

# **Natural Resources Wales Flood Risk Management Plan:**

## **North West Wales Place**

# Contents

1. Introduction .....	3
2. North West Wales Place .....	5
3. Historic flooding in North West Wales.....	7
4. Present day flood risk in North West Wales .....	9
5. Future flood risk in North West Wales.....	15
6. Recent flood risk management activity .....	20
7. Flood risk management work we are planning in North West Wales .....	21
8. NRW Delivery Plan for North West Wales Place .....	24
9. Monitoring and review.....	30
10. Further information.....	30

# 1. Introduction

Natural Resources Wales (NRW) is the largest Welsh Government Sponsored Body, and we have as our core purpose the sustainable management of natural resources in Wales.

We have a range of roles and responsibilities, ranging from regulator to advisor, landowner and operator and emergency responder. We have a strategic oversight role for flood and coastal erosion risk management which involves the general supervision and communication of flood and coastal erosion risk management in Wales. We also have powers to manage flooding from main rivers, reservoirs and the sea.

In Wales, there are estimated to be 245,118 properties at risk of flooding from the sea, rivers and surface water. This is approximately 1 in 8 properties in Wales. We take a risk-based approach to managing the risk of flooding through the activities we do.

This Flood Risk Management Plan (FRMP) covers all of Wales and provides information on the scale of flood risk, as well as NRW's priorities for managing the risk of flooding, and measures that we propose to take, over the coming years. This FRMP covers flooding from rivers, reservoirs and the sea. It does not include flooding from surface water and smaller watercourses, for which Lead Local Flood Authorities (LLFAs) have powers and take the lead.

The FRMP is split into two sections. In the first section, you will find information, priorities and measures set at the National (Wales) level. This second section is split according to [NRW Operational areas](#), also known as NRW Places, where you will find more detailed information and measures at the local scale. It is intended that you may read the FRMP in its entirety so you are able to get the full understanding of what is planned across Wales, or you may wish to access the Place section relevant to where you live.

By being set out in this way, these plans intend to align with, and support the delivery of, the [Area Statements](#), which were developed in response to the [Natural Resources Policy](#). The North West Wales Area Statement identifies the Climate and Environment Emergency as a key theme and the [Marine Area Statement](#) which covers all the Welsh coast, identifies Nature-based solutions and adaptation at the coast as a key theme. The information and proposed actions within this FRMP are directly relevant to these challenges and set out our flood risk management ambitions to help address it.

This North West Wales Place section provides information about the level of risk at a local scale and describes what we have planned for the communities that we are most concerned about. In line with [Welsh Government's National Flood and Coastal Erosion Risk Management Strategy](#) Objectives, we prioritise our work and direct our efforts on a prioritised flood risk basis to communities at greatest risk of flooding. We do this using our Communities at Risk Register (CaRR) that considers a number of factors to identify the locations (communities) at greatest risk of flooding across the North West Wales area. The CaRR is used to inform, plan and prioritise our investment programme to target investment in the most at risk communities. It is not an absolute ranking of risk, it is an indicator of relative significance of risk from location to location. We use this in combination with other factors to allocate our programmes of flood risk management work.

The CaRR was used to inform the identification of Flood Risk Areas in the 2018 [Preliminary Flood Risk Assessment reports](#). The aim of the FRMP is to describe what actions we are taking in these Flood Risk Areas, along with other communities that we feel require action, either in response to recent flooding that has been experienced or by targeting those at

highest risk, using the CaRR. This FRMP is therefore fulfilling our requirements under section 25 of the Flood Risk Regulations (2009) but will also take into account recent fluvial and coastal flooding events and subsequent work arising from them.

The measures included within this plan are correct at the time of writing. We will undertake an annual review of progress against the delivery of measures and will amend any measures as is necessary to ensure that we continue to take a risk based approach to the management of flood risk.



North West Wales Place is predominantly rural in nature and dominated by agriculture and forestry. It has a varied and diverse landscape that includes the steep mountains of the Snowdonia National Park and an extensive coastline including the Llyn Peninsula and the Isle of Anglesey.

There are many important designated sites for conservation and biodiversity across North West Wales Place which are important at attracting tourists to the area for leisure or recreation such as the Snowdonia National Park and Llyn Area of Outstanding Natural Beauty (AONB).

The steep upper catchments of Snowdonia can receive up to 4000mm of rainfall each year. The impermeable geology and soils coupled with steep slopes and high rainfall totals mean that those rivers that begin in the mountains tend to have very steep, fast river channels before levelling out near to the coast which makes them very responsive to rainfall.

Major settlements include Bangor, Caernarfon, Colwyn Bay, Llandudno and Porthmadog.

The North West Wales Place has a coastline that runs from Aberdovey in the South to Rhyl in the North. The rugged coastline and beaches of the Llyn Peninsula and Isle of Anglesey attract many visitors each year. The North West Wales Place coastline is mostly covered by the 'West of Wales' Shoreline Management Plan, with a small section of coastline covered by the 'North Wales and North West England Shoreline Management Plan.

The larger rivers that can be found in North West Wales Place are the Conwy, Glaslyn and the Mawddach.

The River Conwy is approximately 55km long from its source in Migneint Moor to where its estuary discharges into the Irish Sea at the town of Conwy. The river drops steeply in the upper catchment before flattening out near the coast where the lower reaches are affected by the tide. The river flows from South to North and the surrounding lands are predominantly rural with only a small number of urban areas. Key communities are Colwyn Bay, Conwy, Llandudno, Llanrwst and Trefriw.

The River Glaslyn is approximately 26km long from its source on the side of Snowdon to where it meets the sea at the town of Porthmadog. In the upper reaches, the steep channel has greatly influenced the surrounding landscape in creating Glaslyn Gorge. In the lower reaches the wide flat valley created by the estuary of the Glaslyn is now sealed off by Porthmadog cob and reclaimed as important farmland. Key communities are Beddgelert and Porthmadog.

The River Mawddach is approximately 45km long from its source near Dduallt in Snowdonia to where its estuary discharges into the sea at Barmouth. The River Mawddach has many tributaries, many of which are a similar size to the Mawddach itself including the River Wnion. Key communities are Barmouth, Dolgellau and Fairbourne.

Other notable rivers in North West Wales Place are the Adda, Cadnant, Carrog, Cefni, Dwyfach, Dysynni, Gwyrfa, Heulyn, Ogwen, Rhyd-hir, Seiont,

The headwaters of the River Dee, including Llyn Tegid are located within the North West Wales Place before flowing into the neighbouring North East Wales Place.

