Cyngor Gwynedd

Local Flood Risk Management Strategy DRAFT Appendices

Document Control Sheet

Document Title:	Local Flood Risk Management Strategy - Appendicies
Document Author(s):	Various
Project Ref / Title:	
Project Manager:	

Revision History

Date	Version No.	Summary of Changes
09/02/2024	0.01	For public consultation
22/05/2024	0.02	Reviewed following public consultation

Reviews

Name	Title	Date	Version

Approvals

Name	Title	Date	Version

ISO9001:2015
FS526386

ISO14001:2015
EMS 526388

ISO45001
OHS 526389

Appendix A	**Inland Flood Risk by Area (with summary table)**
Appendix B	**Coastal Risk by Area (with summary table)**

Appendix A Inland Flood Risk by Area (with summary table)

Inland flood risk by area

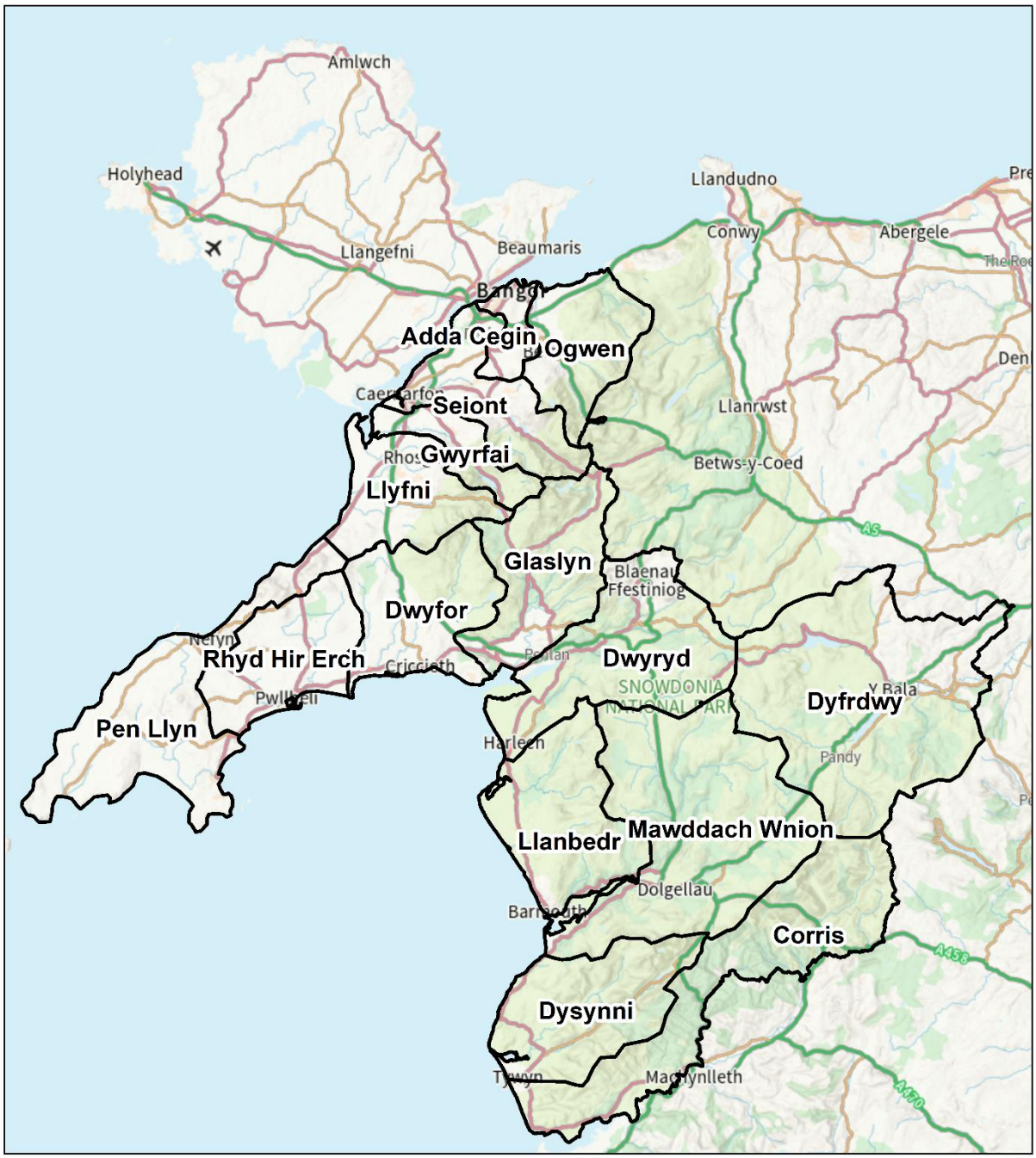
The following section describes inland flood risk in greater detail by considering each hydrological catchment in its turn. The nature and setting of each catchment is described along with a description of the spatial distribution of flood risk zones, and how this corresponds with location of defences and records of historic flooding. Figure A1 below shows the location and extent of all catchments described.

For a more detailed view of flood risk distribution within an area of interest the reader is referred to the Flood Risk Assessment Wales maps on NRW's webpage[1].

Table A2 summarises the level of flood risk within each catchment in its turn and also lists flood risk management schemes and/or studies which are ongoing at present to address risks within each catchment.

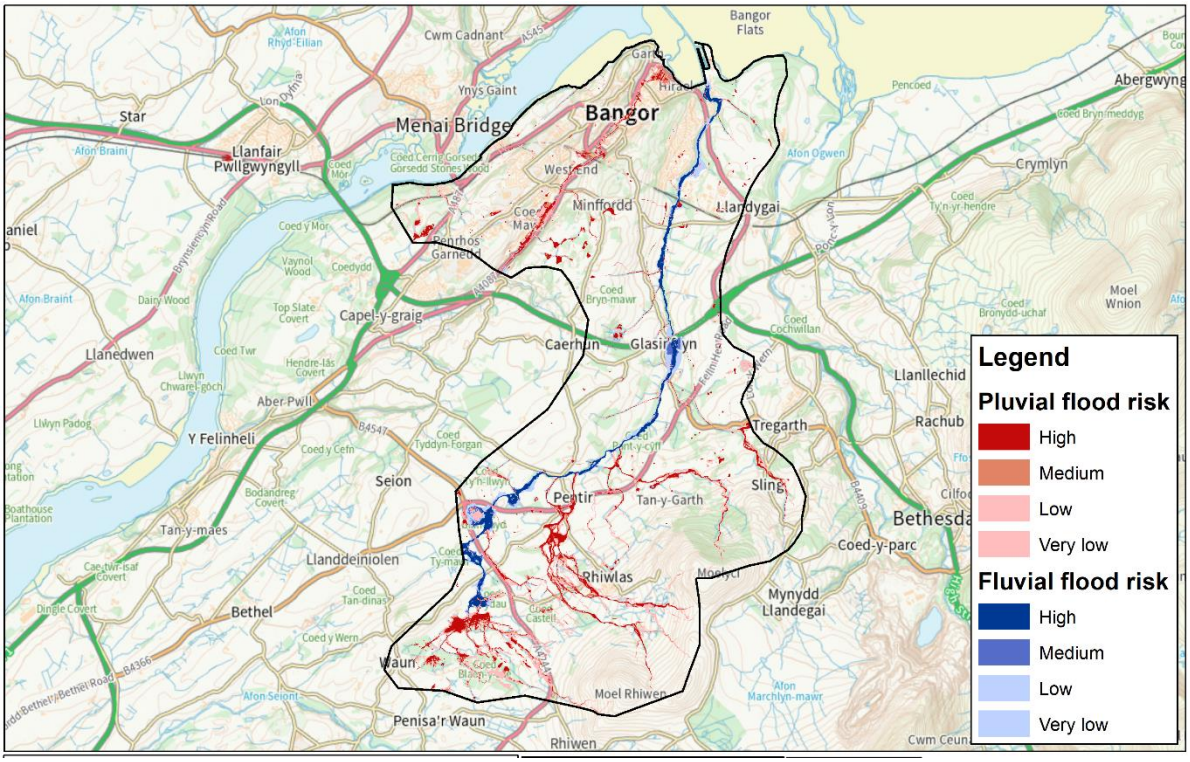
[1] https://naturalresources.wales/flooding/check-your-flood-risk-on-a-map-flood-risk-assessment-wales-map/?lang=en

Figure A1: Hydrological catchments in Gwynedd



Catchment 1: Adda-Cegin

Figure A2: Outline of the Adda-Cegin Catchment and areas of flood risk



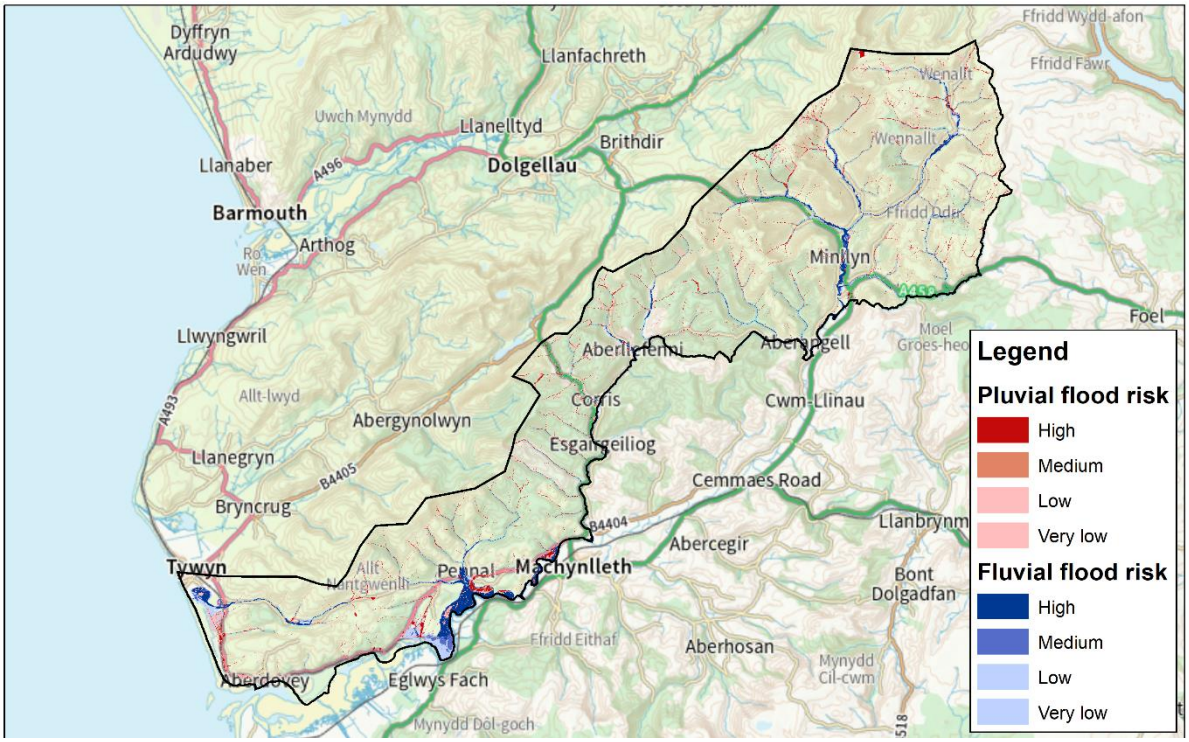
The Adda-Cegin catchment includes the communities of Bangor, Minffordd, Glasinfryn, Pentir, Rhiwlas and Sling. The largest watercourses within the catchment include the Adda and Cegin. The catchment's headwaters are located on the slopes of ~400 m hills on the fringes of Eryri. No areas or properties formally benefit from fluvial flood defences within the catchment.

The principal areas subject to pluvial and fluvial flood risk are the areas immediately surrounding the Afon Adda through the centre of Bangor, and in isolated locations along the upper reaches of the Afon Cegin. Fluvial flood risk is particularly prevalent along the Afon Adda along the Caernarfon Road area of Bangor where it is culverted, having caused a number of flooding issues historically.

Cyngor Gwynedd holds records of 28 flooding incidents across the Afon Adda and Cegin since 2011, there is also several known surface-water related flood incidents across the catchment.

Catchment 2: Corris

Figure A3: Outline of the Corris Catchment and areas of flood risk



Most of the watercourses within the Corris catchment flow into the Afon Dyfi. The catchment includes the communities of lower Tywyn, Aberdyfi, Pennal, Corris, Aberllefenni and Minllyn. The largest watercourses within the catchment include the Dyffryn-Gwyn, Pennal, Dulas and the upper Dyfi. The catchment's headwaters are heavily forested and many sub-catchments are steep and very responsive to short term rainfall events. The catchment is very rural in nature.

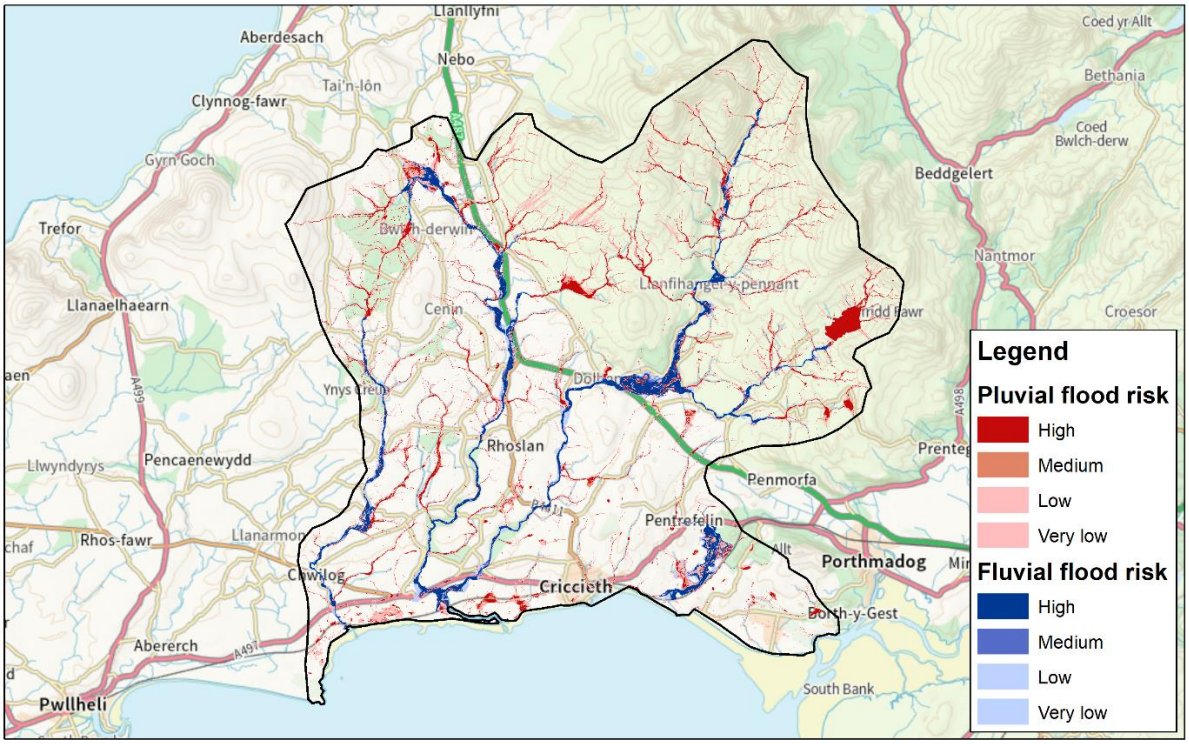
Assets at risk are well-distributed across the catchment. However, there are small concentrations in the villages of Pennal, Corris and Dinas Maddwy, which are particularly susceptible to surface water flooding due to the steep-sided valleys of the headwater areas of the catchment.

Cyngor Gwynedd holds records of 15 flooding incidents in the catchment, with many having been reported in late winter, 2012 due to a period of prolonged heavy rainfall.

A small number of properties benefit from a short section of flood wall on the east bank of the Afon Pennal in the village of Pennal, no other formal defences exist within the catchment.

Catchment 3: Dwyfor

Figure A4: Outline of the Dwyfor Catchment and areas of flood risk



The Dwyfor catchment has its headwaters on the western fringes of Eryri, and as such contains a number of steep-sided, mostly wet catchments as the face the prevailing wind (and weather) direction. A number of large watercourses merge to form the Afon Dwyfor in the low-lying areas of the catchment. The catchment includes the communities of lower Chwilog, Criccieth, Borth-y-gest, Rhoslan, Bryncir and Cwm Pennant. The largest watercourses within the catchment include the Dwyfor, Dwyfach and Wen.

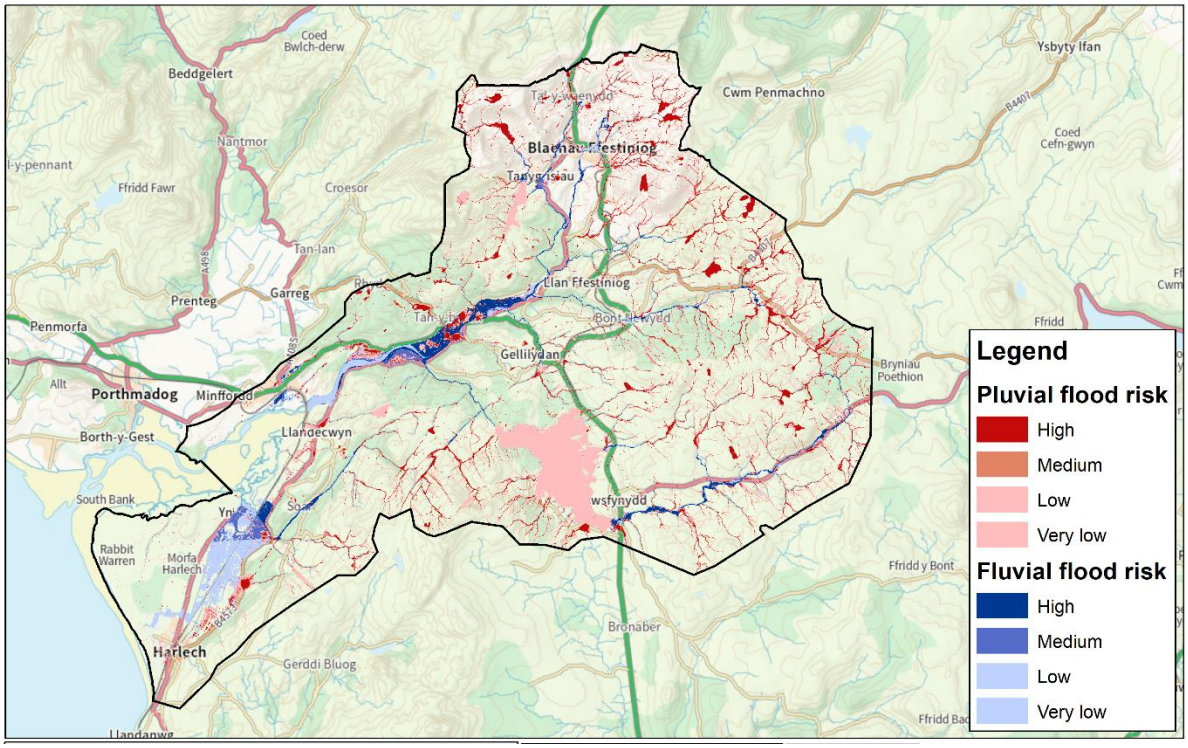
The catchment's land is used almost exclusively for agriculture, with little to no forest cover, and is very rural and as such assets at risk are well-distributed across the catchment However, there are small concentrations near Afon Wen and along the B4411 leading into Criccieth from the north.

Cyngor Gwynedd holds records of 51 flooding incidents in the catchment, with many having been reported in Criccieth during June 2022 due to a severe thunderstorm.

Flood defences are present along sections of the Afon Wen and lower reaches of the Afon Dwyfor to protect agricultural land on the floodplain from inundation.

Catchment 4: Dwyryd

Figure A5: Outline of the Dwyryd Catchment and areas of flood risk



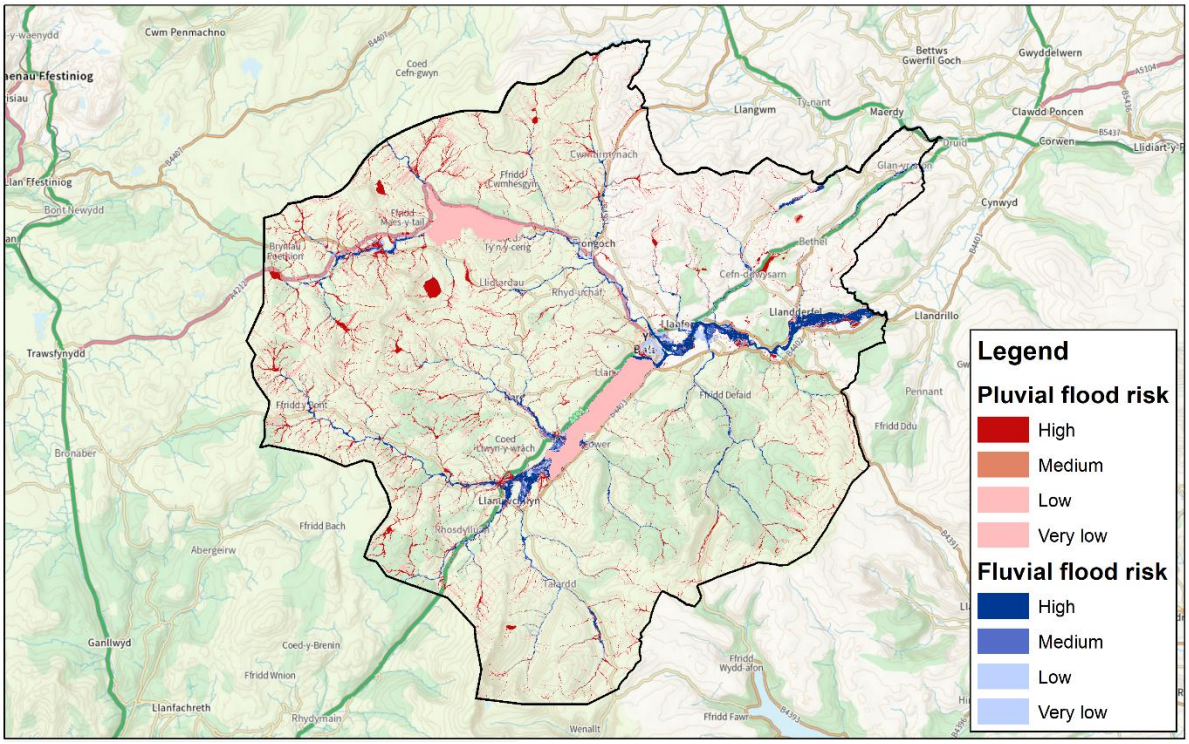
The Dwyryd catchment, similarly to the Dwyfor catchment, has its headwaters on the Western fringes of Eryri. The catchment transitions quickly from a steep, upland catchment to a low-energy, lowland catchment, with many large floodplains along the coast and along the Dwyryd estuary. The catchment includes the communities of Blaenau Ffestiniog, Llan Ffestiniog, Gellilydan, Trawsfynydd, Llandecwyn and Harlech. The catchment also contains Trawsfynydd lake which has a notable impact on the flow of the Afon Prysor. The largest watercourses within the catchment include the Dwyryd, Prysor and Cynfal. The catchment's land is a diverse mixture of raised peat bog, quarries, agricultural land, and coastal marshland.

