRW commissioned a 'Sustainable Communities' pilot study²³ to trial an alternative model of community engagement within Wales that aimed to increase longer term sustainability by embedding ownership of risk at local level. Working in three pilot areas, the study demonstrated that understanding the different people, place and flood relationships in each community was a prerequisite to enable meaningful engagement. It also identified that FAW programme may benefit from a change in focus, moving from getting people to sign up to flood warning direct

²² <https://naturalresources.wales/evidence-and-data/research-and-reports/reports-evidence-and-data-on-flooding/independent-review-of-flood-awareness-wales-2016/?lang=en>

²³ <https://naturalresources.wales/evidence-and-data/research-and-reports/reports-evidence-and-data-on-flooding/sustainable-communities-pilot-study/?lang=en>

and developing community plans, to building greater capacity and knowledge of flood risk within local communities. The evidence from this study, published in July 2018 is now being used to inform recommendations for the future direction of Flood Awareness engagement work.

2.17 Targeting Students

In 2016 NRW commissioned a review²⁴ into the value of engaging young people in Flood Risk Awareness. This identified a gap in knowledge amongst the 16-25 age group. Historically, NRW's focus of engagement activities has been with children of school age and adults at risk of flooding rather than those in 'transition to independence' phase of life – e.g. leaving home and attending university. The research also showed that equipping this 'younger generation' with information makes them more likely to keep it in mind in the future.

The evidence and recommendations from the report led to the development of specific flood advice²⁵ tailored towards students moving away from home for the first time. The work, led by NRW and undertaken in conjunction with the Environment Agency, Scottish Environment Protection Agency, Department for Infrastructure and the National Union of Students was launched in August 2016, just ahead of the new academic year.

This unbranded, consistent advice, ensures that the NUS, a trusted voice for students and parents pass on consistent flood risk messages to a younger generation.

2.18 Working with Landlords

In May 2017, NRW approached Rent Smart Wales²⁶, who process landlord registrations and licences, to host flood advice materials on their resources pages and enhance the information available to tenants living in, or considering living in, the private rented sector. In addition, NRW worked with Rent Smart to create tailored content for their online Landlord registration, which now forms part of the standard training package.

2.19 Community Flood Plans and Volunteer Flood Wardens

During the reporting period NRW helped create 16 community flood plans. This brings the total number of active flood plans in Wales to 74.

In July 2017, NRW consulted with their network of volunteer wardens who help support and implement community flood plans. This identified the need for guidance specific to carrying out their role. Looking at best practise elsewhere, where guidance has been written by volunteers for volunteers, NRW worked with the Flood Wardens and other partners to create a Wales-specific guide to support and guide volunteers²⁷ without compromising their well-being,



Figure 19: Volunteer guidance document

²⁴ <https://naturalresources.wales/evidence-and-data/research-and-reports/reports-evidence-and-data-on-flooding/engaging-young-people-report-2016/?lang=en>

²⁵ <http://www.nus.org.uk/en/advice/housing-advice/are-you-prepared-for-the-risk-of-flooding/>

²⁶ <https://www.rentsmart.gov.wales/en/>

²⁷ <https://naturalresources.wales/media/682747/flood-risk-awareness-guidance-for-volunteers.pdf>

or that of those they intend to assist. The booklets were sent to over 460 volunteers during September 2017 with follow-up network events to review and collate feedback on its suitability in practice. The intention is for it to be a 'live' document that can be easily adapted and updated based on feedback from users.

This work marks a significant shift in NRW's approach to increasing community resilience, moving away from being a 'deliverer', to an 'enabler and facilitator' helping to empower communities to take preventative action themselves.

2.20 Water Company Initiatives

The main focus by Water Companies has been to raise awareness of flood risk caused by sewer misuse. For example, DCWW have continued to expand their 'Stop the Block' campaign and Hafren Dyfrdwy support the national 'Fine to Flush' campaign, both of which aim to raise awareness around un-flushable materials such as wet wipes, which continue to be a major cause of sewer blockages and flooding. This includes engagement with national TV advertising, to targeted local initiatives at problem 'hotspot areas, for example Bettws.

Both companies are also targeting the disposal of fats, oils and grease (FOG). Hafren Dyfrdwy are working specifically in partnership with the Food Service Establishment to provide education and advice on this issue, and DCWW SNAP (Sewer Network Abuse Protection) Technicians advise businesses and influence customer behaviour about the problems of FOG to reduce the number of blockage incidents. Successes include working with premises in Middletown and Welshpool that were causing repeated sewer blockages. Appropriate measures have now been implemented to prevent FOG entering the sewers from these premises.

2.21 Identification of Vulnerable Individuals /Communities



Figure 20: NPT CBC council workers assisting residents at Canal Side following Storm Callum (17th Oct 2018) courtesy of NPT CBC Emergency Planning Team)

There are communities and individuals who may be more vulnerable to the risks of flooding and require extra support should a flood occur, for example those living with care packages, sheltered accommodation, schools and even campsites, where occupants may be unfamiliar with the area. The majority of RMA's reported that they are aware of and have identified particularly vulnerable communities within their locality. For example, using GIS mapping, Carmarthenshire have plotted sheltered housing complexes, schools, care homes and camping and caravan sites against Flood Map overlays and have written specific Flood Evacuation plans for the sites where required. Most RMAs consider any additional support requirements as part of emergency response plans and liaise with Social Services and multi-agency partners such as Local Resilience Forums to help aid prioritisation and action during a flood event. In addition, some RMAs have reported they undertake enhanced awareness raising activities in places where flood risk is known to be a high risk.

For example, Neath Port Talbot and NRW work closely with residents in Canal Side, Aberdulais, an area at high risk of flooding (most recently impacted in October 2018) to raise awareness and improve understanding of the risk and to advise them of the actions they can take to be more prepared for flooding.

It is anticipated that many communities around Wales will face greater risks of flooding due to the impacts of climate change. Coastal communities are particularly vulnerable as a result of sea level rise and the predicted increase in storm frequency and intensity. Many parts of the Welsh coastline are facing change and Shoreline Management Plans are seeking to support coastal adaptation through policies of no active intervention and managed realignment.

Fairbourne

Building on the Fairbourne: Moving Forward project²⁸, Gwynedd CC have engaged with all departments within the council, including Social Services, Education and Housing to improve their joint understanding of how to best manage the futures of vulnerable individuals who live in communities at risk across Gwynedd.

In Fairbourne, Gwynedd CC are working directly with the community, holding a monthly drop-in session and publishing a quarterly newsletter. They also hold public events where residents can access information on resilience measures and where they can access additional help and support. Members of the community have also been invited to become part of the Authority's working groups and project board; this provides the authority with insight from the community perspective and allows them to gather additional information relating to vulnerable residents in the community.



Figure 21: Fairbourne public event (courtesy of <http://fairbourne.info/>)

2.22 Volunteer & Community Networking events

In the last report, two volunteer pilot events were highlighted, which were held as part of the resilient community work, identified in the Ministerial Coastal Flooding Action Plan. Building on these previous events and following publication of the 'flood risk advice guide' for volunteers, NRW hosted community networking events in 5 towns during 2018 to allow people to speak to other local communities and support agencies involved in flooding. 64 community representatives attended, along with 39 professional partners representing Local Authorities, DCWW, Fire & Rescue Service, Police, Ambulance, British Red Cross and RNLI. The events aimed to increase understanding of roles and responsibilities and empower those volunteering to increase resilience in their communities in the longer-term. Representatives involved in community flood planning were also asked what other information would be useful, with insurance and property protection identified. In

²⁸ <http://fairbourne.info/>

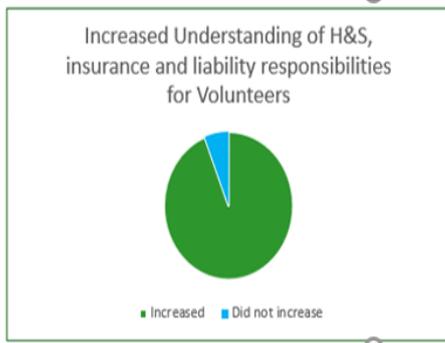


Fig 22: Feedback from volunteer events to show increased understanding of roles

response, NRW have arranged for the National Flood Forum to attend events to give more information and demonstrations on these aspects.

Feedback from the events has shown an appetite for networking and learning amongst those who attended, for example the communities of Dolybont, Talybont & Borth expressed an intention to meet up and see where and how they could help each other. They also joined the Talybont ‘Whatsapp’ group, so they keep informed of any problems upstream that may impact them.

Partnership Working

The National FCERM Strategy supports and encourages partnership and collaborative working, which is also a strong theme in the Well Being of Future Generations Act (2015) and the Environment Act (2016). The revised National Strategy also recognises that improved partnership working, along with partner contributions will become increasingly important as RMA’s look to integrate flood schemes with other infrastructure and environmental projects to bring multiple benefits and seek sustainable, better value interventions.

2.23 Working Together

RMA’s across Wales are already working collaboratively with each other and with other stakeholders, to share knowledge, information and data, deliver FCERM schemes and facilitate joint flood awareness activities. Caerphilly noted a benefit of providing a joint approach to ‘at risk’ communities by reporting that it “*encourages a sense of trust and participation within the targeted communities*”.

LLFAs have also provided examples of partnership working to not only increase awareness of flood risks, but to take positive action to reduce potential floods from occurring. For example, in July 2018, Blaenau Gwent, working alongside Groundwork UK, Keep Wales Tidy and volunteers resolved a tree blockage and gabion basket issue at Bourneville, Abertillery and a river blockage on the River Ebwy, near Cambridge Gardens in Beaufort, Ebbw Vale. Similar work was also undertaken during October 2018 to clear blockages on the Ebbw Fach River.

LLFAs have also reported working with their neighbouring Authorities, local community councils, NRW and DCWW to develop their Flood Risk Management Plans (Caerphilly, Merthyr Tydfil and Neath Port Talbot). Collaborating with DCWW ensures that flood risk from the sewerage network is considered in the published plans and helps raise awareness of this source of flooding with communities. Denbighshire have advised that they are engaging with developers and consultants to advise on flood risk associated with new development and to promote the principles of sustainable and resilient development.

Many LLFAs work closely with Local Resilience Forums, Regional Emergency Planning Services and Severe Weather Groups to promote resilience and flood preparedness

(Bridgend, Caerphilly, Gwynedd, Denbighshire, Monmouthshire, Swansea, Pembrokeshire). These groups provide a helpful platform for sharing of information on flood risk, warning and informing, evacuation, training and co-ordination of arrangements to ensure a multi-agency response to flooding incidents when required. Coastal Authorities and NRW also participate and contribute to Coastal Groups sharing knowledge and advice on coastal issues and best practice and support delivery of SMP2 policies.