### 3. Historic flooding in North West Wales

This section provides a summary of the significant flood events that have happened over the last 20 years in the North West Wales Place. In most cases, we class a flood event to be significant if 20 or more properties (residential or commercial) have been flooded. Other extreme weather events that have caused localised flooding have also occurred, which may not be captured within the events focussed on here.

A summary of each of the significant flood events experienced across North West Wales Place is provided below:

- In January 2005, 44 properties were affected by flooding in Llanrwst, Trefriw and Betws-y Coed. Roads were flooded and the Conwy valley railway line was damaged and closed.
- In March 2010 large waves overtopped defences in Llanfairfechan and caused flooding to approximately 20 basement properties.
- In June 2012, an intense summer rainfall event led to flooding in several communities after rivers overtopped their banks. This mostly affected the Dyfi and Leri catchment but specifically for North West area both. The villages of Pennal and Brynchrug were impacted with properties flooded and transport routes affected.
- On 22 November 2012, fluvial and pluvial flooding occurred in Llanberis, Tal y Bont, Deiniolen and Llanfair Talhaiarn. In Llanberis, 70 properties were flooded; in Tal y Bont, 20 residential properties were flooded; in Deiniolen, 29 properties were flooded and in Llanfair Talhaiarn, 21 properties were flooded.
- In December 2013, a combination of high tides, strong winds and large waves caused flooding along the Conwy coastline. Communities such as Deganwy and Llanddulas experienced property flooding.
- In January 2014, a combination of high tides, strong winds and large waves caused widespread flooding around the Welsh coast with 15 properties affected in Barmouth, Caernarfon 9 properties and Fairbourne, Y Felinheli and Pwllheli 1-2 properties affected within each community.
- On 26 December 2015, flooding occurred across Conwy and Gwynedd with Tal y Bont Gwynedd (20 properties flooded) and the river Conwy (33 caravans) particularly affected. This also caused widespread flooding from both the Gwyrfai and Seiont catchments to communities in Betws Garmon (Gwyrfai Terrace), Bontnewydd and Caernarfon.
- On 22 November 2017, flooding was experienced on Anglesey in Llangefnï, with 6 homes and 27 commercial properties flooded, and Dwyran, where 13 homes flooded.

- On 16 March 2019, Storm Gareth affected properties in Betws y Coed and Llanrwst where 40 properties were flooded
- On 27 April 2019, Storm Hannah brought heavy rain across the Welsh mountains. Capel Curig (Conwy) recorded a 2 day total for 26 to 27 April of 108.4mm, 71% of the April 1981-2010 long-term average, with most of this rain falling in a 22 hour period.
- Storm Ciara (8/9 February 2020) was the first of three named storms to affect Wales during February 2020, the wettest February now on record. North Wales was worst impacted by the storm with many river and rain gauges hitting record levels. 182 properties flooded across North West Wales Place with 172 flooded in Conwy and 10 in Gwynedd.
- In August 2020 Beddgelert, Snowdonia National Park, Gwynedd, was significantly affected by Storm Francis which was a deep Atlantic low pressure system which brought significant heavy rain and gusts of 70-70mph. The combination of extreme river levels and wind speeds led to fallen trees into the river and the Afon Colwyn inundating homes and business with 47 properties affected. Impacts were also experienced in Abergwyngregyn, Bethesda and Betws Garmon.
- Wet weather in late October 2021 resulted in high river levels and affected rural properties in Anglesey and Gwynedd. Properties reported flooding in City Dulas Betws Garmon, Pwllheli and Abererch.

## 4. Present day flood risk in North West Wales

Across the North West Wales Place, there are 13,533 properties at risk of flooding from the sea and 8,756 properties at risk of flooding from rivers. This equates to over 36,000 people at risk of flooding from the sea and nearly 23,000 people at risk of flooding from rivers.

### Flood risk descriptions

River flooding happens when a river cannot cope with the amount of water draining into it from the surrounding land. Sea or tidal flooding happens when there are high tides and stormy conditions. We describe the amount of risk to each property as the 'chance' of flooding. There are three risk categories:

- If something is described as being at '**high**' risk of flooding, this means that each year, there is a chance of flooding of greater than 1 in 30 (3.3%).
- If something is described as being at '**medium**' risk of flooding, this means that each year, there is a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%) for rivers or between 1 in 200 (0.5%) and 1 in 30 (3.3%) for flooding from the sea.
- If something is described as being at '**low**' risk of flooding, this means that each year, there is a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%) for rivers or between 1 in 1000 (0.1%) and 1 in 200 (0.5%) for flooding from the sea.

The following section provides the numbers that are at risk of flooding across the North West Wales Place. If you would prefer to view where is at risk of flooding in map form, we have a number of flood mapping products available on our website. These show visually where is at risk of flooding across Wales for each source. For the most up to date maps, please visit our website: [check your flood risk by postcode](#) and [check your flood risk on a map](#).

The numbers used throughout the following section have been split up into risk from rivers and from the sea. In reality, some properties can be susceptible to both flooding from rivers and the sea, but this can complicate explanations and data presentation, so river and sea flood risk are covered separately. Of course, some properties can be at risk of surface water flooding too, this is not included in this NRW FRMP, as Local Authorities lead on this type of flooding. To find out more about flooding from surface water and smaller streams, please contact the relevant Local Authority.

The properties at risk figures provided throughout this FRMP reflect our understanding of flood risk without flood defences. This is to portray a true scale of flood risk in Wales and to reflect that any flood defence can be overwhelmed in conditions that exceed what it was designed to accommodate.

## What is at risk in North West Wales Place today?

The following tables show the split of properties by level of risk and source across the North West Wales Place if there were no defences present.

Table 1: The numbers of residential properties, non-residential properties and services at risk of flooding from the sea in North West Wales Place.

Flood risk description	Residential properties at risk of flooding	Non-Residential properties at risk of flooding	Key Services* at risk of flooding	Total at risk of flooding
<b>Sea High</b>	7,452	676	184	8,312
<b>Sea Medium</b>	3,351	600	131	4,082
<b>Sea Low</b>	940	174	25	1,139
<b>Sea Total</b>	11,743	1,450	340	13,533

Table 2: The numbers of residential properties, non-residential properties and services at risk from river flooding in North West Wales Place.

Flood risk description	Residential properties at risk of flooding	Non-Residential properties at risk of flooding	Key Services* at risk of flooding	Total at risk of flooding
<b>Rivers High</b>	1,467	239	79	1,785
<b>Rivers Medium</b>	1,953	115	39	2,107
<b>Rivers Low</b>	4,251	477	136	4,864
<b>Rivers Total</b>	7,671	831	254	8,756

\* Key Services include property types related to education, health services, transport, utilities and emergency services.