Flood risk is prominent throughout the catchment, with risk from surface water or small watercourses affecting most communities. The largest clusters of flood risk receptors are located in Blaenau Ffestiniog as the Bowydd and Barlwyd from through built-up areas.

The mapped flood risk pattern matches well with the geographical distribution of flood incidents known to Cyngor Gwynedd. There have been 38 flooding incidents in the catchment, with many having been reported in summer, 2016 due to a prolonged period of heavy rainfall. Surface water flooding problems have been known to exist in Blaenau and Harlech, where numerous small watercourses are culverted beneath the town.

Catchment 5: Dyfrdwy

Figure A6: Outline of the Dyfrdwy Catchment and areas of flood risk



The Dyfrdwy catchment includes the communities of Llanuwchllyn, Bala, Llandderfel, Frongoch, Glan Yr Afon and Llanycil. The largest watercourses within the catchment include the Dyfrdwy, Twrch, Lliw, Tryweryn and Mynach. The catchment's land is largely a mixture of peat bogs and agricultural fields. The catchment contains two large lakes; Capel Celyn reservoir which regulates flow into the Afon Dyfrdwy, and Llyn Tegid, which provide increased flood lag times, therefby generally helping to regulate flooding issues.

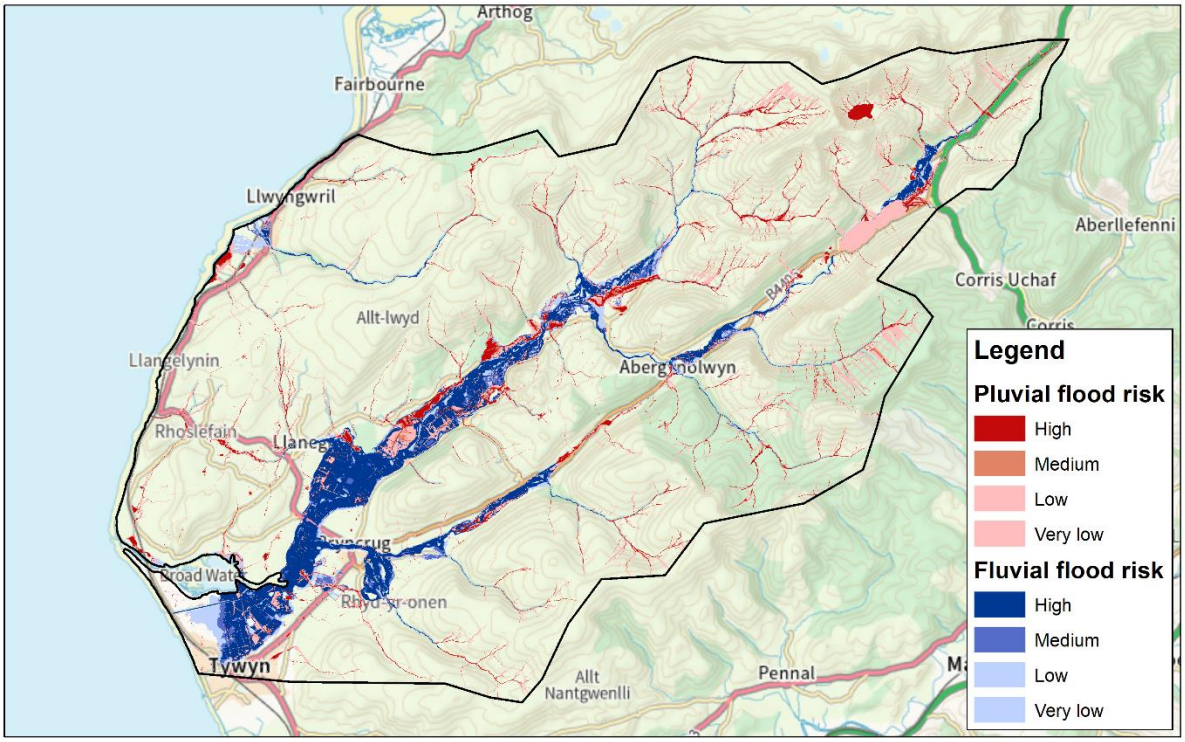
Large, formal flood embankments run along the Eastern edge of Llyn Tegid, and encircle the town centre of Bala, defending it from both the Dyfrdwy and Tryweryn, and the large number of low-risk receptors within this catchment represent the properties afforded protection by these defences.

Flood risk is prominent throughout the catchment, with risk from surface water or small watercourses affecting most communities. The largest clusters of flood risk receptors are located in at the northern end of Bala, along the western bank of the Tryweryn.

Records of flooding within the catchment are generally low and the majority of flooding issues in the catchment appear to be related to surface water issues. There have been 5 incidents of internal flooding since Gwynedd assumed the role of LLFA in 2011.

Catchment 6: Dysynni

Figure A7: Outline of the Dysynni Catchment and areas of flood risk



The Dysynni catchment includes the communities of Tal Y Llyn, Abergynolwyn, Llanfihangel-y-pennant, Llanergyn, Bryncrug and Upper Tywyn. The largest watercourses within the catchment include the Dysynni, Gwril and Fathew.

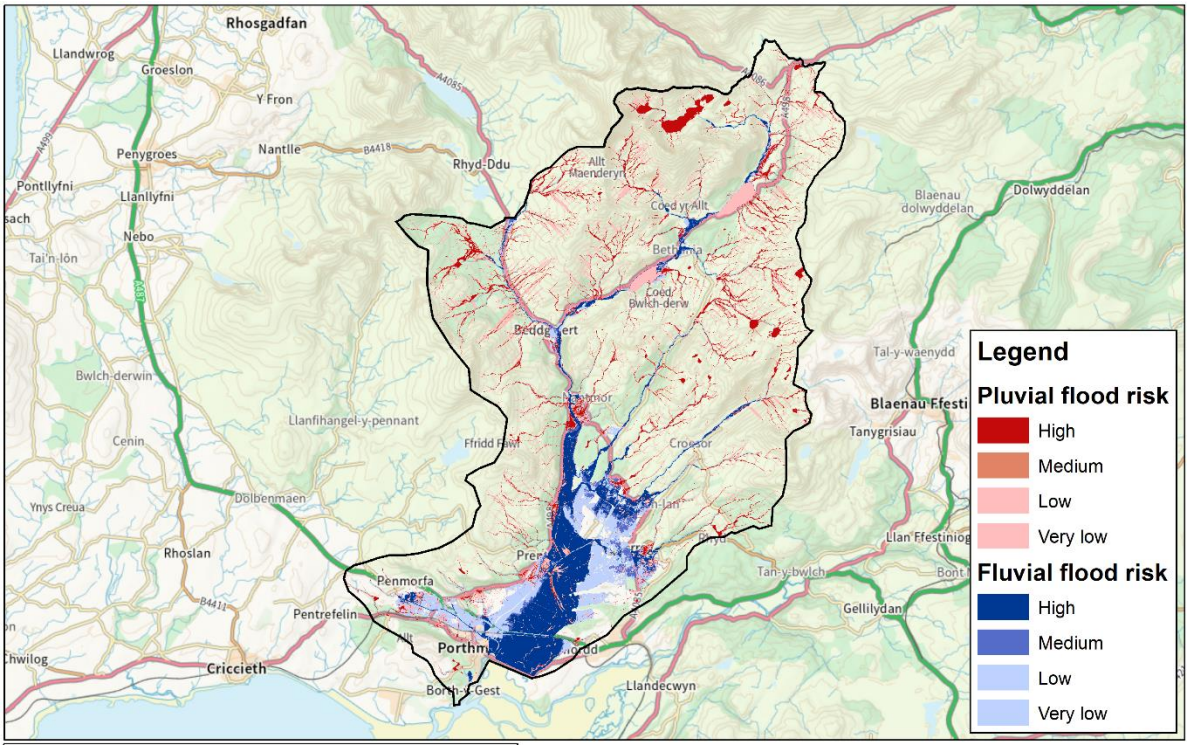
The receptors at risk of flooding in the catchment are almost entirely confined to the valley floors owing to the steep-sided nature of the hills in this area. There are distinct flood risk hot-spots in Abergynolwyn, Llwyngwril, Bryncrug and Llanergyn owing to the catchment's rapid transition from steep upland nature to flat, low energy nature.

Residential properties at the northern end of Tywyn are afforded protection from defences along the sourth bank of the Dysynni; fluvial defences also acto to protect property in Bryncrug. Large, formal flood embankments run along the Afon Dysynni along its upper reaches within the Pennant valley to protect agricultural land within the floodplain. Similar defences run along the flooplains of the Dysynni and Fathew at their confluence.

Cyngor Gwynedd holds records of 16 flooding incidents with n the catchment since 2011. Of those that have been reported, most occurred in summer 2012 due to the Afon Dysynni breaking its banks in Abergynolwyn following heavy rainfall.

Catchment 7: Glaslyn

Figure A8: Outline of the Glaslyn Catchment and areas of flood risk



The Glaslyn catchment has its headwaters amongst the highest peaks of Eryri, and quickly transitions into a low energy, estuarine environment with a broad floodplain. The catchment includes the communities of Beddgelert, Nantgwynant, Nantmor, Llanfrothen, Tremadog and Porthmadog. The largest watercourses within the catchment include the Glaslyn, Colwyn and Croesor.

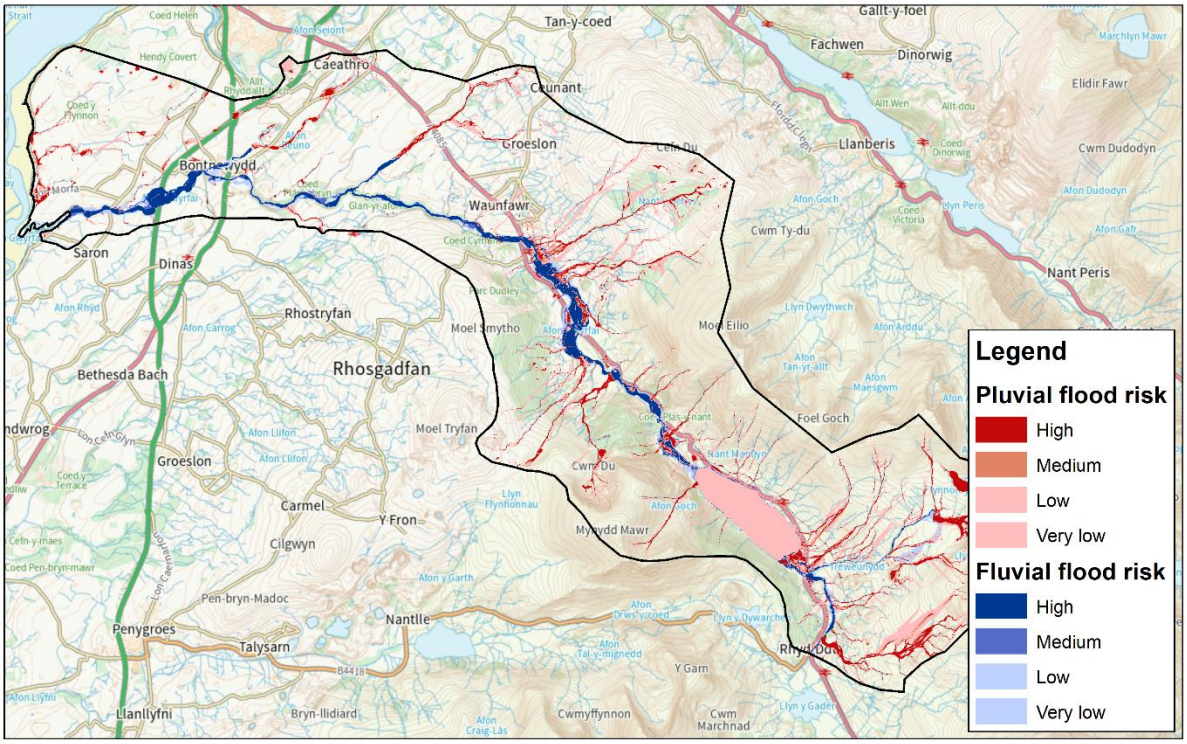
The receptors at risk of flooding in the catchment are mostly confined to Beddgelert, Tremadog and Porthmadog and associated with flooding from the main rivers. However, surface water flood risk also exists throughout all built-up areas, and there are a number of more rural properties scattered throughout the catchment which are at risk of surface water/small watercourse flooding.

The centre of Beddgelert is defended by flood walls along the north and south banks of the Colwyn, and the north and south banks of the Glaslyn. The network of watercourses and surface water systems through Porthmadog and Tremadog are heavily influenced by the tidal gates at Cob Crwn, and flood defences exist along Y Cyt to protect properties along the northern parts of Porthmadog. Climate change effects are likely to result in more properties along Y Cyt becoming at risk from fluvial flooding in the future.

Gwynedd Council holds records of 77 flooding incidents within the catchment since 2011. In late December 2015 in the floodplain areas surrounding Tremadog, many small watercourses were overwhelmed by prolonged, heavy rainfall which prompted flooding problems. Shortly afterwards in mid-January 2016, following heavy rainfall in the upper catchment, Beddgelert suffered severe flooding from the Afon Colwyn and Glaslyn. Beddgelert also suffered significant flooding from the Colwyn in August 2020.

Catchment 8: Gwyrfai

Figure A9: Outline of the Gwyrfai Catchment and areas of flood risk



The Gwyrfai catchment has its headwaters amongst the highest peaks of Eryri, and includes the communities of Rhyd Ddu, Betws Garmon, Waunfawr, Caeathro, Bontnewydd and Llanfaglan. The largest watercourses within the catchment include the Gwyrfai and Beuno.

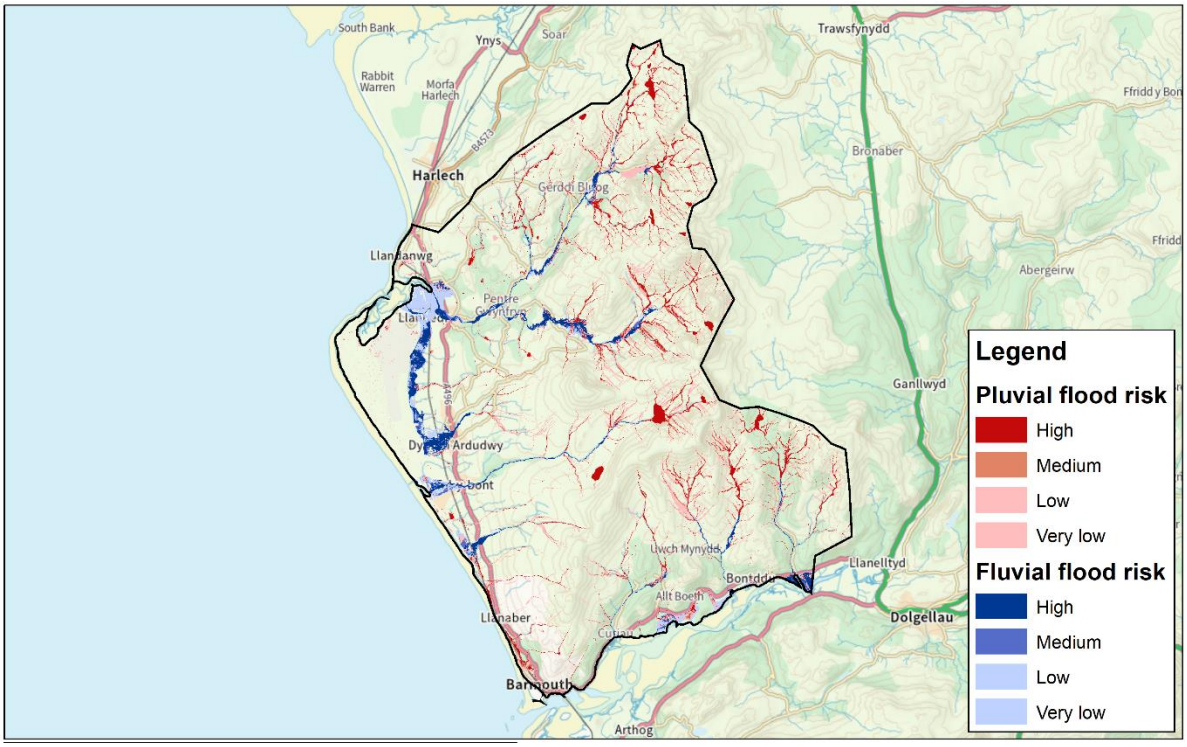
The receptors at risk of flooding in the catchment are mostly confined to Waunfawr and Bontnewydd, however there are a number of receptors scattered evenly throughout the catchment which are at risk of surface water flooding. Bontnewydd is located directly on the confluence of the Gwyrfai and Beuno and facing risk of flooding from both watercourses. A flood defence exists along the north bank of the Gwyrfai as it passes Glanrafon estate.

Numerous streams and drainage ditches flow through Waunfawr from higher ground, many of which are culverted beneath built-up areas in the village, which often results in surface water related issues during high-intensity rainfall events.

Cyngor Gwynedd holds records of 45 flooding incidents with n the catchment since 2011. In late December 2015, Bontnewydd suffered extensive flooding due to a prolonged heavy rainfall event Many surface water flooding incidents were reported over Winter 2012 in the areas in and surrounding Waunfawr, with the period between October 2012 and February 2013 being a much wetter than average winter. There is also a history of flooding problems at Gwyrfai Terrace to the south of Waunfawr.

Catchment 9: Llanbedr

Figure A10: Outline of the Llanbedr Catchment and areas of flood risk



The Llanbedr catchment forms a group of small rivers flowing from east to west from the slopes of the Rhinog hills to the coast. The catchment includes the communities of Llanbedr, Dyffryn Ardudwy, Tal-y-bont, Llanaber, Barmouth and Bontddu. The largest watercourses within the catchment include the Artro, Cwmnantcol, Ysgethin, Dwynant, Cwm llechen, and Cwm-mynach.

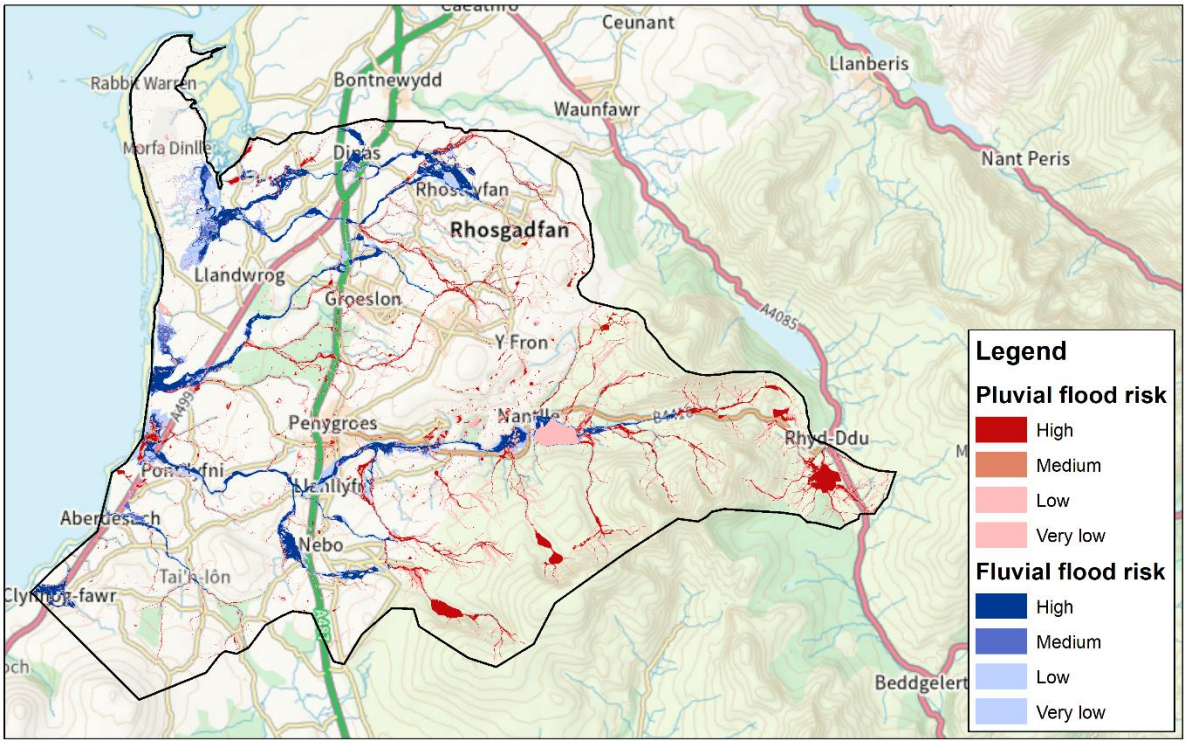
Within this catchment there are concentrations of receptors at flood risk at the centre of Llanbedr and in Talybont, linked to potential flooding from the Artro and Ysgethin respectively. There is also a collection of receptors at risk in the low-lying area to the rear of Barmouth north promenade linked to potential flooding of a watercourse which is culverted beneath Heol y Plas towards a pumping station on the promenade allowing the watercourse to discharge onto the frontage during periods of high tide.