The success of the FRAW project has only been possible due to the close partnership working between NRW, the LLFAs and Water companies (DCWW and Hafren Dyfrdwr) and the sharing of asset data information. As part of the project, an interactive review website was set up which allowed all parties to review input datasets, add local knowledge, review model outputs and provide feedback. This partnership approach led to improved confidence in model outputs and more comprehensive datasets.

With the implementation of Schedule 3 of the Flood and Water Management Act (Jan 2019), many LLFAs have reported working in partnership to share information and to participate in SuDs Approving Body working groups. This is helping them better understand the new regulatory role and develop procedures to manage the application process (Anglesey, Caerphilly, Carmarthenshire, Denbigh, Flintshire, Gwynedd, Merthyr Tydfil, Monmouthshire, Pembrokeshire and Swansea).

Anglesey CC are working closely with Cardigan Bay Coastal Group to understand the potential impacts of SMP2 Action Plan implementation. This includes measures such as managed re-alignment, which has led to meetings with NRW, DCWW and the National Trust regarding 'Shifting Shores'²⁹ and proposed realignment at Cemlyn Bay. This area is already affected by coastal flooding and erosion with the main car park frequently flooded by the tide. With rising sea levels, other vulnerable areas, including footpaths and grazing land are likely to be unusable by the end of the century.

2.24 Internal Drainage Districts

Stakeholder engagement groups have been set up for all Internal Drainage Districts (IDDs). This allows NRW staff to meet with agricultural land owners, farming union officers, Local Authority staff and other stakeholders to discuss IDD management and maintenance operations and to gather local knowledge to make better informed decisions. These independently chaired Advisory Groups meet between 2-4 times a year allowing constructive dialog to aid continuous improvement of NRW's IDD management methods. The drainage rates and special levies for the next financial year are discussed with these groups before they are set to make sure budgets match stakeholders' requirements.

2.25 Water Companies

DCWW have worked collaboratively with other RMAs to deliver localised flooding solutions in locations including Llanelli, Talgarth and Llanberis, with Merthyr Tydfil CBC commenting on their good working relationship with DCWW, working together to identify high risk assets and exploring potential measures together to reduce flood risk.

²⁹ <https://www.nationaltrust.org.uk/days-out/regionwales/wales-shifting-shores>

Hafren Dyfrdwy are also working closely with Powys CC to manage flood risk, for example carrying out CCTV surveys in risk areas including Bronybuckley in Welshpool, Vaynor in Newtown and Tan-y-Bryn in Llanidloes. They also worked together to resolve an issue from a culvert which was causing flooding to a property in Castle Caereinion.

DCWW and Hafren Dyfrdwy are also committed to proactively sharing flood-risk and asset information with other RMAs. DCWW have contributed to the National Flood-Risk Asset database developed by NRW and Hafren Dyfrdwy share their rainfall data to help the LLFA with the hydrological assessment of rainfall during storm events. This was particularly valuable after the storms between 28th May and 1st June 2018.

During 2018, DCWW upgraded the way in which they share flood-risk data through an online tool named MoveIT. This has allowed them to work more efficiently and share data quickly whilst still maintaining security and ownership. A specific inbox for LLFAs has been created to help facilitate direct liaison about any issues or projects occurring.

Chapter 3: FCERM Investment & Funding

3.0 Introduction

Prioritising investment in the most at risk communities is one of the key objectives of the National FCERM Strategy. WG have invested over £150million in flood risk management across Wales during the reporting period. This reinforces WGs commitment set out in the National FCERM Strategy to prioritise investment to the most at risk communities by supporting RMAs in their work to reduce the risk of flooding and prevent more people becoming exposed to risk.

3.1 Flood and Coast Investment Programme Update

Following the Flood and Coast Investment Programme consultation in 2015, WG have developed, consulted on and agreed a scoring methodology for prioritising funding for schemes on a national basis, targeting the most at risk communities. This has created a single programme of investment considering, on an annual basis, schemes from Local Authorities and NRW together.

3.2 New Business Case Guidance

In May 2018, WG issued new business case guidance to RMAs to be used when developing FCERM schemes. The new guidance aligns with the HM Treasury Five Case Model³⁰ and explains how RMAs should appraise new schemes to meet the requirements of the Well-being of Future Generations (Wales) Act 2015. In addition, it is expected the new guidance will simplify the scheme development process. It encourages RMAs to undertake more appraisal work in-house, reducing the requirement for external consultants and it is also 'scalable', so appraisals can be proportionate to the level of investment and risk. It is hoped this will avoid a 'One Size Fits All' approach to investment and reduce the amount of appraisal work associated with smaller flood alleviation schemes.

The new guidance will also ensure that appraisals for FCERM schemes capture evidence of the associated wider benefits such as, amenity, regeneration, community and biodiversity benefits. It will also contribute towards the sustainable management of natural resources by encouraging the use of Natural Flood Risk Management (NFM) methods, where appropriate. This is done by mandating the consideration of NFM at the initial longlist stage and placing an expectation on RMAs to develop at least one NFM, or NFM hybrid option for appraisal at the shortlist stage. Local Authorities and NRW are now required to use this guidance making the case for funding to support FCERM capital schemes from WG.

3.3 Investment Programme

Figure 23 shows a map of WG investment in FCERM across Wales during the reporting period. Table 7 shows the total capital and revenue investment by WG in FCERM between April 2016 and March 2019, split across NRW and the LLFAs. From figures reported, this investment has helped reduce flood risk to over 5500 properties through the construction of new flood protection schemes and maintenance works to existing structures to retain or improve the standard of protection they provide. However, this figure is not an accurate reflection of the total number of properties benefitting from investment as many LLFAs were unable to provide such data.

³⁰ <http://fivecasemodel.co.uk/overview/>

FCERM investment has also helped deliver new flood risk information for Wales to better understand the level of risk from different sources, make improvements in flood modelling and forecasting and support a variety of awareness raising activities. The significant investment has also helped to enhance the resilience of assets against the effects of climate change, protect key infrastructure and deliver social and environmental benefits, for example by improving access through the creation of cycle and footpaths as part of flood alleviation schemes.

	Revenue		Capital		Total per year
	Local Authority	NRW	Local Authority	NRW	
2016/17	3,752,631	20,616,000	7,917,021	16,400,000	48,685,652
2017/18	2,189,895	20,182,994	8,863,579	19,529,152	50,765,620
2018/19	1,153,554	19,756,700	10,524,303	19,484,607	50,919,165
Total	7,096,080	60,555,694	27,304,903	55,413,759	150,370,437

Table 7: Total investment in £ between April 2016 and March 2019.

3.4 Coastal Risk Management Programme

Throughout the reporting period, implementation of the £150 million Coastal Risk Management Programme (CRMP) has begun, which focuses on the risks faced by coastal flooding and erosion as a result of climate change. Between 2016 and 2019 identified Schemes have been at the development phase (ranging from outline business case and full business case) and funding made available through the FCERM Programme. Over 18,000 properties will benefit once all schemes funded through CRMP are completed.

To date, WG have invested around £4.67m, in the development of future coastal schemes through CRMP at, for example, East Rhyl, Aberavon and Eastern Promenade, Porthcawl. This £4.67m of CRMP funding is included within the Capital Figures shown in Table 8.

3.5 Emergency Grant Funding

Emergency grant funding is considered by WG on a case by case basis following a flood event. Between April 2016 and March 2019, WG provided approximately £1.9m for emergency repairs works to damaged FCERM assets. This included £77k awarded to Swansea for emergency culvert repairs and £150k for emergency works at Machen, Caerphilly. Other LLFA's to receive additional emergency funds include Denbighshire (£150k) and Carmarthenshire (£300k). NRW also undertook emergency repair works during the reporting period, including rock armour repair at Aberdesach in Gwynedd, works to repair tidal doors at Glaslyn, Gwynedd and breach repair works at Tan Lan in Conwy. The figure of over £1.9m excludes additional funding following Storm Callum, which caused only limited damage to FCERM assets, for example £12k required for breakwater repairs at Porthcawl. In this instance funding was provided from WG's central sources to help support communities with clean-up and recovery.

WALES

FLOOD AND COASTAL INVESTMENT 2016-2019

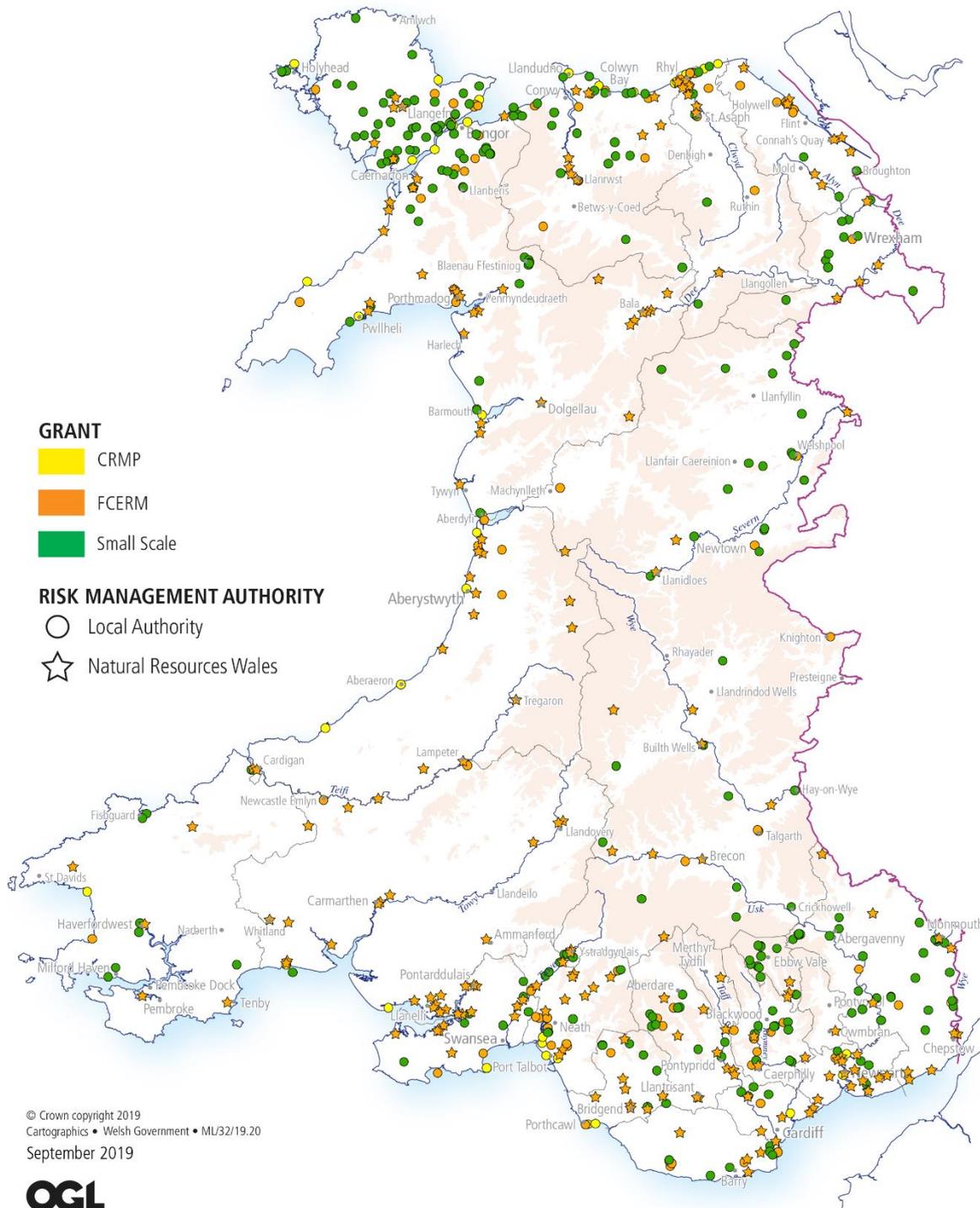


Figure 23: WG FCERM investment across Wales between 2016 and 2019.