The network of sea flood defences across the North West Wales Place help to reduce the risk to nearly 8,000 properties (residential and non-residential) in the 1 in 30 year scenario (3.3% annual exceedance probability) and over 11,000 properties in the 1 in 200 year scenario (2% annual exceedance probability). Further to this, the network of river flood defences help to reduce the risk to over 400 properties (residential and non-residential) in the 1 in 30 year scenario (3.3% annual exceedance probability) and over 700 properties in the 1 in 100 year scenario (1% annual exceedance probability). These properties are not removed from risk entirely by flood defences because flood defences do not completely stop the chance of flooding as they can be overtopped or fail, but the risk is significantly reduced.

## Transport infrastructure

Throughout the North West Wales Place, there is 62km of rail track and 433km of road (major and minor) at risk of flooding from the sea. This means that there is for over 33% of all rail track across Wales at risk of flooding from the sea in the North West Wales Place. In addition, there is 26km of rail track and 396km of road at risk of flooding from rivers.

## Agricultural land

There is just under 400km<sup>2</sup> of agricultural land that is at risk of flooding from the sea across Wales. In North West Wales Place, there is 134km<sup>2</sup> at risk of flooding from the sea which is 34% of the overall Wales total.

In addition, Wales has over 800km<sup>2</sup> of agricultural land that is at risk of river flooding. 20% of the overall total of agricultural land that is at risk of flooding from rivers is in the North West Wales Place.

## Environment

There are a number of protected sites at risk of flooding across the North West Wales Place. Table 3 below provides information on the scale of sites at risk in Wales, as well as the relevant the proportion of risk present in North West Wales.

Table 3: The numbers of National important designated sites that are at risk of flooding from rivers and the sea in North West Wales Place.

<b>Designation</b>	<b>Sea flooding – total area at risk in Wales (km<sup>2</sup>)</b>	<b>Sea flooding – total area at risk in NW (km<sup>2</sup>)</b>	<b>Sea flooding - % of Wales total at risk in NW</b>	<b>River flooding – total area at risk in Wales (km<sup>2</sup>)</b>	<b>River flooding – total area at risk in NW (km<sup>2</sup>)</b>	<b>River flooding - % of Wales total at risk in NW</b>
<b>RAMSAR</b>	204	4	2	23	6	26
<b>Special Areas of Conservation (SACs)</b>	385	76	20	113	29	26
<b>Special Protection Areas (SPAs)</b>	240	38	16	21	5	24
<b>Sites of Special Scientific Interest (SSSI)</b>	513	121	24	180	59	33
<b>Scheduled Ancient Monuments (SAMs)</b>	1	0.6	50	1	0.2	16

## Communities at most risk in North West Wales

Through the Preliminary Flood Risk Assessment stage associated with this FRMP communities were identified as “Flood Risk Areas”. The assessment undertaken to identify Flood Risk Areas across Wales was done using the undefended status of communities to create a platform for comparison. For North West Wales, all of the communities identified as Flood Risk Areas are at risk of flooding from the sea. It is important that work is undertaken to sustain the existing protection that community’s benefit from, as well as continuing to try to identify options to reduce flood risk further in at risk areas.

The North West Wales Place Flood Risk Areas are:

- Abergele – flood risk from the sea
- Fairbourne – flood risk from the sea
- Kinmel Bay – flood risk from the sea
- Porthmadog – flood risk from the sea
- Pwllheli – flood risk from the sea
- Towyn – flood risk from the sea

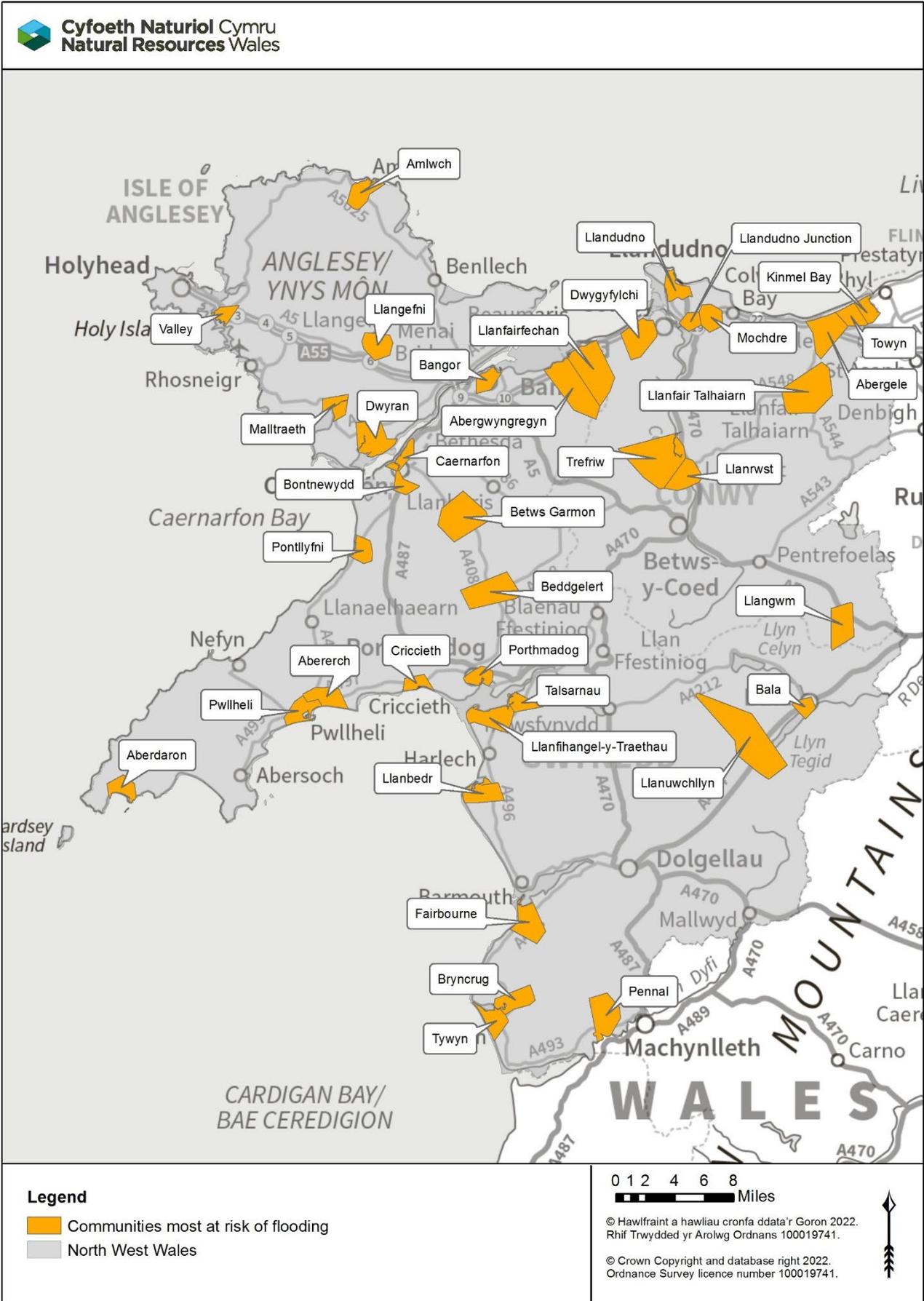
Further to this NRW has considered additional areas at risk of flooding from rivers and the sea. Figure 2 and accompanying Table 4 show the communities across North West Wales that are at risk of flooding from rivers and the sea as identified by the CaRR and where we are planning to take action to manage the risk of flooding. Other communities within Mid Wales are also at risk from flooding but those listed below are the communities where actions are planned in the coming years to help manage and reduce the risk of flooding.