Flood defences are present of the right-hand bank of the Artro as it flows through Llanbedr and also along the tidal section to the west of the A496. A short section of defences are also present on the right-hand bank of the Ysgethin as it approaches the mainline railway to the west of Talybont.

Cyngor Gwynedd holds records of 27 flooding incidents with n the catchment since 2011. Most reports were filed in 2020 and 2021, almost all of which were surface water related. Two notable concentrations of incidents appear in Barmouth and Dyffryn Ardudwy, possibly owing to the steepness of the hills to the east

Catchment 10: Llyfni

Figure A11: Outline of the Llyfni Catchment and areas of flood risk



The Llyfni catchment lies on the western fringes of Eryri and contains several upland sub-catchments. The catchment includes the communities of Nantlle, Talysarn, Llanllyfni, Penygroes, Pontllyfni, Rhostryfan, Groeslon, Y Fron, Bethesda Bach, Clynnog Fawr and Llandwrog. The largest watercourses within the catchment include the Llyfni, Desach, Llifon, and Rhyd. The catchment contains Llyn Nantlle Uchaf, Llyn Cwm Dulyn and Llynnau Cwm Silyn.

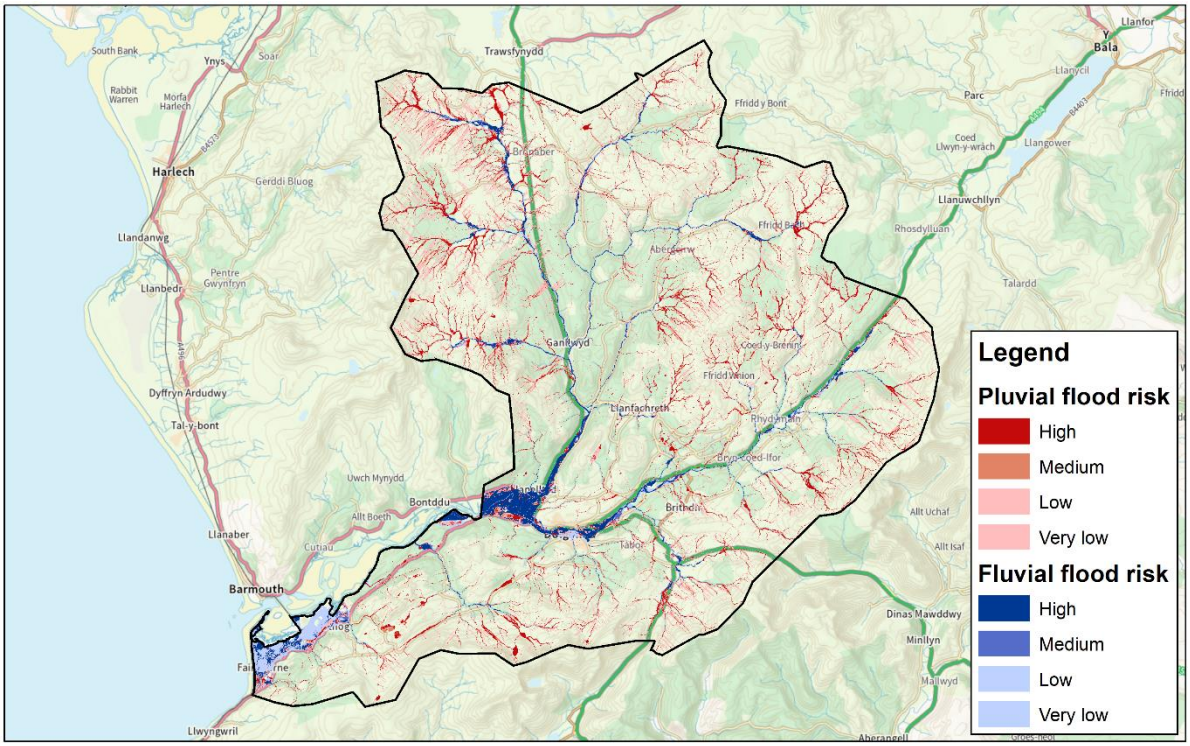
The receptors at risk of flooding are spread across the many villages of the catchment. Notable flood-prone areas include Rhostryfan, Groeslon, Talysarn, Llanllyfni, Pont Llyfni and Clynnog Fawr. No formal inland flood defences exist within the catchment.

Cyngor Gwynedd holds records of 95 flooding incidents within the catchment since 2011. Flood reports (mostly surface water related) were filed over Winter 2012 across a wide area of the catchment. Rhostryfan and Clynnog Fawr have seen a number of flood reports being submitted due to recent, high intensity storm events.

See section 7 of the Local Strategy for details of a flood risk management scheme recently completed by Cyngor Gwynedd in Rhostryfan.

Catchment 11: Mawddach Wnion

Figure A12: Outline of the Mawddach Wnion Catchment and areas of flood risk



The Mawddach Wnion catchment has headwaters in the surrounding uplans before flowing towards estuarine floodplains, and then into the sea. The catchment includes the communities of Bronaber, Ganllwyd, Llanelltyd, Llanfachraeth, Rhydymain, Brithdir, Dolgellau, Arthog, and Fairbourne. The largest watercourses within the catchment include the Mawddach, Wnion, Eden, Gwynant and Clwyedog.

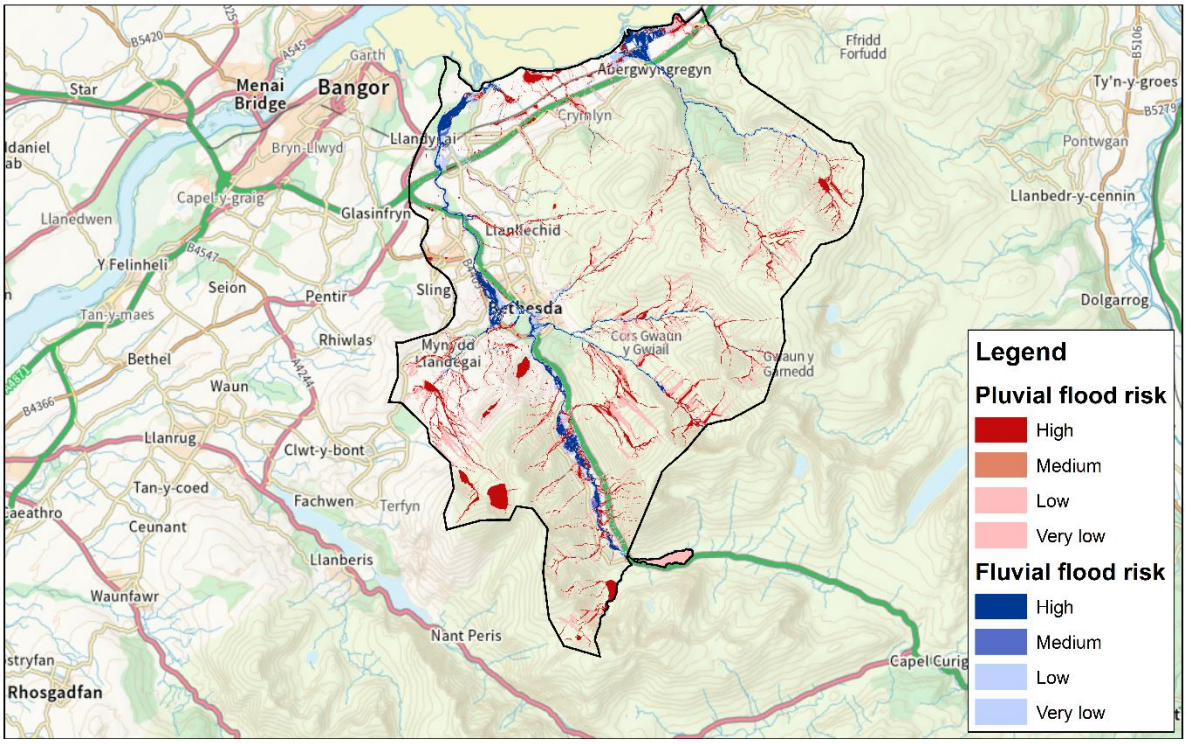
Although there is an even distribution of receptors at flood risk across most of the lower-lying areas of the catchment, the majority of risk confined to Fairbourne and Dolgellau. Dolgellau lies at the confluence of the Wnion and Arran and is at particular risk of flooding from fluvial/pluvial sources as its town centre has been built on an alluvial fan which is now defended by continuous lengths flood walls. The coastal town of Fairbourne has a complex combination of tidal, fluvial and pluvial flood risk due to its situation of a reclaimed salt marsh immediately adjacent to the Afon Mawddach and Cadair Idris hills and is defended from the tidal reach of the Mawddach where it enters the sea by a flood bank.

Cyngor Gwynedd holds records of 8 flooding incidents within the catchment since 2011. Of those recorded, most have been in Dolgellau due to surface water issues.

See section 7 of the Local Strategy for details of a NFM scheme recently completed by Cyngor Gwynedd in the Wnion catchment.

Catchment 12: Ogwen

Figure A13: Outline of the Ogwen Catchment and areas of flood risk



The Ogwen catchment comprises several large watercourses which have their headwaters amongst the highest peaks of Eryri. The catchment includes the communities of Bethesda, Mynydd Llandegai, Rachub, Tregarth, Llandygai, Talybont, and Abergwyngregyn. The largest watercourses within the catchment include the Ogwen, Galedffrwd, Caseg, Aber, Llafar and Ffrydlas.

The villages of Mynydd Llandegai, Bethesda, and Talybont are well-known problem areas for flooding within the catchment although there are a number of other isolated receptors at risk from surface water. Bethesda spreads across the Afon Ogwen's confluence with the Galedffrwd, Caseg, and Ffrydlas, making it particularly liable to extreme rainfall events. Talybont is now protected by a flood alleviation scheme but did historically suffer from intense rainfall events via the small watercourse flowing from the Llanllechid area. Mynydd Llandegai has a recent history of flooding from various sources.

Cyngor Gwynedd holds records of 89 flooding incidents within the catchment since 2011. Of those recorded, most have been in Bethesda due to surface water issues, or in Talybont in response to the severe flooding that occurred in February, 2013.

See section 7 of the Local Strategy for details of a flood risk management scheme recently completed by Cyngor Gwynedd near Talybont.

Catchment 13: Penllyn

Figure A14: Outline of the Penllyn Catchment and areas of flood risk

The Penllyn catchment comprises a selection of small watercourses on the northern and western coast of the Llyn Peninsula and is not centred around any principal river catchment due to the peninsula's shape. The catchment includes the communities of Trefor, Llanaelhaearn, Nefyn, Tudweiliog, Aberdaron, Sarn Mellteryn, Mynytho, Botwnnog, Llanbedrog and Abersoch. The largest watercourses within the catchment include the Soch, Daron, Cyllyfelin, Horon, Elernion and Fawr.

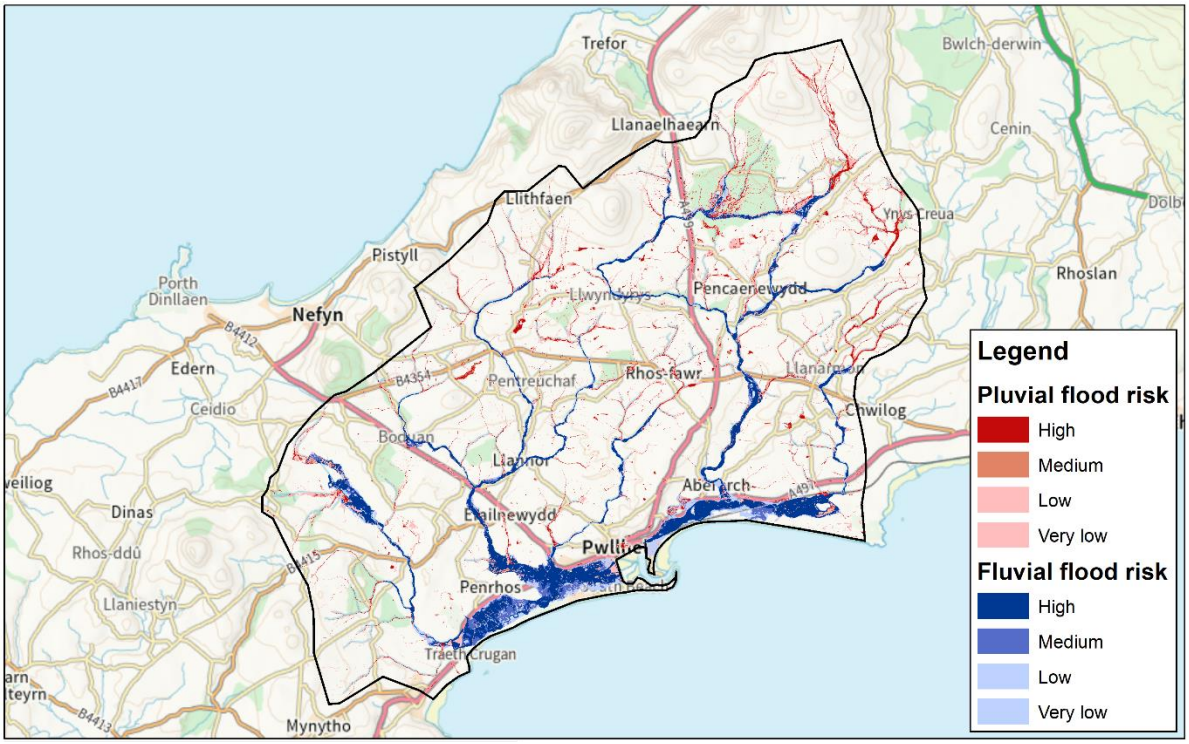
Due to the largely agrarian nature of the catchment, the receptors at risk are mostly spread out evenly. However, there are small concentrations of receptors at risk from flooding in Botwnnog, Aberdaron and Llanbedrog.

The centre of the village of Aberdaron is protected from the Afon Daron and Cyllyfelin by a series of flood walls. Also, two short section of defences protect properties from river flooding in the centre of Botwnnog.

Cyngor Gwynedd holds records of 66 flooding incidents within the catchment since 2011. There seems to be no concentrations of these incidents, with a broad variety of reports detailing many different causes and sources in different years.

Catchment 14: Rhyd Hir Erch

Figure A15: Outline of the Rhyd Hir Erch Catchment and areas of flood risk



The Rhyd Hir Erch catchment centres around the town of Pwllheli, which sits on the confluence of the Afon Rhyd Hir and the Afon Erch, the headwaters of which are found in in the areas running along the north coast of the Llyn Peninsula. The catchment includes the communities of Llithfaen, Y For, Rhyd-y-clafdy, Efailnewydd, Pwllheli, Abererch and Pencaenewydd. The largest watercourses within the catchment include the Rhyd Hir, Penrhos, Erch, Nant y Gledrydd, Ddwyryd, and Ddu.

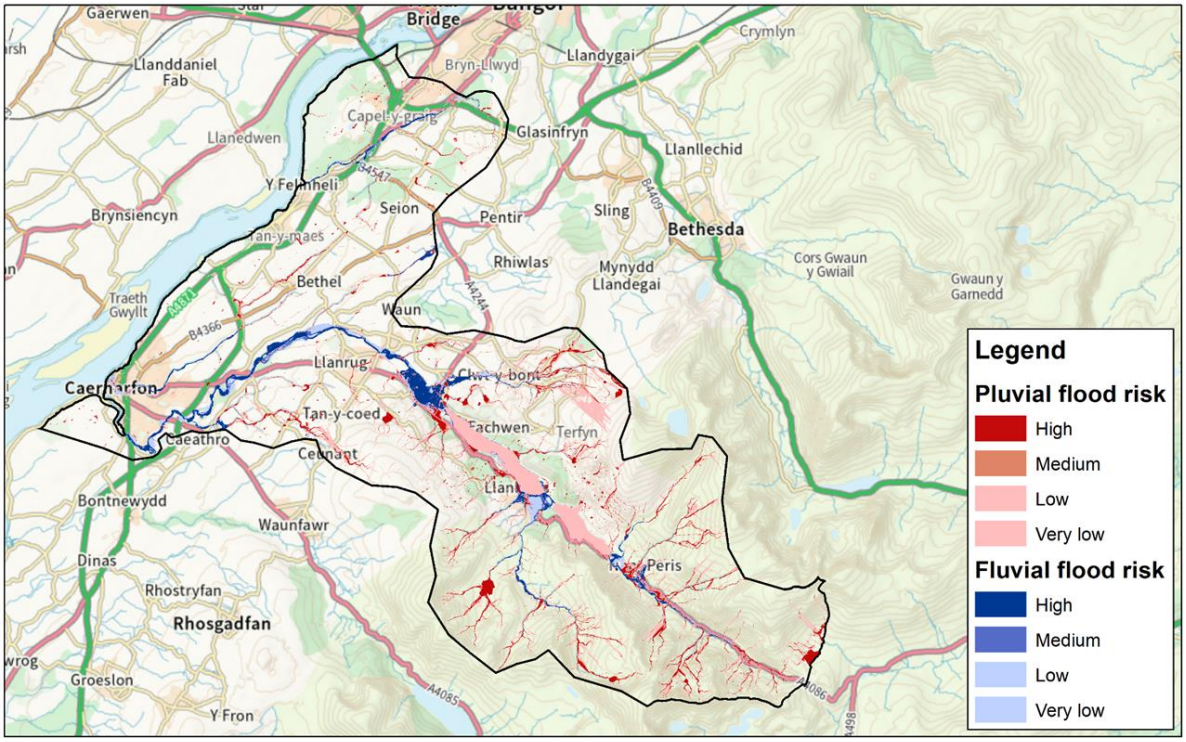
Most of the receptors at risk are in Pwllheli, with the town lying on the floodplain of two main rivers. Both the Rhyd Hir and Erch are heavily influenced by the tidal gates at Pwllheli harbour which prevent tidal ingress at high tide, and as expected most receptors at risk of flooding are within the expanded flood plains of these rivers. Surface water flooding problems are also prevalent in Pwllheli due to the flat nature of the drainage systems as well as tide-locking effects. Numerous properties in the centre of Abererch are also at risk of fluvial flooding. The expansion of these floodplains due to climate change effects in the future is likely to introduce flood risk to more properties.

The centre of Pwllheli is currently protected by flood walls and embankments either side of Cob Bach (upstream of the Rhyd Hir tidal gate), and a flood embankment along the west bank of the Erch serves properties at flood risk within Abererch.

Cyngor Gwynedd holds records of 63 flooding incidents within the catchment since 2011. Of those recorded, most have been in Pwllheli due to surface water issues (overwhelmed domestic gullies) in November 2012. There are other flood reports scattered across the catchment from the winters of 2019 and 2021.

Catchment 15: Seiont

Figure A16: Outline of Seiont Catchment and areas of flood risk



The Seiont catchment contains the sub-catchments of the Seiont, Caledffrwd, Cadnant and Afon Heulyn and includes the communities of Bethel, Caernarfon, Deiniolen, Llanberis, Llanrug and Y Felinheli.

Receptors of flood risk due to surface water and small watercourses are spread throughout the catchment, however clusters of fluvial flood risk receptors are located along the route of the larger rivers at Llanberis (Afon Goch and Afoin Hwch), Cwm y Glo (Seiont), Caernarfon (Seiont and Cadnant) and Deiniolen (Caledffrwd). Properties are afforded protection from flooding by purpose-built defences at Llanberis (Afon Goch) and Cwm y Glo (Seiont).

Cyngor Gwynedd holds records of 187 incidents within the catchment since 2011, most of which occurred following a significant rainfall event in November 2012 when the centre of Llanberis suffered severe flooding as the Afon Goch breached its banks, the same event saw numerous properties in Deiniolen affected by flooding.

See section 7 of the Local Strategy for details of a flood risk management scheme recently completed by Cyngor Gwynedd in Llanberis, which protects numerous properties in the centre of the village.