3.6 Single Revenue Grant

As noted in the previous S18 report, WG's Single Revenue Grant, implemented during the 2015/16 financial year provided LAs the opportunity to bid for revenue funding in addition to core grant funding. The funding is a combined grant with other WG departments and therefore to be eligible, activities must demonstrate a contribution to the Well-being of Future Generation goals and deliver cross cutting environmental, social and economic benefits. During 2016/17 and 2017/18, FCERM revenue funding to Local Authorities was provided through the Single Revenue Grant, of which an annual £1.1m contribution was provided by WG Flood Division.

From 2018/19 financial year going forwards, FCERM Revenue funding is being managed through the WG FCERM team directly to the LLFAs. In 2018/19 WG provided a total grant of £1.43m, the equivalent to £65k available for each local authority to apply for. In addition, a small amount of additional revenue funding was allocated to Local Authorities for specific projects. For example, research work at Fairbourne, Gwynedd and to establish the Wales Coastal Monitoring Centre.

New Structures and Assets

3.7 Capital Investment Programme

Through its planned Capital Investment Programme, NRW has reduced the risk of flooding to 2951 properties. Table 8 provides a summary of where works have been completed and the number of properties benefitting from each scheme. In addition to these figures, capital maintenance work has also sustained the level of protection to many more properties.

Year	Project Name	No. of properties benefitting	Total per year
2016/17	Isca Road, Newport	50	1078
2016/17	Tabbs Gout, Newport	750	
2016/17	Risca, Caerphilly	278	
2017/18	Leckwith Bridge Industrial Estate, Cardiff	868	1282
2017/18	St Asaph, Denbighshire	414	
2018/19	Pontarddulais, Swansea	246	591
2018/19	Pont Robin Tidal Gates, Denbighshire	4	
2018/19	Roath Phase 1&2, Cardiff	341	

Table 8: NRW Flood Alleviation Schemes completed between April 2016 and March 2019

Several other NRW schemes are in the pipeline, for example, project appraisals have been completed for proposed works to reduce the risk to 38 properties at Llanbadarn near Aberystwyth, where the community of Parc yr Onnen, has suffered flooding on several occasions over the last 10 years, and at Ammanford, where 164 residential properties and 71 commercial properties have been identified as being at risk during a 1% annual exceedance probability flood event.

LLFAs have also delivered several FCERM schemes during the reporting period through their programmes of investment. This has included the completion of the Beaumaris coastal defence scheme in Anglesey, the Town Beach scheme in Porthcawl and a coastal erosion embankment east of Bury Port, which has the added benefit of stabilising the coastline east of Burry Port Harbour. It has not been possible to report the number of properties benefitting from LLFA capital works, but schemes have reduced flood risk to residential, commercial and industrial properties, as well as key infrastructure including the Wales Millennium Coastal Path, the A4046 which allows access to Ebbw Vale hospital, the North Wales railway line and a World Heritage Site at Beaumaris.



Fig 24: Flooding at Parc yr Onnen, nr Aberystwyth.

As part of Capital works, all RMA's incorporate biodiversity enhancement and recreational aspects where possible. This helps to meet the goals set out under the Wellbeing of Future Generations Act, biodiversity duties under the Environment Act and align with National FCERM Strategy objectives, which are also translated in Flood Risk Management Plans across Wales.

Little Haven Flood Alleviation Scheme, Pembrokeshire.



Figure 25: completed flood alleviation scheme at Little Haven, Pembrokeshire

The flood alleviation scheme at Little Haven, Pembrokeshire, which comprises of a new shingle bank at the top of the beach, was completed in Summer 2017. The scheme is designed to defend the village against a 1 in 100yr flood event and just two months after construction ended the defences were successfully put to the test by Hurricane Ophelia and Storm Brian.

The scheme was developed through extensive public

engagement to discuss a variety of solutions ranging from the construction of higher concrete walls, offshore windbreaks and more innovative options such as glass walls. The community identified community and public amenity as an important consideration, which led to the shingle bank solution. The promenade, slipway and drainage system were also enhanced as part of the scheme. The scheme has since received an award (June 2018) from the Institution of Civil Engineers for 'Studies and Research' which celebrates conceptual ideas developed through study and research in practical solutions and

recommendations. The judges were particularly impressed with the community engagement to develop an effective solution to the flooding problems associated with high tides, winter storms and peak run-off flows in the stream which discharges across the beach, which also met the communities needs including boat storage at high tide and safer access to the beach for boat trollies.

St Asaph, Denbighshire

Following flooding to over 300 properties in 2012, a full investigation of the defences found they were in poor condition in some locations with a standard of protection of only 1:50. With climate change, it was considered over 500 properties could be at risk of flooding by 2070.

The new flood scheme, completed in March 2019, includes the replacement of a bridge downstream of St Asaph which has been attributed as being a major cause of blockage and subsequent flooding in 2012.

Embankments on both sides of the River

Elwy were also raised and a flood gate was installed. These works have increased the standard of protection to 1:200 and provides increased protection to a total of 414 properties (293 houses, 121 businesses), including homes, schools a doctor's surgery and fire station. NRW also worked with the Local Authority and other partners to deliver wider community and environmental benefits, including improved riverside pathways and access to the river bank and the use of a plant and grass seed mix on the embankments to improve their value to pollinators.



Figure 26: Flooding in St Asaph, November 2012

Trebeddrod Reservoir Spillway upgrade, Carmarthenshire

Works to upgrade the spillway at Trebeddrod Reservoir was completed in October 2016. This major flood defence scheme was required under the Reservoirs Act 2010 to ensure the reservoir continued to operate safely during extreme weather conditions, reducing the flood risk to the village of Furnace. The works included a new, larger capacity spillway and river training works to control the top water in the reservoir.

3.8 Surface and sewer flooding

During the reporting period, DCWW have delivered over 30 capital engineering schemes across Wales to resolve the risk of sewer flooding to properties and the environment. This have comprised of a range of solutions and techniques, including traditional storage and upsizing at Birchgrove, Gaerwen and Talgarth, new pumping stations at Builth Wells and new separated surface water drainage at Trelewis.

During 2018/19, a new tunnel over 1km in length was constructed as part of the Rainscape project to intercept surface water and convey flows back to the environment at Delta Lakes.

During 2018, DCWW have undertaken a significant engineering scheme to replace a critical Victoria-era brick sewer in the heart of Cardiff Bay, which was prone to fat blockages causing sewer flooding and was at risk of collapse. The scheme was carried out in a busy commercial area with several restaurants and bars. Working closely with business owners, they were able to minimise the disruption caused.



Fig 27: construction of new tunnel at Station Road, Llanelli

DCWW also contributed to emergency repairs carried out by Conwy Council to the promenade at Old Colwyn following severe weather in 2018 and carried out 4 emergency sewer repairs due to damage from high river levels.

Although Hafren Dyfrdwy have not been required to undertake any major capital schemes during the reporting period, they have developed and delivered proactive programmes of work including sewer inspections and repair works where necessary. They are also identifying hotspot areas where blockages are common to effectively target future investment.

Asset Management and Maintenance

It was noted in the last report that all RMAs had a regular asset inspection and maintenance regime in place. These regimes monitor asset integrity and performance through operational work programmes to ensure the required standard of protection is maintained. However, it was reported that there was no standardised system in place in terms of prioritisation or frequency which would aid delivery of flood asset maintenance. This has been addressed to an extent through the expansion of NRW's asset management system (AMX) as a national asset database for RMAs in Wales to include all significant assets on Main rivers, Ordinary watercourses and the coast.

3.9 AMX update

Since April 2016, AMX has been developed to host asset information from RMAs across Wales. The quality and quantity of asset data held by the RMA community varied considerably, with limited accurate information on historical assets. A methodology was created to enable all RMAs the opportunity to supply available information on their respective assets. Also added is the Planning, Scheduling and Field Work delivery for the Maintenance of Flood Assets, along with NRW's Hydrometry and Telemetry asset portfolio and integration with NRW's corporate GIS system.

The first phase of project was completed in 2017, with 21 of the 22 LAs supplying information on **8987** assets.

One of the key elements is for the system to be a "live management tool" so that the information detailed is not just a snapshot in time but is the most current data available

through regular updates. This phase of the project is now underway, and RMAs will be asked to supply new asset data, or include any changes to information previously supplied, during Summer 2019.

While providing a central storage of asset data for Wales, a means for RMAs to view and update their respective asset data themselves is seen as the longer-term objective. This will allow speedier updating of the information stored on the system to take place and will provide greater flexibility and efficiency in managing and maintaining flood assets. This element of the project will commence in 2020.

In addition to supporting the development of the AMX system, some LLFAs are investing in additional systems to record data or to carry out activities such as catchment analysis and culvert assessments (Caerphilly). Gwynedd have also reported that they are developing a software package to capture asset inspection results.

3.10 Asset Maintenance & Improvement

During the reporting period LLFAs undertook widespread asset maintenance works, including emergency repairs and general maintenance of culverts, the replacement of storm culverts, gully repairs and the renewal of inlet grids. Many LLFAs also reported works to remove debris from watercourses and clear trash screens and maintenance works to embankments to ensure they continue to function as designed. There has also been coastal repair works across Wales, although no detail is available to inform the report.