Table 4: The name of each of the communities highlighted in figure 2. The Flood Risk Area communities for flooding from rivers and the sea are highlighted in bold.

<b>Community name</b>	<b>Local Authority Area</b>
Aberdaron	Gwynedd
Abererch	Gwynedd
<b>Abergele</b>	Conwy
Abergwyngregyn	Gwynedd
Amlwch	Isle of Anglesey
Bala	Gwynedd
Bangor	Gwynedd
Beddgelert	Gwynedd
Betws Garmon	Gwynedd
Bontnewydd	Gwynedd
Bryncrug	Gwynedd
Caernarfon	Gwynedd
Criccieth	Gwynedd
Dwygyfylchi	Conwy
Dwyran	Isle of Anglesey
<b>Fairbourne</b>	Gwynedd
<b>Kinmel Bay</b>	Conwy
Llanbedr	Gwynedd

<b>Community name</b>	<b>Local Authority Area</b>
Llandudno	Conwy
Llandudno Junction	Conwy
Llanfair talhaiarn	Conwy
Llanfairfechan	Conwy
Llanfihangel - y - Traethau	Gwynedd
Llangefni	Isle of Anglesey
Llangwm	Conwy
Llanrwst	Conwy
Llanuwchllyn	Gwynedd
Malltraeth	Isle of Anglesey
Mochdre	Conwy
Pennal	Gwynedd
Pontllyfni	Gwynedd
<b>Porthmadog</b>	Gwynedd
<b>Pwllheli</b>	Gwynedd
Talsarnau	Gwynedd
<b>Towyn</b>	Conwy
Trefriw	Conwy
Tywyn	Gwynedd
Valley/Dyffryn	Isle of Anglesey

Figure 2: The communities across the North West Wales Place that are most at risk of flooding from rivers and the sea as identified by the CaRR.



## 5. Future flood risk in North West Wales

Across North West Wales, there are predicted to be nearly 18,000 properties at risk of flooding from the sea and over 11,000 properties at risk of flooding from rivers by 2120. This is an increase of nearly 4,500 properties at risk of flooding from the sea and an increase of over 2,000 properties at risk of flooding from rivers.

This equates to an estimate of over 47,000 people at risk of flooding from the sea and nearly 29,000 people at risk of flooding from rivers by 2120. This is an additional 11,000 people at risk from flooding from the sea and an additional 6,000 people at risk from flooding from rivers from 2020.

Climate projections indicate that we will see an increase in the frequency and intensity of extreme weather events, including storm events in the Summer and prolonged wet periods during the Winter period. This will increase peak flows in our rivers, which is expected to increase the risk of flash flooding events. Such flooding is very difficult to forecast and predict and can be very challenging to manage.

Climate projections also indicate that sea level rise will occur for all emission scenarios and at all locations around the UK. Coastal areas will be increasingly vulnerable to increased wave action and accelerated coastal erosion associated with climate change. These impacts will affect not only coastal communities who live and work in coastal areas, but some of Wales' most important natural habitats and heritage sites which are located along our coastline.

We have followed the Welsh Government [Adapting to Climate Change Guidance](#) to base our climate change modelling outputs that have enabled us to include our projections in this FRMP. We have used the central climate change estimate to produce the data outputs used in the following section.

### What will be at risk of flooding in North West Wales Place by 2120?

The following tables show the level of risk and source across the North West Wales Place if there were no defences present for 2020 and 2120.

#### Flooding from the sea

Table 5: The numbers at risk of flooding from the sea for 2020, 2120 and the projected difference in North West Wales Place.

People, economy or environment	Aspect	Units	2020 risk	2120 risk	Difference (Units)	Difference (%)
People	People	Count	36,152	47,448	+11,296	+31%
People	Residential properties	Count	11,743	15,328	+3,585	+31%
Economy	Non-residential properties	Count	1,790	2,584	+794	+44%
Economy	Key services	Count	340	547	+207	+61%

People, economy or environment	Aspect	Units	2020 risk	2120 risk	Difference (Units)	Difference (%)
Economy	Railway	Km	62	91	+29	+47%
Economy	Road	Km	433	606	+173	+40%
Economy	Agriculture	Km <sup>2</sup>	134	157	+23	+17%
Environment	RAMSAR	Km <sup>2</sup>	4	4	0	-
Environment	Special Areas of Conservation (SACs)	Km <sup>2</sup>	76	80	+4	+5%
Environment	Special Protection Areas (SPAs)	Km <sup>2</sup>	38	38	0	-
Environment	Sites of Special Scientific Interest (SSSI)	Km <sup>2</sup>	121	126	+5	+4%
Environment	Scheduled Ancient Monuments (SAMs)	Km <sup>2</sup>	0.6	0.7	+0.1	+17%

## Flooding from rivers

Table 6: The numbers at risk of flooding from rivers for 2020, 2120 and the projected difference in North West Wales Place.