Catchment	*Communities*	*Number of properties at flood risk*[2]					*Number of Essential Services / Non-residential properties at flood risk*[3]	*Number of known incidents*[4]	*Current flood risk management schemes/studies*[5]
		Total	*High risk*	*Medium risk*	*Low risk*	*Very Low risk*			
Adda-Cegin	Bangor Penrhosgarnedd Glasinfryn Minffordd Pentir Rhiwlas Sling	353	17	80	153	103	60	28	*Natural Resources Wales* *Location: Bangor* *Source: River* *Measure: Update hydraulic model* *Status: Ongoing*
Corris	South Tywyn Aberdyfi Pennal Corris Dinas Mawddwy Mallwyd Aberllefenni	272	88	34	104	46	52	15	**Cyngor Gwynedd** ***Location:*** Aberllyfenni ***Source:*** Surface water and small watercourses ***Measure****:* Explore options to manage flood risk concerns towards the northern end of the village where the Afon Llyfenni regularly breaks its banks during periods of heavy rainfall ***Status:*** Not started
									Natural Resources Wales *Location: Pennal* *Source: River* *Measure: Undertake initial assessment and feasibility work for reducing flood risk* *Status: Not started*
Dwyfor	Chwilog Cwm Pennant Garndolbenmaen Criccieth Morfa Bychan Bryncir Pant Glas	125	31	16	42	36	38	51	**Cyngor Gwynedd** ***Location:*** Criccieth ***Source:*** Surface water and small watercourses ***Measure****:* Following widespread surface water flooding in June 2022 Cyngor Gwynedd have initiated a study to assess the capacity and condition of the surface water drainage network in the areas affected. This study will identify areas of most concerns as well as sustainable options to improve flood risk for the community. ***Status:*** Ongoing (Strategic Outline Case)
									Natural Resources Wales *Location: Criccieth* *Source: River* *Measure: Undertake initial assessment and feasibility work for reducing flood risk* *Status: Not started*
Dwyryd	Blaenau Ffestiniog Llan Ffestiniog Gellilydan Llandecwyn Penrhyndeudraeth Harlech Trawsfynydd	654	83	100	355	116	131	38	**Cyngor Gwynedd** ***Location:*** Blaenau Ffestiniog ***Source:*** Surface water and small watercourses ***Measure:*** Study to assess the capacity and condition of the surface water drainage network in the areas in Manod affected by persistent surface water flooding issues. ***Status:*** Not started
									Cyngor Gwynedd ***Location:*** Summerhill Terrace, Blaenau Ffestiniog ***Source:*** Surface water and small watercourses

[2] See main document section 9.1

[3] See main document section 9.1

[4] Number of individual properties known to have suffered from internal flooding according to records held by Cyngor Gwynedd

[5] NRW Schemes and/or studies are as listed in *FRMP Delivery Plan for North West Wales Place*

									Measure: Small improvement to address persistent local surface water flooding issues ***Status:*** Not started
									Cyngor Gwynedd ***Location:*** Y Sgwar, Blaenau Ffestiniog ***Source:*** Surface water and small watercourses ***Measure:*** Small improvement to address persistent local surface water flooding issues ***Status:*** Not started
									Cyngor Gwynedd ***Location:*** Ffordd Uchaf, Harlech ***Source:*** Surface water and small watercourses ***Measure:*** Small improvement to address persistent local surface water flooding issues ***Status:*** Not started
									Cyngor Gwynedd ***Location:*** Ffordd Newydd, Harlech ***Source:*** Surface water and small watercourses ***Measure:*** Small improvement to address persistent local surface water flooding issues ner the bottom of Twtil ***Status:*** Not started
									Cyngor Gwynedd ***Location:*** Penrhyndeudraeth ***Source:*** Surface water and small watercourses ***Measure:*** Scheme to reduce surface water flood risk to properties at Trem yr Wyddfa ***Status:*** On hold
Dyfrdwy	Bala Llanuwchllyn Llandderfel Frongoch Talardd Llanfor Glan Yr Afon	800	112	37	573	78	276	5	*Natural Resources Wales* *Location: Bala* *Source: River* *Measure: Improve existing flood warning service* *Status: Ongoing*
									Natural Resources Wales *Location: Bala* *Source: River* *Measure: Update existing hydraulic model* *Status: Ongoing*
									Natural Resources Wales *Location: Bala* *Source: River* *Measure: Design and construction of flood risk asset improvements* *Status: Not started*
									Natural Resources Wales *Location: Bala* *Source: River* *Measure: Maintain existing defences and inspection regime* *Status: Ongoing*
									Natural Resources Wales *Location: Llanuwchllyn* *Source: River* *Measure: Develop scheme appraisal for flood alleviation scheme* *Status: Ongoing*

									Natural Resources Wales *Location: Llanuwchllyn* *Source: River* *Measure: Improve existing flood warning service* *Status: Not started*
									Natural Resources Wales *Location: Llyn Tegid* *Source: River* *Measure: Improve existing flood warning service* *Status: Not started*
Dysynni	North Tywyn Bryncrug Llwyngwril Abergynolwyn Llangelynnin Tal Y Llyn Rhyd Yr Onen	378	145	56	117	60	110	16	*Natural Resources Wales* *Location: Tywyn* *Source: River* *Measure: Undertake initial assessment and feasibility work for reducing flood risk* *Status: Ongoing*
									Natural Resources Wales *Location: Tywyn* *Source: River* *Measure: Improve existing flood warning service* *Status: Not started*
									Natural Resources Wales *Location: Bryncrug* *Source: River* *Measure: Design and construction of flood alleviation scheme* *Status: Ongoing*
									Natural Resources Wales *Location: Bryncrug* *Source: River* *Measure: Maintain existing defences and inspection regime* *Status: Ongoing*
Glaslyn	Nant Gwynant Beddgelert Nantmor Tremadog Porthmadog Croesor Borth Y Gest	877	20	54	194	609	211	77	*Natural Resources Wales* *Location: Porthmadog* *Source: River/Sea* *Measure: Improve existing flood warning service* *Status: Not started*
									Natural Resources Wales *Location: Porthmadog* *Source: River* *Measure: Develop scheme appraisal for flood alleviation scheme* *Status: Ongoing*
									Natural Resources Wales *Location: Beddgelert* *Source: River* *Measure: Undertake initial assessment and feasibility work for reducing flood risk* *Status: Ongoing*

									Natural Resources Wales *Location: Beddgelert* *Source: River* *Measure: Improve existing flood warning service* *Status: Not started*
Gwyrfai	Llanfaglan Caeathro Bontnewydd Waunfawr Betws Garmon Ceunant Rhyd Ddu	140	22	20	74	24	31	45	**Cyngor Gwynedd** ***Location:*** Bontnewydd ***Source:*** Surface water and small watercourses ***Measure****:* Flood risk management measures along the course of the Afon Beuno as it flows through Bontnewydd, to improve in-channel capacity and improve unobstructed conveyance of peak flows following periods of heavy rainfall. ***Status:*** Ongoing (Full Business Case/Detailed Design)
									Cyngor Gwynedd ***Location:*** Beuno Catchment ***Source:*** Surface water and small watercourses ***Measure****:* Identification and implementation of Natural Flood Management upstream of Bontnewydd to store surface water run-off and reduce peak flows further downstream. ***Status:*** Ongoing
									Cyngor Gwynedd ***Location:*** Waunfawr ***Source:*** Surface water and small watercourses ***Measure****:* Study to establish flood risk and identify flood risk management measures at two specific areas of concern near Croes-y-waun and Pant-y-waun following series of flooding problems over recent years. ***Status:*** Ongoing (Full Business Case/Detailed Design)
									Cyngor Gwynedd ***Location:*** Waunfawr ***Source:*** Surface water and small watercourses ***Measure****:* Small scale scheme to repair and improve section of culverted watercourse upstream of Pen-y-bont following incidents of flooding in 2023. ***Status:*** Not started
									Natural Resources Wales *Location: Betws Garmon* *Source: River* *Measure: Undertake initial assessment and feasibility work for reducing flood risk* *Status: Ongoing*
									Natural Resources Wales *Location: Bontnewydd* *Source: River* *Measure: Design and construction of flood risk asset improvements* *Status: Ongoing*
Llanbedr	Llanfair Llanbedr Llanddwywe Dyffryn Ardudwy Llanaber Abermaw Bontddu	255	16	41	123	59	46	27	**Cyngor Gwynedd** ***Location:*** Dyffryn Ardudwy ***Source:*** Surface water and small watercourses ***Measure:*** Study to investigate flood risk associated with an unnamed watercourse that passes through the centre of the village near the site of the old Berwyn Garage ***Status:*** Not started

									Natural Resources Wales *Location: Gwehelog-Mochras* *Source: River* *Measure: Undertake initial assessment and feasibility work for reducing flood risk* *Status: Not started*
Llyfni	Penygroes Rhostryfan Nantlle Talysarn Pontllyfni Llanllyfni Aberdesach	495	205	64	123	103	63	95	**Cyngor Gwynedd** ***Location:*** Clynnog Fawr ***Source:*** Surface water and small watercourses ***Measure:*** Deliver scheme to reduce risk of flooding from unnamed ordinary watercourses that flows towards the village from the south-east, near Llwyn y Ne ***Status:*** Ongoing (Full Business Case/Detailed Design)
									Cyngor Gwynedd ***Location:*** Groeslon ***Source:*** Surface water and small watercourses ***Measure:*** Deliver scheme to reduce risk of flooding from unnamed ordinary watercourses near Cae Sarn and Dyffryn Terrace ***Status:*** Ongoing (Full Business Case/Detailed Design)
Mawddach - Wnion	Dolgellau Fairbourne Brithdir Ganllwyd Llanfachraeth Arthog Llanelltyd	994	54	33	676	231	385	8	**Cyngor Gwynedd** ***Location:*** Bridge Street, Dolgellau ***Source:*** Surface water and small watercourses ***Measure:*** Study to identify solution for local surface water flooding issues near Bridge Street ***Status:*** Not started
Ogwen	Llandygai Tal Y Bont Abergwyngregyn Tregarth Bethesda Mynydd Llandegai Rachub	412	52	37	254	69	81	89	**Cyngor Gwynedd** ***Location:*** Mynydd Llandegai ***Source:*** Surface water and small watercourses ***Measure****:* Study to establish flood risk and identify flood risk management measures at various locations across the village following series of flooding problems over recent years ***Status:*** Ongoing (Full Business Case/Detailed Design)
									Cyngor Gwynedd ***Location:*** Mynydd Llandegai ***Source:*** Surface water and small watercourses ***Measure****:* Identification and implementation of Natural Flood Management in the catchment surrounding Mynydd Llandegai, to store surface water run-off and reduce peak flows further downstream. ***Status:*** Ongoing
									Natural Resources Wales *Location: Abergwyngregyn* *Source: River* *Measure: Build hydraulic model* *Status: Ongoing*
Penllyn	Aberdaron Botwnnog Abersoch Mynytho Tudweiliog Nefyn Morfa Nefyn	246	62	43	115	26	103	66	**Cyngor Gwynedd** ***Location:*** Lon Mynydd, Nefun ***Source:*** Surface water and small watercourses ***Measure:*** Small improvement to address local surface water flooding issues near Lon Mynydd ***Status:*** Not started

Rhyd Hîr-Erch	Abererch Pencaenewydd Llangybi Y Ffor Llannor Efailnewydd Pwllheli Boduan	472	62	67	247	96	156	63	**Cyngor Gwynedd** ***Location:*** Pencaenewydd ***Source:*** Surface water and small watercourses ***Measure:*** Improvement scheme to reduce flood risk to the centre of the village following previous incidents of multi-property flooding, most recently in 2021. ***Status:*** Ongoing
									Cyngor Gwynedd ***Location:*** Ffordd Mela, Pwllheli ***Source:*** Surface water and small watercourses ***Measure:*** Small improvement to address local surface water flooding issues near Ffordd y Mela ***Status:*** Not started
									Natural Resources Wales *Location: Pwllheli* *Source: River/Sea* *Measure: Update existing hydraulic model* *Status: Ongoing*
									Natural Resources Wales *Location: Pwllheli* *Source: River/Sea* *Measure: Develop scheme appraisal for flood alleviation scheme* *Status: Ongoing*
Seiont	Nant Peris Llanberis Deiniolen Llanrug Bethel Caernarfon Felinheli	611	79	39	339	154	272	187	**Cyngor Gwynedd** ***Location:*** Caernarfon ***Source:*** River ***Measure****:* Scheme to improve the intake structure of the Afon Cadnant below Maes Cadnant to reduce likelyhood of blockages and subsequent risk of flooding (main river but Council owned asset). ***Status:*** Ongoing (Full Business Case/Detailed Design)
									Cyngor Gwynedd ***Location:*** Dolafon ***Source:*** Surface water and small watercourses ***Measure****:* Scheme to improve capacity of culverted watercourse system beneath Dolafon estate and reduce risk of flooding for surrounding properties. ***Status:*** On hold
									Cyngor Gwynedd ***Location:*** Llanrug ***Source:*** Surface water and small watercourses ***Measure****:* Small scheme to improve surface water drainage capacity at the northern end of Glanffynnon estate ***Status:*** Ongoing
									Natural Resources Wales *Location: Caernarfon (Seiont Mill)* *Source: River* *Measure: Undertake initial assessment and feasibility work for reducing flood risk* *Status: Ongoing*

Appendix B Coastal Risk by Area (with summary table)

Coastal risk by area

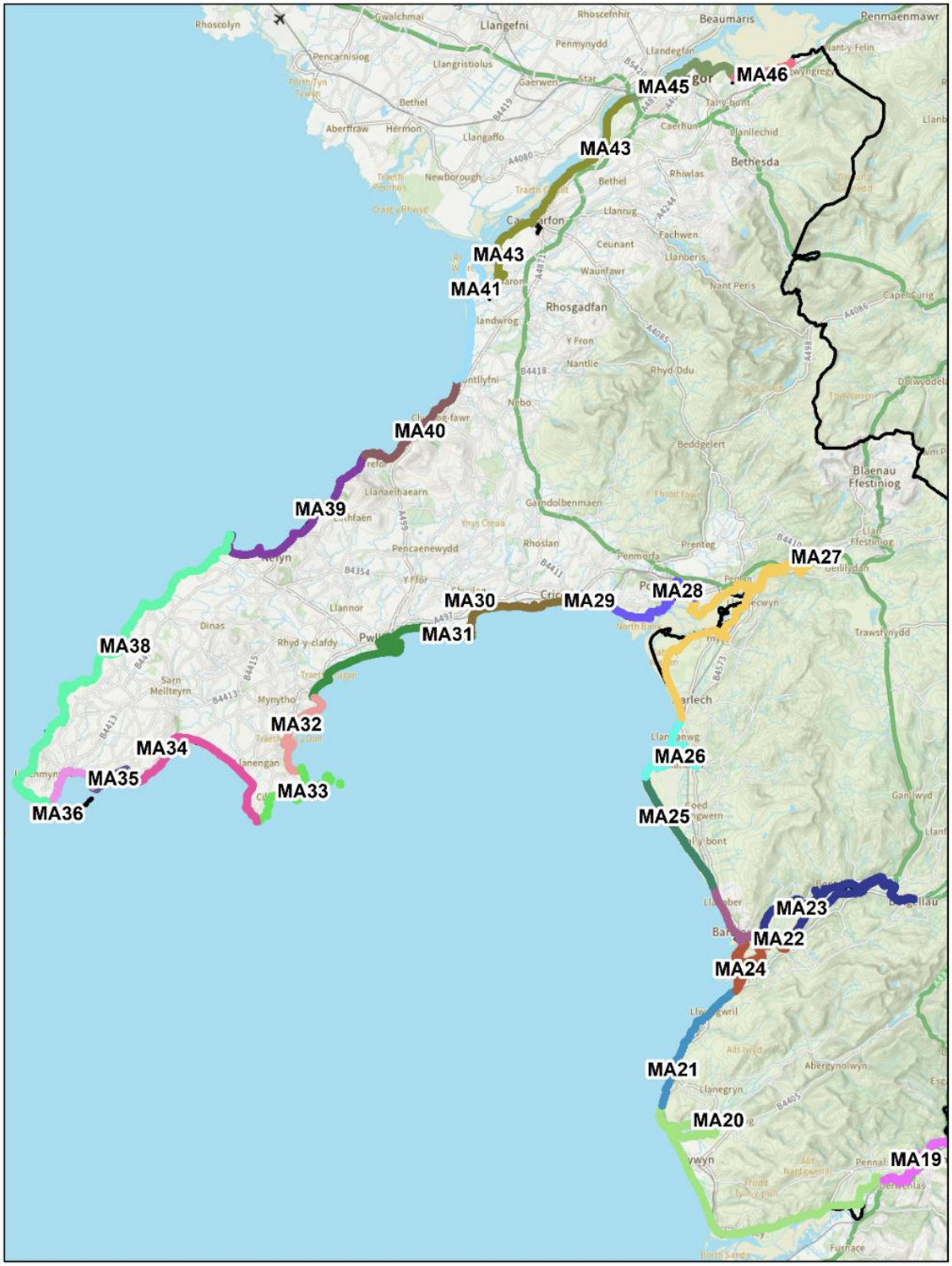
The following section describes coastal flood risk in greater detail by considering each coastal Management Area in its turn. Management Areas (MA) along the Gwynedd coastline have been defined within the Shoreline Management Plan (SMP2), and represent a length of the coastline where the various frontages are interdependent in terms of coastal processes, and therefore should be managed as a collective to achieve the desired environmental outcome. With this in mind the policies for neighbouring frontages within a MA are designed to complement each other.

Management Areas is Gwynedd extend from MA 20 on the north side of the Dyfi estuary to MA 46 on the north coast, to the east of the mouth of the Afon Ogwen (see Figure B1 below).

The nature and setting of each MA is described along with a description of the spatial distribution of flood risk zones, and how this corresponds with location of defences and changes in future shoreline policies. For a more detailed view of coastal risk distribution within an area of interest the reader is referred to the Flood Risk Assessment Wales maps on NRW's webpage.

Table B1 summarises the level of coastal risk within each MA in its turn and also lists coastal risk management schemes and/or studies which are ongoing at present or programmed for the future to address risks within each MA.

Figure B1: Distribution of Management Areas along Gwynedd coastline



Management Area 20

Figure B2: Outline of Management Area 20 and areas at coastal flood risk

Management Area 20 extends from Pennal to Tonfannau and includes the communities of Bryncrug, Tywyn, Aberdyfi and Pennal.

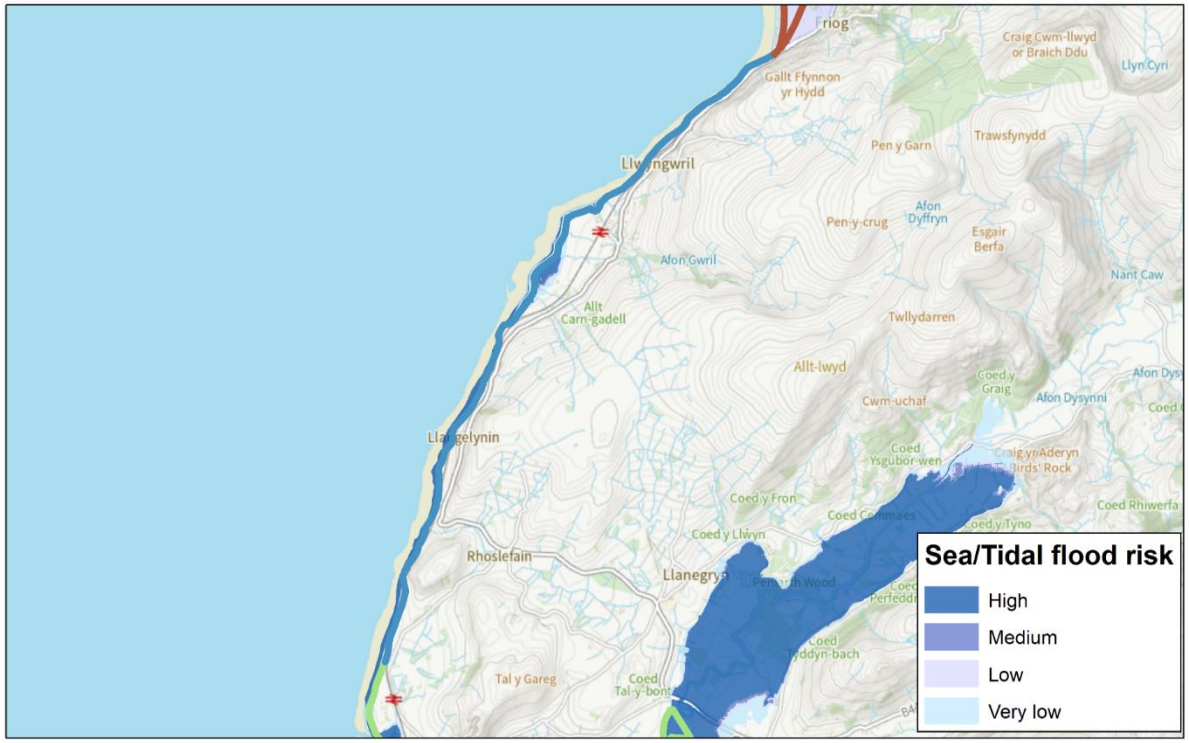
The main residential area at present day flood risk is the area surrounding Sandilands on the northern fridges of Tywyn which is currently defended from tidal ingress via the Dysynni to the north. Otherwise, large low-lying areas of the Dysynni and Dyfi Valleys are at flood risk as well as the Penllyn marshes to the south of Tywyn, which is currently defended from tidal ingress at the Afon Dyffryn Gwyn outfall.

Managed realignment policies apply to many of the existing defences along this Management Area although long-term Hold the Line policies apply for the main frontages of Tywyn and Aberdyfi.

See section 7 of the Local Strategy for details of a coastal risk management scheme completed by Cyngor Gwynedd in Tywyn.

Management Area 21

Figure B3: Outline of Management Area 21 and areas at coastal flood risk



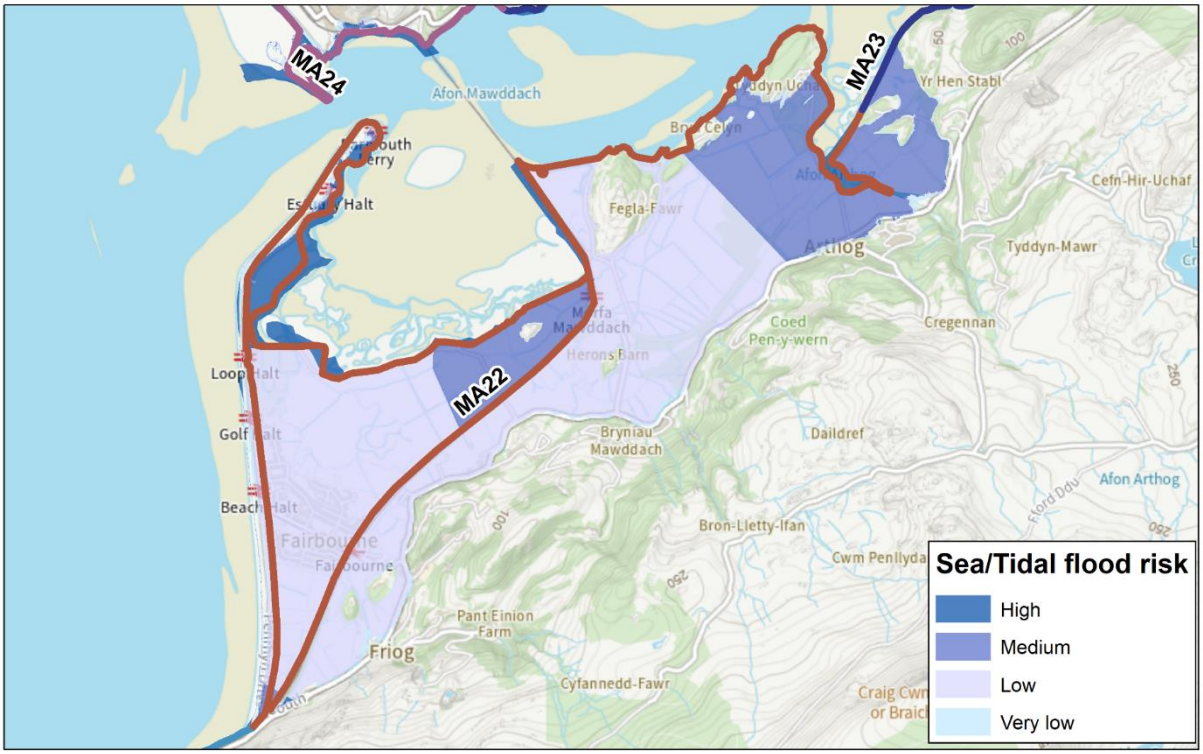
Management Area 22 extends from Tonfannau to Friog Cliffs and includes the communities of Llangylenin and Llwyngwril.