LLFAs can access funding to support with the costs associated with maintenance work to FCERM assets through the Small Scale Works Grant. Eligible works could include minor works to existing flood and coastal risk management infrastructure e.g. improving trash screens/headwalls, relining culverts, restoring drainage systems and structural renovation works. Over the reporting period, WG have awarded over £4,300,000 in grants which has funded 243 schemes. It is estimated this has benefited around 5,600 properties. WG has committed £1 million to this grant annually until at least March 2021.

NRW owns and maintains **3906** flood risk assets, which comprises of 494km (309 miles) of linear assets, flood embankments (389km) and floodwalls (57km). The performance of these flood assets is monitored regularly to ensure they remain at their target condition. The current asset performance figure of those assets meeting target condition stands at **97.9%** (March 2019).

Year	% NRW assets passing in High Risk Systems (target 99%)
2016/17	97.1%
2017/18	98.7%
2018/19	97.7%

Table 9: NRW flood assets meeting target condition (%)

NRW spends around £6million each year maintaining flood risk assets and main river watercourses. The focus of NRW maintenance operations is activities that help manage flood risk and where economic and environmental considerations justify intervention.

Routine activities include:

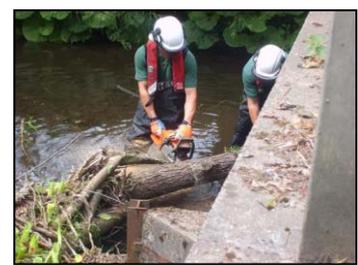
- maintaining flood barriers and pumping stations
- clearing grills and removing obstructions from rivers
- controlling aquatic weed in rivers
- removing silt and gravel from river beds
- managing grass, trees and bushes on our flood embankments
- inspecting and repairing flood defence structures



Fig 28: NRW “robomower” grass cutting, Monmouth



Fig 29: Operational response at Abergwili



Fix 30: Blockage removal from bridges

Capital funding is also used to carry out larger scale maintenance projects on NRW defences and structures. Some examples include erosion repair works on a flood alleviation scheme in Monmouth, repairs to the flood walls at Sion Street, in Pontypridd and replacement of a culvert and tidal doors at Draenogan, Gwynedd.



Fig 31: Completed erosion repair works, Monmouth



Fig 32: Wall repairs in progress, Sion Street, Pontypridd

3.11 Reservoirs

NRW own or manage 38 large raised reservoirs, including those on WG Woodland Estate and have a programme of works in place to assess reservoirs, carry out inspections and implement safety measures where required. In addition to safety measures, a schedule of regular visits to monitor and report on the reservoirs is maintained. This enables NRW to identify and monitor any weaknesses and seek further advice from an inspecting engineer if needed.

DCWW reservoirs requiring appropriate maintenance has increased from 86 to 129 due to the changes in Reservoir Regulation.

Since the last report, DCWW have adopted new Risk Assessment for Reservoir Safety (RARS) methodology to carry out a comprehensive review of their reservoir asset base. RARS methodology is a risk framework looking at the risk of several failure mechanisms of a reservoir and the subsequent risk of loss of life. This methodology represents a real change in approach to investment and intervention, which is now identified based on a proactive quantitative assessment of the risk (called the Portfolio Risk Assessment (PRA)), rather than simply reacting to observations and recommendations made during statutory inspections. From the PRA, DCWW have developed a multi-AMP strategy to improve reservoir safety. By the end of AMP6 (2020), works to address priority issues at ten sites will be complete.



Figure 33: Upper Neuadd reservoir dam stability project (courtesy of Skanska)

3.12 Asset inspection and accreditation

NRW employs 10 accredited asset inspectors who inspect all flood risk assets on Main River and the coast, including those owned by third parties. Approximately **14000** risk-based, visual inspections are carried out each year.

During 2016, WG provided funding for a series of asset inspection accreditation courses, known as T98. This was delivered through the WLGA's national capacity building programme (also funded by WG). The purpose was to provide an opportunity for LA representatives to become trained and accredited in the asset inspection process to the same level as NRW inspectors. An awareness course was also made available for those who required a basic overview of the process.

The increased number of T98 accredited inspectors across Wales has the benefit of resilience, providing the capability for accredited inspectors to move cross boundary should the need arise e.g. assessing flood assets post flood event, or supporting neighbouring Authorities where resources are constrained.

In 2017, good practice guidance³¹ was introduced relating to the management of flood risk at reservoirs. The ability to lower a reservoir's water level quickly in an emergency is a key factor in ensuring reservoir safety in the event of a problem occurring and the guidance is aimed at reservoir inspecting engineers who are required to review the drawdown capacity of reservoirs.

³¹ Floods and Reservoirs 4th Edition (2015) and Guide to drawdown capacity for reservoir safety and emergency planning (2017) <https://www.gov.uk/government/publications/guide-to-drawdown-capacity-for-reservoir-safety-and-emergency-planning>

3.13 Property Flood Resilience

Property Flood Resilience (PFR) measures can be both a means of resistance, (keeping water out), and flood recoverability (allowing water in, but enabling a quick and economic recovery and reoccupation of the property).

There has been limited investment and implementation of PFR measures during the reporting period, with several reasons cited for it not being used as a routine means of reducing flood risk to properties.

These included:

- Obtaining homeowner agreement – concerns over blight/property value.
- Practicalities of retrofitting to older properties.
- Ability of residents to deploy in an emergency.
- Not effective if residents are away from the property and unable to deploy.
- Lack of British standards and accreditation for the products being developed and marketed within the Blue Pages³².



Figure 34: example of a single door flood barrier

It was also noted by Rhondda Cynon Taff that even where IPP has been fitted they are not always utilised, as evidenced during flooding events in 2018-19.

WG are supporting the development of a robust Code of Practice³³ and accompanying guidance to provide a standardised approach for the delivery and management of PFR. It is hoped this will improve confidence in PFR and its subsequent implementation to help improve resilience to flood events.

Despite the challenges, there are examples of PFR being deployed during the reporting period with flood doors and gates being the most used form. Anglesey have invested £28k on external flood doors (supplemented by vent brick covers) at 5 properties in LlanfairPG; Denbighshire have invested £17k on 6 properties in Rhuddlan, on flood barriers and air bricks; Neath Port Talbot have spent £74k on flood doors at 12 Properties in Ystalyfera and Pembrokeshire have implemented a flood gate at 1 property at a cost of £500.

Hafren Dyfrdwy have also reported the installation of property resilience measures on 10 properties to reduce the risk from sewer flooding.

Other LLFAs have noted the potential to implement IPP alongside other strategic flood risk management measures. This includes Bridgend, where PFR has been identified as an option within their outline Business Case for Beach Road, Porthcawl and Monmouthshire

³² Directory of property flood products <http://bluepages.org.uk/>

³³https://www.ciria.org/Research/Projects_underway2/Code_of_Practice_and_guidance_for_property_flood_resilience_a_spx

who have an £80k PFR scheme programmed for 2019/20 which will protect up to 7 properties.

3.14 Network Rail

NRW work closely with Network Rail (Wales Route) to discuss and agree actions on key areas of mutual interest. This includes looking at ways in which they can work collaboratively to prepare for the effects of severe weather and climate change, managing land and strengthening Wales' natural and transport assets, including the 34 miles of rail assets identified as vulnerable to overtopping, coastal erosion and storm surge.



Fig 35: Backfilling of Rock at Southern End, Friog Corner, Gwynedd

This partnership was reinforced in October 2016, with the signing of a Memorandum of Understanding (MOU) between the organisations setting out a commitment to collaborate and co-operate for the benefit of Wales' communities and environment.

Since the creation of the MOU, NRW and Network Rail (Wales Route) have worked closely on several coastal and river schemes. For example, recent work to improve the rock armour at Friog Corner, Gwynedd and the removal of debris and large cobbles from beneath the railway bridge at River Rhondda Fach in Porth. This work has ensured flood risk to the railway line and property upstream is reduced.

Both organisations are keen to continue this strategic working relationship and promote further partnership work to support FCERM across Wales and contribute to the sustainable management of Wales' natural resources.

Nature Based Solutions & Green Engineering

WG's Natural Resources Policy, and the National FCERM Strategy recognise the value of 'nature-based solutions' to support the delivery of flood risk management. It can also be an effective means of enhancing and restoring floodplains to improve their resilience to pressures such as climate change and help RMAs deliver other legislative duties such as the duty under Section 6³⁴ of the Environment (Wales) Act 2016 to maintain and enhance biodiversity in the exercise of their functions. The use of natural measures and green infrastructure in FCERM also aligns with the well-being goals and principles of sustainable management of natural resources.

3.15 Delivering Environmental Benefits through FCERM Schemes

FCERM schemes provide an opportunity to deliver wider environmental benefits by incorporating the use of nature-based solutions where feasible. As noted earlier in this

³⁴ <http://www.legislation.gov.uk/anaw/2016/3/section/6/enacted>

chapter, there is now an expectation on RMAs to develop at least one natural flood management or hybrid scheme during the options appraisal process for new schemes.



In June 2018, NRW in partnership with Pembrokeshire Coast National Park Authority, Pembrokeshire County Council, the National Trust and local landowners, began work on a two year project in Solva, Pembrokeshire. It is hoped the project will help to reduce flood risk to properties in Solva. The focus of the project is to use natural flood management techniques, alongside traditional methods to 'slow the flow' and manage flood risk within the catchment.

Figure 36: Work to install leaky dams at Solva

11 leaky dams have been installed on land managed by the National Trust and Pembrokeshire. Over the next 2 years further leaky dams and other nature-based solutions will be installed along the local watercourses. It is hoped that this project, which has minimum environmental impact will deliver an improved flood defence system for the area and bring with it wider benefits for water quality, biodiversity and habitat creation.

LLFAs have also noted they are keen to explore opportunities to deliver nature-based solutions to reduce flood risk, particularly from surface water run-off. For example, Carmarthenshire are working in partnership with DCWW on the Rainscape³⁵ projects in Llanelli and Burry Port and Gwynedd commissioned a report to identify suitable locations within the Gwyfrai catchment where such measures could be used to mitigate flood risk. This is now being investigated in further detail. Blaenau Gwent are in discussions with a landowner to discuss land management measures that could help with water management whilst still maintaining an economically viable farming business. Other LLFAs including Pembrokeshire and Torfaen have advised that they support schemes which are not aimed specifically at reducing flood risk, but may help with water management, for example tree planting and peat bog restoration projects, such as the project to restore degraded blanket bog at Mynydd Garnlochdy (Torfaen).