People, economy or environment	Aspect	Units	2020 risk	2120 risk	Difference (Units)	Difference (%)
People	People	Count	22,904	28,986	+6,082	+27%
People	Residential properties	Count	7,671	9,640	+1,969	+26%
Economy	Non-residential properties	Count	1,085	1,400	+315	+29%
Economy	Key services	Count	254	318	+64	+25%
Economy	Railway	Km	26	37	+11	+42%
Economy	Road	Km	396	485	+89	+22%
Economy	Agriculture	Km <sup>2</sup>	163	179	+16	+10%
Environment	RAMSAR	Km <sup>2</sup>	6	6	0	-
Environment	Special Areas of Conservation (SACs)	Km <sup>2</sup>	29	32	+3	+10%
Environment	Special Protection Areas (SPAs)	Km <sup>2</sup>	5	6	+1	+20%

People, economy or environment	Aspect	Units	2020 risk	2120 risk	Difference (Units)	Difference (%)
Environment	Sites of Special Scientific Interest (SSSI)	Km <sup>2</sup>	59	64	+5	+8%
Environment	Scheduled Ancient Monuments (SAMs)	Km <sup>2</sup>	0.2	0.3	+0.1	+50%

## Communities at most risk of future flooding in North West Wales

The lists below and the following map shows the communities across the North West Wales Place that are projected to experience the biggest change in danger (as defined within our Community at Risk Register) presented from the risk of flooding from rivers and the sea in 2120. Other communities within the North West Wales Place are also predicted to see a change in danger by 2120 but those listed below are predicted to see the greatest change.

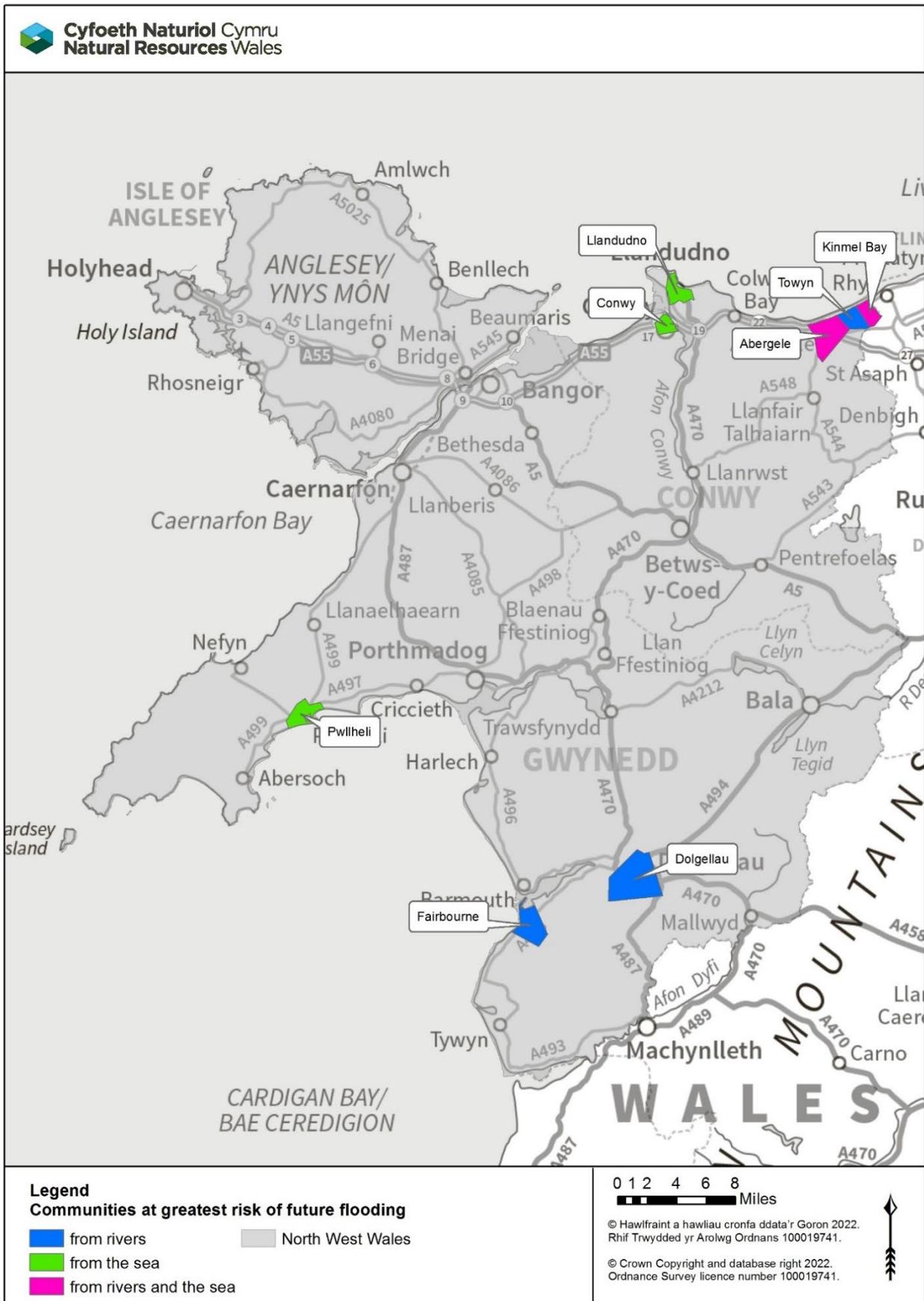
By 2120, the five communities in North West Wales Place that are projected to experience the biggest change in danger from the risk of flooding from the sea are:

- Abergele
- Conwy
- Kinmel Bay
- Llandudno
- Pwllheli

By 2120, the five communities in North West Wales Place that are projected to experience the biggest change in danger from the risk of flooding from rivers are:

- Abergele
- Dolgellau
- Fairbourne
- Kinmel Bay
- Towyn

Figure 3: The communities across North West Wales Place where there is predicted to be the biggest change in danger by 2120. The map shows the top five communities for risk from river and the top five for risk from the sea.



## What we are doing for communities at future risk of flooding

Within our activities and measures set out within this FRMP, we will take account of the need to consider flood risk over the long term, the need to consider the impact climate change will have on Wales and the need to take action now to consider how to both mitigate and adapt within the context of the Climate Emergency. We will do this by seeking to better understand the impacts of climate change through our data and evidence, and use this to inform the advice we provide to others and the work that we undertake.

When we consider, design and construct new flood alleviation schemes we build in allowances to future proof our structures in respect to projections for future climate change. However, we recognise that it will not be possible to prevent flooding in every location both now and in the future through traditional FRM activities, so we are also initiating long term adaptation planning in a number of locations, these are included as Local Measures within the Place based sections of this FRMP.

Welsh Government Planning Policy TAN15 requires new development to take account of climate change over the development lifetime. This helps ensure some resilience to our changing climate is factored into development proposals and can also help with recovery should a flood event occur.