Ground level generally rises steeply from the shoreline in this location and therefore flood risk to property and essential services is low, although the coastal flood zone does extend into the low lying area to the south-west of Llwyngwyil, extending into the two holiday parks.

The shoreline policy for the majority of this MA is to hold the line due to the position of the railway line adjacent to the coast although there is a Managed Realignment section along the frontage facing Llwyngwril.

Management Area 22

Figure B4: Outline of Management Area 22 and areas at coastal flood risk

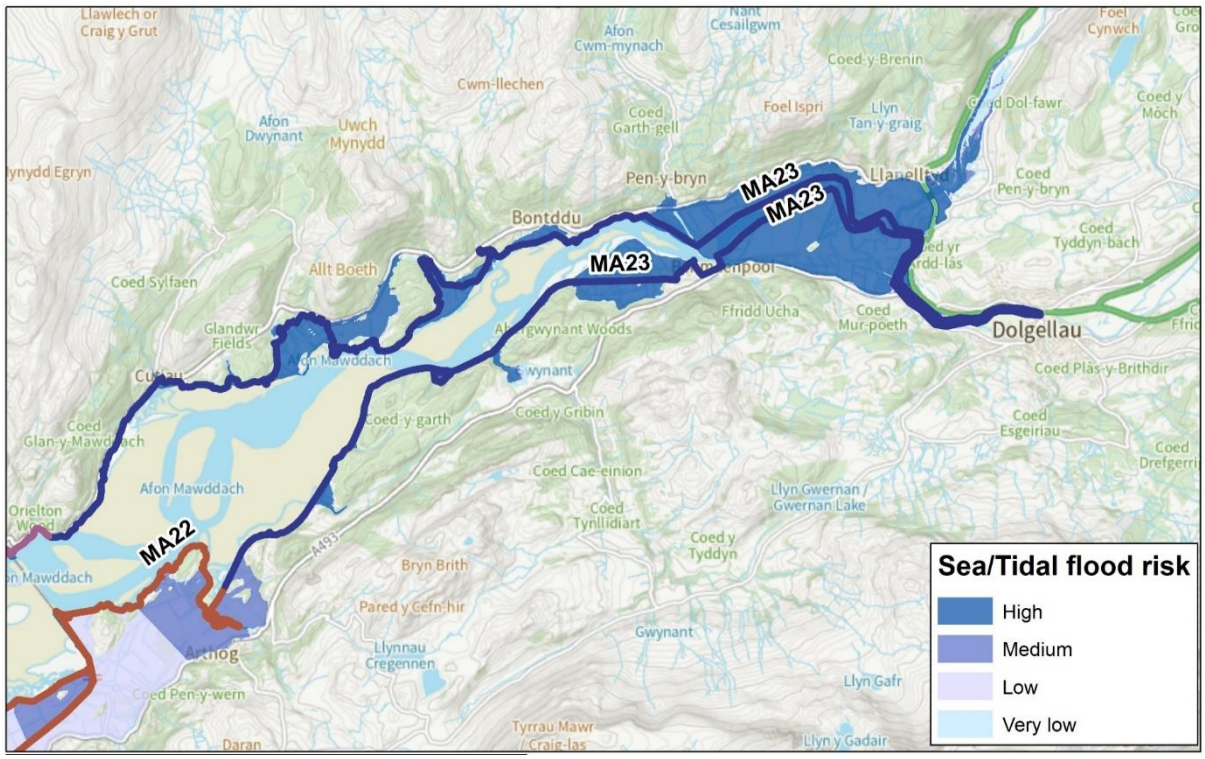


Management Area 22 extends from Friog Cliffs to Arthog and includes the communities of Friog, Fairbourne and Arthog, all of which are low-lying and heavily dependant on coastal defences, which include a shingle bank along the Fairbourne frontage and a tidal embankment along the southern banks of the Maddway estuary. Flood risk levels along this MA reflect the protection provided by these defences.

The SMP2 policy for this MA is for a gradual Managed Realignment of all defences and multi-agency efforts have been ongoing for a number of years to determine when and how defences could be retreated, and how resulting impacts upon these communities should be managed.

Management Area 23

Figure B5: Outline of Management Area 23 and areas at coastal flood risk



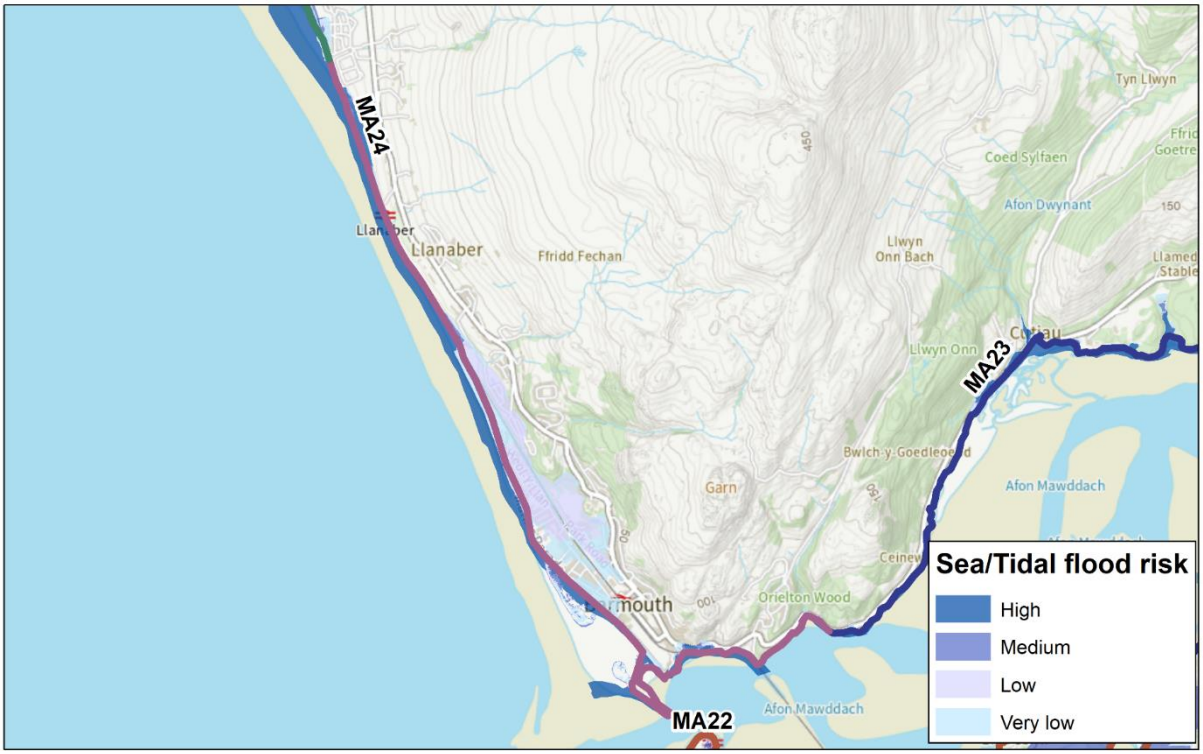
Management Area 23 extends along the lower reach of the Afon Mawddach from Arthog to Porth Aberamffra, and includes the communities of Arthog, Dolgellau, Llanelltyd and Bontddu.

Small clusters of high risk receptors exist on both sides of the Mawddach, namely at Penmaenpool, Abergwynant, Llanelltyd and Bnot Ddu. With increase in tidal level due to climate change more low-lying receptors accross the whole estuary will face risk of flooding, a cluster of which are located along the Afon Wnin in Llanelltyd.

Private/informal flood defences exist on both sides of the estuary, with the old railway embankment along the south bank providing some protection to the low lying areas along its landward side. Managed realignment policies exist along most defended sections of the estuary.

Management Area 24

Figure B6: Outline of Management Area 24 and areas at coastal flood risk



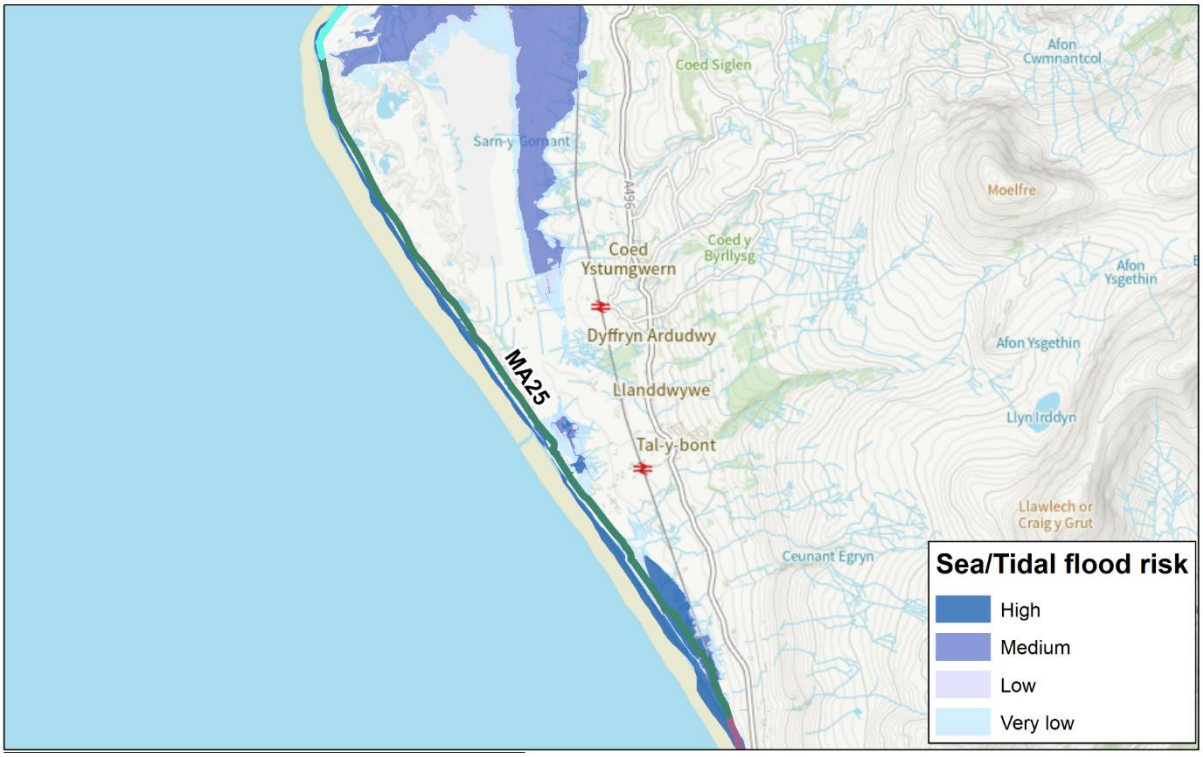
Management Area 24 extends from Porth Aberamffra to Llanaber Point and includes the communities of Barmouth and Llanaber.

The receptors at high risk of flooding are mainly located around the harbour area of Barmouth, and nearby along Church Street. The centre of Barmouth is provided protection from coastal flooding from the seal wall along the length of the promenade, and the number of receptors in the low and very low risk columns emphasises the importance of these defences.

HTL coastal policies exist for all southern parts of Barmouth but this transitions to a medium/long-term MR policy for the northern promenade where pressure upon existing defences is much greater. To the north of Barmouth the shoreline is fixed by the mainline railway embankment and the policy reverts to HTL.

Management Area 25

Figure B7: Outline of Management Area 25 and areas at coastal flood risk



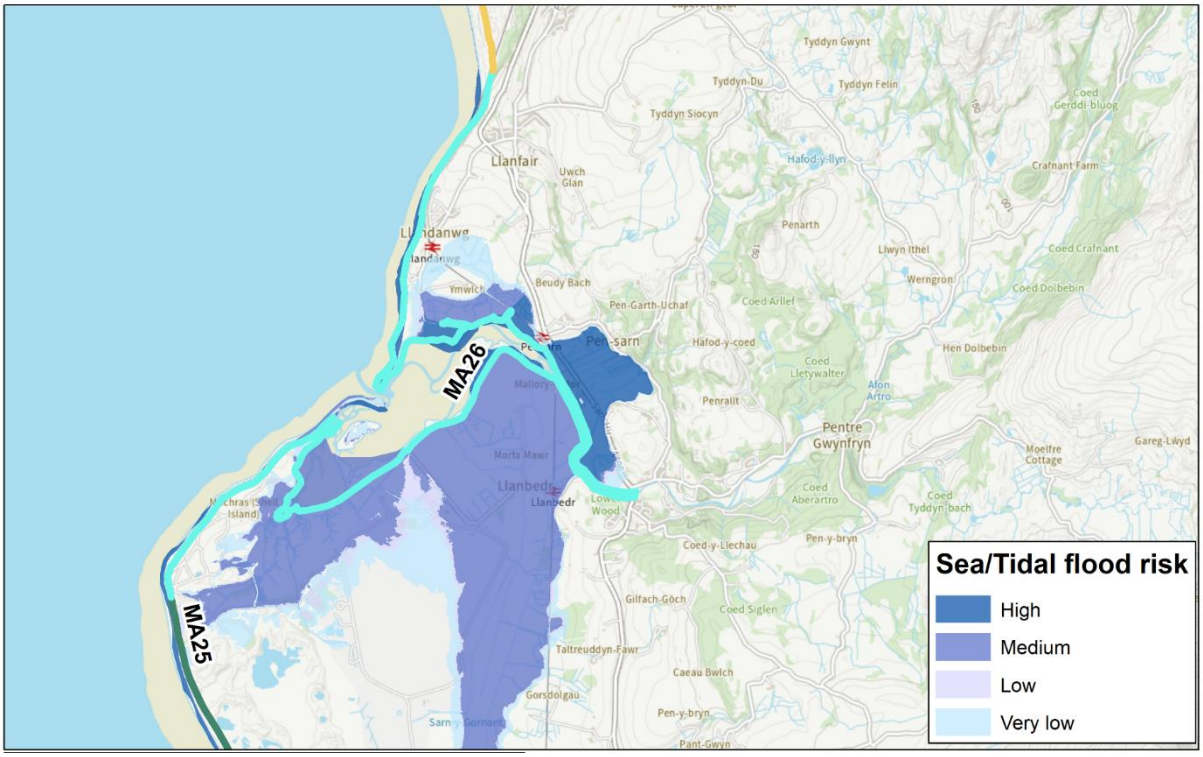
Management Area 25 extends from Llanaber Point to Mochras and includes the communities of Talybont and Dyffryn Ardudwy.

Coastal flood risk to residential properties and essential services is generally low along this area although the holiday parks between the shoreline and the mainline railway will face an increased flood risk in the future.

No formal defences exist along this frontage although isolated pockets of the frontage are served by private defences. The shoreline policy for the whole frontage is either MR or NAI.

Management Area 26

Figure B8: Outline of Management Area 26 and areas at coastal flood risk



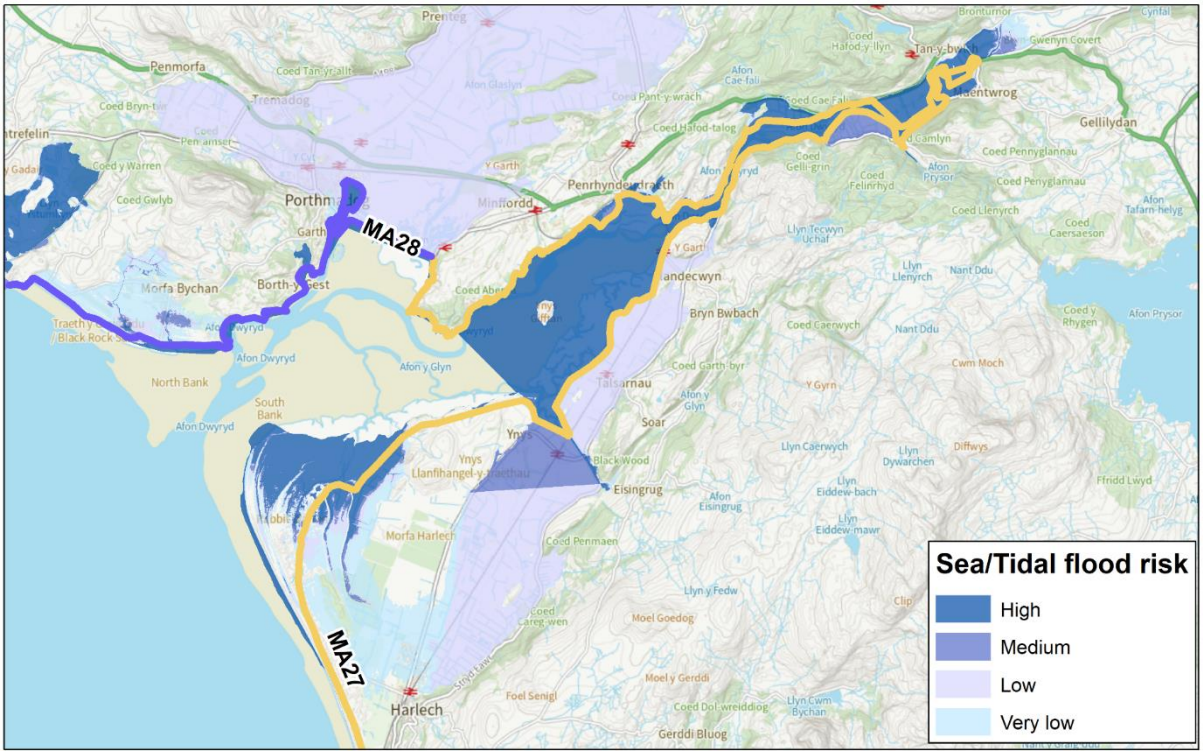
Management Area 26 extends from Mochras to Llanadanwg headland and includes the communities of Llanbedr, Pensarn and Llandanwg.

Both sides of the Artro estuary are served by defences and the majority of receptors at medium coastal flood risk are located within the low-lying area on the landward side of the southern defences. With an increase in sea level in the future more receptors within the lower lying areas of Llanbedr village become at risk from coastal flooding, along with residential receptors at the southern end of Llandanwg.

Future flood risk in the area is also likely to be influenced by shoreline policy, with the southern side of the Artro and the frontage at Llandanwg served by MR policies.

Management Area 27

Figure B9: Outline of Management Area 27 and areas at coastal flood risk



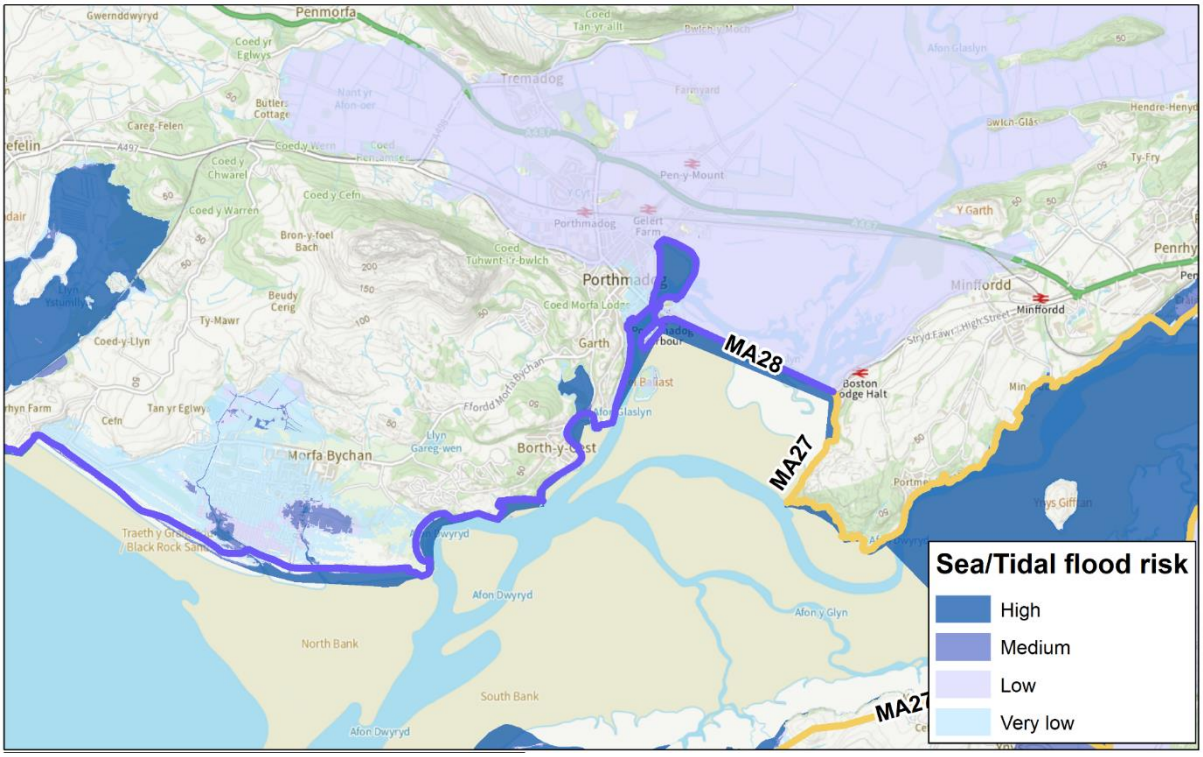
Management Area 27 extends from Llandanwg Headland to the east end of Porthmadog Cob and includes the communities of Harlech, Talsarnau, Llandecwyn, Maentwrog and Penrhyndeudraeth.