Innovative examples of green engineering have also been reported, for example the use of eco-friendly hessian sandbags filled with soil and seed to construct a low-level flood bank and erosion protection at Newcastle Emlyn (Carmarthenshire) and Monmouthshire have secured £10k of grant funding to install a series of woody debris dams during 2019/20 to slow the flow of a small watercourse in Tintern. Monmouthshire are also working with partner organisations including Transition Monmouth and NRW to identify and develop opportunities for natural flood management schemes in the area.

3.16 Water Companies

Water companies are also working to support ecosystem and biodiversity resilience through their work programmes. Hafren Dyfrdwy have recently piloted a scheme to enhance amenity and biodiversity through a grant scheme. A contribution of £20k has

³⁵ <https://www.dwrcymru.com/en/My-Wastewater/RainScape.aspx>



Figure 37: attenuation basin at a school in Llanelli

helped create an 2.5-acre area of wet woodland next to the River Severn in mid Wales. The scheme has re-directed the existing surface water drainage assets, with the aim of helping to reduce surface water flood risk and improve quality and biodiversity.

In May 2017, DCWW published their “Welsh Water 2050³⁶” vision document for public consultation, which includes direct actions to improve biodiversity and ecosystems in Wales as they go about their day to day operations as a water and sewerage service provider. As part of their ongoing work to manage surface water through the ‘Rainscape’ project, DCWW

have implemented a variety of green engineering measures including basins, planters, swales, porous paving, filter strips and geo-cellular storage. These measures help slow down infiltration rates and some can also help remove contaminants from the water. They have recently worked with a school in Llanelli to construct a swale to separate and attenuate surface water drainage. This is helping to reduce flood risk and provides a social and educational benefit to the local community, as well as increasing aquatic biodiversity.

DCWW have also invested £2.7m to create a 2100m² attenuation basin at a formerly disused landfill site in Llanelli. The purpose of the basin is to attenuate 1ha of highway, carpark and roof drainage to reduce peak flows in the sewer network, potentially removing 146l/s at peak flow. As part of the project more than 17 species of plants, along with native grasses and wildflowers were used to improve biodiversity and encourage pollinators. Pathway links to existing active travel routes in the area were also created to help improve community health and wellbeing.



Figure 38: cross view of attenuation basin in Llanelli

Several RMAs have commented that the delivery of nature based solutions remains challenging. Several reasons have been cited, including; difficulties securing landowner agreement, limited understanding of effectiveness or where NFM is best placed, resource constraints, long-term maintenance needs and associated costs. Funding and the scale of interventions required to deliver a reduction in risk were also noted as a constraint. Some

³⁶ <https://www.dwrcymru.com/en/Company-Information/Business-Planning/Welsh-Water-2050.aspx>

suggestions on the types of tools or measures that could improve delivery going forward include; training and accredited courses, guidance documents such as a toolkit of options for small scheme works and case studies highlighting good working practices. It has also been suggested that better engagement with landowners to promote the wider benefits including to local communities would be helpful, perhaps aided by a third-party agency as is done in Scotland.

3.17 Marine Area Statement, Coastal Emerging Theme

Under section 11 of the Environment (Wales) Act, NRW are required to deliver Area Statements by March 2020. These will consider evidence from the State of Natural Resources Report (SoNaRR) and implement the priorities, risks and opportunities identified by the National Natural Resources Policy (NRP) for the sustainable management of natural resources (SMNR) at the local level.

Three emerging themes have been identified for the marine area statement, including *'nature-based solutions and adaptation in the coastal zone'*. Coastal adaptation and nature-based solutions can help contribute to the challenge of improving ecosystem resilience and support successful, sustainable communities within the coastal zone and has direct relevance to the delivery of FCERM in Wales and SMP2 implementation. Consultation is currently being undertaken with coastal stakeholders to identify the potential challenges and opportunities that can be addressed through the area statement process.

3.18 National Habitat Creation Programme

NRW delivers the National Habitat Creation Programme (NHCP) on behalf of WG to provide coastal compensatory measures to offset environmental losses resulting from coastal flood and erosion risk management projects.

It addresses the requirements for managing the integrity of the Natura 2000 sites relating to the Habitats Directive. It is also closely aligned to the Well-being of Future Generations Act and the Environment (Wales) Act through the provision of nature-based solutions to coastal transition and adaptation. In the context of coastal adaptation this translates not only to provision of compensatory habitat creation, but wider benefits of well-being and socio-economic value.

The NHCP facilitates the implementation of the SMP2 for RMAs through planning and delivering appropriate and timely compensation, enabling flood and coastal erosion schemes to be delivered effectively and in compliance with the Habitats Directive and WG's FCERM Strategy.

NHCP targets were originally informed by Habitat Regulations Assessments for the SMPs, but are now more closely linked with flood and coastal erosion risk management plans and projects delivered by RMAs. There is therefore a need to evaluate NHCP habitat creation targets against WG's FCERM Programme. The amount of compensatory habitat required will depend on the projects in WG's FCERM Programme.

During the reporting period the NHCP has continued to appraise sites for coastal transition. There are currently 11 sites under NHCP assessment and at the early stages of

project delivery. For some, NRW has started to engage with land owners, local authorities, service providers and stakeholders where appropriate.

3.19 Research & Development

One of the main projects sitting as part of the England and Wales FCERM Research and Development Programme is **Working with Natural Processes**³⁷. This important work provides the current evidence base for natural flood management and has been used to help inform WGs revised FCERM Strategy for Wales. Another project, currently underway is looking to develop a Natural Flood Management design guide. Working with CIRIA, the aim is to develop an industry standard guide and design framework to help plan natural flood management schemes.

NRW is also working alongside the WG to seek additional opportunities to meet gaps in knowledge and evidence including the two following projects funded by the Natural Environmental Research Council (NERC)³⁸:

- Green approaches in river engineering – supporting implementation of green infrastructure³⁹ New evidence-based support for asset managers, engineers, decision-makers and other end-users to support the selection and application of green engineering approaches for river protection
- Greening the Grey: A Framework for Integrated Green Grey Infrastructure (IGGI)⁴⁰ Support for asset managers, engineers, conservation and biodiversity teams, decision-makers, and other end-users to help better identify integrated green grey infrastructure options.

³⁷ <https://www.gov.uk/government/publications/working-with-natural-processes-to-reduce-flood-risk>

³⁸ <https://nerc.ukri.org/>

³⁹ <http://eprints.hrwallingford.co.uk/1400/>

⁴⁰ <http://eprints.gla.ac.uk/150672/>

Chapter 4: Development Planning, Permitting & Consenting

4.0 Introduction

The planning system is key to the implementation of sustainable development in Wales. It is also an important mechanism to support the delivery of the well-being goals. In terms of flood risk, planning policy seeks to direct development away from areas at risk of flooding, particularly residential development. There have also been changes to the way in which flood risk activities are permitted, with works to a main river or its floodplain now falling under the Environmental Permitting Regulations. Relevant permissions, permits and consents are required from the relevant authority to ensure activities do not cause or exacerbate flood risk, interfere with the maintenance of flood defence assets, or adversely impact the environment.

4.1 Strategic Planning

All local Planning authorities in Wales have a statutory duty to prepare a Local Development Plan (LDP) to outline proposals and policies to control development within their area. During the reporting period 5 LDPs have been adopted and Snowdonia National Park has recently adopted its replacement plan (Feb 2019). The majority of LDPs are supported by a Strategic Flood Consequence Assessment (SFCA), which are used by the LAs to make informed decisions when allocating sites for future development. Most LAs have reported that they use their SFCA to “screen out” highly vulnerable and emergency services development in areas of flood risk. Some LAs, including Bridgend, Carmarthenshire, Denbighshire, Merthyr Tydfil and Neath Port Talbot also confirm that their SFCA considers the future impact of climate change and is given due consideration in site allocations.

LAs also report that their Local Flood Risk Management Plan (FRMP) and SMP are considered in the preparation of the LDP to ensure policies on flood risk and coastal management align. For example, Carmarthenshire’s FRMP highlights an area of concern in terms of flood risk which has been replicated in their LDP, and Gwynedd notes that there is a presumption against new development in areas marked for ‘Managed Realignment’ and ‘No Active Intervention’ in epochs 1 and 2 of the SMP. With the introduction of Schedule 3 of the FWMA, requiring the use of SuDS on all new development, LLFAs have noted that they are now working closely with planning colleagues to ensure future LDPs take account of this legislation and include supporting policies.

4.2 Development Planning Advice

The planning system has an important role in ensuring new development is not exposed unnecessarily to flooding and seeks to guide development to locations at little or no risk from flooding.

Since March 2016, NRW have been a named specialist consultee on flood risk matters, placing a statutory requirement on LPAs to consult with them on relevant development proposals. NRW have provided flood risk advice on over 6000 planning responses during the reporting period (details in Table 10).

LLFAs are also influential on matters relating to surface water flood risk, drainage and risk from ordinary watercourses. Some, for example Swansea, impose planning conditions relating to engineered based resilience measures, such as floor slab levels. Prior to implementation of the SuDs Approval Bodies (SABs) in January 2019, the majority of LLFAs used planning conditions to manage surface water drainage and flood risk. The consensus is that SABs will help to ensure comprehensive, sustainable drainage systems are achieved that can also contribute to the delivery of wider environmental and social benefits.

WG operate a suite of key indicators designed to identify how the planning system contributes to the achievement of strategic sustainable development. One indicator, 'SD4 Resilience to Climate Change – Flood Risk', is collected from Local Planning Authorities and provides information on how planning applications for development in flood risk areas are being managed. The number of proposals granted for residential development in areas of C2 (undefended flood plain) and C1 (areas where there is significant infrastructure, including flood defences) is shown in Table 10.

Year	Residential development approved in C2	Residential development approved in C1	Total
2016-17	217	469	686
2017-18	263	958	1221

Table 10: Planning permission granted for residential development in zone C1 and C2

The increase in applications being permitted in the flood plain has been considered by WG in their review of planning policy and TANs 14 and 15.

RMA's report that in addition to providing technical flood risk comments on planning consultations, flood risk planning advice is made available on their websites (NRW, Blaenau Gwent, Caerphilly, Denbighshire & Pembrokeshire). Bridgend and Carmarthenshire are currently drafting supplementary guidance in relation to implementation of Schedule 3 of the FWMA and Pembrokeshire have a section on 'Areas Liable to Flood' embedded within their Good Practice Guidance on 'Safeguarding for Planning Purposes'.

Water companies also have a role in supporting the planning process, providing advice on sewerage capacity and connections.

Over the reporting period, NRW have been working with LPAs and WG to refine and clarify flood risk planning advice. This has helped NRW improve the consistency of approach and value of advice to flood risk concerns across Wales.