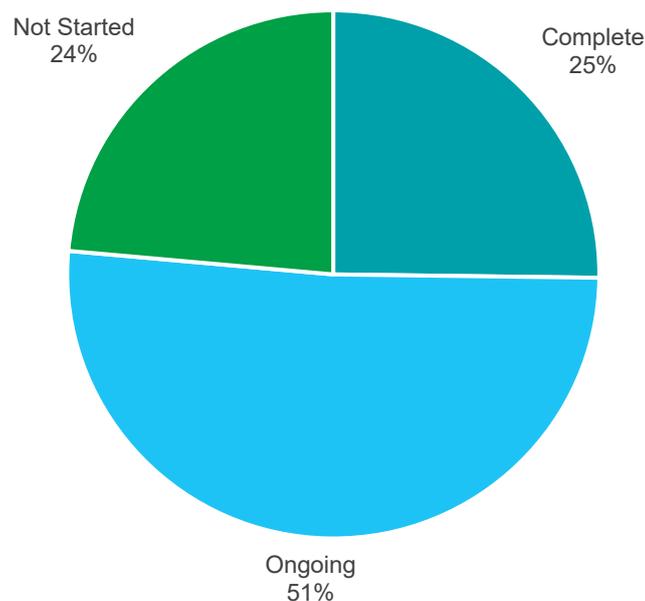
To support both strategic planning decisions and individual planning applications, we have developed a new [Flood Map for Planning \(FMfP\)](#). The FMfP shows how climate change will affect flood risk extents over the next 100 years. It shows the potential extent of flooding assuming no defences are in place. A central estimate of climate change (ranging from 20-30% increase in flows) was used for peak river flows and 1.1m of sea level rise was applied along the Welsh coastline. Although not yet formal planning policy, we use the FMfP as the best available information to inform our planning advice in our role as a statutory consultee.

In terms of working to influence policy, we work closely across the Welsh Government to support development of policy and strategies. Climate change is at the forefront of these discussions including exploring how we can improve understanding and communication of flood risk. We have also recently commissioned work, looking at revised climate change allowances for peak river flows and rainfall events. We will be using the outputs of this project to recommend updates to the Welsh Government's guidance on climate change allowances.

## 6. Recent flood risk management activity

We published our first cycle Flood Risk Management Plans in early 2016. These plans contained a number of community scale measures for the following years that would help to manage and reduce the risk of flooding. We have undertaken a review of the measures for communities within the North West Wales Place. The below chart shows a summary of our delivery of these measures.

Figure 4: The progress made against the NRW measures set out in the first cycle FRMPs in North West Wales.



Key delivery highlights include:

- We have undertaken the first phase of flood risk management improvement work in Llanfair Talhaiarn to increase the protection from flooding to 29 houses and 4 businesses. We have also undertaken appraisal work for the delivery of a potential flood risk management scheme in Llangefni.
- We have commenced work to consider the long term strategy for managing flood risk in a number of coastal communities, including Fairbourne, Porthmadog and Pwllheli.
- We have delivered maintenance schemes such as at Abererch, Bontnewydd, Draenogau and Fairbourne, which have maintained our defences and provided a sustained level of protection to those properties that benefit.
- We have commenced work at Llyn Tegid to manage reservoir safety, flood risk and ensure continuity of service for water resources into the future.

It should be recognised that many of the actions identified in the first cycle FRMPs take considerable time and effort to deliver and whilst the relative number of completed measures is low, a significant numbers of the identified measures are in delivery. Also, our work plans and the capacity to deliver them are highly influenced by actual flood events occurring; the floods of February 2020 in Wales for example have had a significant impact on our ability to take forward planned work.

# 7. Flood risk management work we are planning in North West Wales

## Introduction

There are a number of communities within the North West Wales place where we consider there is still more to be done to manage and reduce the risk of flooding. These communities and associated measures are detailed within this section. The National Section of this FRMP sets out how we prioritise our work on a risk basis so that those communities that are most at risk of flooding are addressed first.

We undertake flood risk management at a range of different scales dependant on what will achieve the desired result. This Flood Risk Management Plan provides information at two scales. At a Wales-wide, National scale through our National Measures (the activities we undertake across Wales, some of which makes our actions at the local scale possible), and at the local community scale. The National Measures can be found in the National section. The local community scale measures can be found in this section.

## Measure terminology

### Measure type

There are four types of measures and local measures are categorised according to measure type.

**Prevention** of the damage caused by flooding, this includes attempts to make catchments more resilient, and efforts to prevent areas becoming more susceptible, to flood risk.

**Protection** against flooding in specific locations by provision of schemes and approaches to reduce the risk and likelihood against flooding.

**Preparedness** of communities and emergency responders to act in the event that flooding should occur, which can reduce the impacts of flooding and make communities more resilient.

**Review** to make improvements in our understanding of flood risk to better inform and consider potential future action.

All of the above types of measures seek to reduce the likelihood of flooding or the impacts it has on people and properties, it should be highlighted however that flood risk can only be managed to a certain extent. We cannot remove flood risk entirely and there will always be potential for flood events to exceed the limits of the risk management techniques being used. For example flood defences will be built within technical, economic and environmental constraints, therefore in extreme events flood water can exceed the capacity that they were designed to contain.

In each location where we intend to undertake either initial or detailed assessment of potential options, in line with [Welsh Government's FCERM Appraisal Guidance](#), we will consider all potential options for managing flood risk. That will include local and catchment based options, and will consider the long term impacts that climate change will have on the

communities at risk, therefore, to consider the most sustainable approach in each location, adaptive options will also be included within our assessments.

## Measure implementation status

**Not started:** work has not yet begun.

**Ongoing:** work has begun.

## Measure timescale

The timescales proposed are a factor of relative priority and the likely complexity of what might be required; they are also subject to funding and capacity.

**Short Term:** Planned to be delivered in the short term (years 1 - 2)

**Medium Term:** Planned to be delivered in the medium term (years 3 - 4)

**Long Term:** Planned to be delivered in the long term (years 5 +)

## Priorities

**Priority 1:** Respond to the climate and nature emergencies by seeking innovative practices, promoting adaptation and preparing for future change.

**Priority 2:** Develop and deliver catchment approaches to reduce flooding and contribute to ecosystem resilience, working with partners and stakeholders where possible and appropriate.

**Priority 3:** Improve community resilience to current and future flood risk. Work with partners to support communities to become more aware and take action to mitigate their own flood risk.

**Priority 4:** Seek and take opportunities for enhancement to the health and wellbeing of communities, biodiversity and the environment, and the wider benefits they provide, to support NRW's response to the Nature Emergency.

**Priority 5:** Increase resilience of flood risk management assets, to reduce the impacts of current and future flood risk.

**Priority 6:** Improve effectiveness of our key products and services, including our digital services, to provide improved services to the public.

**Priority 7:** Continuously improve our understanding and communication of current and future flood risk (including climate change) so that decisions are based upon the best available evidence and information.

**Priority 8:** Provide an effective and sustained response to flood events, working in collaboration with Risk Management Authorities and Professional Partners where required.