The receptors at risk of flooding are mostly located on the southern side of the Dwyryd estuary with the medium and low risk receptors located near Ynys and Talsarnau respectively, both of which are currently served by coastal defences. With an increase in future sea level the lower-lying residential area at the northern end of Harlech also faces increased flood risk.

MR policy exists along most of the defended lengths of the Dwyryd estuary, most notably the section of the Dwyryd on the seaward side of the mainline railway opposite Talsarnau.

Management Area 28

Figure B10: Outline of Management Area 28 and areas at coastal flood risk



Management Area 28 extends from the east end of the Porthmadog Cob to Graig Ddu and includes the communities of Porthmadog, Tremadog, Morfa Bychan and Borth Y Gest.

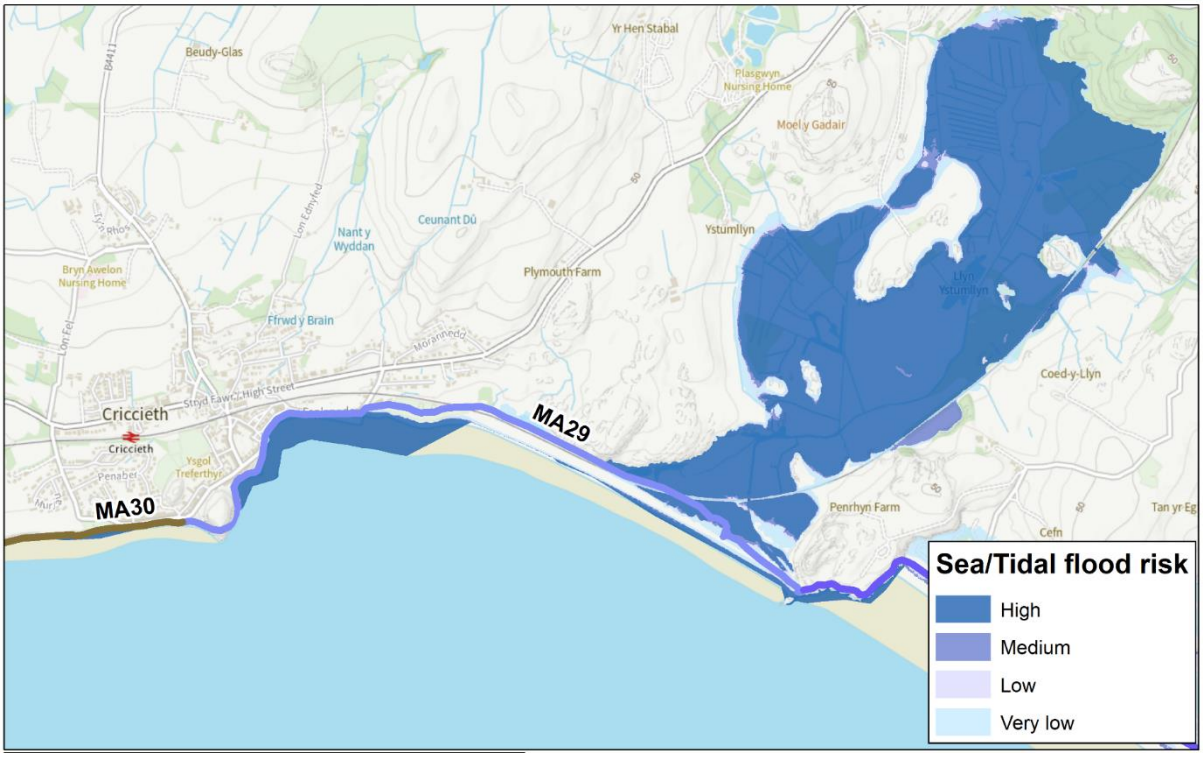
Most of Porthmadog, Tremadog and the large low-lying area to the north of the Cob are defended by two sets of tidal gates at Cob Crwn, and large number of low-risk assets within this MA reflects the level of protection provided by these defences. The areaa of higher flood risk are concentrated around Porthmadoig Harbour.

An increase in sea level rise puts more properties in the centre of Porthmadog at risk of coastal flooding, along with more properties in the lower-lying areas of Morfa Bychan. Future flood risk at Morfa Bychan could be influenced further by a MR policy along its frontage.

See section 7 of the Local Strategy for details of a coastal risk management scheme recently completed by Cyngor Gwynedd at Borth y Gest.

Management Area 29

Figure B11: Outline of Management Area 29 and areas at coastal flood risk



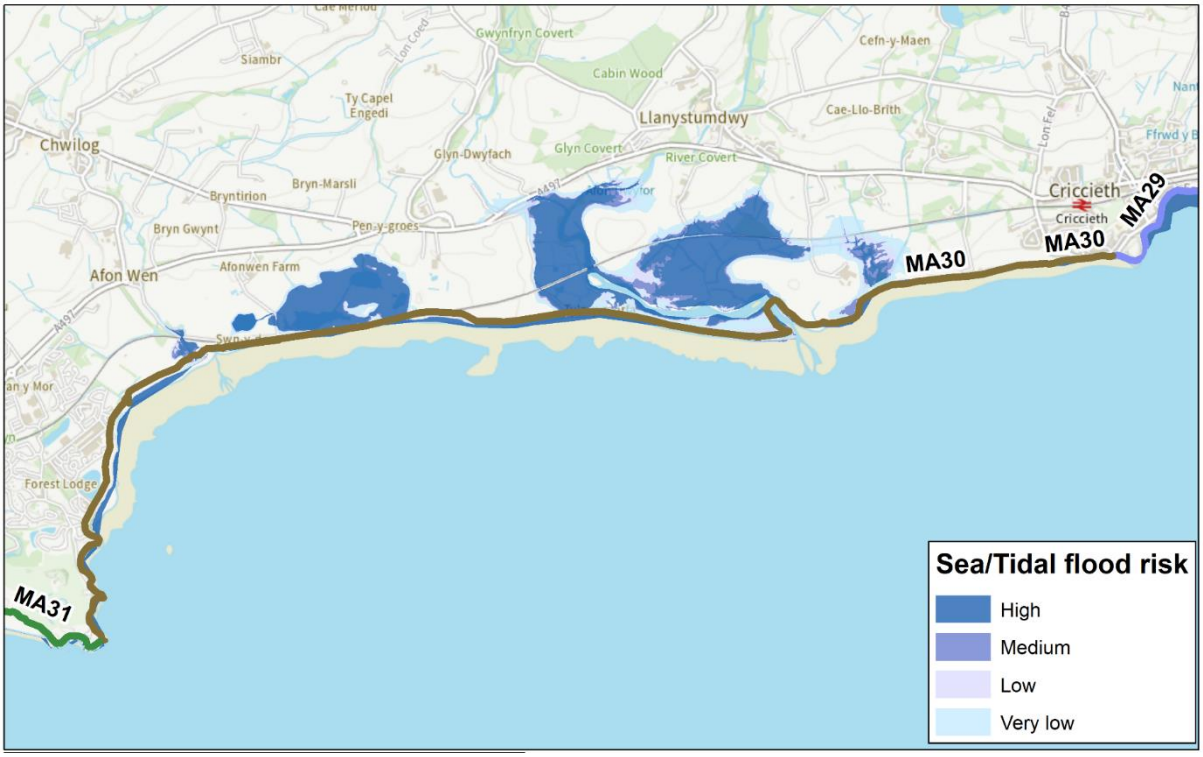
Management Area 29 extends from Graig Ddu to Criccieth Castle and includes the communitiy of Criccieth (East).

Flood risk is generally low along this MA due to its rural setting although the low-lying agricultural land between Pentrefelin and shoreline is susceptible to coastal inundation, which could be exacerbated in the future due to a MR coastal policy along this frontage.

Coastal flood risk in Criccieth is low but challenges do exist to maintain beach levels in order to protect the sea walls that extend from the esplanade to the harbour.

Management Area 30

Figure B12: Outline of Management Area 30 and areas at coastal flood risk



Management Area 30 extends from Criccieth Castle to Penychain and includes the communities of Criccieth (West) and Afon Wen.

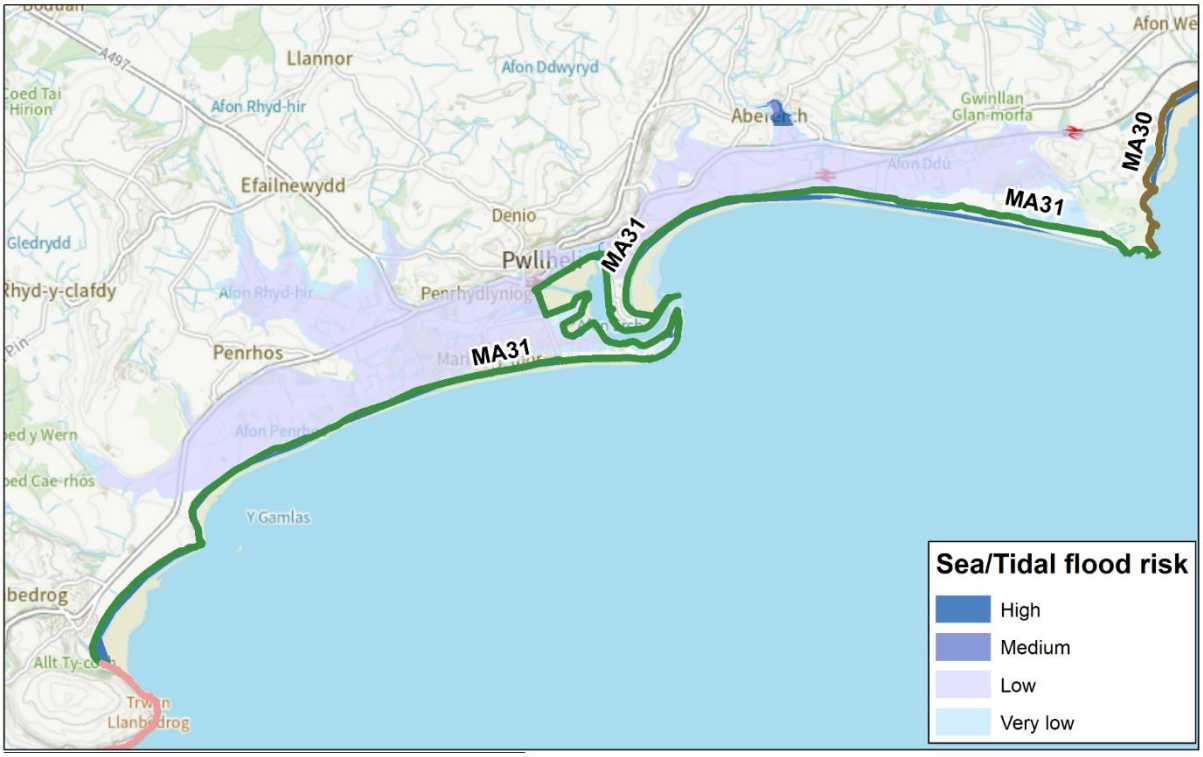
Flood risk to property and essential services is low.

A HTL shoreline policy applies to the defences along the west Criccieth frontage where tall structures at the back of the beach support the highway and properties on its landward side. A recent pattern of lowering beach levels pose a risk to the stability of these structures into the future.

A MR policy exists where the railway embankment fixes the shoreline at Afon Wen, otherwise the general policy for this frontage is NAI.

Management Area 31

Figure B13: Outline of Management Area 31 and areas at coastal flood risk



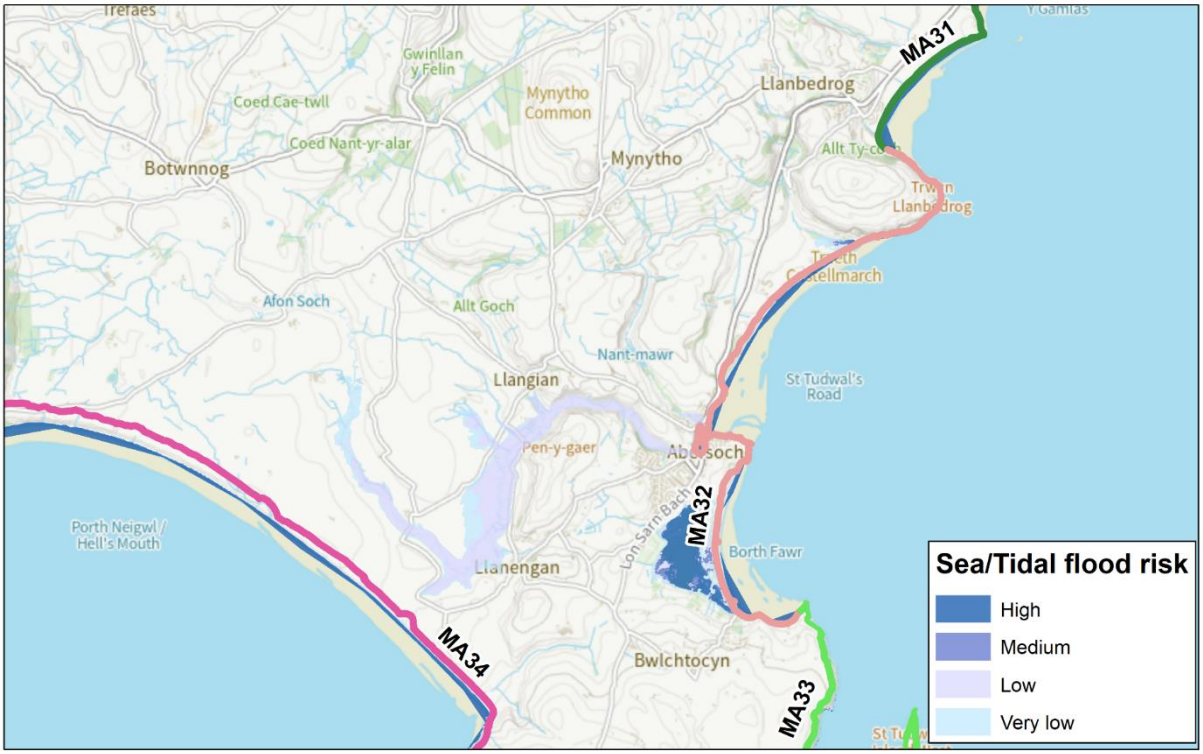
Management Area 31 extends from Penychain to Mynydd Tir-cwmwd and includes the communities of Abererch, Pwllheli, Penrhos and Llanbedrog.

Most of Pwllheli and the low-lying area to the south of Abererch are defended by a variety of coastal flood risk structures including the tidal gates within the harbour and the dune systems either side of Pwllheli, and the large number of low-risk receptors within this MA reflects the level of protection provided by these defences.

An increase in sea level puts more receptors at Pwllheli and Abererch at risk of coastal flooding. Future flood risk in this area is likely to be influenced by long-term MR policies along the Abererch and Traeth Cugan frontages.

Management Area 32

Figure B14: Outline of Management Area 32 and areas at coastal flood risk



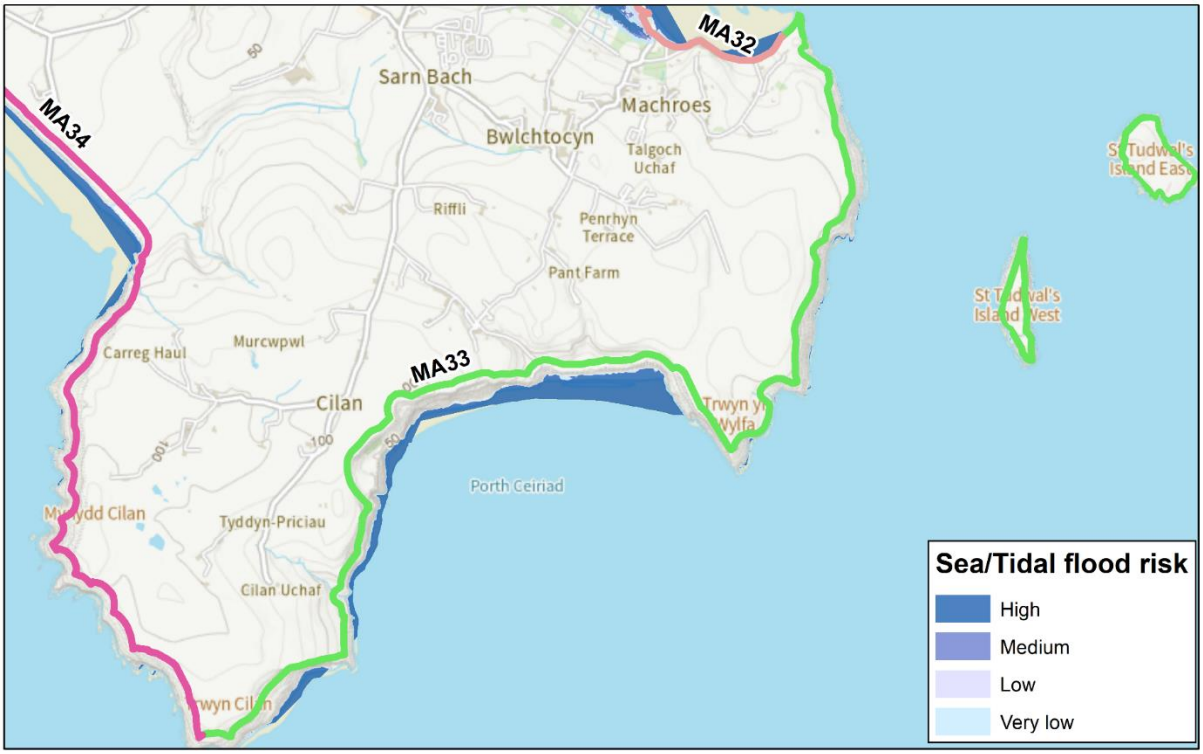
Management Area 32 extends from Mynydd Tir-cwmwd to Penrhyn Du and includes the community of Abersoch, Machroes, Llangian and Llanengan.

The areas of high coastal flooding risk are mainly located near the Abersoch harbour and further south at Machroes. Properties are also at present risk in the low-lying areas on the landward side of the harbour, along the defended valley of the Afon Soch and also near the golf club via a flood route from the direction of Machroes. Numbers of receptors at risk in these areas increase with an expected rise in future sea level.

MR policies apply to most of the shoreline within this area, including Abersoch harbour and the defended section of Borth Fawr to the south.

Management Area 33

Figure B15: Outline of Management Area 33 and areas at coastal flood risk

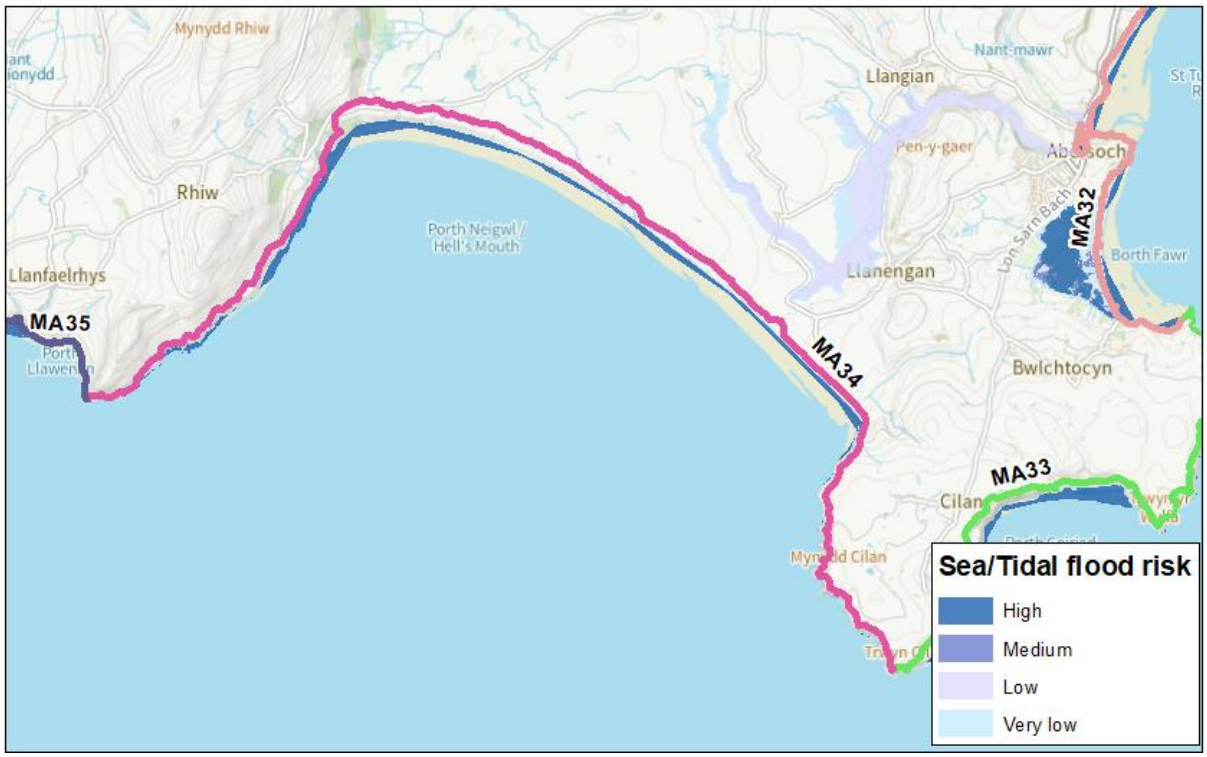


Management Area 33 extends from Penrhyn Du to Trwyn Cilian with Porth Ceiriad at its centre.

Ground level generally rises steeply from the shoreline in this area and therefore flood risk to property and essential services is low. The natural steep rocky cliffs along the frontage means that the general shoreline policy is NAI.