During 2018, NRW worked initially with Anglesey and Wrexham to trial the use of standing advice in response to proposals for highly vulnerable development in zone C2. The advice reiterated the policy stance in TAN 15 and the presumption against such development. Under the trial, NRW would only review flood consequence assessments where the LPA confirmed there to be an overriding reason for the proposal. Benefits to the approach included quicker and clearer advice, reduced likelihood of homes being built in the floodplain, more efficient use of resources with potential saved costs for LPA, NRW and

applicant. Following the success of the trial, the approach is now being rolled out across Wales.

NRW also worked with WG to develop guidance⁴¹ on how climate change should be considered for development proposals to ensure development was sustainable both now and in the future. Published in August 2016, this guidance came into full effect on 1st December 2016 and applies to both planning applications and preparing and reviewing Local Development Plans.

More recently, WG have been working closely with NRW and Local Planning Authorities as they review and redraft planning policy documents TAN14 and TAN15, providing technical advice, recommendations and critical appraisal of emerging drafts. During consultation, the revised TAN15 will propose a shift in planning policy from a precautionary approach to more evidence-based decision making. It will also suggest tighter constraints on highly vulnerable development in areas of high flood risk. This is in line with sustainability principles and the goals of the Well Being of Future Generations Act, which requires public bodies in Wales think about the long-term impact of their decisions. NRW are also working with WG to create a new Flood Map for Wales which will replace the 'Long Term Risk of Flooding' maps and Development Advice Map currently referred to in TAN15.

4.3 Flood Mapping

The Development Advice Map (DAM) is a crucial part of current planning policy for locating new development and acts as a 'trigger' for more detailed assessment of flood risk. In April 2017, responsibility for publishing and maintaining the DAM was transferred from WG to NRW. As part of this process, a full review of zone C1 zone was undertaken. The DAM now aligns with NRW's 'Flood Map' and is updated on a 3-monthly cycle. Previously, there had been just 4 updates since its initial publication.

Work is now progressing to develop a single 'Flood Map for Wales' as an extension to the FRAW project. This will bring together the DAM and NRW's Flood Risk Map to provide a single source of mapped flood risk information.

4.4 Flood Risk Activity Permitting

NRW's permission is needed for any activities that are to be carried out in, over, under or near a main river or flood defence (including a sea defence), or within a flood plain. This has historically been controlled through Flood Defence Consents issued under the Water Resources Act 1991. On the 6 April 2016, this changed to become part of the Environmental Permitting Regulations 2016. This change introduced the following key aspects:

- Flood Defence Consents became Flood Risk Activity permits (FRAPs).
- The flat rate fee of £50 was removed and a cost recoverable charging scheme implemented.
- Flood Risk Exemptions were introduced that provide the opportunity for customers to register to undertake a flood risk activity free of charge if certain conditions are met.

⁴¹ <https://gweddill.gov.wales/docs/desh/publications/160831guidance-for-flood-consequence-assessments-climate-change-allowances-en.pdf>

- Flood Risk Exclusions introduced which enables customers to undertake certain flood risk activities free of charge without notifying, registering or applying to NRW so long as certain conditions are met.

During the reporting period NRW issued 726 FRAPs. Further information on FRAPs, exemptions and exclusions can be found on the NRW website⁴².

4.5 Ordinary Watercourse Consents

Works within or adjacent to a watercourse not classed as a main river may require an ordinary watercourse consent (OWC) from the relevant Lead Local Flood Authority. The exception is where a watercourse is located within an Internal Drainage District, within which certain works may require a Land Drainage Consent, which NRW administer.

During the reporting period LLFAs across Wales have issued 571 ordinary watercourse consents. However, this figure represents only 13 LLFAs so it is likely the true figure is much greater.

Nearly all RMAs who responded stated that they were generally opposed to culverting of watercourses due to the adverse impacts on flood risk, ecology, safety and aesthetics, only permitting such activity for access purposes. Where culverting is permitted, RMAs generally require long term maintenance arrangements to be agreed, along with appropriate easements to ensure adequate space is available for access and maintenance.

4.6 Compliance Checking and Enforcement

The approach to compliance checking and enforcement is generally the same across Wales, comprising of site visits, advice via the RMA website or supporting correspondence to the permitting/consent process, moving to warning letters and enforcement notices where works have been carried out without permission or in contravention of the relevant permit/consent. However, many RMAs have advised that they are unable to undertake proactive activity in this area due to limited resources, lack of training and a concern that such action will be lengthy and resource heavy.

Glen Trothy Caravan Park, Mitchell Troy, Monmouth

Following reports from local residents, NRW investigated unconsented works along the banks of the River Trothy. This comprised a significant length of 'flood fence', constructed by the site owners without appropriate permissions in place, or any evidence to demonstrate there would be no resulting increase in flood risk. Over a period of 18 months, NRW worked with the owners of the site to remedy the situation, explaining the regulatory requirements and what evidence was required to prevent further enforcement action. A Flood Consequence Assessment (FCA) (based on the outputs of detailed hydraulic modelling) was subsequently prepared and submitted. Based on the evidence set out in the FCA, NRW was satisfied the structure would have no adverse impact on flood risk and determined it could remain in place.

⁴² <https://naturalresources.wales/permits-and-permissions/flood-risk-activities/?lang=en>

River Diversion - Cresswell River in Loveston, Pembrokeshire.

In 2016, NRW received calls from the public regarding discolouration of the River Cresswell and the cutting down of trees. Following investigation, it was confirmed that the landowner had diverted and straightened approximately 400m of main river without the required Flood Risk Activity Permit or other relevant permissions. Although there was limited impact on flood risk, the primary offence was the carrying out of in-river works without a permit, with an adverse effect on geomorphology, biodiversity and fisheries. Following interviews and site meetings, NRW agreed a remediation scheme with the landowner to reinstate the river to its former course and replace the lost environmental features and habitat. The co-operation of the landowner meant the enforcement case did not proceed to formal prosecution.

4.7 Internal Drainage Districts: Boundary Review & Rates

The previous report advised on the transfer of Internal Drainage Boards administration and assets to NRW in April 2015. During this reporting period, NRW have undertaken a review of the boundaries of all 13 Internal Drainage Districts (IDDs) in Wales. This identified amendments to 8 IDD boundaries to reflect changes in land use and its management. The project included a public consultation to help refine the outcomes. The finalised proposals were submitted to WG in February 2018 for approval. Most of the changes once implemented will remove land parcels from IDD boundaries which no longer receive a benefit from IDD operations, making IDDs more equitable by ensuring drainage rates are appropriate.

NRW have also made improvements to their systems for collection of Drainage Rates issued for the agricultural land and buildings within an IDD. This has resulted in a significant reduction of debts associated with unpaid rate demands; arrears brought forward to 2017/18 of £90k dropped to arrears of £20k being carried into 2018/19.

4.8 Reservoir Regulation

There are 365 large raised reservoirs in Wales which are regulated by NRW under the Reservoirs Act 1975. NRW ensure reservoir undertakers observe and comply with the requirements of the Reservoirs Act so that reservoirs are kept in a safe condition.

Since implementation of changes to the Reservoirs Act (April 2016), all pre-commencement reservoirs⁴³ for which NRW are responsible have been inspected and supervised appropriately. Registration of post-commencement reservoirs is almost complete with preliminary investigations and inspections underway.

DCWW are awaiting provisional designations from NRW for the 45 additional reservoirs now requiring statutory inspection and related maintenance. To help inform the risk designation process, DCWW have updated and are soon to share mapping of an uncontrolled release of water from reservoirs under their ownership.

Hafren Dyfrdwy have identified and inspected all reservoirs that fall under the requirement for statutory inspection and have reported to be fully compliant with the regulations.

⁴³ Pre-commencement reservoirs are capable of storing 25,000m³ of water above the natural level of the land adjoining the reservoir – the previous capacity threshold

Chapter 5: Forward Look

5.1. Setting Direction

The second National FCERM Strategy (under development at time of writing this report) will set out WG's vision for managing flood and coastal erosion risk in the coming years. It complements new legislation and policies for Wales and seeks to not only reduce risk, but also prevent issues for our future generations. Key changes include the promotion of nature-based solutions, green engineering and catchment approaches to manage and reduce risk and seeking to better understand and prevent exposure to risk. This highlights the importance of good information to enable evidence-based decision making, particularly on how investment is prioritised. It also requires strong links with development planning policy and a clear steer to prevent exposure to flood and coastal erosion risks both now and in the future.

Local Flood Risk Management Strategies, which are a requirement of the Flood and Water Management Act, must be consistent with the National FCERM Strategy. There will therefore be a need to review and update these local strategies to ensure they align with the National FCERM Strategy objectives and measures.

5.2 Prioritising Investment

Key to the national FCERM Strategy is prioritising investment to those communities most at risk and WG have announced their commitment to work with Coastal Local Authorities on a £150 million programme of investment over the next 3 years through their Coastal Risk Management Programme reducing risks to over 18,000 properties. This is in addition to over £51 million of investment during 2019/20 into flood and coastal erosion risk management across Wales, which is prioritised on reducing risks to properties.

The Communities at Risk Register is used to provide a consistent way of considering and ranking risk from all sources. This has recently been updated through the Flood Risk Assessment Wales project and enables an objective comparison between the risk associated with different sources of flooding at the community scale. It is anticipated this key dataset will be updated on an annual basis and WG have made a commitment to use this as one element within the criteria for prioritising FCERM investment across Wales.

5.3 Improving understanding and communication of risk

The draft revised National FCERM Strategy includes a new objective on improving our understanding and communication of risk. This identifies the importance of flood mapping and modelling, investigation into the cause and source of flooding, research and the sharing of data to help inform decision making and preparedness.

5.4 Flood Maps (Rivers and Sea)

The next stage of the Flood Risk Assessment Wales project will be to:

- replace the online 'Risk of Flooding from Rivers and the Sea' maps
- develop a 'Flood Map' for Wales to support revised planning policy TAN15, and
- develop new 'Risk and Hazard' maps required by the EU Floods Directive.

This work has commenced and is expected to be completed by Summer 2020.

Through the revised draft National FCERM Strategy, WG has also asked NRW to review the National Coastal Erosion Risk Maps, to align them with SMP2 policies and to aid public understanding of coastal erosion.

5.5 Reservoir Flood Maps

Currently there is no flood mapping for newly registered reservoirs under 25,000m³. NRW are undertaking a flood mapping project to illustrate the likely impacts of an uncontrolled release of water from the reservoir. The maps will guide the designation of reservoirs and better inform Local Resilience Fora to help aid emergency preparedness and incident response planning. This project is planned to run throughout 2019/2020.