**Priority 9:** Continually improve our flood warning service to enable people to take effective action in response to flooding.

**Priority 10:** Provide effective planning advice on flood risks and consequences to reduce inappropriate development in areas at risk of flooding.

**Priority 11:** Prioritise our work on a risk basis in alignment with Welsh Government's National FCERM Strategy and develop our evidence base to secure future investment in flood risk management.

**Priority 12:** Promote, support and implement nature-based solutions where appropriate to reduce the risk and impacts of flooding and to deliver wider ecosystem benefits.

**Priority 13:** Undertake our strategic oversight role to understand all sources of flood risk on a national basis to inform investment and optimise how we plan work including with other partners.

**Priority 14:** Ensure we have an FCERM workforce with the appropriate capabilities and skills required to meet our priorities and respond to future challenges.

## 8. NRW Delivery Plan for North West Wales Place

The following delivery plan sets out on a community basis, the measures that we are in the process of undertaking or plan to undertake to help manage the risk of flooding to that community. This provides a list of measures we intend to undertake within the North West Wales Place over the coming years, subject to assessment and funding justification.

Table 7: The delivery plan of planned flood risk measures for North West Wales Place.

Ref.	Location	Source	Measure name	Measure type	Link to FRMP Priority	Timescale	Status
NW1	Aberdaron	River/Sea	Undertake initial assessment and feasibility work for reducing flood risk	Protection	1	Long Term	Not started
NW2	Aberdaron	River/Sea	Maintain existing defences and inspection regime	Protection	5	Short Term	Ongoing
NW3	Abererch	Sea	Develop scheme appraisal for flood alleviation scheme	Protection	1	Short Term	Ongoing
NW4	Abererch	River	Develop scheme appraisal for flood alleviation scheme	Protection	1	Medium Term	Ongoing
NW5	Abererch	River/Sea	Maintain existing defences and inspection regime	Protection	5	Short Term	Ongoing
NW6	Abergele	River	Design and construction of flood risk asset improvements	Protection	1	Long Term	Ongoing
NW7	Abergele	River	Design and construction of flood risk asset improvements	Protection	1	Medium Term	Not started
NW8	Abergwyngregyn	Sea	Consider future management options and undertake coastal adaptation planning	Review	1	Long Term	Not started
NW9	Abergwyngregyn	River	Build hydraulic model	Review	7	Short Term	Ongoing
NW10	Amlwch	River	Undertake initial assessment and feasibility work for reducing flood risk	Protection	1	Medium Term	Not started

<b>Ref.</b>	<b>Location</b>	<b>Source</b>	<b>Measure name</b>	<b>Measure type</b>	<b>Link to FRMP Priority</b>	<b>Timescale</b>	<b>Status</b>
NW11	Bala	River	Improve existing flood warning service	Preparedness	9	Medium Term	Ongoing
NW12	Bala	River	Update existing hydraulic model	Review	7	Short Term	Ongoing
NW13	Bala	River	Design and construction of flood risk asset improvements	Protection	1	Short Term	Not started
NW14	Bala	River	Maintain existing defences and inspection regime	Protection	5	Short Term	Ongoing
NW15	Bangor	River	Update existing hydraulic model	Review	7	Short Term	Ongoing
NW16	Beddgelert	River	Undertake initial assessment and feasibility work for reducing flood risk	Protection	1	Short Term	Not started
NW17	Beddgelert	River	Improve existing flood warning service	Preparedness	9	Short Term	Not started
NW18	Betws Garmon - Gwyfrai Terrace	River	Undertake initial assessment and feasibility work for reducing flood risk	Protection	1	Short Term	Ongoing
NW19	Bontnewydd	River	Design and construction of flood risk asset improvements	Protection	1	Short Term	Ongoing
NW20	Bryncrug	River	Undertake initial assessment and feasibility work for reducing flood risk	Protection	1	Medium Term	Not started
NW21	Bryncrug	River	Maintain existing defences and inspection regime	Protection	5	Short Term	Ongoing
NW22	Caernarfon (Seiont Mill)	River	Undertake initial assessment and feasibility work for reducing flood risk	Protection	1	Short Term	Ongoing
NW23	Clwyd	Sea	Development of the recommendations from the Clwyd strategy	Preparedness/ Protection/Review	1, 2	Medium Term	Ongoing
NW24	Clwyd	River/Sea	Maintain existing defences and inspection regime	Protection	5	Medium Term	Not started
NW25	Clwyd - Ffynnon y Ddol	River	Undertake initial assessment and feasibility work for reducing flood risk	Protection	1	Short Term	Not started

<b>Ref.</b>	<b>Location</b>	<b>Source</b>	<b>Measure name</b>	<b>Measure type</b>	<b>Link to FRMP Priority</b>	<b>Timescale</b>	<b>Status</b>
NW26	Clwyd - Old Foryd Road	Sea	Design and construction of flood risk asset improvements	Protection	1	Medium Term	Not started
NW27	Conwy	River	Work with other RMAs where we have a joint interest, to plan and undertake activities that reduce the risk of flooding to communities	Prevention/Protection/Preparedness/Review	1, 2, 13	Medium Term	Not started
NW28	Conwy	River/Sea	Maintain existing defences and inspection regime	Protection	5	Short Term	Ongoing
NW29	Criccieth	River	Undertake initial assessment and feasibility work for reducing flood risk	Protection	1	Long Term	Not started
NW30	Dinas Dinlle	Sea	Consider future management options and undertake coastal adaptation planning	Review	1	Medium Term	Ongoing
NW31	Dwygyfylchi	River	Build hydraulic model	Review	7	Long Term	Not started
NW32	Dwyran	River	Undertake initial assessment and feasibility work for reducing flood risk	Protection	1	Short Term	Ongoing
NW33	Dwyran - Braint	River	Improve existing flood warning service	Preparedness	9	Short Term	Not started
NW34	Dysynni	Sea	Consider future management options and undertake coastal adaptation planning	Review	1	Medium Term	Ongoing
NW35	Eryri Meirionnydd	River/Sea	Design and construction of flood risk asset improvements	Protection	1	Medium Term	Ongoing
NW36	Fairbourne	Sea	Undertake initial assessment and feasibility work for reducing flood risk	Protection	1	Short Term	Ongoing
NW37	Gwehelog - Mochras	River	Undertake initial assessment and feasibility work for reducing flood risk	Protection	1	Long Term	Not started
NW38	Harlech	Tidal/	Undertake initial assessment and feasibility work for reducing flood risk	Protection	1	Short Term	Not started
NW39	Kinmel Bay	Sea	Undertake initial assessment and feasibility work for reducing flood risk	Protection	1	Short Term	Ongoing