Management Area 34

Figure B16: Outline of Management Area 34 and areas at coastal flood risk

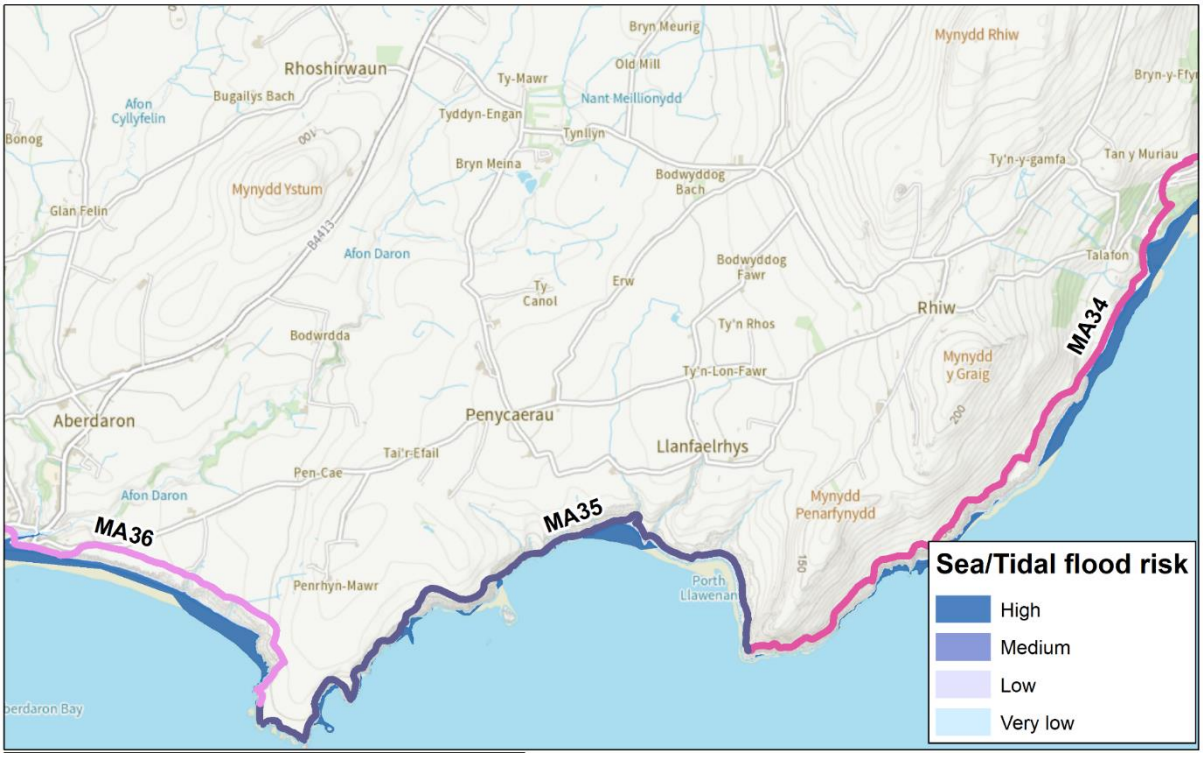


Management Area 34 extends from Trwyn Cilian to Trwyn Talfarach with Porth Neigwl at its centre.

Ground levels generally rise steeply from the shoreline in this area and therefore flood risk to property and essential services is low. The whole frontage is undefended and as a result the general shoreline policy is NAI. There is a pattern of cliff retreat along Porth Neigwl which could put isolated properties as well as the unclassified road towards Plas yn Rhiw at risk from coastal erosion in the future.

Management Area 35

Figure B17: Outline of Management Area 35 and areas at coastal flood risk

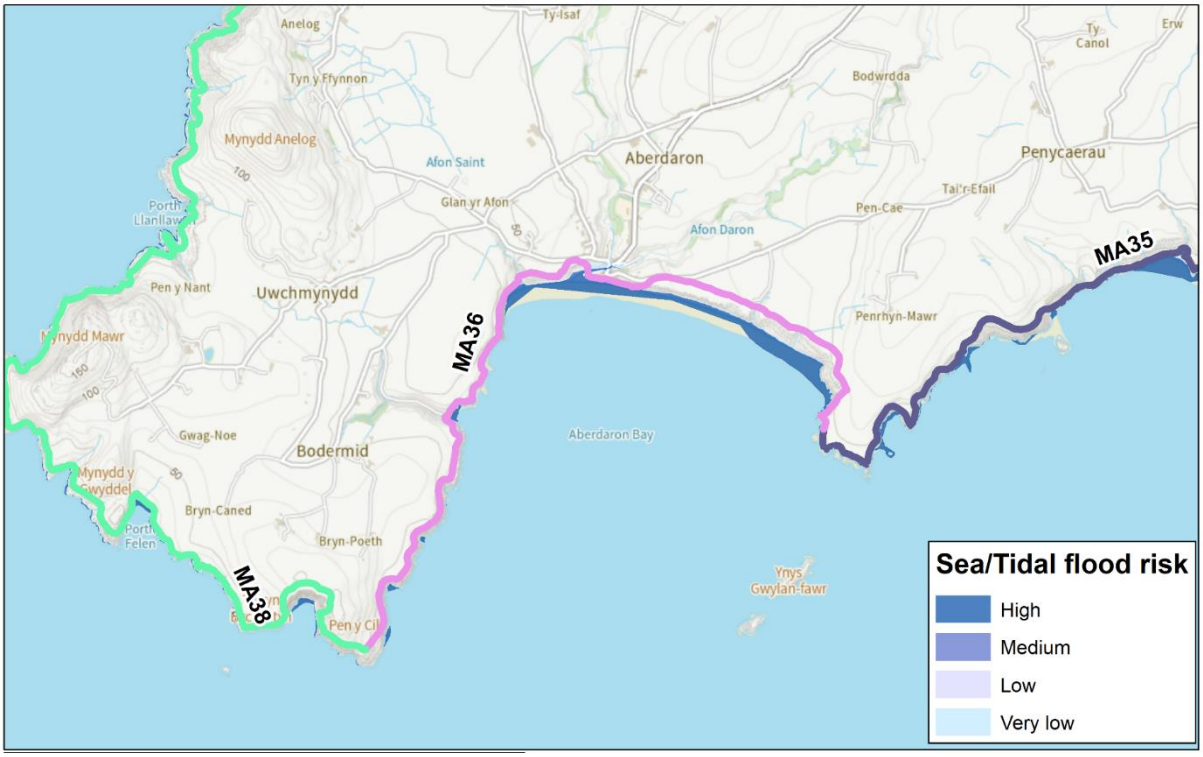


Management Area 35 extends from Trwyn Talfarach to Trwyn Penrhyn which includes the coastal slopes above Porth Llawenan.

Ground level generally rises steeply from the shoreline in this area and therefore flood risk to property and essential services is low. The natural steep rocky cliffs along the frontage means that the general shoreline policy is NAI.

Management Area 36

Figure B18: Outline of Management Area 36 and areas at coastal flood risk



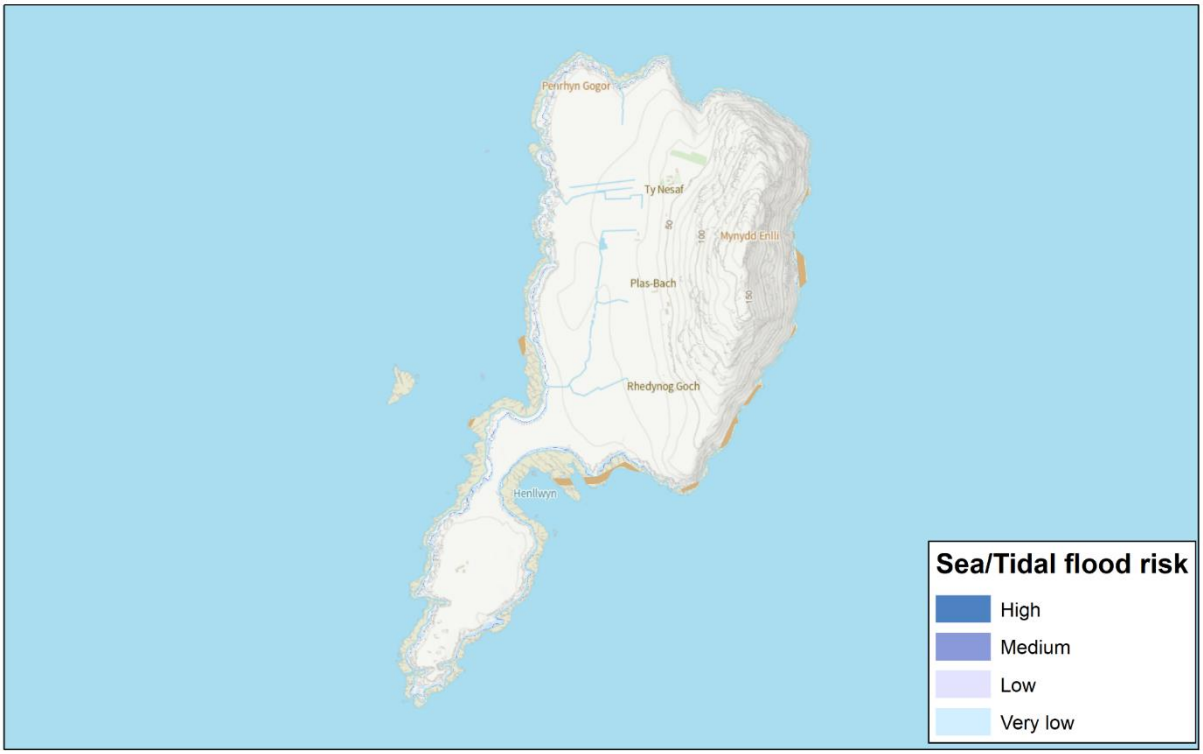
Management Area 36 extends from Trwyn Penrhyn to Pen y Cil and includes the community of Aberdaron.

Flood risk in this area is generally low although some receptors are at low risk within the defended area near the mouth of the Afon Soch, and more receptors in this area will face risk of coastal flooding with an increase in sea level rise in the future.

Risks from coastal erosion exist along the slopes to the east of the village, parts of which are defended at beach level. A MR policy exists across the whole Aberdaron frontage, either side of Aberdaron coastal erosion risks are low and shoreline policy is for NAI.

Management Area 37

Figure B19: Outline of Management Area 37 and areas at coastal flood risk

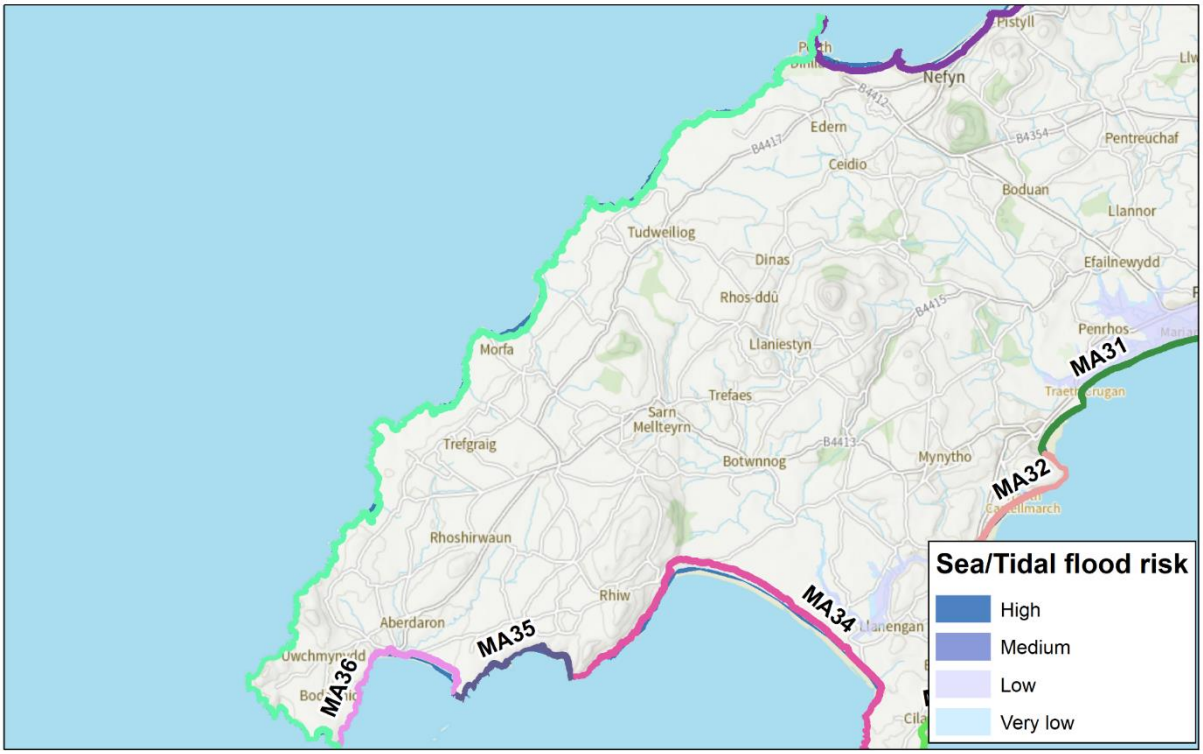


Management Area 32 extends along the Ynys Enlli coastline.

Flood risk to property and essential services at Ynys Enlli is low. The natural rocky cliffs along the frontage means that the general shoreline policy is NAI.

Management Area 38

Figure B20: Outline of Management Area 38 and areas at coastal flood risk

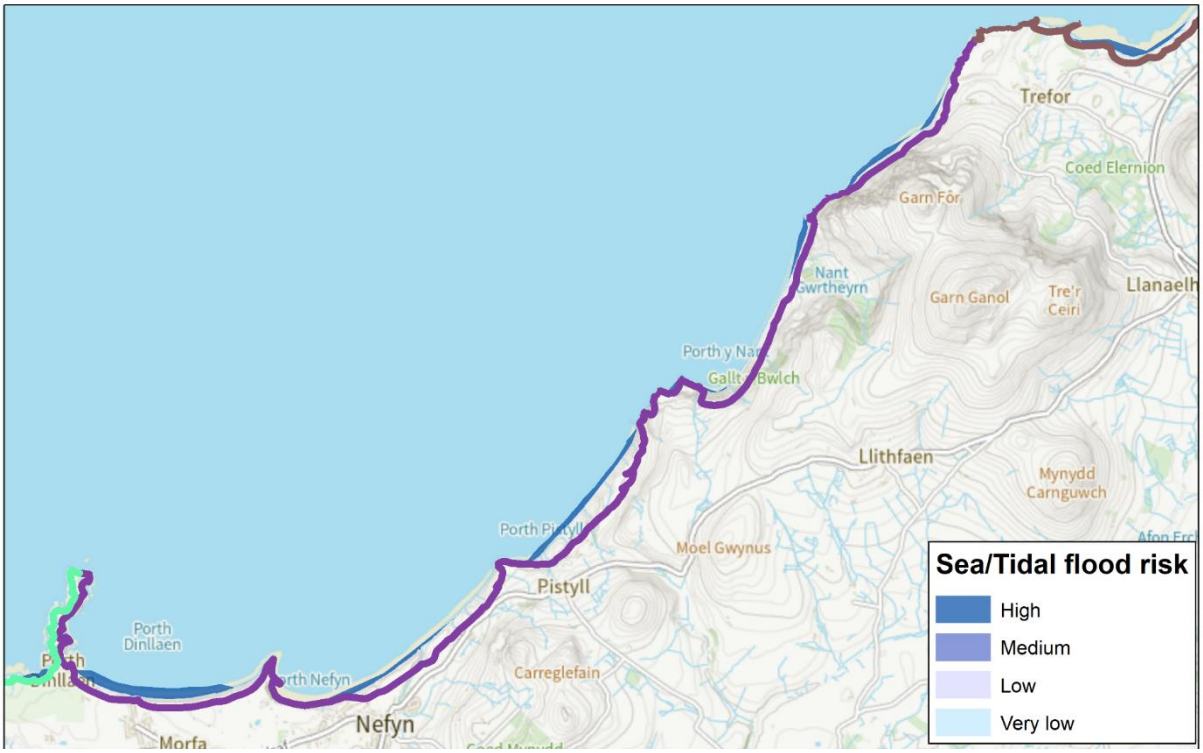


Management Area 38 extends from Pen y Cil to Carreg Du and includes the community of Tudweiliog. Numerous small bays exist along this length of the coastline including Porth Oer and Porth Towyn.

This is a largely rural area and as ground level also rises steeply from the shoreline the flood risk to property and essential services is low. The natural steep rocky cliffs along the frontage means that the general shoreline policy is NAI.

Management Area 39

Figure B21: Outline of Management Area 39 and areas at coastal flood risk



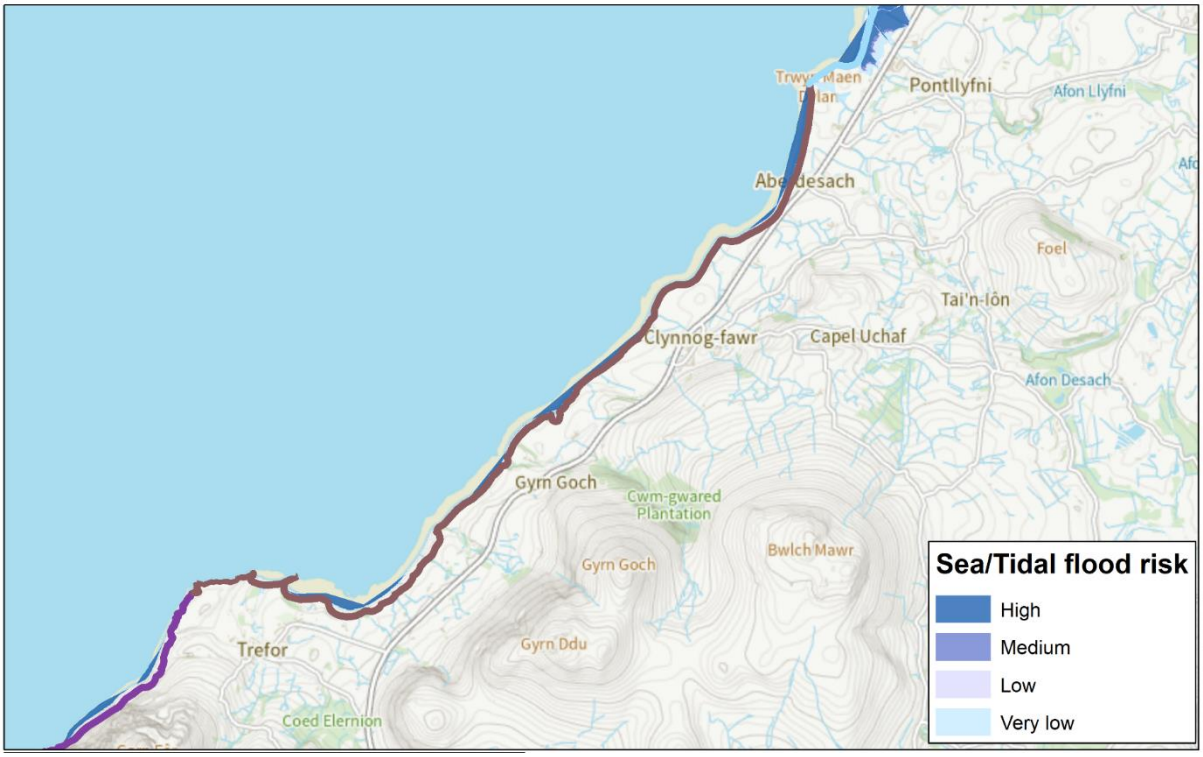
Management Area 39 extends from Carreg Du to Trwyn y Tal and includes the communities of Porthdinllaen, Morfa Nefyn and Nefyn.

The majority of high-risk receptors are located at Poerth Dinllaen and the northern end of Morfa Nefyn, while receptors at flood risk also exist at the northern end of Porth Nefyn.

The coastal slopes above Morfa Nefyn and Porth Nefyn are dynamic with a history of coastal slips placing properties above the slopes at risk from coastal erosion. Large areas of these bays are defended by beach level structures although the general long-term policy for all of these defended areas is MR.

Management Area 40

Figure B22: Outline of Management Area 40 and areas at coastal flood risk

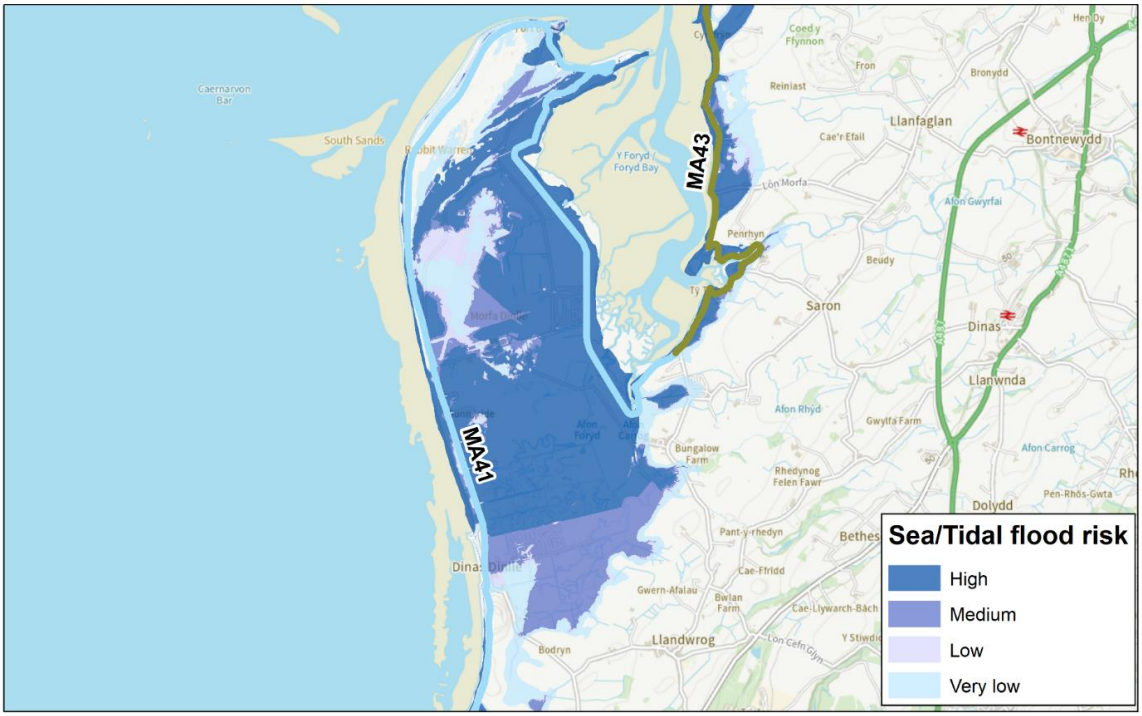


Management Area 40 extends from Trwyn y Tal to Trwyn Maen Dylan and includes the communities of Trefor and Aberdesach.