5.6 Flood Investigations

Through the draft revised National FCERM Strategy, WG aim to standardise the reporting of flood and coastal erosion flooding events and has placed a new expectation on LLFAs to investigate incidents of flooding where 20 or more homes in one area suffer internal flooding. This is a significant change to current practice, where no minimum threshold is set for investigations. It is hoped this will help improve consistency of reporting and improve understanding of risk in terms of location, source and cause of flooding.

5.7 Data Updates

The National FCERM Strategy encourages RMAs to share data to help improve understanding and communication of risk and better inform decision making. WG want to see more open and transparent data sharing, for example upon completion of flood investigations or updated flood modelling. This will help ensure the public and stakeholders are using the most up to date information and that investment can be directed to those areas most at risk.

5.8 Research and Development

Our understanding of the risks of flood and coastal erosion is improving as more research is undertaken. There is a commitment in the draft revised National FCERM Strategy to support research requirements in Wales through the joint FCERM research programme (in collaboration with the Environment Agency and DEFRA) and through other independent projects. Current projects underway include:

- Climate change and flooding – new evidence for sea level rise projections and river flooding. This project will incorporate the latest climate scenarios into flood allowances to help ensure flood protection measures remain effective under a changing climate.
- A roadmap for flood hydrology – all inland flood risk management work is underpinned by hydrology; this project aims to work with hydrology users and experts to plan both the short-term and long-term future of flood hydrology.

5.9 Code of Practice and Guidance for Property Flood Resilience

As noted in section 3.13, PFR could play a valuable part in managing flood risk across Wales. CIRIA are leading a project to develop a robust and authoritative Code of Practice along with consolidated guidance to provide a standardised approach for the delivery and management of PFR. WG are interested in the outputs of this project and how it can be utilised in Wales.

5.10 Preventing Exposure to Risk

Another new objective in the draft revised National FCERM Strategy seeks to prevent more people becoming exposed to flood and coastal erosion flood risk. This recognises the need for a clear alignment with planning policy, and for flood risk information to be up to date and as accurate as possible to inform development planning and infrastructure decisions. Preventing exposure to risk both now and in the future will require RMAs to support the strong planning policy stance that seeks to avoid placing people in areas of high flood risk, thus avoiding the build-up of future problems that could be difficult and expensive to resolve. It is anticipated that the revisions to TAN15, continued updates in flood mapping and the role of the Sustainable Drainage Approval Bodies will help to ensure inappropriate development can be minimised.

5.11 Preparedness and Resilience

The draft revised National FCERM Strategy has a greater emphasis on supporting communities to recognise, understand and take ownership of their flood risk, so that they can be more resilient to the impacts of flooding. RMAs are already acting to raise awareness of risks, for example working with communities to develop flood plans, public drop in sessions and providing information on their websites. However, this shift in focus to 'collective responsibility' is likely to be a challenge for RMAs as they seek to develop more pro-active engagement and delivery of flood risk management with those communities exposed to risk.

5.12 Climate Change

Climate change projections suggest that Wales will see higher sea levels, increased storminess, an increase in intense rainfall events and more frequent flooding. This, coupled with a growing population, brings significant challenges of how to defend low-lying coastal areas and fluvial floodplains. In response, WG are investing in longer-term coastal adaptation and promoting wider catchment schemes to adapt to the impacts of climate change in the communities of Wales.

5.13 Nature Based Solutions and Green Engineering

The draft revised National FCERM Strategy promotes the increased use of nature-based solutions, green engineering and catchment approaches to manage flood and coastal erosion risk, address the impacts of climate change and help deliver improved environmental, social and economic resilience. This aligns with the new FCERM Business Case Guidance which states that RMAs must consider nature-based approaches or hybrid schemes when developing options for new flood assets and maintenance.

5.14 Shoreline Management Plans and Coastal Monitoring

Rising sea levels and the dynamic nature of the coastline will mean an improved understanding of the longer-term trends will be needed to effectively manage the Welsh coastline. SMPs are an important consideration and WG have sought to improve links to SMP2 policies via revisions to TAN15 and through the need for a robust, evidence-based process when a SMP policy change is proposed. The draft revised National FCERM Strategy also encourages RMAs to work collaboratively through the Wales Monitoring Centre to collate data and share information and expertise to develop a repository of information that can then be used to support coastal adaptation and FCERM investment decisions.

5.15 Coastal Adaptation Toolkit

The Welsh Government is developing a Coastal Adaptation Toolkit to support adaptation delivery. The toolkit is being developed through ongoing collaboration with the Wales Coastal Groups Forum and Coastal Groups in Wales including the identification of priority guidance requirements. The Coastal Adaptation Toolkit is expected to be delivered by 2021.

5.16 Water Company Business Plans

The water companies operating in Wales have also committed continued investment to help reduce flood risk from their sewerage network. Commitments and long-term objectives are set out in their Business Plans and seek to enhance resilience of their assets from impacts such as climate change as well as reduce the risk and exposure to communities from sewerage flooding. Planned activities also align with WGs' Natural Resource Policy priorities and the principles of sustainable management of natural resources. For example, Hafren Dyfrdwy are working with partners such as the Montgomery Wildlife Trust to enhance the management of woodland areas on their reservoir sites. Their plans also include maintenance of upland areas to provide localised flood benefits and enhance biodiversity and water supply resilience.

DCWW plan an increased investment of around £2.3billion across the business with priority investments including a substantial extension of Rainscape across ten priority catchments, a major programme to enhance the safety of their reservoirs to make them resilient to future severe storm risks, and a substantial National Environment Programme to directly improve 400km of rivers towards 'good' ecological status. Drainage Area Plans are also being developed in partnership with other land users, with four priority 'whole catchment solutions' identified to explore holistic catchment solutions through an innovative SMNR approach.

Preparing for impacts of a changing climate also feature heavily in business plans. The sustained dry weather in Summer 2018 underlined the scale of challenge water companies face to balance supply and demand with water resources. There is increased focus on water efficiency and both DCWW and Hafren Dyfrdwy are targeting low-level domestic leakage and awareness with customers to avoid wastage by using water more wisely. Hafren Dyfrdwy have an ambitious target in place to reduce consumption by 105 litres per person per day by 2065.

Summary

Managing the risk from flooding and coastal erosion remains a priority for the Welsh Government, as demonstrated within their 'Programme for Government: Taking Wales Forward'⁴⁴, which includes a commitment to "continue to invest in flood defence work."

However, environmental, social and economic pressures such as climate change, population growth and continued squeeze on resource availability, means the way in which flood and coastal erosion risk is managed must adapt. Although there is still a need to build and maintain flood defences, the new approach set out in WGs National FCERM Strategy recognises the importance of improving awareness and understanding of risk, encouraging people to take action to improve their own resilience. A new Flood Map for Wales, along with the requirement for RMAs to update maps, plans and data on a regular basis will help to ensure the public and stakeholders have access to the most up to date and accurate information.

There is also more emphasis on preventative action and improving the linkages with other WG policy areas such as development planning and Shoreline Management Plan policies. Aligning better with such policies will help inform better development planning and infrastructure decisions and ensure long term sustainable development that does not put people at risk in the future. RMAs will have their part to play in this, both through the new direction on sustainable drainage, but also as a consultee in the planning process.

Still in its relative infancy in Wales, a key priority for WG is the increased use of natural interventions, green engineering and catchment wide approaches to reduce risk, improve resilience and create more sustainable schemes that deliver wider well-being benefits. Going forward, RMAs will need to consider nature-based solutions as an option in all new FCERM schemes in line with the new FCERM Business case guidance. It is hoped this will also promote more collaborative and partnership working across and between RMAs to develop and deliver projects that not only reduce flood risk but provide wider benefits for the environment and social wellbeing.

The draft revised FCERM Strategy complements other WG legislation and policy, it seeks to reduce risk, deliver wider environmental, social, well-being and economic benefits and prevent issues for future generations through well informed, place-based decisions.

⁴⁴ <https://gov.wales/programme-government>

Appendix 1

Summary of Progress Against National FCERM Measures

Sub-Objective 1: Provide Strategic Leadership and Direction at a National Level				
	Delivery deadline	Lead	Progress as of April 2014	Progress as of March 2019
Development of National Standard for Sustainable Drainage Systems and accompanying guidance.	End 2013	WG	Ongoing. Welsh Government is developing national standards and guidance. Once developed, these will go out to consultation.	Complete - Implementation of Schedule 3 of FWMA commenced 7th January 2019.
Undertaking of a review of national policies in relation to coastal risk management including research on the options for communities facing increased levels of risk.	End 2013	WG	Ongoing. Coastal adaptation review underway in light of SMPs and 2014 Coastal Flooding Review.	Complete - Review undertaken as part of the Coastal Review, carried out following winter storms of 2013/2014. Closure report published December 2017.
Development of a national funding policy and prioritisation methodology for the assessment of applications for funding for all flood and coastal erosion risk management activities funded from the Welsh Government.	End 2013	WG	Ongoing, Draft consultation document on National Programme of Investment being finalised for consultation Summer 2014.	Complete - Following the FaCIP consultation in 2015, WG have developed and agreed a scoring methodology for prioritising funding for schemes nationally targeting the most at risk communities. This has created one single programme of investment considering, on an annual basis, schemes from Local Authorities and NRW together.

Establishment of a principle for ensuring access to buildings and contents flood insurance to replace the Statement of Principles.	Jun-13	WG	Ongoing for implementation in 2015.	Complete - Flood Re launched in April 2016
Drafting and commencement of legislation relating to flood and coastal erosion risk management as required through the life of this Strategy.	End 2017	WG	Ongoing e.g. secondary legislation for reservoir safety scheduled for autumn 2014	Complete Amendment to Reservoirs Act (1st April 2016) Flood Risk Activity Permitting coming under Environmental Permitting Regs (1st April 2016) Implementation of Schedule 3 of FWMA (7th January 2019.)
Raising awareness of the implications of flood and erosion risk across all business sectors over the life of the Strategy.	End 2017	WG	Ongoing. Recent coastal storms of Dec 2013/Jan 14 has created more joined up working between government departments, particularly in terms of providing funding for damages sustained.	Complete - Programme of awareness raising activities planned and delivered by RMAs over the National FCERM Strategy lifetime.
Sub-Objective 2: Provide Strategic Leadership and Direction at a Local Level				
Delivery of a coastal erosion map for Wales.	2012	NRW		Complete – Published April 2012
Delivery of the second round of Shoreline Management Plans by 2012 with proportionate implementation over the life of the Strategy	2012	Coastal groups	Ongoing. All SMP2s submitted to Welsh Government by May 2013 for approval.	Complete - Each of the second edition SMPs approved by Minister by Dec 2014

Development of the National Habitats Creation Programme as part of the delivery of the Natural Environment Framework	2012 with proportionate implementation by 2017	NRW	Ongoing	Complete - NHCP developed. Programme being delivered on an on-going basis.
Development of Local Flood Risk Management Strategies	Delivery by 2013 with proportionate implementation by 2017	LLFAs	15 completed, 6 awaiting sign off, 1 due for consultation	Complete – all published by December 2015.
Implementation of statutory responsibilities including those set out within the Flood and Water Management Act 2010 and the Flood Risk Regulations	2015 with proportionate implementation by 2017	RMAs	Ongoing	Complete - Statutory responsibilities and related activities embedded within RMAs work activities
Proportionate implementation of the Catchment Flood Management Plans over the life of the Strategy	2017	NRW	Ongoing	Complete – Any outstanding actions from Catchment Flood Management Plans (CFMPs) carried over into Flood Risk Management Plans (FRMPs) FRMPs have been delivered since early 2016.
Sub-Objective 3: Develop policies for effective land use management and enhanced development control procedures where appropriate				
Development of Local Development Plans that include adequate provisions in respect of flood and coastal erosion risk.	Ongoing	LPAs	16 LDPs adopted by March 2014	On-going - 2 of 24 LDPs not adopted. 13 LDP review's commenced
Compliance with requirements of Planning Policy Wales and relevant Technical Advice Notes.	Ongoing	LPAs	Ongoing- Application of TAN 15	Complete - Activities undertaken by RMAs via the Town & Country planning process.