<b>Ref.</b>	<b>Location</b>	<b>Source</b>	<b>Measure name</b>	<b>Measure type</b>	<b>Link to FRMP Priority</b>	<b>Timescale</b>	<b>Status</b>
NW40	Kinmel Bay	River	Undertake initial assessment and feasibility work for reducing flood risk	Protection	1	Medium Term	Not started
NW41	Llanbedr	Tidal	Undertake initial assessment and feasibility work for reducing flood risk	Protection	1	Medium Term	Not started
NW42	Llandudno	Sea	Update existing hydraulic model	Review	7	Medium Term	Ongoing
NW43	Llanfair Talhaiarn	River	Design and construction of flood risk asset improvements	Protection	1	Short Term	Ongoing
NW44	Llanfair Talhaiarn - Elwy	River	Design and construction of flood risk asset improvements	Protection	1	Short Term	Ongoing
NW45	Llanfair Talhaiarn - Nant Barrog	River	Design and construction of flood alleviation scheme	Protection	1	Short Term	Ongoing
NW46	Llanfair Talhaiarn - Nant Barrog	River	Consider and integrate nature-based solutions including natural flood management in NRW flood risk schemes and activities	Prevention	1, 2, 4, 12	Short Term	Ongoing
NW47	Llanfair Talhaiarn	River	Improve existing flood warning service	Preparedness	9	Short Term	Ongoing
NW48	Llanfairfechan	River	Update existing hydraulic model	Review	7	Medium Term	Not started
NW49	Llanfihangel - y - Traethau -Ty Gwyn Tidal Door	Sea	Design and construction of flood risk asset improvements	Protection	1	Medium Term	Not started
NW50	Llangefni	River	Develop scheme appraisal for flood alleviation scheme	Protection	1	Short Term	Ongoing
NW51	Llanuwchllyn	River	Improve existing flood warning service	Preparedness	9	Medium Term	Not started
NW52	Llanuwchllyn	River	Update existing hydraulic model	Review	7	Short Term	Not started
NW53	Llyn Tegid	River	Design and construction of flood alleviation scheme	Protection	1	Short Term	Ongoing
NW54	Malltraeth	Sea	Design and construction of flood risk asset improvements	Protection	1	Medium Term	Ongoing

<b>Ref.</b>	<b>Location</b>	<b>Source</b>	<b>Measure name</b>	<b>Measure type</b>	<b>Link to FRMP Priority</b>	<b>Timescale</b>	<b>Status</b>
NW55	Mochdre	River	Update existing hydraulic model	Review	7	Long Term	Not started
NW56	North Wales Coast - Pensarn to Red Wharf Bay	Sea	Build hydraulic model	Review	7	Medium Term	Not started
NW57	North Wales Coast - Ynys Mon	Sea	Build hydraulic model	Review	7	Long Term	Not started
NW58	Pennal	River	Undertake initial assessment and feasibility work for reducing flood risk	Protection	1	Medium Term	Not started
NW59	Pontllyfni	Sea	Consider future management options and undertake coastal adaptation planning	Review	1	Long Term	Not started
NW60	Porthmadog	Sea/River	Improve existing flood warning service	Preparedness	9	Short Term	Not started
NW61	Porthmadog	Sea/River	Develop scheme appraisal for flood alleviation scheme	Protection	1	Short Term	Ongoing
NW62	Pwllheli	River/Sea	Update existing hydraulic model	Review	7	Short Term	Ongoing
NW63	Pwllheli	River/Sea	Develop scheme appraisal for flood alleviation scheme	Protection	1	Short Term	Ongoing
NW64	Talsarnau	Sea	Consider future management options and undertake coastal adaptation planning	Review	1	Long Term	Not started
NW65	Tan Lan	Sea	Consider future management options and undertake coastal adaptation planning	Review	1	Short Term	Ongoing
NW66	Towyn	Sea	Maintain existing defences and inspection regime	Protection	5	Long Term	Ongoing
NW67	Trefriw - Crafnant Loop	River	Design and construction of flood risk asset improvements	Protection	1	Short Term	Ongoing
NW68	Trefriw - Princess Street	River/Sea	Undertake initial assessment and feasibility work for reducing flood risk	Protection	1	Long Term	Not started
NW69	Tywyn	River	Undertake initial assessment and feasibility work for reducing flood risk	Protection	1	Long Term	Ongoing

<b>Ref.</b>	<b>Location</b>	<b>Source</b>	<b>Measure name</b>	<b>Measure type</b>	<b>Link to FRMP Priority</b>	<b>Timescale</b>	<b>Status</b>
NW70	Tywyn	River	Improve existing flood warning service	Preparedness	9	Long Term	Not started
NW71	Valley/ Dyffryn	River/Sea	Update existing hydraulic model	Review	7	Long Term	Not started
NW72	Ynys Mon	River	Work with other RMAs where we have a joint interest, to plan and undertake activities that reduce the risk of flooding to communities	Prevention/Protection/Preparedness/Review	1, 2, 13	Medium Term	Ongoing
NW73	Ynys Mon	River/Sea	Maintain existing defences and inspection regime	Protection	5	Short Term	Ongoing
NW74	North West Wales Place	River/Sea	Work with RMAs where we have a joint interest, to plan and undertake activities that reduce the risk of flooding to communities	Prevention/Protection/Preparedness/Review	1, 2, 13	Short Term	Ongoing

## 9. Monitoring and review

It has been a requirement of the Flood Risk Regulations for published Flood Risk Management Plans to be reviewed, and if necessary updated, every 6 years. The Retained EU Law (Revocation and Reform) Act 2023 will revoke this legislation by the end of 2023. We intend to continue planning our work in this way and will review the measures within the Flood Risk Management Plan on an annual basis. This is likely to occur during summertime so there is up to date information to inform our business planning processes. The progress of delivery of each measure will be assessed and if necessary updated at this point and we will produce updates on our progress as required.

## 10. Further information

This North West Wales Place section is one of six sections that provide detailed local information as part of NRW's Flood Risk Management Plan for Wales. There is also a National overview section that provides information, priorities and measures set at the National (Wales) level.

If you would like to find out further information about how we manage flood risk across Wales, you can access any of the following:

Flood Risk Management Plan for Wales: National overview

Flood Risk Management Plan for Wales: South Central Wales Place

Flood Risk Management Plan for Wales: South East Wales Place

Flood Risk Management Plan for Wales: South West Wales Place

Flood Risk Management Plan for Wales: Mid Wales Place

Flood Risk Management Plan for Wales: North East Wales Place