Coastal flood risk is generally low across the whole frontage with a limited number of properties located near the shoreline. A cluster of properties along the frontage at Aberdesach face risk of flooding with future rise in sea level due to climate change. A risk of coastal erosion also exists for properties near the frontage at Aberdesach due to the retreat of the shingle bank at the back of the beach, with the shoreline policy for the frontage recommended as MR.

Management Area 41

Figure B23: Outline of Management Area 41 and areas at coastal flood risk



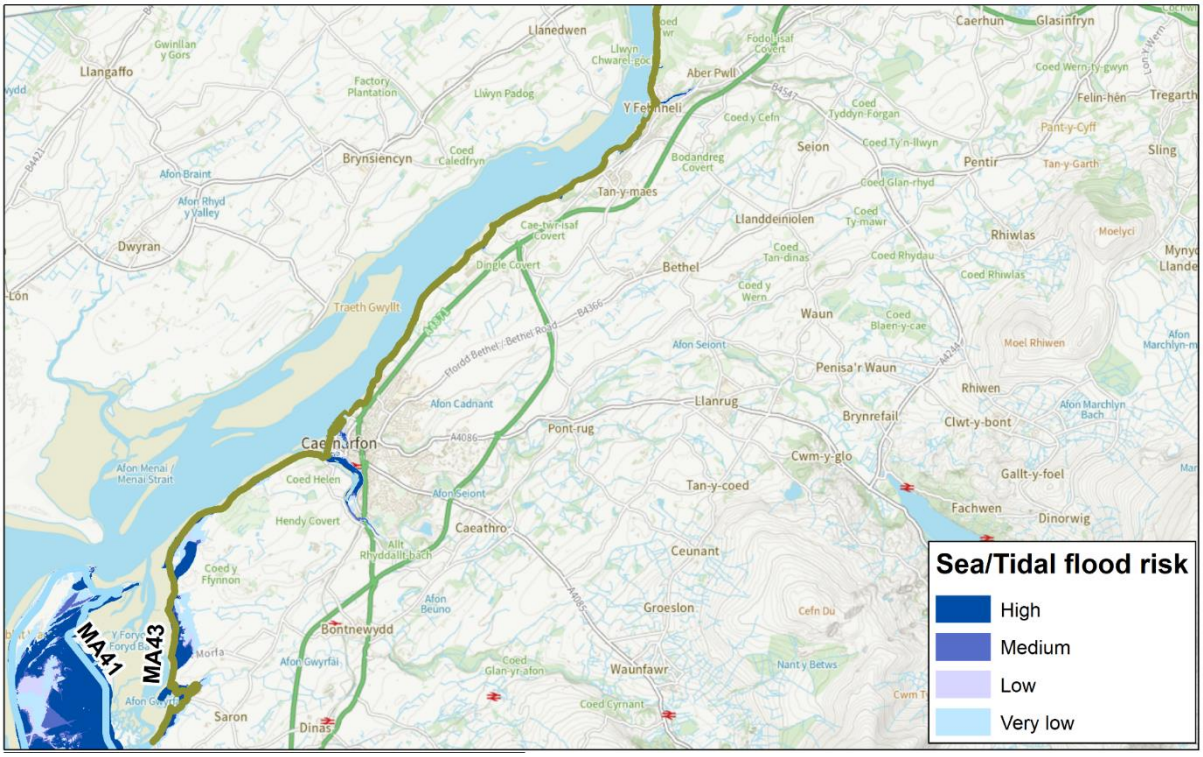
Management Area 41 extends from Trwyn Maen Dylan to Llanddwyn Island (including Foryd and Abermenai) and includes the communities of Pontllyfni and Dinas Dinlle.

The low-lying headland of Morfa Dinlle faces flood risk from the direction of the open coastline and also from Foryd Bay to the west, as a result numerous properties in the area are at present day flood risk. The total number of properties at risk, at Dinas Dinlle in particular, is expected to rise with an increase in tidal extent in the future. Other areas at flood risk within this MA include the low-lying agricultural land either side of the tidal reaches of the Afon Llyfni and Afon Llifon to the south.

Morfa Dinlle is defended from inundation from Foryd Bay by a flood embankment with a similar embankment protecting Dinas Dinlle to the north of the village. An offshore structure stabilizes the level of the beach at Dinas Dinlle thereby providing protection from incoming waves. A MR policy applies to most of the coastline in this area.

Management Area 43

Figure B24: Outline of Management Area 43 and areas at coastal flood risk



Management Area 43 extends from Foryd Bay to the Britannia Bridge and to the Mermaid Inn and includes the communities of Saron, Caernarfon and Y Felinheli.

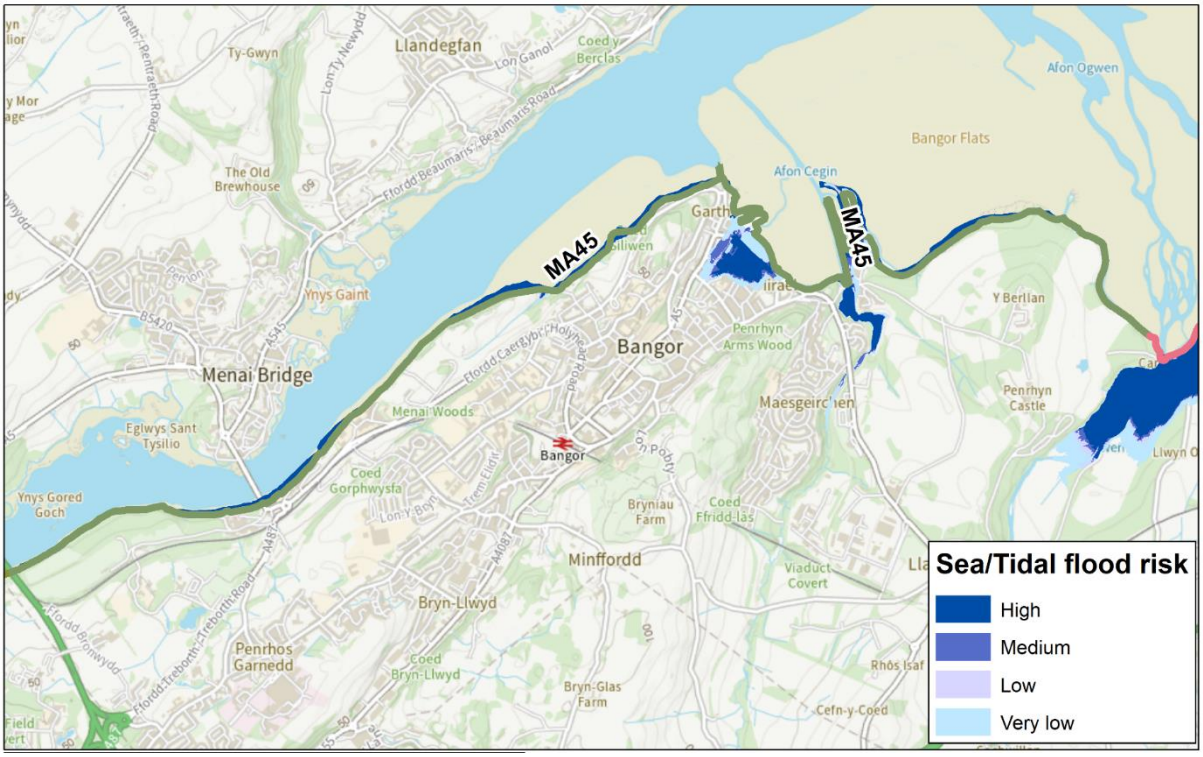
The receptors at flood risk are mainly concentrated along the tidal reach of the Afon Seiont in Caernarfon, near Waterloo Port and also the lower frontage of Felinheli. With an increase in sea level in the future due to climate change more receptors in the area of Dock Victoria and Felinheli harbour are expected to face risk of flooding.

Tidal flood defences now exist along Beach Road in Felinheli in the form of a set-back wall adjacent to the highway (see section 7 of the Local Strategy).

A long-term MR policy applies to the frontage between Caernarfon and Foryd Bay, where the foreshore road is largely supported by a structural embankment at present.

Management Area 45

Figure B25: Outline of Management Area 45 and areas at coastal flood risk



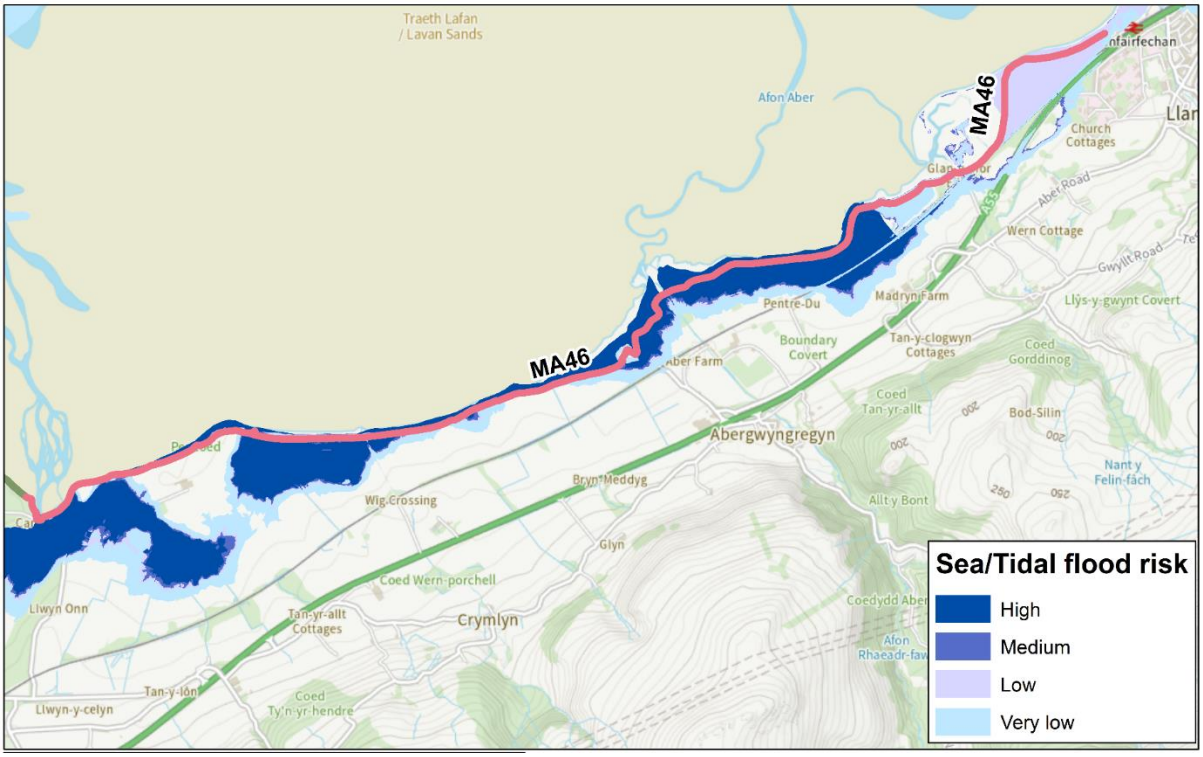
Management Area 45 extends from the Britannia Bridge to Afon Ogwen and includes the community of Bangor.

There is a large number of receptors at risk of flooding within the low-lying residential area on the landward side of Hirael Bay, the number of receptors at risk in this area is expected to rise with an increase in sea level due to climate change in the future. Some properties near the shore of the Menai Strait between Siliwen Road and Garth Point are also at risk of flooding, otherwise the level of risk within this area is low.

A long-term MR shoreline policy applies to the Hirael Bay frontage, otherwise the prevalent policy along the shore of the Strait is for NAI.

Management Area 46

Figure B26: Outline of Management Area 46 and areas at coastal flood risk



Management Area 46 extends from Afon Ogwen to Llanfairfechan and includes the communities of Tal y Bont and Abergwyngregyn.

Due to the agricultural nature of the landscape, flood risk is low in this area, but there is a threat to property near Abergwyngregyn due to an expected rise in sea level in the future.

A MR shoreline policy exists near the Afon Aber area, while the policy to the west is NAI.

Management Area	*Communities*	*Number of properties at flood risk*[6]					*Number of Essential Services / Non-residential properties at flood risk*[7]	*Properties at risk of coastal erosion*[8]	*Current FCERM management schemes/studies*[9]
		Total	*High risk*	*Medium risk*	*Low risk*	*Very Low risk*			
19	Pennal	1	1	0	0	0	1	0 (0)	*Arrangements for future adaptation planning for Pennal Valley based on SMP2 managed realignment policy to be discussed and agreed between partner authorities at West of Wales Coastal Group.*
20	Bryncrug Tywyn Aberdyfi	500	170	44	53	233	45	138 (138)	**Cyngor Gwynedd** ***Location:*** Tywyn frontage ***Source:*** Sea ***Measure****:* Monitoring and maintenance of coastal defence structures across the frontage to maintain standard of defence and allow continued access towards the beach ***Status:*** Ongoing *Natural Resources Wales* *Location: Dysynni* *Source: Sea* *Measure: Consider future management options and undertake coastal adaptation planning* *Status: Ongoing* *Arrangements for future adaptation planning for the Penllyn marshes area based on SMP2 managed realignment policy to be discussed and agreed between partner authorities at West of Wales Coastal Group.*
21	Llwyngwril	0	0	0	0	0	0	0(0)	
22	Fairbourne Arthog Friog	493	1	1	449	42	63	No data available	*Natural Resources Wales* *Location: Fairbourne* *Source: Sea* *Measure: Undertake initial assessment and feasibility work for reducing flood risk* *Status: Ongoing*
23	Llanelltyd Pen Y Bryn Bontddu Penmaenpool	62	25	5	7	25	14	0(0)	
24	Abermaw	548	12	7	308	221	127	0 (0)	**Cyngor Gwynedd** ***Location:*** Abermaw, Viaduct Gardens ***Source:*** Sea ***Measure****:* Develop scheme to reduce flood risk on landward side of sea wall, namely Church Street and the area surrounding the Harbour Office ***Status:*** Start of construction scheduled for 2024

[6] See main document section 9.1

[7] See main document section 9.1

[8] See main document section 9.1

[9] NRW Schemes and/or studies are as listed in *FRMP Delivery Plan for North West Wales Place*

									Cyngor Gwynedd ***Location:*** Abermaw, North Promenade ***Source:*** Sea ***Measure****:* Deliver a scheme to improve flood and coastal erosion risk at the northern end of the promenade ***Status:*** Ongoing (Full Business Case/Detailed design)
25	Talybont Dyffryn Ardudwy	2	0	1	0	1	7	4 (4)	*Arrangements for managements of the frontage area based on SMP2 managed realignment policy to be discussed and agreed between partner authorities at West of Wales Coastal Group.*
26	Llanbedr Pen-sarn Llandanwg	41	1	10	2	28	48	5 (5)	*Natural Resources Wales* *Location: Llanbedr* *Source: Tidal* *Measure: Undertake initial assessment and feasibility work for reducing flood risk* *Status: Not started*
27	Penrhyndeudraeth Maentwrog Llandecwyn Talsarnau Harlech	516	8	46	93	369	52	2 (2)	*Natural Resources Wales* *Location: Harlech* *Source: Tidal* *Measure: Undertake initial assessment and feasibility work for reducing flood risk* *Status: Not started*
									Natural Resources Wales *Location: Talsarnau* *Source: Sea* *Measure: Consider future management options and undertake coastal adaptation planning* *Status: Not started*
									Natural Resources Wales *Location: Llanfihangel - y - Traethau -Ty Gwyn Tidal Door* *Source: Sea* *Measure: Design and construction of flood risk asset improvements* *Status: Not started*
28	Porthmadog Morfa Bychan Borth Y Gest	1877	27	7	1358	485	583	51 (51)	*Natural Resources Wales* *Location: Porthmadog* *Source: River/Sea* *Measure: Improve existing flood warning service* *Status: Not started*
									Natural Resources Wales *Location: Porthmadog* *Source: River* *Measure: Develop scheme appraisal for flood alleviation scheme* *Status: Ongoing*
									Arrangements for future management planning for the natural dune defence based on SMP2 managed realignment policy to be discussed and agreed between parted authorities at West of Wales Coastal Group.
29	Criccieth (East)	1	0	0	0	1	0	50 (48)	**Cyngor Gwynedd** ***Location:*** Criccieth ***Source:*** Sea

									Measure**:* Criccieth long term adaptation planning - Develop longer term planning for management of defences within the area looking to potential realignment in the medium term of the shingle banks and the longer-term management of Criccieth sea front ***Status: Not started
30	Afon Wen Criccieth (West)	1	0	0	0	1	0	78 (78)	**Cyngor Gwynedd** ***Location:*** Criccieth ***Source:*** Sea ***Measure**:* Develop and implement strategy to manage decline of coastal defences on Criccieth West Beach ***Status:*** Ongoing (Strategic Outline Case)
31	Pwllheil Abererch Penrhos Llanbedrog	1498	0	1	1091	406	428	1 (1)	**Cyngor Gwynedd** ***Location:*** Pwllheli ***Source:*** Sea ***Measure**:* Develop and implement strategy for maintaining flood defence offered by the dunes at the back of Traeth Crugan ***Status:*** Ongoing
									Natural Resources Wales *Location: Abererch* *Source: Sea* *Measure: Develop scheme appraisal for flood alleviation scheme* *Status: Ongoing*
									Natural Resources Wales *Location: Pwllheli* *Source: River/Sea* *Measure: Develop scheme appraisal for flood alleviation scheme* *Status: Ongoing*
									Natural Resources Wales *Location: Pwllheli* *Source: River/Sea* *Measure: Update existing hydraulic model* *Status: Ongoing*
32	Abersoch	69	23	8	11	27	44	13 (13)	**Cyngor Gwynedd** ***Location:*** Borth Fawr, Abersoch ***Source:*** Sea ***Measure**:* Borth Fawr realignment strategy - Develop and discuss potential realignment strategy for the area based on SMP2 policy for managed realignment ***Status:*** Not started
									Arrangements for future adaptation planning for the Warren frontage based on SMP2 managed realignment policy to be discussed and agreed between parted authorities at West of Wales Coastal Group.
									Arrangements for future adaptation planning for Abersoch Valley area based on SMP2 managed realignment policy to be discussed and agreed between parted authorities at West of Wales Coastal Group.
33	Llanengan	1	0	0	0	1	0	0 (0)	*Arrangements for future adaptation planning at Porth Neigwl based on SMP2 managed realignment policy to be discussed and agreed between parted authorities at West of Wales Coastal Group.*

34	Botwnnog	4	0	0	1	3	0	0 (0)	
35	Uwchmynydd	0	0	0	0	0	0	0 (0)	
36	Aberdaron	6	0	0	1	5	11	29 (29)	**Cyngor Gwynedd** ***Location:*** Aberdaron frontage ***Source:*** Sea ***Measure****:* Develop an integrated plan for management of defence and land use within the area based on SMP2 policy for managed realignment ***Status:*** Not started
									Natural Resources Wales *Location: Aberdaron* *Source: River/Sea* *Measure: Undertake initial assessment and feasibility work for reducing flood risk* *Status: Not started*
									Natural Resources Wales *Location: Aberdaron* *Source: River/Sea* *Measure: Maintain existing defences and inspection regime* *Status: Ongoing*
37	Ynys Enlli	0	0	0	0	0	0	0 (0)	
38	Tudweiliog	0	0	0	0	0	1	2 (2)	*Arrangements for future adaptation planning at Porth Oer based on SMP2 managed realignment policy to be discussed and agreed between parted authorities at West of Wales Coastal Group.*
39	Porthdinllaen Nefyn Morfa Nefyn	25	13	4	5	3	13	31 (8)	**Cyngor Gwynedd** ***Location:*** Porth Nefyn ***Source:*** Sea ***Measure****:* Develop a plan for monitoring, management and communication of risks associated with cliff instability in the area ***Status:*** Not started
40	Aberdesach Trefor	6	0	0	0	6	1	15 (11)	**Cyngor Gwynedd** ***Location:*** Trefor ***Source:*** Sea ***Measure****:* Develop a local action plan for adaptation and management of existing structures ***Status:*** Not started
									Cyngor Gwynedd ***Location:*** Aberdesach ***Source:*** Sea ***Measure****:* Develop and discuss potential need for adaptation of management of the frontage based on SMP2 policy for managed realignment ***Status:*** Not started

41	Dinas Dinlle Pontllyfni	72	8	34	5	25	49	0 (0)	*Natural Resources Wales* *Location: Dinas Dinlle* *Source: Sea* *Measure: Consider future management options and undertake coastal adaptation planning* *Status: Ongoing* *Natural Resources Wales* *Location: Pontllyfni* *Source: Sea* *Measure: Consider future management options and undertake coastal adaptation planning* *Status: Not started*
43	Caernarfon Y Felinheli Saron Llanfaglan	305	26	42	68	169	226	89 (89)	**Cyngor Gwynedd** ***Location:*** Ffordd yr Aber, Caernarfon ***Source:*** Sea ***Measure****:* Develop a plan for management and maintenance for the area based on SMP2 policy for managed realignment ***Status:*** Not started
45	Bangor Treborth	313	199	24	17	73	44	9(9)	**Cyngor Gwynedd** ***Location:*** Hirael Bay ***Source:*** Sea ***Measure****:* FCERM scheme to reduce risk of coastal flooding to the low-lying area of Hirael Bay and address ongoing coastal erosion concerns at the frontage. ***Status:*** Construction ongoing
46	Tal Y Bont Abergwyngregyn	2	0	0	0	2	0	0 (0)	*Natural Resources Wales* *Location: Abergwyngregyn* *Source: Sea* *Measure: Build hydraulic model* *Status: Ongoing*