Provision of appropriate advice on flood and coastal erosion risk in relation to planning applications.	Ongoing	WG	Ongoing- Application of TAN 15	Complete - Activities undertaken by RMAs via the Town & Country planning process.
Appropriate undertaking of Strategic Flood Consequence Assessments and their use to inform Local Development Plans	Ongoing	LPAs	Ongoing	Complete - Where required Strategic Flood Consequence Assessments undertaken and used to inform LDPs.
Approval and adoption of SuDS drainage systems by the SuDS Approving and Adopting Body.	Ongoing from 2013	SuDS Approving and Adopting Body (Local Authorities)	Ongoing –Welsh Government developing proposals for implementing Schedule 3 of the Flood and Water Management Act	Complete - SAB approvals and adoption have become part of LLFA work activities since commencement of Schedule 3 of FWMA
Provision of advice and guidance on appropriate land use management.	Ongoing	WG	Ongoing. Literature review undertaken. Scoping of Welsh evidence needs started.	On-going - Led by WG
Sub-objective 4: Establish regular maintenance schedules for flood and coastal erosion risk management assets				
Development of a register of natural and manmade structures or features likely to have an effect on flood risk by 2014.	Ongoing	LLFAs	Ongoing, at least 16 have a register	Complete - Asset data information held in AMX or other locally based system
Establishment of a programme of regular and appropriate maintenance for flood and coastal erosion risk management assets.	Ongoing	RMAs (in relation to their own assets)	Ongoing- all have a programme Ongoing.	Complete - Information held in AMX or other locally based system

Designation of natural and manmade structures or features likely to have an effect in flood or coastal erosion risk over the life of the Strategy.	Ongoing from 2012	NRW, Lead Local Flood Authority and Internal Drainage Boards	One designation under way in Rhonda Cynon Taf CBC.	On-going – Where available, information held in AMX or other locally based system
Sub-objective 5: Ensure that by 2026 everyone who lives in a flood risk area understands the flood risk they are subject to, the consequence of this risk and how to live with that risk				
Continuation and development of Flood Awareness Wales.	Ongoing	NRW	Ongoing	Complete - Programme of work delivered over course of National FCERM Strategy.
Programme of community based awareness and engagement activities, utilising the Flood Risk Management Community Engagement Toolkit.	Ongoing from 2012	NRW, LLFAs	Ongoing- including more than 60 events by Lead Local Flood Authorities	Complete - Programme of work delivered over course of National FCERM Strategy.
Identification of at risk groups within communities, including vulnerable individuals	2017	LLFAs	Ongoing, including Welsh Government Funded project on vulnerability	Complete - Programme of work delivered over course of National FCERM Strategy.
Development of a national Single Point of Contact for queries relating to flood risk.	2013	WG	Ongoing - discussions between Welsh Government and Natural Resources Wales regarding Single Point of Contact and wider flood support. Extended Floodline Service trialled.	On-going - Revised measure included within draft update of National FCERM Strategy.

Continuation and expansion of the Floodline Warning Direct Service over the life of the Strategy.	2017	NRW	Ongoing, details provided in Chapter 5	Complete – Activity undertaken throughout lifetime of National FCERM Strategy. This is continuing part of NRW's programme of work.
Sub-objective 6: Enhance property and community level resilience				
Ensure property level flood resilience measures and the requirements for SuDS are incorporated into Building Regulations.	2017	WG	Not started. Welsh Government currently this unlikely to be progressed.	Partially complete - New requirement for SuDS on all development of 100m2 or more (Schedule 3 of FWMA). No status report for including property level resilience measures within Building Regs.
Enhanced awareness of property level resilience measures and guidance on their use.	Ongoing	WG	Ongoing. Some measures have been installed by NRW, on a community basis and by LLFAs in some localities. Guidance available via NRW & National Flood Forum.	Complete – RMAs consider use of property level resilience as part of suite of flood risk management measures. and make use of it where appropriate.
Development of a sustainable methodology for funding individual property level resilience measures	2014	WG	Ongoing. To be consulted upon as part of National Programme of Investment.	Complete – Established policy position following consultation and review. PLP acceptable as part of larger, community schemes.
Provision of appropriate warnings in relation to all sources of flooding	Ongoing	NRW	Ongoing, improvements in flood warnings described in Chapter 3	Complete - Activities embedded within NRW work activities (excluding flood warning from surface water).
Sub-objective 7: Ensure the preparation and testing of Emergency Plans				

Complete emergency plans for all sources of flood risk.	Ongoing	Category 1 and 2 responders under the Civil Contingencies Act	Ongoing, development of numerous community level, LLFA and Local Resilience Forum plans.	Partially Complete - LLFA and LRF plans further developed and updated over National FCERM Strategy lifetime.
Development of community level emergency plans, as required by relevant communities.	Ongoing	NRW	Ongoing. As above	Complete - At risk communities identified and plans developed accordingly.
A pan-Wales emergency exercise to test response and recovery arrangements by 2016.	2016	WG	Ongoing. A coastal evacuation exercise task group is planning a large scale exercise along the Severn Estuary in Spring 2015.	Partially Complete - Smaller scale exercises carried out, but no pan-Wales emergency exercise undertaken.
Local level emergency exercises to test response and recovery arrangements over the life of the strategy.	Ongoing	Category 1 and 2 responders under the Civil Contingencies Act	Ongoing, Exercise Berwyn April 2013	Complete - Smaller scale exercises carried out, but no pan-Wales emergency exercise undertaken.
Sub-objective 8: Respond to events in a timely and appropriate manner				
Early and appropriate response to emergency events for all events.	Ongoing	Category 1 and 2 responders under the Civil Contingencies Act	Ongoing	Complete - Emergency response procedures developed and implemented as required.
Development and implementation of effective evacuation protocols for emergency events.	Ongoing	Category 1 and 2 responders under the Civil Contingencies Act	Ongoing, development of LLFA and Local Resilience Forum plans	Partially Complete - LLFA and LRF plans further developed and updated during course of Strategy lifetime.

Development of mutual aid protocols for resources, equipment and respite for emergency events.	Ongoing	Category 1 and 2 responders under the Civil Contingencies Act	Ongoing, as above	Complete - RMAs have considered relevant protocols and embedded where appropriate.
Identification and provision of suitable respite accommodation as appropriate over the life of the Strategy	Ongoing	LAs	Ongoing, at least 13 LLFAs report that they have identified suitable respite accommodation	Complete - Appropriate respite accommodation identified and reviewed during course of Strategy lifetime.
Sub-objective 9: Facilitate recovery from flooding within the shortest possible timescales				
Development of procedures for the effective clearance of debris	Ongoing	LLFAs	Ongoing, 16 LLFAs have clearly defined procedures in place, 2 further report this is work in progress	Complete - All RMAs aware of the need for procedures and undertake clearance activities within their work programme.
Development of repair schedules including provision for the installation of resilient measures by 2015	Ongoing	LLFAs	Ongoing, at least 17 LLFAs have clearly defined procedures in place, 1 further LLFA reports that this is work in progress	Complete - Procedures developed embedded within RMAs work activities.
Investigations into the causes of flooding to be undertaken where necessary within one month	Ongoing	LLFAs	Ongoing, 397 investigations carried out during the reporting period. LLFAs report that there is variation in trigger levels for carrying out investigations.	Complete - Activities embedded within RMAs work activities. Trigger thresholds vary, not all flooding is investigated.
Sub-objective 10: Develop a National Programme for investment for flood and coastal erosion risk management				

Undertake research into the costs and benefits of softer engineering approaches including the use of natural processes to flood and coastal erosion risk management	End 2013	WG	Ongoing- supported by the Working with Natural Processes cross-cutting theme under the Defra/EA/Welsh Government/NRW research programme	Ongoing - Research could pick up cost/benefits going forward.
Guidance on the comparative use of hard and soft engineering approaches to flood and coastal erosion risk management to be issued by 2013	End 2013	WG	Ongoing. As above	Partially complete - Guidance on soft engineering approaches produced, but this doesn't include any comparison between hard and soft approaches.
Development of a national funding policy and prioritisation methodology for the assessment of applications for funding for all flood and coastal erosion risk management activities funded from the Welsh Government.	End 2013	WG	Ongoing, Draft consultation document on National Programme of Investment being finalised for consultation Summer 2014.	Complete - Following the FaCIP consultation in 2015, WG have developed and agreed a scoring methodology for prioritising funding for schemes nationally targeting the most at risk communities. This has created one single programme of investment considering, on an annual basis, schemes from Local Authorities and NRW together.
Development of a national priority schedule for flood and coastal erosion risk management schemes.	2014	WG	Ongoing. As above	Complete - Commitment to use the Communities at Risk Register included within draft update of National FCERM Strategy.

Development of a business case for the establishment of a single capital funding programme for Wales	2014	WG	Ongoing. As above	Complete - Single programme of investment created, considering on an annual basis, schemes from Local Authorities and NRW together. New Business Case Guidance also published in 2018.
Sub-objective 11: Increase the use of alternative sources of funding for flood and coastal erosion risk management				
Development of a national policy on the use of contributions towards flood and coastal erosion risk management schemes, including the National Habitat creation Programme.	2014	WG	Ongoing, Funding gap review undertaken by Flood Risk Management Wales Committee for Welsh Government. Options have been identified and the Minister has asked for specific detail on partnership-funding.	On-going - revised measure included within draft update of National FCERM Strategy.



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